The role of connectedness to nature & place for participatory protected area management.

A thesis submitted to the Institute of Earth Systems of the University of Malta for the degree of Doctor of Philosophy in Environmental Management and Planning

Submitted by: Brian Restall

Student no: 05037673

L-Università ta' Malta

Enrolment date:	October 2012
Completion date:	September 2017
Enrolment:	Part-time basis

Institute:	Institute of Earth Systems.
Course:	Doctor of Philosophy in Environmental Management and Planning
Supervisor:	Dr. Elisabeth Conrad
Co-Supervisor:	Prof. Saviour Formosa
Advisor:	Christophe Cop

Board of Examiners

Chair:	Prof. Godfrey Baldacchino,
Visiting reviewer:	Dr. Christopher M. Raymond
Non-visiting reviewer:	Dr. Charles Galdies

This work was part-funded by the Strategic Educational Pathways Scholarships (STEPS), awarded by the Ministry for Education and Employment, part-financed by the European Social Fund (ESF).

STEPS
Strategic Educational Pathways Scholarships

Operational Programme II – Cohesion Policy 2007-2013

Empowering People for More Jobs and a Better Quality of Life
Scholarships part-financed by the
European Union European Social Fund (ESF)
Co-financing rate: 85% EU Funds; 15% National Funds
Investing in your future

Recommended citation:

Restall Brian (2017). The role of connectedness to nature & place for participatory protected area management. Unpublished Ph.D thesis. Institute of Earth Systems. University of Malta.

Author's declaration for electronic submission of a thesis

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

UNIVERSITY OF MALTA
FACULTY/INSTITUTE/CENTRE/SCHOOL________________________

DECLARATION OF AUTHENTICITY FOR DOCTORAL STUDENTS

Student's I.D. /Code 75744M

Student's Name & Surname Brian Costall

Course ____

Title of Dissertation/Thesis
The role of connectedness to nature & place for participatory protected area management.

I hereby declare that I am the legitimate author of this Dissertation/Thesis and that it is my original work.

No portion of this work has been submitted in support of an application for another degree or qualification of this or any other university or institution of higher education.

I hold the University of Malta harmless against any third party claims with regard to copyright violation, breach of confidentiality, defamation and any other third party right infringement.

☒ As a Ph.D. student, as per Regulation 49 of the Doctor of Philosophy Regulations, I accept that my thesis be made publicly available on the University of Malta Institutional Repository.

☐ As a Professional Doctoral student, as per Regulation 54 of the Professional Doctorate Regulations, I accept that my dissertation be made publicly available on the University of Malta Institutional Repository.

☐ As a Doctor of Sacred Theology student, as per Regulation 17 of the Doctor of Sacred Theology Regulations, I accept that my dissertation be made publicly available on the University of Malta Institutional Repository.

☐ As a Doctor of Music student, as per Regulation 24 of the Doctor of Music Regulations, I accept that my dissertation be made publicly available on the University of Malta Institutional Repository.

____
Signature of Student

20/09/2017
Date

** Tick applicable paragraph.*

11.06.2015

UNIVERSITY OF MALTA
FACULTY/INSTITUTE/CENTRE OF/FOR IES

SUBMISSION OF DISSERTATION/THESIS FOR EXAMINATION

Student's ID/Code 05037673

Student's Name & Surname Brian Restall

Course Doctor of Philosophy

Title of Dissertation/Thesis

The role of connectedness to nature and place for participatory protected area management

I am hereby submitting my dissertation/thesis for examination by the Board of Examiners.

Signature of Student

29/09/2017
Date

Submission noted.

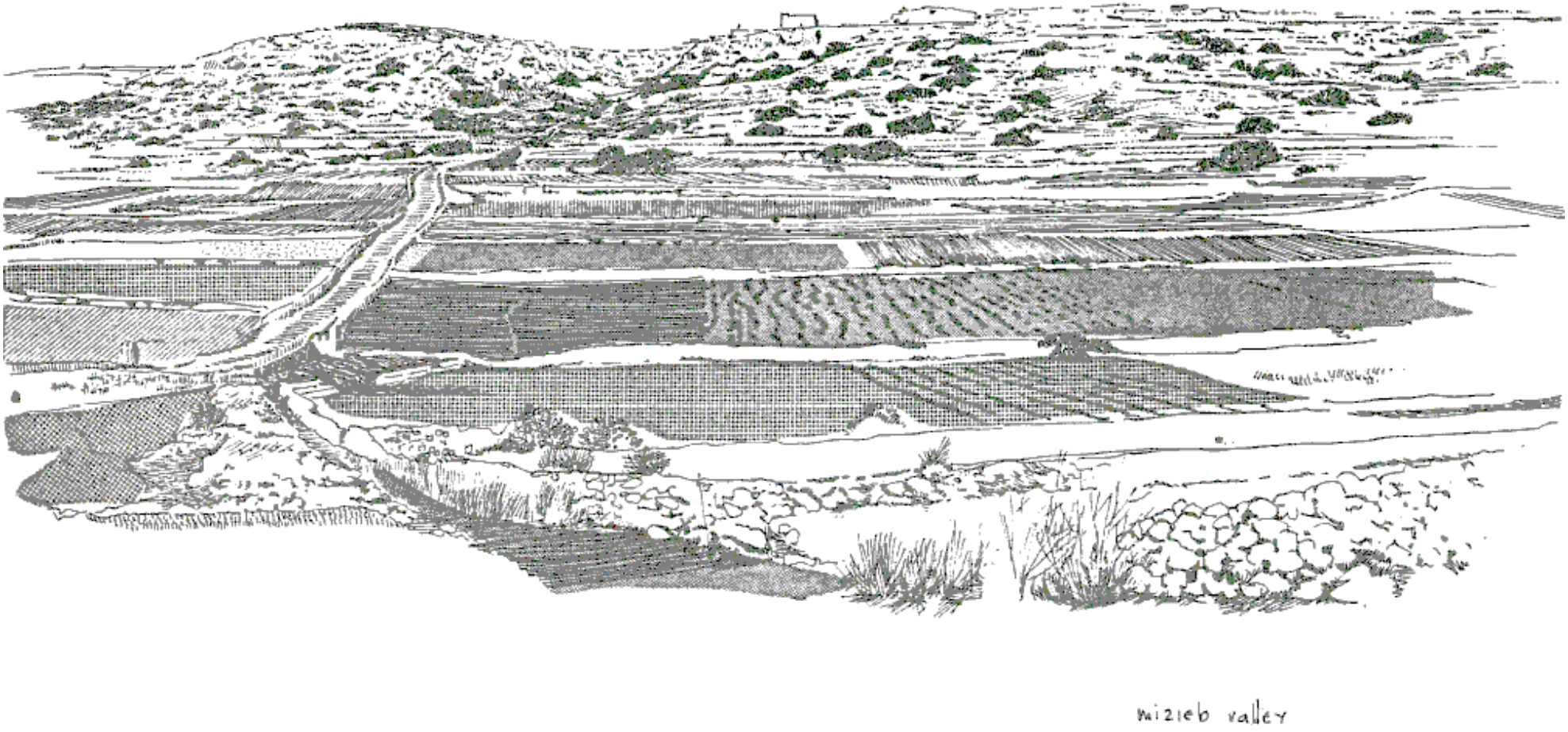
ELISABETH CONRAD
Principal Supervisor
(in Caps)

Signature

22/09/17
Date

"If there is danger in the human trajectory, it is not so much in the survival of our own species as in the fulfilment of the ultimate irony of organic evolution: that in the instant of achieving self-understanding through the mind of man, life has doomed its most beautiful creations."

Elizabeth Kolbert. (2016). *The Sixth Extinction: An Unnatural History.*[1]



Mizieb Valley by J.M. Spiteri in *'Advisory outline development plan for North West Malta. Survey report and analysis'* (1966).[2]

Acknowledgements

It is almost six years since I started my doctorate studies, and during this time I have been helped and encouraged by numerous individuals. Without the many chats and discussions I have had in struggling through this effort, the path to completing this thesis would not have been as fulfilling.

First of all I would like to thank my supervisors for assisting me in getting to this point. Elisabeth Conrad, who took on the leading supervisor role, for introducing me to academic rigour necessary at doctorate level, and got me questioning what I had previously taken for granted. She provided critical commentary and managed to draw out the logic of my arguments in order to make this thesis so much tighter and focused than I could have imagined. Saviour Formosa for his friendly advice and technical GIS support which was much needed in the initial phases of this work.

I also have to thank Christophe Cop for his help with the statistical analysis, and Ashley Hili for help with the spatial outputs. I would also like to thank Stephen Conchin at the Planning Authority who provided access to required GIS layers. I am also grateful to all those who made this work possible through their contribution to surveys and interviews, and other discussions. I hope that in some way, this work helps to enhance people's quality of life through better management of areas we live in and love.

I would like to thank Stefan Schaa for being more than just my work colleague since he has been supportive throughout. But the biggest thank you goes to Daniele for your patience and Alexander.

Abstract

This thesis is based on the hypothesis that connectedness to nature and place (attachment) is likely to be a strong influence on how local communities and stakeholders respond to designation and management of protected areas. This study therefore explores relationships between connectedness to nature (CNT), place attachment (PA) and pro-environmental behaviour (EB), using the Maltese Islands as a case study, and focusing in particular on the potential for these constructs to be used for more effective involvement of stakeholders in the management of such sites.

The intensities of CNT, PA and pro-environment behavioural intentions, as expressed by a sample of household respondents across the islands, were measured (n=401) in order to establish a national baseline. Results were then analysed and used to examine the relationship between these three constructs using correlation analysis and structural equation modeling. The influence of demographic variables on results was also explored. Results obtained were further mapped, in order to analyse the spatial relationship between respondent home location and proximity to protected areas, and to allow analytical comparisons between these constructs and other environmental and place-related variables.

The study identifies promising opportunities for a more systematic understanding of the sub-dimensions of place attachment (Identity, Dependence, Bonding) and connectedness to nature (Self, Perspective, Experience), and how these relate to socio-cultural factors and location. The study results also found positive associations between CNT, PA and EB, and that age and educational achievement were moderate predictors of positive EB. While results support the proposition that PA has a weak positive association with overall positive EB intentions, CNT shows a moderate correlation with EB.

Geo-spatial mapping of results indicate that existing protected areas (whether protected for nature, landscapes, or urban qualities) are evidently loci of community attachments with nature and place. Results also suggest that PA and CNT are in fact quite different social and spatial constructs, with clearly diverse, but also common, physical locations of attachment or connectedness. Differences in means intensity between Malta and Gozo were noted for all three constructs. Spatial analysis shows a clear relationship between respondents' home location, PA, CNT and EB with protected areas in their vicinity however, attachment to place is not only correlated to NATURA 2000 sites but also to protected urban areas. The mapping of these social constructs facilitates overlaying of different data layers, allowing for a combined analysis of the values that members of a community attribute to nature and place. This socio-spatial projection provides a complementary perspective for resource managers, allowing them to take into consideration the public's values in place-based protected area

management. It also builds an argument for socio-spatial analysis of these social constructs not only for the purposes of environmental planning, but also to help people improve connectedness to nature and place for their well-being and their combined effect on pro-environmental behaviour.

There thus appears to be merit in recognising not only the professional's technical input in protected area management, but also the validity of the lay public's deeper attachments towards place within a socio-spatial planning framework. This study also provides recommendations on how practitioners can leverage these findings to enhance people's pro-environmental behaviour and engagement with protected areas in order to truly manage them for and with people.

Keywords: conservation psychology, place theory, connectedness to nature, place attachment, place identity, place mapping, GIS, PPGIS, environmental behaviour, socio-spatial planning, participatory conservation management, protected areas.

Table of contents

Table of figures

Table of tables

Glossary of terms[3]

Address geocoding: Process of assigning alphanumeric locational identifiers (such as the municipal address or physical location) to spatially related information. For example, an address may be matched to an address range on a street segment, or a given spatial area (i.e., the limits of a polygon, a line segment, a point along the segment, or an absolute point that has been coordinated). The process implies a geographic base file which can be used to pass addresses in order to find out characteristics about the geometry.

ARC INFO/MAP - A vector-based GIS developed and marketed by ESRI, Inc.

Area: A level of spatial measurement referring to a two-dimensional defined space. A polygon on the earth as projected onto a horizontal plane is an example of an area.

Base data: Basic level of map data on which other information is placed for purposes of comparison or geographical correlation

Base map: Mapped data that seldom changes and is used repeatedly.

Cartography: The art or science of making maps.

Citizen science: Scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions.

Civic Place Attachment: A type of social attachment in which the place symbolizes a social category to which an individual belongs.

Clustering: A process in which multiple, spatially coincident, co-registered raster objects are reduced to a single raster object, called a cluster map. The input rasters contain analytical data (such as spectral images and elevations). In general, each clustering method compares the values in corresponding cells to all other cell values, and assigns the output cell to the group (or cluster) it most resembles.

Connectedness to nature - CNT: A social construct concerned with understanding why humans have an innate desire for closeness with nature, how they identify themselves with the natural environment and the relationships they form with nature (Schultz 2002).

Datum: A mathematical description of a smooth surface that closely fits the mean sea-level surface for an area of interest. A datum is derived from a chosen ellipsoid, and provides the surface to which a cartographer refers ground control measurements. Maps of large extent must use consistent parameters for ellipsoid

and datum to insure consistency between the map projection and ground control.

Displacement: The loss of one's place, such as from forced or obligatory relocation, or from place destruction.

Environmental Behaviour - (EB): In this context refers simply to preventative action taken by humans to protect their environment by empathizing with nature and addressing environmental issues (Lee et al., 2013; Stern, 2000).

Environmental Evaluation: A judgement about the current quality of the environment.

Environmental Identity: The inclusion of nature in one's self-concept (Clayton & Opotow, 2003). That is, the sense that one's self is similar to the natural world, as well as the tendency to bestow moral worth upon natural organisms.

Environmental Risk Perception: A perception that the environment is subject to damage, or harm, or that the environment may be a source of harm to oneself.

Geodatabase: A database or file structure used primaril to store, query, and manipulate spatial data. Geodatabases store geometry, a spatial reference system, attributes, and behavioural rules for data.

Geographic Information System - GIS: A Geographic Information System is a computer system designed to allow users to collect, manage, and analyze large volumes of spatially referenced and associated attribute data. The major components of a GIS are: a user interface system; data base management capabilities; data base creation/data entry capacity; spatial data manipulation and analysis packages; and display/product generation functions.

Nature: The phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations. While there is a physical dimension to nature, nature is also argued to also be a socially constructed and contingent phenomenon (Demeritt, 2002).

Place Attachment - PA: One of the most widely used place terms which in general refers to a bond between an individual or group and an environment, characterise d by positive affect, and the desire to maintain closeness to the particular setting (Giuliani, 2003; Hidalgo & Hernández, 2001). The place that is the focus of the attachment may vary in scale, type, and physical or social characteristics.

Place Dependence: Sometimes termed, functional attachment, place dependence refers to the ability of a place to satisfy needs and goals, or the extent to which the physical characteristics of the place provide the

appropriate resources for one's preferred activities, along with frequent use of the place (Stokols & Shumaker, 1981). Generic place dependence is attachment to a certain category of place, based on its function. Geographic place dependence is attachment to a particular place.

Place Identity: The aspects of one's self-concept that are influenced by place (Hague, 2007; Proshansky, 1978; Proshansky, Fabian, & Kaminoff, 1983; Proshansky & Fabian, 1987). The physical world aids in self-definition through the processes of distinctiveness, continuity, self-esteem, and self-efficacy (Twigger-Ross & Uzzell, 1996). Settlement identity refers to identification with certain types of places (Feldman, 1990).

Place: A physical setting upon which meaning has been imposed; place is a geographical space that becomes - a centre of meaning or field of care (Tuan, 1977). Place meaning is constructed through experience, and is strengthened as the meaning becomes shared among users (Stokols & Shumaker, 1981).

Point in polygon: The ability to superimpose a set of points on a set of polygons and determine which polygons (if any) contain each point.

Pro-Environmental Behaviour - (EB): Actions intended to minimize environmental harm, or improve environmental conditions.

Protected Areas: The International Union for Conservation of Nature (IUCN) defines a protected area as "a *clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values*" (Dudley, 2008).

Raster: A representation of the world as a surface divided into a regular grid of cells. Raster models are useful for storing data that varies continuously, as in an aerial photograph, a satellite image, a surface of chemical concentrations, or an elevation surface.

Regression: A statistical technique that allows one to examine the relationship between two or more quantitative variables. This relationship is expressed in terms of the correlation between the variables, i.e., the degree of association, and a best fit trend line that express mathematically the character of the relationship.

Remote sensing: The act of detection and/or identification of an object without having the sensor in direct contact with the object. Includes satellite imagery and aerial photography.

Rootedness: A deep familiarity and sense of comfort with a place that develops over time and does not

necessarily involve conscious awareness (Relph, 1976).

Sense of place: Describes the sense of connectedness that develops toward unique and meaningful places. Some authors suggest that sense of place encompasses the sub-concepts of place identity, place attachment, and place dependence, or that it includes ancestral ties, feeling like an insider, and a desire to stay in the place.

Shapefile: A vector data storage format for storing the location, shape and attributes of geographic features. Features in a shapefile can be represented by points, lines, or polygons.

Socio-spatial planning: Refers to environmental planning and management which considers how people constantly modify and remodify places while, simultaneously, places constantly impact the lives of their inhabitants.

Spatial: Refers to phenomena distributed in two or three dimensional space and therefore having physical dimensions.

Spatial Analysis: Extends the basic set of discrete map features of points, lines and polygons to surfaces that represent continuous geographic space as a set of contiguous grid cells. The consistency of this grid-based structuring provides a wealth of new analytical tools for characterizing "contextual spatial relationships", such as effective distance, optimal paths, visual connectivity and micro-terrain analysis.

Spatial correlation: The spatial association among objects.

Spatial Statistics: Extends traditional statistics on two fronts. First, it seeks to map the variation in a data set to show where unusual responses occur, instead of focusing on a single typical response. Secondly, it can uncover "numerical spatial relationships" within and among mapped data layers, such as generating a prediction map identifying where likely customers are within a city based on existing sales and demographic information.

Topographic map, or topo map: A map that uses colors and symbolic patterns to represent the general surface features of the earth, such as grassland, forest, marsh, agricultural, urban, and barren rock.

Topophilia: Tuan's (1974) term that literally translates to love of place. Tuan affirms that topophilia can be defined broadly to include all of the human being's affective ties with the physical environment.

Transformation: Mathematical expressions used to convert coordinate data within one frame of reference to coordinate data in another frame of reference. It is used for a variety of applications including changing

from one map projection to another map projection, or converting from one set of coordinates captured on a digitizer to UTM ground coordinates.

Universal Transverse Mercator map projection - (UTM): A system of plane coordinates based upon 60 north-south trending zones, each 6 degrees of longitude wide, that circle the globe.

Vector data model: A representation of the world using points, lines, and polygons. Vector models are useful for storing data that has discrete boundaries, such as country borders, land parcels, and streets.

Acronyms

AA	- Affective affiliation
AEI	- Area of Ecological Importance
AHLV	- Areas of High Landscape Value
AMOS	- Amos Development Corporation
ANOVA	- Analysis of variance
ANSI	- American National Standards Institute
AVHLV	- Areas of Very High Landscape Value
BFN	- Das Bundesamt für Naturschutz
BMI	- Body mass index
CBD	- Convention on Biological Diversity
CC	- Creative Commons
CCS	- Conservation Choices Scale
CHAID	- Chi-square Automatic Interaction Detector
CNT	- Connectedness to nature
CO2	- Carbon emissions rank
CR	- Cognitive representation,
DAF	- Directed attention fatigue
DAG	- Directed Acyclic Graph
DIS	- Dispersion of built-up areas
EB	- Environmental behaviour
EC	- European Commission
ED 50	- European Datum 195
EEA	- European Economic Area
EEC	- European Economic Community
EFTA	- European Free Trade Association
EIA	- Environmental Impact Assessments
EID	- Environmental Identity scale
ERA	- Environmental Resources Authority
ERB	- Environmentally responsible behaviour
ESRI	- Environmental Systems Research Institute
EU	- European Union
FAO	- Food and Agricultural Organisation
FEMA	- Faculty of Economics, Management and Accountancy

FER - Fertilise r use rank
GDP - Gross domestic product
GIS - Geographic information system
GNI - Gross National Income rank
GOV - Governance quality rank
HBC - Natural habitat conversion rank
HPU - Heritage Scheduling
IAP2 - International Association for Public Participation
IAT - Implicit Association Test
INS - Inclusion of Nature in Self Scale
IPCC - Intergovernmental Panel on Climate Change
IUCN - International Union for Conservation of Nature
JRC - Joint Research Centre
KMO - Kaiser-Meyer-Olkin
LC - Local Council
LPG - Liquefied petroleum gas
LUP - Land uptake per person
MA - Millenium Assessment
MC - Marine captures rank
MCAST - Malta College of Arts Science and Technology
MEPA - Malta Environment anad Planning Authority
MRA - Malta Resources Authority
MT - Malta
MTA - Eurostat
NAW - National Assembly for Wales
NBSAP - National Biodiversity Strategy and Action Plan for the Maltese Islands (
NCSD - National Commission for Sustainable Development
NEP - Malta National Environment Policy
NFL - Natural forest loss rank,
NR - Nature relatedness
NRS - Nature Relatedness Scale
NSO - National Statistics Office
ODZ - Outside Development Zones
OECD - Organization for Economic Co-operation and Development
OGC - Open Geospatial Consortium

OJ - Official Journal of the European Union
PA - Place attachment
PAI - Place Attachment Inventory scale
PBA - Percentage of built-up area
PCA - Principal component analysis
PD - Population density rank ,
pENV - Proportional composite environmental
PFWS - President's Foundation for the Well-being of Society
PGR - Population growth rank
PMR - Politically motivated reasoning
POPS - Private Owned Public Spaces
PPGIS - Public participation geographic information systems
PPS - Probability Proportional to Size
PTHR - Proportion of threatened species rank,
RC - Relationship commitment
SACs - Special Areas of Conservation
SCI - Sites of Community Importance
SD - Standard deviation
SIA - Social impact assessment
SLR - Systematic literature review
SOER - State of the Environment Report
SPAs - Special Protection Areas
SPED - Strategic Plan for Environment and Development
SPSS - Statistical Package for Social Sciences
STEPS - Strategic Educational Pathways Scholarships
TCA - Tree Cluster Analysis
TER - The Environment Report
ToM - Times of Malta
TPO - Tree Preservation Orders
TPPI - The Today Public Policy Institute
TV - Television
UCA - Urban Conservation Order
UGI - Urban green infrastructure
UGS - Urban green spaces
UK - United Kingdom

UNEP	- United Nations Environment Programme
UPU	- Urban Permeation Unit
URL	- Uniform Resource Locator
US EPA	- United States Environmental Protection Agency
USA	- United States of America
USDA	- United States Department of Agriculture
UTM	- Universal Transverse Mercator map projection
VGI	- Volunteered Geographic Information
WDPA	- World Database on Protected Areas
WHO	- World Health Organisation
WTP	- Water pollution rank
WUP	- Weighted urban proliferation

1 Introduction

Considering that human behaviour is the single-most important determinant of the future of biodiversity, it is crucial that we understand the relationships that people form with the natural world (WHO, 2012).[4] In fact, resistance can arise if environmental agencies attempt to manage protected areas without accounting for the divergent meanings and values different groups attach to them, and their ecosystems (Jasper et al., 2016; [5] Dudley et al. 2008[6]). A shift is thus taking place within environmental governance, which draws attention to tools that respond to system dynamics, uncertainty, and contested values (Armitage, 2012[7]; Wise, 2014).[8] Better insight into people's relationships with nature and place has the potential to enhance our ability to effectively meet conservation goals, by better understanding the affective basis for human behaviour (Mahboubi, 2015)[9]. Understanding how these relationships form, how they influence personal values or attitudes towards the environment, and what behavioural implications they may have remains of essence.

This work adopts a post-positivistic view of place and nature, based on an information processing rather than a more phenomenological approach. This effort aims to apply connectedness to nature (CNT), place attachment (PA), and environmental behaviour (EB) constructs in order to understand the bond that exists between humans, place, and nature in relation to participatory protected area management. While numerous theoretical frameworks exist for understanding how values and moral norms influence pro-environmental behaviour, like the value-belief-norm (VBN) theory (Stern, Dietz, Abel, Guagnano, & Kalof, 1999)[10] and the theory of reasoned action (Fishbein & Ajzen, 1975,[11] Ajzen &Fishbein, 1980),[12] these models do not consider the affective determinants of pro-environmental behaviour (Raymond et al. , 2011; [13] Anton et al., 2016).[14] Consequently, this study adopted a model based on affective constructs like CNT and PA in isolation from these mainstream theoretical models. CNT is primarily concerned with understanding why humans have an innate desire for closeness with nature, how they identify themselves with the natural environment, and the relationships they form with nature (Schultz, 2002).[15] PA is concerned with the psychological bonding that develops between an individual and a place (Prohansky, Fabian and Kaminoff (1983)[16], and the meanings, beliefs, symbols, values, and feelings that individuals or groups associate with a particular locality (Williams and Stewart, 1998).[17] EB in this context refers simply to preventative action taken by humans to protect their environment by empathising with nature and addressing environmental issues (Lee et al., 2013;[18] Stern, 2000)[19].

This study is driven by the following research question:

"Can connectedness to nature, place attachment and environmental behaviour constructs contribute to participatory protected area management?"

1.1 Contribution to the state of art

Many integrated environmental and planning efforts seem to have failed in achieving conservation targets because of an inability to integrate the complexity of socio-ecological demands and interdependencies that exist between resources and people living around them (Miller et al., 2012).[20] Numerous stakeholders may be involved in protected areas and their management and typically hold different preferences for how to actually administer protected land (Brown et al. 2015).[21] Even conservation science remains conflicted on the aims and methods of conservation science itself, and on the best conservation approach for protected areas. However, a key paradigm shift has occurred in this field towards a bottom-up approach which includes an appreciation of more participatory and inclusive approaches that take account of community needs and values, and which is informed by a more holistic view of the situation on the ground (Smith, 2003; [22] Le Roux et al., 2013)[23]

While there is a substantial body of research in the respective areas of protected area management and environmental psychology, this research addresses gaps in the literature by seeking to better bridge the two fields of study, providing an understanding of CNT, PA, with EB and with specific reference to protected areas and their management. The hypothesis is that connectedness to nature and place (attachment) is likely to be a strong influence on how local communities and stakeholders respond to designation and management of protected areas, implying that these constructs can potentially be used to effectively involve stakeholders in the management of such sites.

Since this research has a specific focus on management of spatially-delineated protected areas, it also sought to document and explore physical locations of affective attachment by projecting these three social constructs spatially via a Geographic Information System (GIS). Mapping of these social constructs allows for a combined analysis of the values that different members of a community atttribute to nature and place. It will also operationalise a framework for participatory involvement in protected area management using a socio-spatial planning approach. This socio-spatial projection is expected to provide a useful perspective for resource managers to be aware of and potentially include the public's values as valid considerations for place-based protected area management, also building an argument for socio-spatial analysis of these social constructs in the wider field of environmental planning. This is original research and builds on a paper published by Gosling and Williams (2010)[24], who studied associations between pro-environmental behaviour and two other types of emotional associations, PA and CNT, in the context of farmers' management of native vegetation on their land. It also builds further on seminal work using mapping approaches for measuring and displaying similar cognitive constructs, for example, the mapping of landscape values and place attachment (Brown and Raymond, 2007;[25] &

Raymond and Brown, 2015).[26]

The approach adopted enables a critical analysis of CNT, PA and EB constructs using established statistical research methods, with further reflection on those same constructs in relation to other environmental spatial data variables. The author also devised and validated a Conservation Choices Scale which aims to assess community values and preferences for different natural resource management options. The mapping of these contructs is in itself new ground since it not only explores the interplay between these three social factors, their sub-scales and other demographic variables, but also the relationship that might exist with location and adjacent protected areas. The proposed approach also ensures stronger integration of a range of disciplines from both the sciences and the humanities by attempting to operationalise these factors within socio-spatial planning and environmental management efforts. The process adopted here is also significantly different from emerging literature on social cartography in that the representational cartography effort is undertaken by the researcher post interview, and based on the data gathered during the interview, rather than participatory mapping direct by the respondent, either on paper or electronically. Post-representational cartography provides an original framework for integrating these perspectives, and has the potential to bring cartography into a new arena that transcends the empiricist/critical divide (Caquard 2014).[27]

Spatial mapping of intangible assets like CNT or PA can be a useful approach to better integrate local knowledge in conservation planning; and works not only to detect areas of common values or disagreement, but also as an educational tool. CNT and PA spatial mapping can allow planners to identify areas of distinctive human connection and analyse these with reference to related land characteristics for areas in need of biodiversity protection (Colchester, 1998)[28] and integrated resource management, while contributing towards participatory decision making and providing a reference point for monitoring or evaluation. This effort is expected to provide insights into how social constructs can be defined spatially and whether there are any implications at the neighbourhood or national spatial scale for collective action and environmental planning. According to Hays and Kogl (2007)[29], networks most relevant to mobilising collective action at the local level are those invested within that neighbourhood, and where social interaction shapes (and is shaped by) the spatial context and meanings people give it (Jorgensen 2008)[30]. Consequently, a mapping process that includes input by the people most affected by the issues being mapped has the potential to contribute to development of critical consciousness and generation of collective action (Moore and Garzon, 2010).[31]

The overarching aim of this work is thus to explore ways of managing areas for people and with people instead of just 'managing resources', and to understand the relevance of people's attachments to nature and place for protected area management. The hypothesis is that connectedness to nature and place (attachment) is likely to be a strong influence on how local communities and stakeholders respond to designation and

management of protected areas. This work is of broad relevance to protected area management and socio-spatial planning theory worldwide, but focuses on the Maltese Islands as its study area in view of the country's high population density, small size, and related intense stakeholder conflict over land-related issues. **Figure 1** provides a schematic block diagram depicting the overall conceptual framework of the research.

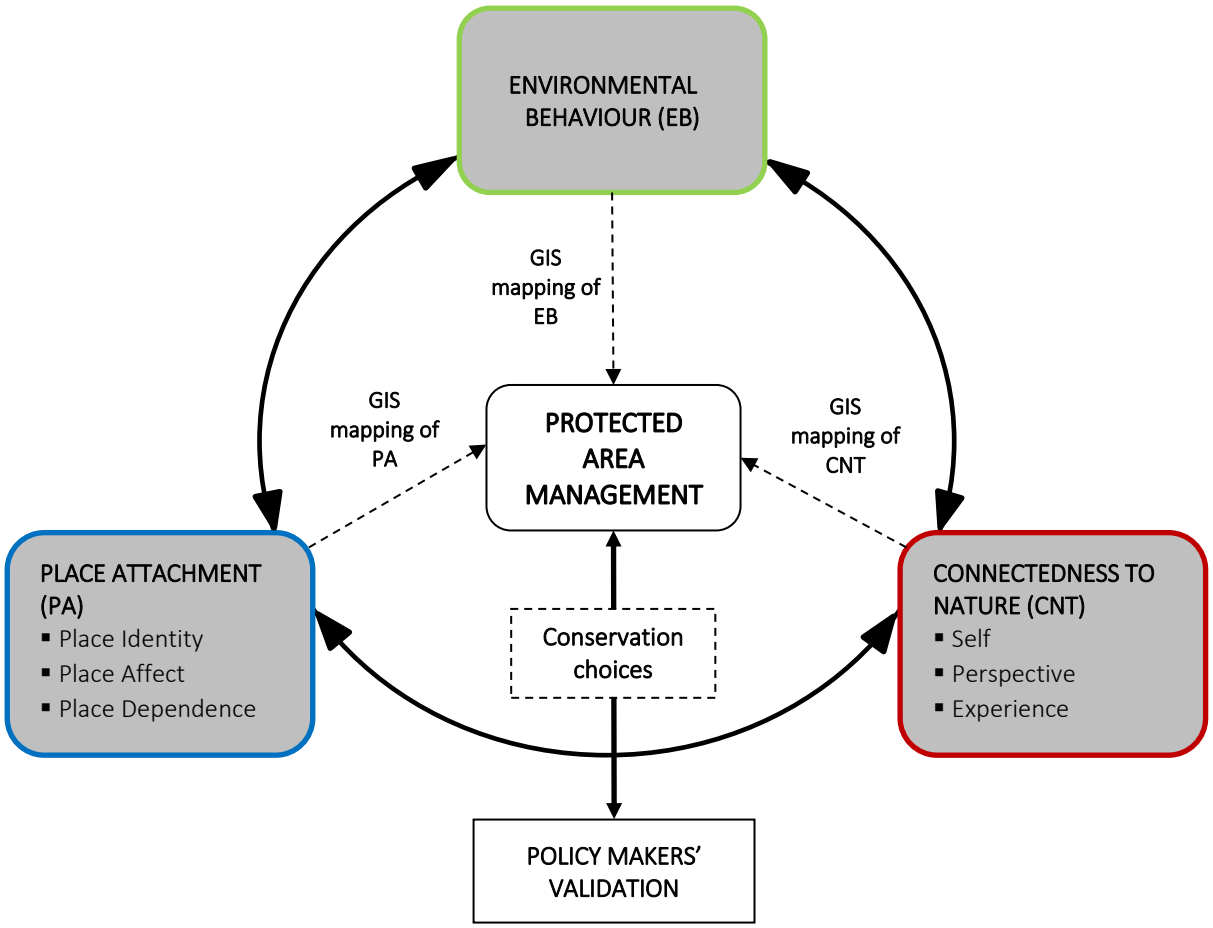


Figure 1 - Schematic of proposed conceptual framework

In conclusion, this thesis offers the following contributions to the literature on sense of place and nature, and towards socio-spatial aspects of environmental planning and management:

- Provides one of the first thorough reviews of connectedness to nature theory;
- Offers a novel interview method for translating special places into spatial measures of place attachment;
- Developed and validated a new psychometric scale of management conservation preferences, and demonstrated its applicability to environmental management for increased CNT and PA;
- Developed and empirically validated a new model of environmental behaviour which includes both PA and CNT constructs;

- Empirically demonstrates that CNT and PA are indeed separate social constructs, even spatially;
- Shows the spatial variation in CNT and PA and special places with respect to conservation areas in both rural and urban environments;
- Reflects on practitioner views on the use of CNT and PA concepts in land-use planning, and offering some guidance on how to apply these constructs in environmental management.

1.2 Research phases

This research effort was conducted in the following phases:

1) The first phase of this study involved a review of the diverse literature related to protected areas, place-based management and socio-spatial planning. It then reviewed literature on "connectedness to nature" (CNT), "place attachment" (PA) and "environmental behaviour" (EB) constructs in the context of environmental or conservation psychology literature which highlights the human relationship with nature and place. The review was also undertaken in order to identify research methods used in the field and possible gaps. A review paper on CNT was submitted to the *'Journal of Environmental Management'* and published in June 2015. A copy of the published paper is provided in **Appendix 03 - A literature review of connectedness to nature and its potential for environmental management. T**his paper has been cited 39 times as at 25/09/2017 according to Google scholar. For a list of these citations please refer to **Appendix 04 - Citations for 'A literature review of connectedness to nature and its potential for environmental management'** according to SCOPUS as at 25/09/2017

2) The second phase involved the establishment of a research design, building on the review of research methods. This stage also involved the drafting of a comprehensive questionnaire for data collection, and determination of the population and required sample size.

3) The third phase of this study involved collection of data required in order to understand how the Maltese population relates to the natural environment, and the strength of people's affective connections to nature and place. A face-to-face questionnaire was administered (n=401) across a sample of 13 clusters of 30/31 household respondents each. The clusters were selected from across 13 localities in close proximity or overlapping with NATURA 2000 (NATURA 2000) sites across the Islands, as well as from four control-site clusters distant from NATURA 2000 sites.

4) The fourth phase involved statistical analysis of the data collected in order to understand how CNT, PA and EB values and attitudes are most positively and negatively aligned with socio-demographic variables and

location. Special places where respondents feel a particular connection to nature or place where projected on an online GIS, and assessed in relation to two protected area designations, namely NATURA 2000 sites and Urban Conservation Areas. This involved preparation of spatial outputs mapping the respondents' home location and the distribution of their CNT, PA and EB mean scores in order to determine whther patterns in affective connections to nature and place can inform protected area management from a spatial point of view.

5) The fifth phase of this study then identified how the research results provide new insight to environmental management and planning. As an additional assessment component, the results developed in this study were evaluated by selected planners and policy-makers, employed within relevant spatial planning/environmental management authorities in the Maltese Islands. Respondents were asked to consider the potential utility of the method and outputs developed within the context of their professional work; all respondents agreed that the method could make a valuable contribution to the policymaking process, with several observing that such perceptions maps would be particularly useful at the level of strategic environmental policy formulation.

Another three papers are presently being prepared for eventual submission to the '*Journal of Environmental Psychology*', '*Applied Geography*' or other journals, titled:

- "*The spatial role of connectedness to nature and place attachment in protected area management.*" (In progress)
- *"Socio-spatial implications of attachment to place and nature for environmental behaviour*".
- *"Testing the influence of connectedness to nature on environmental behaviour and protected areas"*

Other potential paper titles include:

- **"***The comparison of spatial measures of connection to nature with urban and rural conservation priorities*."
- *"A comparison of the spatial attributes of place attachment and connectedness to nature".*
- *"The conservation choices scale. a new psychometric scale of management conservation preferences."*

To accomplish the research objectives highlighted above, this thesis is structured as follows. This introductory chapter outlined the background and importance of the topic to be examined. It also identified the contribution to the state of art and research phases of the study. The subsequent three chapters (Chapters 2-4) provide a comprehensive review of different fields of literature relevant to this work. Chapter 2 discusses protected areas and key considerations for their participatory management. Chapter 3 then reviews and discusses theories of place and related place-based and socio-spatial mapping approaches to conservation.

Chapter 4 presents the results of a semi-systematic literature review of place attachment, connectedness to nature and environmental behaviour, also reviewing methods of measurement of these social constructs. It also discusses the need for more holistic theoretical frameworks that clarify the overlaps in fragmented CNT and PA concepts, rather than just concentrating on these constructs in isolation. Chapter 5 then presents the study area in terms of its biogeographical and sociological context, and discusses relevant considerations relating to environmental pressures, designated areas and public participation practice. Chapter 6 provides a detailed description of the research methods used throughout the study. Chapter 7 then provides a detailed analysis of statistical and spatial results, including an analysis of whether location and proximity to protected areas are a significant determinant for the social constructs measured. Chapter 8 relates the findings of the study to their implications for protected area management. Chapter 9 then provides a conclusion, with final remarks, key recommendations, and suggestions for further analysis and research.

2 Protected areas and participatory environmental management

Protected areas are important instruments for the conservation of biological diversity and are keystones of sustainable development strategies worldwide (Convention on Biological Diversity, 2008).[32] Similarly, local participation of stakeholders in governance of protected areas is considered to be crucial to natural resource management and biodiversity conservation (Dudley, 2008,[33] Borrini-Feyerabend et al., 2013).[34] This chapter reviews key literature relevant to protected areas, and discusses how human well-beings are directly and indirectly dependent on the biodiversity contained therein. It then proceeds to explore the relevance of ensuring adequate public participation in protected area management, in order to ensure conservation effectiveness. This chapter illustrates the policy context underlying the aims of this study, and justifies the the benefits of protected areas. It then reviews the potential of applying socio-spatial planning frameowkrs to protected area management.

2.1 Protected areas in the European Union

There is no doubt that human agency has a direct or indirect impact on biodiversity,. These anthropogenic drivers were first explored in the Millennium Ecosystem Assessment (2001),[35] which assessed the consequences of ecosystem change on human well-being , and provided the scientific basis for action needed to enhance the conservation and sustainable use of those systems. Protected areas are intended to provide a level of protection for biodiversity in the midst of these drivers and pressures. In response to increased species extinction rates, ecosystem degradation, and genetic diversity loss, the '2010 Biodiversity Target' was first adopted by governments worldwide in 2002 at the 6th Conference of the Parties (COP 6) of the Convention on Biological Diversity (CBD). The 2010 target was to achieve a reduction of biodiversity loss globally as a contribution to poverty alleviation. In 2010, Parties to the Convention on Biological Diversity adopted a revised and updated Strategic Plan for Biodiversity, including the Aichi Biodiversity Targets[36], for the 2011-2020 period. The Aichi Biodiversity Targets are a set of twenty, time-bound, measureable targets that are embedded into national strategies and action plans by the 193 Parties to the Convention.

As at December 2016, protected terrestrial areas (including inland waters) listed in the World Database on Protected Areas (WDPA)[37] covered around 14.8% of the world's land surface and 12.7% of the world's marine and coastal areas within national jurisdiction, including a small but growing area of global ocean (e.g., the Ross Sea region of Antarctica established in 2016, MFAT).[38] The International Union for Conservation of Nature (IUCN) defines a protected area as "a *clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values*" (Dudley, 2008[39]). Similarly, the CBD (1992)[40] defines protected areas as a "*geographically*

defined area which is designated or regulated and managed to achieve specific conservation objectives". Furthermore, one of the criteria for protected areas is the protection of an '*important*' species and its habitat (Agius, 2014),[41] a typical landscape, or to safeguard unique suite of human-nature interactions for instance. Protected areas are categorised under a six-category system, based on their management objectives (IUCN, 2008[42]; Dudley & Stolton 2008[43]), namely: Strict Nature Reserve, Wilderness Area, National Park, Natural Monument or feature, Habitat/Species Management Area, Protected Landscape/Seascape 1.7, and Protected Area with sustainable use of natural resources.

Within Europe, the main instrument for designation of protected areas is the NATURA 2000 network (NATURA 2000). The NATURA 2000 network was established in May 1992, designed and legislated for the protection of core habitat, breeding and resting sites for rare and threatened species, and unique natural habitat types. It stretches across all 28 EU countries, both on land and at sea, and meant to ensure the long-term survival of Europe's most valuable and threatened species and habitats listed under both the Birds Directive and the Habitats Directive (EC).[44] The Birds Directive requires the establishment of Special Protection Areas (SPAs), while the Habitats Directive requires the proposal of Sites of Community Importance (SCIs) which are in turn designated as Special Areas of Conservation (SACs) upon approval by the EC for species other than birds and for habitat types. It is in fact the SPAs and SACs which together form the NATURA 2000 network of protected areas, and as of January 2016, the NATURA 2000 network included 27,312 sites with a cumulative terrestrial area of 787,606 km^2 (around 18 % of land in EU Member States) and a marine area of 360,350 km^2 (NATURA 2000 Barometer 2017).[45] NATURA 2000 is also a key contribution to the Program of Work of Protected Areas of the Convention on Biological Diversity (CBD). It is important to note that the philosophy of the NATURA 2000 approach is to allow sustainable and compatible human land use within these sites.

Most protected areas were originally established to protect landscape features and/or wildlife, or for biodiversity conservation, including genetic, species and ecosystem diversity (IUCN).[46] However, it is becoming understood that protected areas must also take into consideration economic, social, cultural, and regional requirements at the national level if they want to succeed in their conservation aims (Tsiafouli et alii 2013).[47] However, many protected areas, besides conserving a wide range of ecosystem services and other social, economic and cultural benefits, also provide space for natural evolution and for safeguarding a nation's heritage and cultural values (European Commission, 2015).[48] The spectrum of protected area designations recognises that cultural and natural values are connected, and that the communities living in or near these landscapes are crucial to sustaining them. It is therefore fair to assume that protected areas are a crucial part of the biophysical and social landscape and should not be considered in isolation from their surroundings (Stolten and Dudley 1999[49]). However, it is important to note that the relationship between protected areas and neighbouring communities

can have both positive and negative dimensions, and much depends on the relative balance of costs and benefits and also on deeper psychological constructs such as place attachment (Buta, Stephen and Kiriaki 2014).[50] On the one hand, the creation of protected areas can come at a cost to local residents and communities, with few obvious and direct benefits (West and Brechin, 1991[51]; Wells et al., 1992[52]; Ghimire and Pimbert, 1997;[53] UNEP, 2008[54]). On the other hand, several studies have shown the benefits of protected areas to the economy and human well-being (Millennium Assessment, 2005;[55] WHO;[56] Brink, 2016).[57] Figure 2 provides a theoretical framework which illustrates the importance of biodiversity protection for the wider public, and the causal links between natural capital and ecosystem services which ultimately impact human health. These interactions are in fact complex because they are often dependent on a number of modifying forces which can be indirect, and displaced across space or different timescales. The same framework also provides an indication of the different strategies and interventions which can be applied at the institutional level via policy and planning tools to enhance human well-being and conserve those same ecosystems.

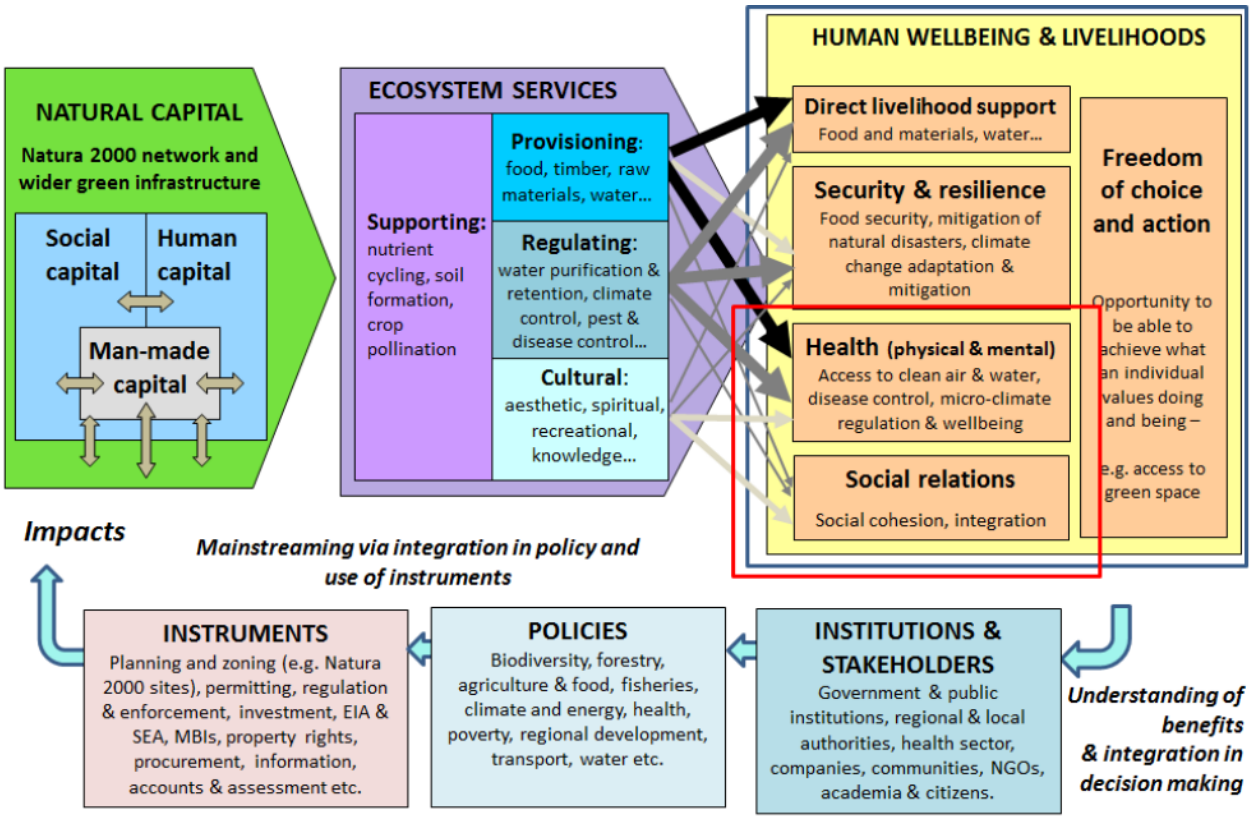


Figure 2 - Natural capital, ecosystem services, human well-being and livelihoods (Brink et. al. 2016) - Adapted from the Millenium Assessment, 2005[58] and TEEB, 2011a[59]

It is important to note at this point that despite the above arguments for NATURA 2000 protection, doubts have been expressed in various studies on the actual effectiveness of NATURA 2000 protection across Member States (Popescu et al., 2014;[60] Milieu, 2016[61]) and some claim that in many cases NATURA 2000 management plans are plagued by systemic deficiencies (European Topic Centre on Biological Diversity, 2014),[62] and ultimately seem to lock what are already highly degraded ecosystems into depleted areas that are not really allowed to

recover their ecological function via restoration. Similar results have been noted in the 'Mid-term review of the EU biodiversity strategy to 2020'[63] which admits that biodiversity loss and ecosystem service degradation continued across the EU since the 2010 biodiversity baseline[64], with this review confirmed further by the 2015 European Environment state and outlook report.[65] A more recent report by the European Court of Auditors (2017)[66] concluded that in fact Member States were not managing the NATURA 2000 network well, and that conservation measures required were typically delayed or inappropriately defined due to a lack of coordination amongst the relevant authorities and stakeholders, and even among neighbouring Member States.

On the other hand, a more recent fitness check of the Birds and Habitats Directives suggests that the Directives are fit for purpose (EC, 2016)[67], and clearly demonstrate overall effectiveness, efficiency, relevance, coherence, and EU added value. However, this same study flags a number of significant implementation challenges which impact not only the achievement of the objectives of the Directives, but also the costs and burdens placed on authorities and stakeholders, and the ability to simultaneously achieve the goals of other EU policies, especially in key economic sectors. Furthermore, the study suggests that while the Annexes of the Directives should be updated in order to improve species coverage, align with international agreements' annexes, or take account of changes in conservation status), its conclusion is that updates at this stage would generate uncertainty and be counter-productive in both nature conservation and economic terms. Having said that, it was only in December 2016 that the EU Commission announced (Juncker, 2016)[68] that the Birds and Habitats Directives will indeed be saved and not weakened, ending two years of uncertainty over the laws' future. In conclusion while there is little doubt that these Directives do provide a firm legal basis for protection, implementation challenges remain prevalent. This work is intended to explore possibile fresh approaches to addressing some of these challenges by exposing whether social contructs can be leveraged towards protected area management.

2.2 Benefits of protected areas

Much has been written in the environmental and social psychology literature about the human need to connect with nature or place within a living and changing landscape, and the influences psychological constructs can have on our emotional, cognitive, aesthetic, and even spiritual development (Kellert, 1993[69]). However, the potential use of psycho-social constructs in protected area management is often overlooked (Stratford & Davidson, 2002;[70] Blicharska et. al., 2016[71]). Humans are keen to pursue their personal interests and tend to ignore the effects of their needs on their physical and social environments, collectively leading to tangible environmental deterioration over time (Kibert et al., 2011)[72]. However, continued increase in the use of natural resources such as water, land, forestry, biodiversity and fisheries, without paying sufficient attention to their depletion or environmental impacts, can lead to ecological crises and security threats (CIHEAM/FAO, 2016).[73]

Nonetheless, communities within developed countries, which can '*afford*' to promote '*post-materialist*' values (Inglehart, 1997;[74] Mutsaers 2015)[75] in the large part, also exhibit a collective interest towards securing their living environments. More often than not, however, disparate expectations lead to stakeholder conflict (Hardin, 1968[76]; Dawes, 1980[77]; Ostrom, 1990; Vlek, 1996;[78] Dawes & Messick, 2000[79]; Osbaldiston & Sheldon, 2002[80]). Consequently, "*individual actors are interdependent as regards the collective outcomes of their (relatively) independent choices*" (Schmuck, 2003)[81]. Moreover, an increase in ecosystem distress will lead to an increase in sostalgia – "*the distress that is produced by environmental change impacting on people while they are directly connected to their home environment*" (Albrecht, 2007).[82]

It is imperative that conservation managers have a clear understanding of community attitudes to natural areas (Hornback & Eagles, 1999[83]; Roberts & Bacon, 1997[84]; Ariane et al., 2015), while integrating broader values and meanings of landscapes into management objectives and plans (Greene, 1996[85]; Brandenburg & Carroll, 1995[86]; Mitchell, Force, Carroll, & McLaughlin, 1993;[87] Williams & Stewart, 1998[88]; Hobbs et al., 2014,[89] Sayer et al., 2013[90]). This is particularly relevant when studying national sentiment towards place and naturewhich is stressed by urbanisation and possibly technology's unintended consequences, ultimately leading to a gradual detachment from nature (nature deficit disorder - Louv, 2005).[91] This is especially worrying in the case of children today who seem to have less direct contact with nature than ever before, resulting in the '*extinction of experience'* and thus decreasing their appreciation of the natural world (Soga et al., 2016).[92]

As mentioned earlier, over the last couple of centuries there seems to be an emerging disengagement of humans from the natural environment (Beck and Katcher, 1996;[93] Axelrod and Suedfeld 1995;[94] Katcher and Beck, 1987;[95] Dickinson, 2013[96]). This seems mostly due to the migration of people into cities which tends to insulate people from outdoor natural environmental stimuli (Stilgoe, 2001)[97]. The consequences of this detachment are as yet unclear (Katcher and Beck, 1987; Kahn et al., 2009;[98] Bekoff and Bexell, 2010[99]; Purdy, 2015)[100] and some believe that excessive time spent only in artifical environments can have adverse effects like exhaustion or produce a loss of vitality and health (Katcher and Beck, 1987; Stilgoe, 2001; Silva, 2017);[101] even possibly with impacts on the long-term survival of the human species (Katcher and Beck, 1987;[102] Lewis, 1992;[103] Wilson, 1993;[104] Bustad, 1996;[105] Keller, 1997[106]). Similar concerns are noted with reduced place attachment worldwide due to changing patterns of social interaction, limiting social networks and cohesion due to mobility or neighbourhood deprivation (Livingston, Bailey and Kearns, 2008).[107] This same concern has also been voiced in Pope Francis' latest Encyclical proposals (2015)[108] for '*integral ecology*' as a new paradigm of justice "*which respects our unique place as human beings in this world and our relationship to our surroundings*" (15), noting that "*nature cannot be regarded as something separate from ourselves or as a mere setting in which we live*" (139). In fact, Pope Francis confirms his thinking that "*the analysis of environmental problems cannot be separated from the analysis of human, family, work-related and urban contexts, and of how individuals relate to themselves*"

(141), and that ultimately "e*very violation of solidarity and civic friendship harms the environment*"(142).

With natural areas under increasing threat, there is an urgent need to demonstrate how natural habitats can deliver sound social benefits. There is no doubt that the human relationship with the natural world is interconnected to human conscious and subconscious minds (Maller et al. 2008)[109] and many researchers posit that humans are not only dependent on nature for their physical needs (food, water, shelter, etc) but also for their psychological (Kaplan & Kaplan, 1989[110]; Hartig et al., 1991;[111] Kaplan, 1992,[112] 1995;[113] Lachowycz and Jones, 2011;[114] Hartig et al., 2014;[115] Lee et al., 2015;[116] James et al., 2015;[117] Bratman, 2015[118]), emotional and spiritual needs (Wilson, 1984;[119] 2001;[120] Katcher and Beck, 1987;[121] Roszak et al., 1995;[122] Friedmann and Thomas, 1995;[123] Frumkin, 2001;[124] Yang et al., 2015;[125] Richardson et al., 2016).[126] Natural places also facilitate stress recovery, encourage exercise participation, stimulate development in children and provide opportunities for personal development and sense of purpose in adults (Health Council of the Netherlands, 2004),[127] while facilitating social contact (so building social capital) and the creation of attachment to place. This indicates that parks and other natural environments play a crucial role in human well-being by providing this needed access to nature.

Despite the above dependence on protected areas, we still have further need to understand the complex relationship between human and environmental well-being (Birley, 2002[128]; Noble and Bronson, 2005;[129] Braveman et al., 2011[130]). This relationship was partially addressed by the seminal work of Tuan (1974[131]; 1977), Relph (1976),[132] and Bechtel and Churchman (2002),[133] who besides confirming the relationship between people and their environment also indicated that when people interact with landscapes they tend to attribute 'meaning' and values to landscapes, and develop a 'sense of place'. It is this complex mix of cultural and natural values or meanings of tangible and intangible natural heritage which makes protected areas so vital, and at the same time so challenging (Berghöfer & Dudley, 2010[134]). However, willingness or otherwise, to be involved with protected areas and share in the benefits and responsibilities of conservation is partially dependent on deeper psychological bonds that people have with nature and place. The major premise of this thesis is that an understanding of people's attachments to nature and place is critical to leverage their support and to encourage their engagement in the management of such protected sites.

Safeguarding protected areas, and the complex mix of cultural and natural values that come along with them is extremely challenging and therefore requires an approach that is interdisciplinary, inclusive, and which engages people and communities. There is no doubt that human dimensions of place are intricately combined with the geography of that place, and that there is a need to integrate community values of place with existing top-down planning approaches which are typically guided by expedient demarcation at the macro-level (Brown and Weber, 2012)[135] or by scientific criteria (e.g. habitat extent).

2.3 Public Participation in Protected Area Management

Public participation is defined by Creighton & Creighton (2008, 1)[136] as "*the process by which an organization consults with interested or affected individuals, organizations, and government entities before making a decision*". In most countries, despite the fact that protected areas are usually considered public land, the tendency in the past has been to only give the public a minor role in their management, based on a mentality of safeguarding these areas from misuse and degradation by the public (Hales, 1989;[137] Palo and Uusivuori, 2012;[138] and Dovers et al., 2015).[139] However, this centralised management approach can have negative implications, including a loss of ownership and responsibility by local populations for the protected area (Williams and Stewart, 1998;[140] Borrini-Feyerabend, 2002).[141] Since the 1990s, new approaches towards community involvement in nature conservation have been attempted, and it is no longer acceptable to declare and manage a protected area without community consultation and involvement (IUCN, 2017).[142] There is now also increasing recognition and understanding of how stakeholders can or should influence natural resource management (Burroughs, 1999;[143] Prell et al., 2009).[144] In fact, one of the most consistent themes emerging from the literature is that the traditional command-and-control mode of environmental management is slowly but surely being replaced by approaches that favour negotiated and collaborative planning frameworks with the community (Alterman Rachelle, 2001;[145] 1982[146]). However, it is important to note that while improved bottom-up consultation and engagement processes can lead to better planning and management outcomes, recent work in theory of participation by Reed et al. (2017)[147] suggests that a mix of bottom-up and top-down processes are required to support effective planning and management outcomes.

Negotiated contracts also fit in well with established theories of urban and regional planning, such as Healey's '*collaborative planning*' (1997),[148] Innes' '*communicative planning*' (1998),[149] or Forester's '*deliberative planning*' (1999)[150]. This shift towards negotiated contracts is a direct result of several social developments over the years, including the increase in environmental awareness among the public at large, the increased availability of information about environmental planning, the generally higher education levels of the public, the increased focus on participation as a right and requirement for successful planning, and greater affluence, which in turn allow both public and private stakeholders to settle disputes via further planning and legal actions at their disposal. Consequently, participatory initiatives for natural resource management nowadays must include stakeholder analysis, that is the process of identifying individuals or groups that are likely to affect or be affected by conservation efforts (Freeman, 1984;[151] Reed et al., 2009).[152]

The advantages of public participation in governmental decisions assures more legitimate decisions and enhances public faith in governments since it helps reduce potential conflicts between different

stakeholders; it increases the breadth of knowledge which contributes to better decisions; and it balances the power of vested interests by allowing all those affected by a decision to influence the decision process (OECD, 2015;[153] Calvet-Mir, 2015).[154] The European Union Convention on Access to Information, Public Participation in Decision-making and Access to Justice on Environmental Matters (Aarhus 1998)[155] outlines the basic principles underlying why participation should be considered a right. Indeed, the importance of public engagement in planning is a core element of the Aarhus Declaration (UNECE, 2001)[156] and has led to the need to develop protocols for stakeholder involvement. Despite all of the above, few consultation frameworks achieve meaningful public participation as this requires much more than simply holding public meetings or collecting comments (US EPA, 2014).[157] Conducting meaningful public participation involves seeking public input at specific points in the decision process and on specific issues when such input has a real potential to help shape the decision or action. The 'Spectrum of Public Participation' developed by the International Association of Public Participation (IAP2, 2014) identifies five levels of public participation that can help clarify where the public stands in planning and decision-making, and how much influence the community actually has (Table 1). Informing and consulting in fact represent the lowest levels of public engagement but remain the most commonly used.

Table 1 - The 'Spectrum of Public Participation' developed by the (IAP2, 2014).

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions.	To obtain public feedback on analysis, alternatives and/or decision.	To work directly with the public throughout the process to ensure that public issues and concerns are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives andthe identification of the preferred solution.	To place final decision-making in the hands of the public.
PROMISE TO THE PUBLIC	To keep the public informed.	To keep the public informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision.	To ensure that public concerns and issues are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	To look to the public for direct advice and innovation in formulating solutions and incorporate advise and recommendations into the decisions to the maximum extent possible.	To implement what the public decides.
EXAMPLE TOOLS	• Fact sheets • Websites • Open houses	• Public comment • Focus groups • Surveys • Public meetings	• Workshops • Deliberate polling	• Citizen Advisory committees • Consensus-building • Participatory decision-making	• Citizen juries • Ballots • Delegated decisions

The realities of close proximity between gateway communities and designated protected areas in such a densely populated island like Malta may create significant stakeholder conflict, particularly at conservation sites that are very close to urban interfaces. Any attempts to mitigate this multifaceted conflict needs responses spanning different spatial scales and levels of societal organization (United Nations, 2005[158]; Sandbrook et al., 2010[159]). In fact, people frame complex situations in ways which are internally consistent with their world views and their life experience (Shmueli et al., 2006)[160]. Understanding how people interpret conflicts and identifying the main divergent frames is critical in order to address intractable conflict and contain escalation. Resolution of such conflicts through collaborative, community-based approaches is necessary and stakeholders, like natural resource management agencies, environmental groups, local communities, businesses, and visitors, are all essential players in the conservation challenge (Esau, 1996;[161] Figgis, 1999[162]).

Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process, and is a two-way collaborative problem solving process with the goal of achieving better and more acceptable decisions (IAPP, 2007).[163]However, communities are quite complex and encompass individuals with plural interests, diverse perceptions, needs, values and desires (Worah, 2002).[164] While studies indicate that communities actually want to be involved in the management of their local protected area (Jeanrenaud, 1999),[165] one cannot assume that all members of a community will want to participate at the same level and intensity, or at all. According to Jones (2007)[166] the desirability of public participation can be justified in order to increase:

1. Democratisation (Jonsson & Lundqvist 2006)[167];
2. Legitimacy (Zachrisson 2004[168], Jonsson & Lundqvist, 2006);
3. Information Exchange (Jonsson & Lundqvist 2006);
4. Tackling of Conflicts (Jonsson & Lundqvist 2006; Zachrisson 2004[169]; Laasonen 2008[170]);
5. Heterogeneity and Social Justice (Bergmann 2006)[171].

Brown et al. (2005)[172] argue that this can only be achieved by acknowledging that communities living near these protected areas are central to sustaining them and should be involved in their management, sharing in the benefits and responsibilities of conservation via inclusive approaches that rely on participatory processes and partnerships which link a diverse array of stakeholders in stewardship and sustainability. Zachrisson (2010)[173] concludes that deliberative elements are central to the success of co-management processes of natural resources, and that co-management and deliberative democratic approaches cross-fertilise one another and are well suited to solve complex, multi-faceted problems characterised by value conflicts. While participatory methods with a social focus could certainly lead toward more equitable and successful conservation practices, experiences elsewhere indicate that such an integrated approach continues to be elusive (Barrett et al., 2005)[174]. Valid concerns are also raised by what is referred to as '*participation inequality*', where a very small percentage

of participants contribute a very significant proportion of information to the total outcome (Haklay, 2016).[175] This phenomenon is typically driven by multiple factors and occurs across spatial and temporal scales which can impact the social and technical outcomes of any participative process. This can only be addressed by including an exploration of participation patterns early on in the analysis of a participative process and examining the biases that are caused by it (Haklay, 2016).

Translating that social knowledge into decision-making and participation can still remain an issue, especially when one considers that it is unlikely that communities will formally manage extensive areas, but rather will attend to specific locations (Selman, 2004),[176] which creates further difficulties when considering policy at the regional scale. However, while there is good practice towards shifting complete management responsibility of protected areas to communities where appropriate (Rao et al., 2016),[177] there still remains scope for integrating local values in the decision making processes. Consequently public participation is crucial on a number of different levels (Axford, 2005)[178]:

- As a management tool for accomplishing pre-determined management objectives,
- In order to win support for and compliance with protected area policies,
- To reduce conflict between neighbours and site managers,
- To facilitate the involvement of local people in their surrounding environment,
- To increase ownership of and connection to the area and decrease the social cost of conservation to them (Orlove and Brush, 1996)[179].

Exploring both the intensity and orientation of an individual's sense of place and connectedness to nature can provide insights into the potential for community involvement in protected area management. Axford (2005)[180] also found that the stronger an individual's sense of place, the greater their place dependence and commitment, and the greater their desire to be involved in management. Analysing the strength and orientation of sense of place illustrated that there is a high degree of diversity in how individuals perceive and feel about an area, and their desire to be involved in management. The type of information obtained in this study is important and useful to the management agencies if they are to successfully engage the community in meaningful ways.

However, the role of the public is often unacknowledged by decision makers and implementing authorities, despite clear evidence that engaging with landowners and users is key to reaching high ecological effectiveness in NATURA 2000 sites (European Environment Agency, 2014)[181] and to successfully influence or initiate measurable outcomes in conservation. There is also the issue of a partisanship effect which suggests that people rely on partisan narratives to form an opinion and the extent to which we are prepared to follow "*our party*", especially if those behaviours could be perceived as identifiers of political attitudes (Coffey and Joseph, 2012,[182] Miller, 2012).[183] A recent study by Briguglio (2015)[184] argues that in fact households close to a particular

political party in government derive satisfaction from contributing to causes promoted by '*their*' party, while those close to the opposition may refrain in defiance (n = 1,037). Similar studies (Borg, 2005)[185] have indicated how political polarisation can seriously impact on decision-making in Malta, and that this effect must be considered carefully when involving stakeholders in planning. A more recent study examined whether willingness to pay for landscape protection differs according to the individual's political preferences in Malta (Davison, 2016).[186] The results indicate that individuals who trust the present Government have a lower willingness to pay than those who do not. Persons who do not trust the Government are willing to pay more to prevent a Government project that would result in the loss of agricultural land and open spaces. Khan (2015)[187] also offers further insights into "*Politically motivated reasoning*" (PMR), and what motivates political predispositions and the rationality behind the reasoning processes involved, and ultimately notes a "*symmetry*" in the cognitive mechanisms across opposing political or cultural groups. Khan identifies PMR to be a central issue in communication and decision sciences, and has major significance in understanding positions or polarisation associated with competing cultural or political values in order to address sources of persistent public conflict. Furthermore, Conrad (2008)[188] argues that while having lists of protected species and sites is important, they also have little meaning to the Maltese population and very little effort has been undertaken at protected sites to educate about their conservation and intrinsic value. In her concluding remarks she suggests that "*the exclusion of key stakeholders from conservation initiatives is likewise a major constraint to their acceptability amongst the public at large. Without a stake in the success of conservation initiatives, there are few motivating factors for support when conservation is not a central component of cultural value systems. ….*".

In this work, the values people and communities give to place and nature will be used to identify any significant insights for working towards more participatory approaches for protected area management which may be influenced specifically by these three social constructs - connectedness to nature, place attachment and environmental behaviour. There is a clear need to establish whether affective connections to nature and place can indeed play a role in socio-spatial planning for protected areas and participatory conservation management. This effort is based on the understanding that protected areas and socio-spatial planning are grounded in the interactions between people and place (Natarjan, 2015),[189] and attempts to project trends and patterns on the use of those spaces. Understanding human connections with nature and place by local communities, visitors and managers is likely to assist policy makers in providing protected areas where both biodiversity and stakeholder interests are assured. Reframing community values for CNT and PA spatially has the potential to add an innovative dimension to administrative GIS projections of place, and can include local communities in a meaningful way while also helping inform protected area management. It also provides an interesting opportunity to establish an accurate narrative of social affiliations to place within the study area. This could counteract any potential '*shifting baseline syndrome*' (Kahn & Friedman, 1995[190]; Pauly D., 1995[191]), which refers to changing human perceptions of biological systems due to loss of experience about past conditions. This effort could also help influence the

validity of participatory monitoring, local ecological knowledge, community-based conservation, and conservation education efforts (Papworth et al., 2009).[192]

3 Place-based and socio-spatial environmental management

This chapter builds further on the notion that human agency has mostly dominated place and the landscape, and that there is an inherent "*human dimension*" to these physical locations (Hunziker, Buchecker, and Hartig, 2007) which can help understand the dynamics of socio-ecological systems for environmental management (Leenhardt, 2015).[193] Moreover, management actions that affect a bounded geographical area can be said to be place-based, so the chapter introduces the theory on place first. It then reviews the benefits and challenges of place-based management at the local and European spatial scale. Place-based management refers to any management action which has implications for a specified area, and is promoted as a key component of ecosystem approaches to management (Olsen, 2011).[194] The final part of the chapter introduces the concept of locational data and socio-spatial frameworks which could provide a more holistic perspective for understanding social constructs like CNT, PA and EB, and their role in protected area management and planning. Socio-spatial methods are proposed to understand the human perspective underlying places by integrating different disciplines. The potential of applying statistical robust data and location using geographic information systems (GIS) is discussed as a tool for identifying loci of attachment to place and nature, and their implications to protected area management.

3.1 Theory of Place

Literature related to the concepts of environmental management is substantial; however there is considerable divergence in how the term 'place' is used to refer to different landscapes or geographical scales, or how it can mean different things to different people (Cresswell, 2014)[195]. The concept of place is in fact often confused with a number of other terms like location, region, community, space, or setting. In social research, however, place takes on at least three distinct interpretations (Agnew and Duncan, 1989)[196] namely:

- location or the spatial distribution of social and economic activities;
- 'locale' or the settings for everyday routine social interaction provided in a place and;
- sense of place or identification with a place, emotionally or symbolically.

Various disciplines like environmental psychology, architecture, geography and sociology, recognise a fundamental relationship between individuals and place, and use the concept of place primarily to describe physical aspects of a specific location as well as meanings and emotions associated with that location by individuals or groups (Gould and White, 1974;[197] Relph, 1976;[198] Gieryn, 2000;[199] Tuan, 1977[200]). Place theory

finds its roots in the work of Martin Heidegger's (1973) seminal arguments in *Being and Time*, and Pierre Bourdieu's (1979)[201] discussion of habitus. Both theorists' contributions were elaborated further by Harvey (1996)[202] and Casey (2001).[203] Yi-Fu Tuan (1974)[204] coined the term "*topophilia*" to describe the emotional connections that exist between the physical environment and human beings, and refers to "*geopiety"* (1976, 1993) in order to encapsulate a broad range of emotional bonds between humans and their terrestrial home. In his seminal work titled "*Place and placelessness",* Relph (1976)[205] also reflected on various issues of human-environment interaction suggesting that there is a cultural change in the way people relate to environments, coupled with simultaneous changes in the physical nature of environments; and affected by technological advancements in communication, travel and globalisation. He also suggests four different types of place interactions, while Bott (2008)[206] contributed another fifth interaction, namely:

- space and place relationships (existential, perceptual, architectural, cognitive, abstract);
- identity of place (in-sidedness and out-sidedness, images);
- authenticity;
- placelessness (kitsch, mass communication, mass culture, big business, central authority; and
- future prospects for place (the inevitability of placelessness, and designing a lived-world of places). (Bott, 2008)

Steele (1981)[207] contributed further to the '*transactive relationship'* between person and setting, suggesting that the following types of place experiences and characteristics can elicit a powerful and engaging sense of place in certain locations in everybody who encounters them:

Table 2 - Types of place experiences and characteristics (Steele, 1981).

Types of Place Experiences	Major Characteristics of Place
▪ immediate feelings and thoughts	▪ identity
▪ views of the world	▪ history
▪ occupational experiences	▪ mystery
▪ intimate knowledge of one spot	▪ joy
▪ memories or fantasies	▪ surprise
▪ recognition or newness	▪ security
▪ personal identification with a "spot"	▪ vitality
▪ sense of enjoyment or displeasure	▪ memory

Consequently, the concept of place puts an emphasis on '*emplacement*' wherein social and psychological phenomena are played out within physical and spatial contexts (Bonaiuto, Carrus, Martorella, & Bonnes, 2002[208]; Cresswell, 2004[209]; Gieryn, 2000). Furthermore, place may also be influenced by human

perception, cognition, affective propensities, self-concept, social dynamics, economies, cultures, and histories which are filtered through various human value systems, *"ranging from materialistic and utilitarian to spiritual"* (Bott, 2000).[210] Figure 3 below indicates how place and people perceive their environment across three different components of natural, cultural/social and perceptual/aesthetic qualities, and how these shape our understanding of landscape (Swanwick, 2002).[211]

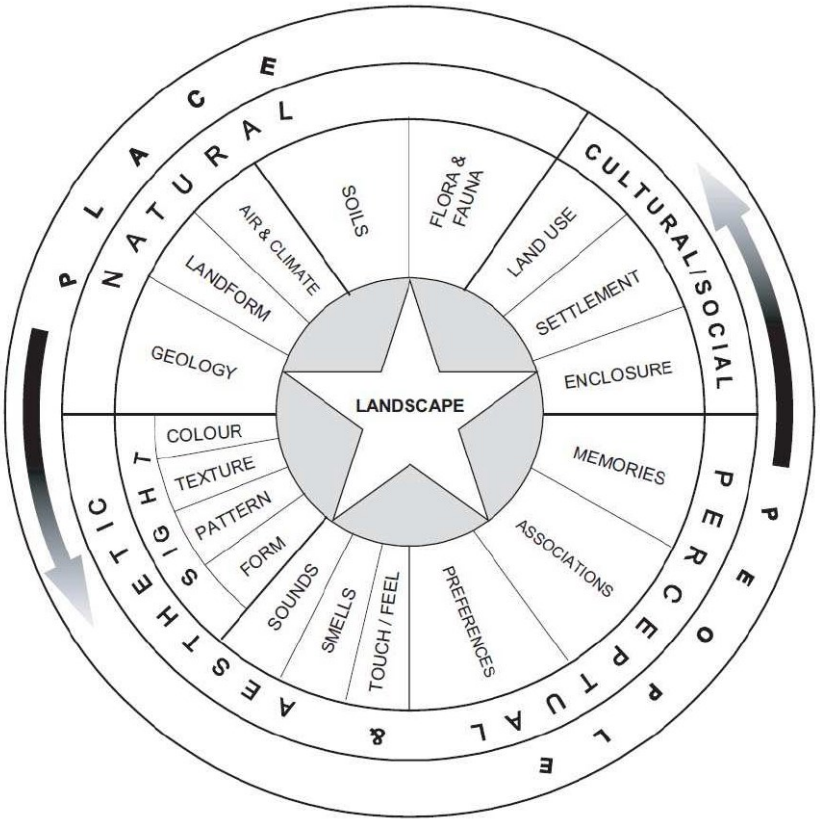


Figure 3 - How we perceive place and landscape (Swanwick, 2002)

Sack (1992)[212] takes this further by suggesting a '*Relational Geographic Framework*' wherein place constitutes a concrete, integrated focal point where the forces of nature, social relations and meaning meet and overlap to create a space which can be experienced, understood, and explained from multiple perspectives along a continuum from somewhere to virtually nowhere, as illustrated in Figure 4 below.

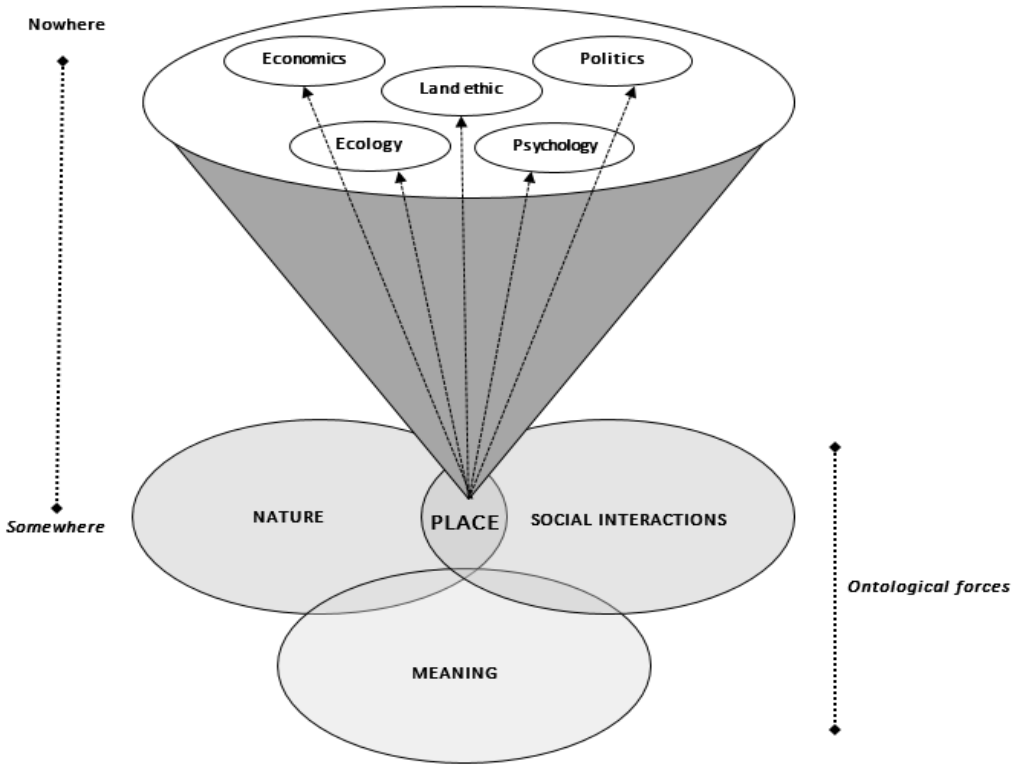


Figure 4 - Relational Geographic Framework applied to Natural Resource Management (Sack, 1992).

Place meaning is starting to find a rightful position in place-related policies as an important human dimension of ecosystem management, and it's implications have increasingly become subject to stakeholder scrutiny and heated debates (Smaldone, 2005).[213] At this stage, it is important to note that one of the major aims of this thesis is to understand emotional and symbolic meanings of protected areas resources that have important implications for ecosystem management, rather than tangible properties associated with commodity production and ecological processes as understood by Schroeder (1992).[214] Beyond a greater ecological consciousness, this implies a shift of focus that recognises the following fundamental constructs (Williams, 1995)[215]:

i. Ecosystems are socially constructed places;
ii. Ecosystems can be described as the intersection of natural forces, social and economic relations and sociocultural meaning;
iii. Ecosystem management must map the full range of meanings that humans assign to places;
iv. Ecosystem management requires new epistemological considerations;
v. Socially constructed places are organised in a hierarchy of nested scales.

It is important to note that Williams and colleagues (e.g., Williams et al., 2014a[216],b[217]; Williams 2014,[218] Williams and Patterson 2005),[219] indicate that place is a plural concept represented by different epistemological positions and starting points. This work adopts a post-positivistic view of place which is based on an information

processing approach. In this position of place, inputs of place attachment are quantitatively considered and compared to other quantitatively assessed constructs such as environmental behaviour. This is consistent with 'place as a locus of attachment' enquiry. However, it is important to keep in mind that there are also other hermeneutic, dialogical, discursive and phenomenological approaches to place, embraced by the broad area of enquiry of 'place as a centre of meaning' (Raymond et al., 2017). [220]

3.2 A place-based approach to environmental management and planning

Many integrated environmental and planning efforts seem to fail in achieving ecosystem conservation goals as they are unable to understand the complexity of socio-ecological systems, especially the interdependency that exists between the resources and people living around them (Miller et al., 2012).[221] However, one can also sympathise with environmental management practioners who are equally confronted with strong sectorial demands or the public sentiment when deciding strategically about complex planning or environmental management issues like sustainable agriculture, community resources, maintaining ecosystems, and biodiversity conservation (Brunckhorst, 2010).[222] Furthermore, numerous stakeholders could be involved in protected areas, representing multiple interests and presumed to hold different management preferences for how to actually administer protected land (Brown et al., 2015).[223] Even conservation science remains conflicted on the aims and methods of conservation science itself, and the best conservation approach for protected areas. So far, four prominent but opposed viewpoints have emerged from this debate (The Future of Conservation project, 2017):[224]

i) the '*New conservation*' approach (Marvier, 2012;[225] Kareiva et al., 2012,[226] Levin, 2014[227], Marris, 2014,[228] Marvier et al., 2014)[229] which advocates a shift towards viewing conservation as being about protecting nature in order to improve human well-being (especially that of the poor), rather than for biodiversity's own sake.
ii) The '*Traditional Conservation*' approach (Soulé, 1985,[230] Greenwald et al., 2013;[231] Reed et al., 2013[232], Miller, 2014[233]) which supports the protection of nature for its own sake and is critical of markets and economic growth as tools for conservation since this could imply neglecting species that may be considered to be of little economic value.
iii) The '*Market Biocentrism*' approach (Wilson, 2016)[234] which argues for conservation support based on nature's intrinsic value along with a market-based approach.

The '*Critical social scientists*' approach (Bockington, 2011;[235] Büscher et al., 2012;[236] Spash, 2015[237]) which argues against the ability of markets and capitalism to deliver benefits for both nature and people, and prefers conservation activities which favour the economically poor and/or politically marginalised, while improving

human welfare.

Environmental planning which meets the needs and aspirations of the affected community remains an immensely complex challenge - especially when attempting to strike a balance between ecology and society while responding to internal and external drivers of change (Ostrom, 2002;[238] 2007[239]). Consequently, it is no surprise that place-based approaches to environmental management (rather than typical site-based approaches) are becoming integral to the practical implementation of ecosystem conservation (Olsen et al., 2011).[240] A place-based approach provides a 'relational' view of a place and offer an alternative to fixed variable and static points of views (physical determinism), focusing instead on meaning. In fact, the relational view acknowledges that a space becomes a place as meanings are assigned to it through social relations, and these social meanings, in turn, act to reshape places (Lefebvre, 1991).[241] Consequently, place-based conservation is typically motivated by a stronger role for local community and bottom-up decision-making processes. However, it should be noted from the onset that there does not appear to be one single definition of what is meant by a place-based approach (National improvement service for local government in Scotland, 2016),[242] and place-based conservation approaches are defined as those which:

- Are focused on conservation methods and issues that pertain to a specific place or region;
- Are designed, targeted, and conducted at places that are of special significance to the communities that use them;
- Are developed by communities for those same communities' benefits and which address issues that exist at the neighbourhood level;
- Value the experiences of local communities and help provide ecosystem conservation which combines their traditional knowledge with modern technologies and techniques;
- Engage public entities to work with local communities to plan, design, resource, build and deliver services around people, families and communities;
- Make the most of assets / capabilities already available in local communities and continuing to develop the capacity of people, families and communities to support conservation;
- Seek to support people, families and communities to become more engaged, empowered, connected and resilient;
- Focus on prevention and early intervention, tailored to local needs and circumstances; and
- Enable public authorities to become catalysts and facilitators, rather than simply providing autocratic conservation services. (ibid.)

Clearly, there is substantial overlap and complementarity between placed-based approaches and other frameworks for environmental management. For instance, landscape approaches can also be place-based but

they provide a more targeted emphasis on providing a wider encompassing scale for assessing and managing areas since they incorporate geological, geomorphological, biological and anthropic influences, and arguably offer a more comprehensive snapshot (Cassar and Conrad, 2012).[243] Nonetheless, parallels with place-based management are still inferred since a landscape is not only considered as a physical "space" for living but also a place with meanings and contributions to social identity (Hunziker, 2007).[244] Both place and landscape approaches emphasise adaptive management, stakeholder involvement, and multiple objectives. They are also driven by similar principles when attempting to reconcile and integrate conservation and competing land uses on the landscape scale, with these principles including (Bockmühl, 2011)[245]:

1. Continual learning and adaptive management - *Allows for learning and new understanding, obtained while mediating between land use and ecosystem conservation, in order to serve as a basis for revising strategies;*
2. Common concern entry point - *Allows for simpler and common objectives between stakeholders to build trust and help move forward in a stepwise approach;*
3. Multiple scales - *Allow for capturing of processes operating at different scales which can improve local interventions, inform policy, and help coordinate administrative entities;*
4. Multifunctional uses and purposes - *Allows for different landscape values by different stakeholders by entertaining trade-offs in spatially explicit ways which integrate ecosystem management;*
5. Involve multiple stakeholders - *Allows for proper engagement with stakeholders for more effective and equitable outcomes which allow for change over time;*
6. Negotiated and transparent change logic - *Allows for stakeholder diversity by reaching a shared vision on goals, challenges, risks , uncertainties, as well as on options and opportunities;*
7. Clarification of rights and responsibilities - *Allows for clarification of rights and responsibilities, and how conflicting claims will be negotiated via an accepted legitimate system for arbitration, justice, and reconciliation;*
8. Participatory and user-friendly monitoring - *Allows for the generation and transparent sharing of information from proposed activities, progress and threats;*
9. System-level resilience - *Allows for actions which address threats and improves capacity to respond to shocks; and*
10. Strengthened stakeholder capacity - *Allows for effective participation by building capacity amongst stakeholders on required skills and capacities (social, cultural, financial).*

Other approaches to environmental management like market-based approaches also have merit since they can provide direct economic incentives to land stewards for environmental services. They can also help realign private and social benefits by internalising any ecological externalities, diversifying sources of conservation

funding, as well as making conservation an attractive land-use paradigm (Adhikari, 2009).[246] Similarly, an ecosystem approach to management is one that is "*geographically specified, adaptive, takes account of ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse societal objectives*", with implementation needing to be "*incremental and collaborative*" (NOAA Strategic Plan, 2004;[247] 2005[248]). These approaches are in most cases process-oriented approaches which remain substantially different from sectoral and project-based outlooks. It is important at this stage to ensure that the reader distinguishes between place-based and traditional project-based approaches since in the latter the focus is much narrower and typically focused on single developments in isolation from other activities in the vicinity. Table 3 below summarises the salient contrasts between place-based and project-based approaches.

Table 3 - Contrasts between place-based or landscape approaches against project-based approaches to environmental problems (reproduced from Sayer et al., 2013).[249]

Issue	Sectoral or project approach	Landscape or place-based approach
Problem addressed	Simple.	Complex (even "wicked").
Objectives and endpoint	Precisely defined.	Loosely defined.
Objective setting	Fixed in advance.	Regularly revisited.
Planning	Linear (grand design).	Nonlinear and in frequent need of revision (muddling through).
Scale	Local: Generally one or two major land uses.	Larger scale: multiple interacting land uses.
Scope	Generally well defined.	Fuzzy and evolving (subject of consultation and negotiation).
Emphasis	Goal-driven.	Process-driven.
Success and failure	Easily identified ("black and white").	Perception of positive and negative outcomes are stakeholder dependent and determined by changing contexts ("shades of gray").
Monitoring	Progress can be measured, simple, evidence-based, defined in advance.	Complex, targets move and desired outcomes may require modification over time.
Learning	Informal and project cycle level.	Integral and continuous, social learning.
Management and governance	Clear and well defined organizational roles and structures.	Organizational roles evolve and often overlap; civil society has increasing significance.
Authority	Largely centralised and clear.	Decentralised /distributed, potentially dynamic and negotiated.
Time scale	Short to medium term (a few years).	Many years to several decades.
Role of other actors	Subjects of a project.	Participants within a process.
External factors viewed as	Constraints and contexts.	Possible subjects of higher level interventions to reduce threats or enable processes or outcomes.
Negotiations to achieve	Specific outcomes.	Engagement and to determine what is mutually

		acceptable.
Role of science	To lead and define.	To detect patterns, inform interpretation and contribute to evaluation and learning.
Funding	Carefully budgeted; fits present-day donor cycles.	Indeterminate (ideally institutionalized to support a long-term vision.

Conserving special places in our terrestrial environment is a great way to balance the often competing, and occasionally conflicting, demands of resource use, economic development, and conservation. Consequently, this research effort is focused on place-based approaches to environmental management since they provide the opportunity to design, target, and conduct environmental planning for places that have a special quality, are of some particular significance, or represent a combination of characteristics for different people. Nevertheless, the only place-related key planning document in Malta to-date is the '*Landscape Assessment Study of the Maltese Islands'* published back in 2004 (MEPA) as part of the process of reviewing the Structure Plan for the Maltese Islands. However, Conrad (2009;[250] 2011[251]) flags valid concerns on the extent to which it reflects community perceptions of landscape. She attempted to understand people's perceptions of the Gozitan landscape by investigating respondents' understanding of the term 'landscape', their opinion concerning characteristic aspects of the landscape of Gozo, aspects revealing change in the landscape and their personal desired future vision of the landscape (n=480). When comparing results, Conrad concluded that similarities amongst cohort responses emerge, like a focus on determining landscape character based on physical landscape characteristics and agreement on causes of landscape change. She also notes that a key difference remains linked to respondents' tendency to also highlight intangible features of landscape like 'feel', 'experience' and values. The MEPA assessment study, on the other hand, specifically focuses on landscape as the "*visual aesthetic*" dimension of an area only. A similarly interesting observation was how respondents were keen on discussing complex facets of landscape change and blaming negative change on a *"changing social culture and way of life, and the commercialisation of the island and the power relations in Maltese society".* Consequently, Conrad concludes that the subdivision of landscape character units applied in the Assessment Study appear to hold little relevance to the way in which the landscape is perceived by the public in general.

If participatory place-based conservation management is to take root, adequate research methods must be developed to integrate the geography of place with the human perception of that place. The arguments on the need to consider human perception in a geography of place have been substantially discussed in the conservation social sciences by Daniel et al. (2012),[252] Kaltenborn et al. (2017),[253] Kati & Jari (2016),[254] Muhar et al. (2017),[255] Norgaard (2010),[256] Raymond et al. (2013),[257] Satterfield et al. (2013)[258] and, Setten et al. (2012), among others.[259] Simply considering natural assets within protected areas as a commodity or a manageable resource alone, runs the risk of isolating the prevailing environmental issues from the contextual whole of the area thus detracting from place meaning or sense of place. As mentioned earlier, this often results in a disconnect

between people and planning processes, generating conflict and resistance to management plans (Stewart et al., 2013).[260] Entrikin (1991)[261] in fact suggests that scientific discourse in place-based approaches can bridge a central position between the scientific/technical perspective and a more appreciated and inclusive view from communities' place meaning(-ness of place), while also remaining spatially specific. This chosen place-based approach involves three major shifts in protected area analysis and frameworks:

i) from non-spatial modelling of place resources as commodities to the consideration of social-ecological dynamics, as reflected in the literature on ecosystem management (Christensen et al., 1996) and ecological resilience (Gunderson, 2000);[262]
ii) from top-down, expert-driven decision-making frameworks to a more decentralised governance approach aimed at inclusiveness and collaboration (Wessells, 2010;[263] Young et al., 2007);[264] and
iii) consideration of the historical, cultural, and symbolic significance of places, acknowledging community meaning and identity (Brandenburg & Carroll, 1995;[265] Adger et al., 2011)[266] obtained from local knowledge (Fischer, 2000).[267] This work is particularly focused on addressing this third recommendation.

3.3 Socio-spatial mapping for environmental management

Spatial mapping and analysis of geographically referenced information is being used extensively in the social sciences to gain spatial perspectives that can help contribute to the resolution of complex environmental problems which are embedded in space and time. This is especially the case today due to the proliferation of location-based personal devices over the last decade (Goodchild, 2010).[268] This potential opportunity departs from the fact that places are never simply locations since they are always sites for someone and of something (Shields, 1992)[269] and endowed with subjective meaning. The process of analysing these discourses of space and related spatial practices is referred to as a process of '*social spatialisation'*. The term social spatialisation will be used to designate the social construction of the '*spatial as product of both discursive and non-discursive elements, practices and processes*' (Shields, 1992).[270] In view of recent efforts towards community involvement in natural resource management, socio-spatial mapping has emerged as a powerful tool to bring communities' knowledge and points of view to the attention of public authorities or decision-makers (Hernandez, Hidalgo and Ruiz, 2013).[271] In fact, participatory mapping is nowadays being used extensively to create maps that represent community values and perceptions, land use patterns, local knowledge, and practices that can empower decision making while also empowering stakeholders. Participatory mapping in fact refers to "*community-based research and development approaches that use local people to map places*", and which facilitate public involvement in policy making (Sieber, 2006;[272] Przybylski et al., 2013)[273] by projecting cognitive spatial knowledge onto cartographic and visual descriptive datasets (Herlihy and Knapp, 2003)[274]. McLain et al. (2013)[275] and Brown et al. (2013)[276] identify three broad potential uses of socio-spatial data in environmental planning, namely to: 1) *secure*

land tenure and manage natural resources; 2) identify local ecological knowledge; and 3) identify peoples' connection to place.

Another reason driving the interest in the spatial projection of social constructs is the need to understand the relationship between such social constructs at different levels of scale, and their influence on and within the macro geographical context (Sallie, 2000).[277] Spatial mapping of intangible assets like CNT or PA, and other nature-place-human priorities, can be a useful approach to better integrate local knowledge in conservation planning and works not only to detect areas of common values or disagreement, but also as an educational tool. CNT and PA spatial mapping can allow planners to identify areas of distinctive human connection and depict that data layer with related land characteristics for areas in need of biodiversity protection (Colchester, 1998)[278] and integrated resource management, while contributing towards participatory decision making and providing a reference point for monitoring or evaluation. This effort is expected to provide insights into how social constructs can be defined spatially and whether there are any implications at the neighbourhood or national spatial scale for collective action and environmental planning. According to Hays and Kogl (2007)[279], networks most relevant to mobilising collective action at the local level are those invested within that neighbourhood, and where social interaction shapes (and is shaped by) the spatial context and meanings people give it (Jorgensen, 2008)[280]. Consequently, a mapping process that includes input by the people most affected by the issues being mapped has the potential to develop critical consciousness and generate collective action because (Moore and Garzon, 2010; 1)[281]:

- *"Participants develop their own language to describe their reality, producing terms and definitions that reflect their values.*
- *Shared personal experiences enable groups to analyse patterns and identify collective experiences.*
- *The role of institutions and the extent of their power in shaping collective experiences becomes more obvious."*

Over the last years we have seen the emergence of a new field of customised online mapping platforms which offer more accessible tools than standalone geographic information systems (GISs) and that enable non-specialist researchers to undertake the analysis of geospatial data sets. These online platforms and tools have created a new mapping landscape which can empower researchers to easily visualise, manipulate, and share their findings as dynamic layers of data on top of base maps, and in formats which are as useable as Google Maps but with greater power and flexibility, and at lower financial costs. WebGIS is defined by Peng and Tsou (2003)[282] as a number of inter-related geographic information services relying on the World Wide Web to access spatial knowledge and analytical techniques in delivering GIS outputs. In fact, WebGIS can facilitate a sense of participation equality since it offers citizens the opportunity to access data and spatial tools at their own

convenience, beyond the limitations of traditional public meetings (Attard, 2014)[283] while also offering people the opportunity to voice their opinions and share their views on a spatial scale (Kingston et al., 1999).[284] In other words, socio-spatial planning and associated GIS tools can help provide a vision and consistent direction not only of what is desirable, but especially what is possible socially. These developments have led to another two emerging academic disciplines that have been around for the last 25 years but are now coming of age due to technology, namely:

i) Geographic Information Science (GIS) which was first noted for its potential by Goodchild (1992)[285] and who later defined it as "*that branch of information science that deals with the geographical domain, or as the set of fundamental scientific questions raised by geographical information and the technologies that collect, manipulate and communicate it*" (The Royal Society, 2015; 1).[286]

ii) Citizen Science which finds its roots in seminal work by Alan Irwin (1995)[287] and Rick Bonney (2009),[288] and is defined as the "*partnerships between those involved with science and the public in which authentic data are collected, shared, and analysed*" (Jordan et al., 2012a).[289] Citizen science reflects both the desire to create or grow data sets on temporal and spatial scales (Dickinson et al., 2012)[290] and the desire to educate members of the public (Bonney et al., 2009b).[291] It is also a form of research collaboration which can involve the public in scientific research projects aimed at addressing real-world problems (Wiggins and Crowston, 2011)[292] by merging knowledge from public engagement, education, science outreach, computer science, human-computer interaction, statistics, algorithms and domain knowledge (e.g. ecology, astrophysics, life science, digital humanities, archaeology). It is clear that biology, sociology, educational psychology, science teaching and learning, ecology, conservation, and resource management are all areas of inquiry that can greatly inform environmental research (Rebecca et al., 2015)[293].

GIS science and citizen science have also taken a limited interest in the combination of place and nature. This effort makes a contribution towards adding a socio-environmental dimension to GIS science, and attempts to visualise information and map data which is not "inherently spatial" (IEEE Computer Society, 2010)[294]. Most current spatial projections transform data about points on the Earth's surface to a one dimensional plane, which excludes certain important characteristics of a three dimensional space.[295] However, for a map to reflect a community's local knowledge and experience, it must use that community's same 'language', based on that community's own discourse, so that participants can see something of relevance to them in the final map (Moore and Garzon, 2010).[296] Furthermore, there has been limited interest and studies on how communities understand space and how lay participants' perspectives can be applied to a spatial planning context (Natarajan, 2015).[297] This approach is expected to expose knowledge from what can be located in a point in space geographically to the relationship which that point (or its contents) has with the neighbouring/adjacent spaces or community values

(spatial). It is this very relationship at the crossroads which is of interest to this effort.

Public participation geographic information systems (PPGIS) are an excellent tool that has even started to be used by community advocacy and non-profits locally (MareNostrum, 2015),[298] with very interesting outcomes for the study area on land use and state of the open spaces (http://www.grandharbourcharter.net/). Volunteered Geographic Information (VGI - Goodchild, 2007)[299] is also gaining ground where people are being enabled to contribute directly to map making and volunteer geographic information which asserts their own views of their surroundings and contribute to local decision making. However, both PPGIS and VGI have a number of limitations like high costs, the potential marginalisation of the digitally illiterate, possiblelimited cartographic literacy amongst respondents, and accuracy of generated data (Brown, 2012).[300] However, a study by Pocewicz et al. (2011)[301] which used a mixed-mode approach to evaluate internet mapping versus paper-based methods concluded that there was hardly any difference in the spatial distribution of places mapped between Internet and paper methods. While using a paper-based PPGIS survey resulted in a higher response rate, reduced participant bias, and greater mapping participation, nonetheless the survey tool did not seem to influence the spatial distribution of the PPGIS data. The approach adopted here is different and opens opportunities for a somewhat new point of view and reconsideration since it enables the critical analysis of CNT and PA constructs using established statistical research methods, and then reflecting on those same constructs with other environmental spatial data using GIS. This approach ensures a stronger integration of a range of disciplines from both the sciences and the humanities by attempting to operationalise these factors within socio-spatial planning and environmental management efforts. The process adopted here is also significantly different from emerging literature on social cartography in that the representational cartography effort is undertaken by the researcher post interview, and based on the data gathered during the interview, rather than participatory mapping directly by the respondent, either on paper or electronically.

4 Literature review of three social constructs and their measures

This chapter provides an overview of key literature related to the three cognitive constructs explored in this work: connectedness to nature (CNT), place attachment (PA), and environmental behaviour (EB). It also explores the potential application of these constructs in environmental management. This chapter first presents the results of a literature review of published papers relating to CNT, based on principles of Systematic Literature Reviews (SLRs). It then presents the results of a separate review of literature related to place attachment and environmental behaviour. For each of the three constructs, this chapter describes (i) the methodology used to review the literature, (ii) an overview of the construct and key literature, and (iii) a synthesis of measurement methods. The final section of the chapter discusses gaps/limitations that were identified in the present body of work through this review.

A preliminary count of search results for the terms "place attachment" and "connectedness to nature" on Scopus in papers published between 2002 and 2014 suggests that the concepts of place attachment are much better understood than connectedness to nature. A search for the term "place attachment" (PA) revealed 1064 potential sources which are of direct relevance to the subject, whereas only 260 papers were noted for CNT during the same period. This presented an opportunity to make a case specifically for CNT, and review its potential application in planning and in environmental management. This SLR method is explained in further detail in the next section, and in a paper published in the Journal of Environmental Management which attempted to fill the gap in the literature.

4.1 Connectedness to nature (CNT) and its relevance for environmental management

A review of CNT literature was undertaken using principles of systematic literature reviews (SLRs) protocols as a guide. The SLR protocol was identified a-priori; it detailed the study inclusion criteria, established a series of review questions, identified relevant studies, appraised their quality and summarised the evidence to provide an overall picture of CNT literature. The aim was to synthesize findings from recent literature in order to understand the direction CNT research is taking, while reducing the effect of the reviewer's own bias, identifying gaps, and suggesting directions for further research (Khan, 2003[302], Higgins & Green, 2005)[303]. Pullin and Knight (2001;[304] 2004),[305] Fazey et al., (2004)[306] and Sutherland et al., (2004)[307] agree that SLRs are improved methods for the identification of academic evidence and for its application in environmental conservation and management. This section provides a concise and systematic synopsis of the somewhat fragmented literature on

CNT for researchers to draw reliable conclusions on CNT's potential contribution to environmental management (Sackett et al., 2000).[308]

4.1.1 Systematic literature review methods

The first step of the literature review involved systematically identifying data sources. The papers which formed our dataset were thus selected from peer reviewed literature on CNT published between January 2002 and December 2014. Searches of web-based databases hosted by SciVerse (Scopus) were conducted, specifically under the categories for "Life sciences" (7,200 journal titles) and "Social sciences and humanities" (5,300 titles). Scopus was selected because it offers significant coverage of databases that deal with the environmental social sciences. The search terms used were "*connectedness to nature*" and "*nature relatedness*", with papers selected for further evaluation if they contained this term within the article title, abstract and/or keywords. Other related search terms were excluded since CNT is by now established as the leading term for this construct. The use of the Scopus database inevitably means that other relevant CNT literature may have been overlooked, since it only offers literature written in English, and excludes other works published in books, dissertations, and conference proceedings or online. Nonetheless peer-reviewed research communicated through the medium of established journals remains the most reliable source for a systematic literature (SLR) review that can withstand academic scrutiny, despite the above limitations.

Notwithstanding the above, for researchers trying to identify or build a CNT measure ideal for their needs a more complete list of available measures is needed. Consequently, in order to provide a more comprehensive literature review of measures associated with CNT, the author also undertook a Scopus search beyond the reference years, and furthermore screened the first 100 returns of literature from the Google search engine using the same keywords, but focusing specifically on measurement of CNT. This second dataset was used to provide a more comprehensive collation of CNT measures. Only English language publications were assessed.

Study inclusion criteria

Each article returned by the database search had its full text reviewed if the title and/or abstract were deemed to meet any three of the following study inclusion criteria, namely: a) articles specifically dealing with the topic of connectedness to nature; b) articles containing a measure quantifying the connection to the natural world; and c) articles that attempt to map CNT. Publications were scored for the extent to which they discussed each of the three inclusion criteria listed above in the title or abstract, and when necessary in the introduction and discussion sections. Thus, whether a published article was deemed relevant was dependent on the context of the study, and its direct relevance to CNT. Consequently, papers that simply mentioned CNT or simply discussed fringe aspects of underlying CNT concepts were deemed to be irrelevant to this review. All papers were assessed

by the primary author to ensure consistency, with key findings then reviewed by the second author. After searching the Scopus database, the selection was narrowed down to 260 papers published between 2002 and 2014. Of these 260 sources, 90 papers were deemed to match the study inclusion criteria mentioned above.

The final sample was comprised of 90 peer reviewed papers across forty different journals, which were found to be of direct relevance to CNT within the 13 years analysed on the Scopus database. Out of the 90 papers reviewed for the first dataset, 49% used one or more tools to quantify CNT, and some of the studies reviewed have even developed psychometric scales of their own. A comparison against the coverage of other similar psychological constructs like place attachment (in the same database and over the same period) suggests that CNT is still somewhat under-represented in the Scopus literature.

Coding protocol

The selected papers were each reviewed carefully to assess their relevance against a coding protocol presented below, which was derived following a preliminary review of all papers beforehand. We identified the following 10 review variables in order to describe the papers' context and methods relating to CNT, and these variables were subsequently scored for each paper (Table 2).

Table 2 - Descriptive variables and answer categories used

#	Variables	Questions	Categories
1.	Study Category:	What type of study is this?	(i) Empirical research (i.e., qualitative and quantitative studies), (ii) Reviews, and (iii) Essays/comments.
2.	Research integration	Is the study stand-alone or part of a wider programme of research?	i) Stand-alone, ii) wider.
3.	Funding	Did the study receive funding?	Yes/No. (i) No funding; (ii) State funding; (iii) NGO funding; (iv) EU funding; (v)Internal funding; (vi) Source not specified.
4.	Journal and country:	Which journals are publishing about CNT, and which countries are papers coming from?	(i) Journal name; (ii) Origin of main author.
5.	Disciplinary focus:	Does the study emanate from a specific disciplinary standpoint?	(i)Psychology, (ii)Human geography, (iii)Biology, (iv)Physical geography, (v)Sociology, (vi) Medical, (vii) Conservation.
6.	Spatial focus:	Is the study focused on a particular type of environment? If yes, what type of environment?	Yes/No. (i) Natural areas (not directly modified for human purpose); (ii) Rural areas; (iii) Urban areas, (iv) Office environments; (v) Outdoor areas or urban parks; (vi) Contaminated/polluted environments; (vii) Other.
7.	Stakeholder Involvement	Does the study involve stakeholders?	(i)No stakeholders involved; (ii)Official agencies; (iii)NGOs; (iv)Locals; (v)Resource users; (vi)Research community; (vii)Minority groups.
8.	CNT mapping	Does the study involve spatial/geographic mapping of CNT or related concepts?	Yes/No.
9.	CNT Measurement	Is the study focused on the measurement of CNT?	Yes/No.
10.	Policy and Management	Does the study have practical implications for policy and environmental management?	Yes/No

4.1.2 Connectedness to nature theory

A substantial body of literature has been written that examines the nature of the human relationship and orientation towards nature (e.g. Schultz, 2001, [309] 2002,[310] Degenhardt, 2002[311]; Mayer & Frantz, 2004;[312] Orr, 2004;[313] Nisbet, Zelenski & Murphy 2009[314]). This section is concerned with understanding how people identify with the natural environment as an important aspect of the person-nature relationship. Connectedness to nature as a construct is also known as nature connectedness, nature relatedness, connectivity with nature, emotional affinity toward nature, or inclusion of nature in self.

As mentioned earlier, Wilson (1984)[315] claims that humans have an innate kinship for nature which he terms biophilia. This understanding of our sense of inclusion in nature is referred to as our *'ecological identity'* or

'*ecological self*' (Naess, 1973);[316] and attachment to nature and place are thought to affect human identity or self-definition (Clayton & Opotow, 2003; Mayer & Frantz 2004[317]; Schultz et al., 2004[318]). Perkins (2010)[319] defines the construct of love and care for nature as "*a deep love and caring for nature which includes a clear recognition of nature's intrinsic value as well as a personal sense of responsibility to protect it from harm*". Similarly Nisbet et al., (2009)[320] proposed the term '*nature relatedness*' (NR) to explain our individual levels of connectedness with other living things in the natural world - even those that are not appealing to humans. NR is in fact thought to be relatively stable over time and across situations, though not completely fixed (Brown and Weber, 2012)[321].

Klassen (2010)[322] argues that there is an interrelatedness between ecological identity, sense of place and ecological literacy (**Figure 5**). The degree to which these three concepts influence individuals varies from person to person and one's CNT is dependent on a variety of precursors including prior knowledge, lived experiences, cultural background, and encountering and conversing with people who display their compassion, caring, and dedication for environmental concerns. Schultz (2002)[323] also suggests that '*values*' act as a bond between all these concepts and precursors mentioned by Klassen since they underpin the relationship with the natural world, and their affective psychological and physiological responses to natural settings (Crystal and Harris, 1987)[324].

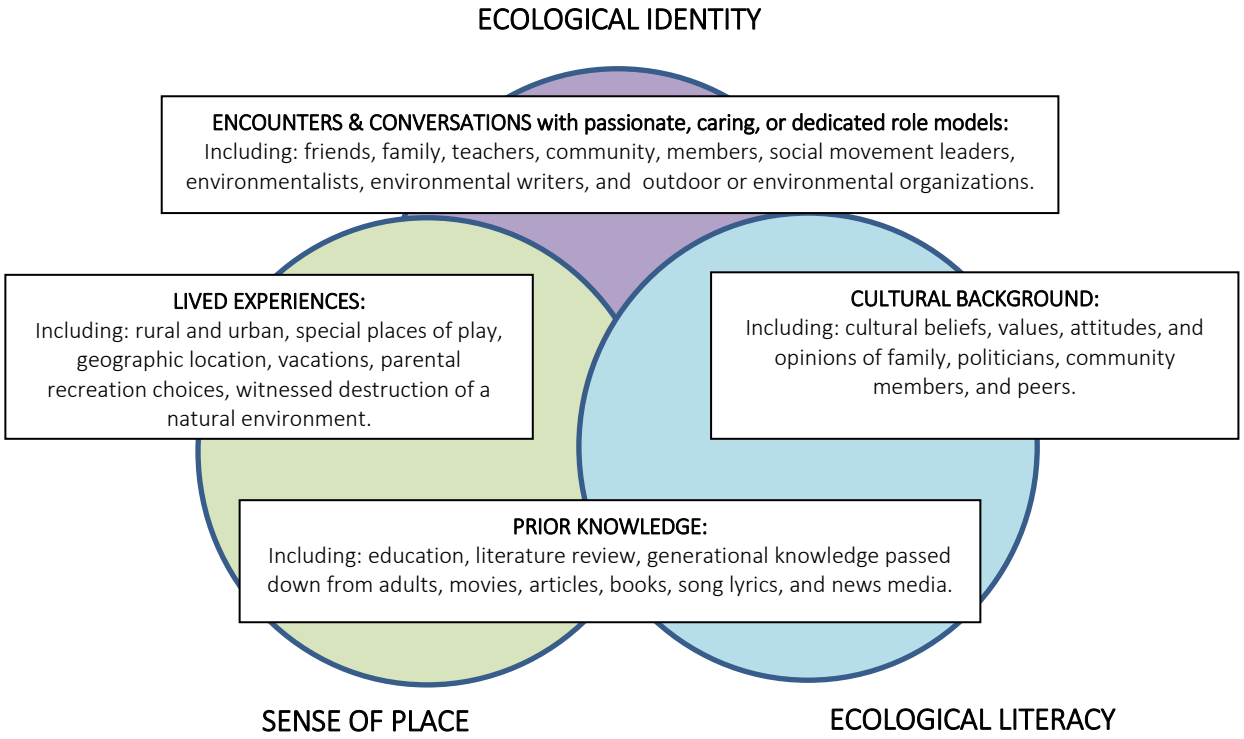
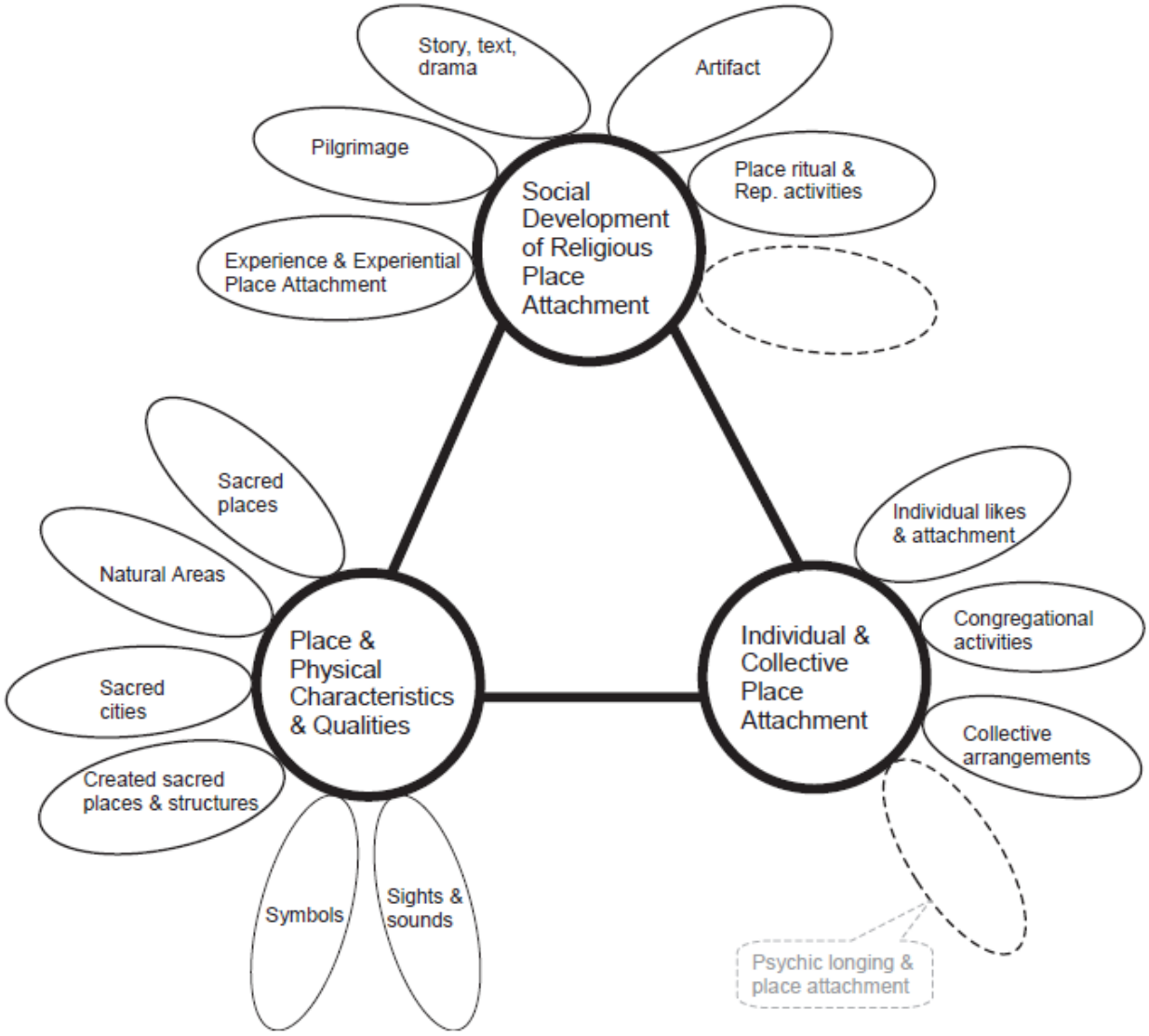


Figure 5 - Connectedness to Nature: Interrelationships of Concepts & Precursors (Klassen, 2010).

Various authors have suggested that humans were in the past more physically and psychologically connected to nature than people living in industrialised nations today (Melson, 2001[325]; Shepard, 1993[326];

1996).[327] This implies a potential disconnect from the natural environment (Axelrod and Suedfeld, 1995[328]; Beck and Katcher, 1987;[329]1996)[330] primarily due to the displacement of people into cities which seems to insulate us from outdoor natural environmental stimuli (Stilgoe, 2001).[331] Clearly human pressures in modern society, coupled with technological improvements and increased urbanisation, could also be affecting people's ability to connect with nature in their daily lives, potentially creating a nature-disconnect which is thought to have an impact on our empathy for other species and our desire to help conservation efforts (Louv, 2008[332]; Kellert, 1997;[333] Conn, 1998[334]). This could also be leading to a decline in people's connectedness across generations and diminishing our experience in and with the natural world (Kahn, 2009)[335]. Some even argue that the relationship between people and the natural world is in fact broken, and that this is leading to a failure to value the very same systems that keep us alive (Monbiot, 2013)[336]. Consequently understanding how a sense of connection with nature can impact upon people's decisions to protect nature is critical if we wish to protect biodiversity, and ultimately this same sense of connectedness to nature (Howard, 1997[337]; Schultz, 2000[338]).

Wilson (1984) also suggests that another important determinant impinging on our deep and profound relationship with nature is spirituality, and suggests that an ecological self is experienced through '*a sense of belonging or spiritual oneness with nature*'. In fact, place can be defined phenomenologically as *"any environmental locus in and through which individual or group actions, experiences, intentions, and meanings are drawn together spatially"* (Relph, 1976;[339] Casey, 2009).[340] It incorporates generative processes through which a place and its experiences and meanings, including place attachment, shift or remain more or less the same. Mazumdar & Mazumdar (2004)[341] present a conceptual model for understanding the complex connections between religion, place, identity, and attachment. They also developed a model to represent how phenomenologically place is not just the physical environment separate from people but is actually a multivalent and complex interaction of how they experience place (Figure 6).



Broken line ellipses indicate possibilities not discussed in the original paper, and lighter fonts indicate probable titles of areas for those ellipses.

Figure 6 - Religious place attachment: a model. (Mazumdar, 2004)

Similarly, Kamitsis and Francis (2013)[342] conclude that exposure to nature and CNT are indeed positively associated with psychological well-being and significantly mediated by spirituality. Schroeder (1990,[343] 1991[344]) defines spirituality as the experience of "*being related to or in touch with an 'other' that transcends one's individual sense of self and gives meaning to one's life*" at the deepest level of the human psyche (Crystal and Harris, 1987). Thus, the human values of natural areas can also include a sense of timelessness and feelings of community and connectedness to other people, as well as to places and things in nature (e.g., landforms, natural features, other living things).

Schultz (2002, 2004)[345] argues that the construct for CNT is composed of three dimensions of psychological inclusion in nature - i) a cognitive or mental representation of that self that creates an

interdependence with nature; ii) an affective representation which refers to an individual's emotional bond with nature that creates a sense of intimacy and care for it; and iii) a behavioural component which refers to an individual's commitment to act in the best interest of the natural environment and protect it. However, Ashmore, Deaux and McLaughlin-Volpe (2004)[346] suggest that there are more dimensions to CNT and propose that '*collective identity'* also has a determinant role since one may interpret nature as a collective community to which humans belong (Clayton, 2003).[347] Collective identity is defined by Tajfel (1978)[348] as "*that part of an individual's self-concept which derives from his knowledge of his membership of a social group (or groups), together with the value and emotional significance attached to that membership"*. Collective identity is also related to social capital theory which Perkins et al. (2002)[349] define as "*the norms, networks, and mutual trust of 'civil society' that facilitate cooperative action among citizens and institutions*", and which result in direct benefits for those community members (Kawachi et al., 1997).[350] In fact, social capital theory could also play an important role in the way humans adapt to environmental shocks (Mogues, 2006),[351] or in certain cases even explain why they can hamper adaptation (Bezabih et al., 2013).[352] It would therefore be fair to conclude that the level of resilience of social-ecological systems is not only dependent on social factors, such as people's ability to anticipate changes and adapt to future challenges (adaptive capacity), but is also influenced by human intervention, institutional policies and exposure to natural changes over time (Nelson et al., 2007[353]). Consequently, ecological resilience and social factors like CNT are intrinsically interconnected through changing forms of natural resource management demands over time (Ruiz-Mallén et al., 2013).[354]

The above '*eco-psychological*' arguments then suggest that there are significant disparities in the way individuals are attracted to nature, and disconnectedness from nature could indirectly contribute to environmental deterioration (Howard, 1997;[355] Schultz, Shriver, Tabanico, & Khazian, 2004[356]). Schultz (2000) and Howard (1997) argue that if we start to value nature, we will feel a higher concern for it and commit towards its protection. However, the relationship between nature and self is in many ways at conflict with people's perceptions of natural and unnatural environments - where most perceive natural areas as independent from human agency, potentially leading to cognitive dissonance (Festinger, 1957;[357] Elliot et al. 1994[358]). Cognitive dissonance occurs when people are torn between opposing thoughts or feelings about a particular concept (Festinger et al., 1956;[359] Vinning et al., 2008[360]). This dissonance typically leads people to rationalise their environmentally damaging behaviour in order to relieve this dissonance, and feel better about their contradictory perceptions and actions. Hence, resolving this conflict in perceptions of CNT and actual behaviour could lead to more environmentally responsible behaviour (Vinning et al., 2008).[361]

Several authors (e.g. Roszak, 1992[362]; Bragg, 1996[363]) insist that a more connected sense of self to nature is conducive to environmentally responsible behaviour (ERB), and that less tangible social motivations like CNT or place attachment are in fact potential drivers of significant environmental action (Kals, Schumacher, & Montada,

1999[364]; Vaske & Kobrin, 2001[365]; Dutcher, Finley, Luloff and Johnson, 2007[366]) . Indeed, as connectedness to nature or place increases so does one's empathy and willingness to protect it (Mayer & Frantz, 2004)[367]; and direct contact with nature has been shown to increase interconnectedness and love for nature (Wilson, 1984; Kaplan & Kaplan, 1989;[368] Rolston, 1993[369]). Meanwhile, Schultz (2000)[370] argues that the value people give to an object depends on the extent to which they include that object within their sense of self, and that pro-environmental behaviour is more likely with increased connectedness to nature or place (Gosling, 2009; Schultz, 2002). A recent literature review by Natural England (2016)[371] consolidates the emerging evidence that connection to nature is associated with certain well-being, educational outcomes and pro-environmental behaviours. Figure 7 outlines the pathways to nature connection and the inherent benefits that typically are noted from increased connectedness, like improved quality of life, health and prosocial/environmental behaviours (Richardson et al. 2016).[372]

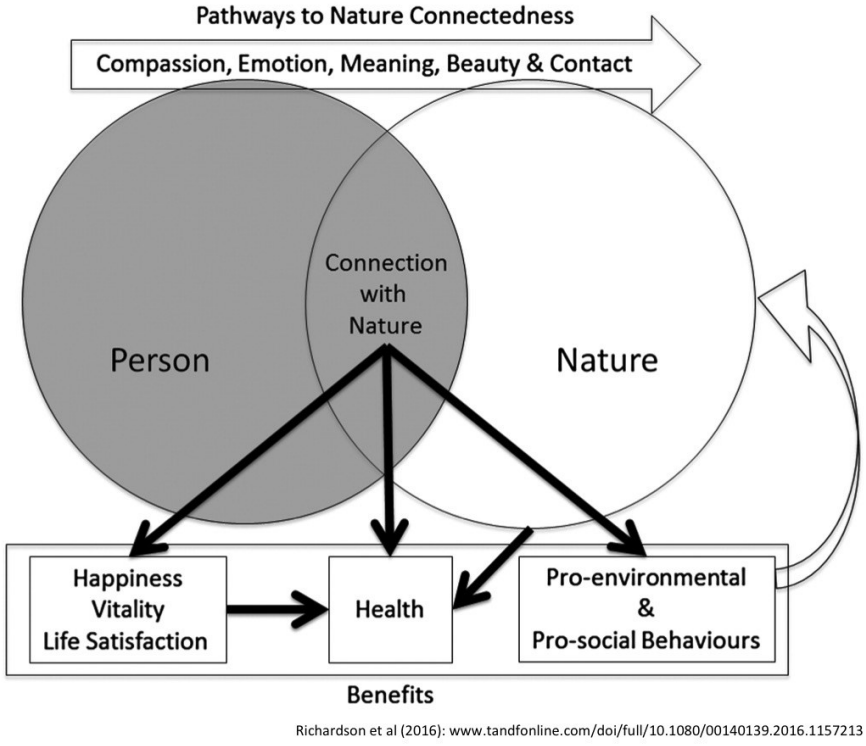


Figure 7 - The benefits and routes to nature connection (Richardson, 2016)

As mentioned earlier, there is doubt that successful nature management can be designed or implemented without taking in consideration the relationship with the broader society. For instance, conserving rural landscapes has been shown to require complex coordination with many public and private stakeholders (Donahue, 1999;[373] Sample, 1994).[374] Despite the potential links between peoples' CNT and planning, only 74% of the studies reviewed involved stakeholders somewhat, with the vast majority of them (60%) being involved for data gathering purposes and to obtain their views (11%). This implies that although there were varying degrees of public involvement, only 3% of the papers attempted to apply the findings through true participatory or consultative research beyond the mere acknowledgement of local people's reflections and attachment to nature.

Nonetheless, it is crucial to note that despite the appeal of participatory research, this in itself raises numerous other academic and political challenges that go beyond the mere production of data (Cornwall and Jewkes, 1995).[375] More needs to be done in order to make the case on how CNT research can contribute towards ensuring that the location of power in the participation process remains with the local people involved (Hovik et al., 2010), while fostering and leveraging this connectedness, or lack of it, towards effective participatory conservation efforts and more responsible environmental behaviour (Ernst and Theimer, 2011).[376]

4.1.3 Measures for CNT

The aim of this section is to provide an overview of CNT measures mentioned or used in the wider literature to measure, quantify and categorise the human relationship with our natural environment. We review the distinctiveness of these measures as a further contribution to the theoretical understanding of connection to nature, and undertake a critical analysis of their strengths and weaknesses.

Table 4 below builds on previous compilations published by Bruni, Schultz and Saunders (2013)[377], Hefler and Cervinka (2009)[378] and Tam (2013)[379] in order to identify any measurement gaps in the existing literature by reviewing a compendium of CNT tools. It should be noted that only the most-cited measures and those intended for an adult target audience were reviewed, and this list is not deemed to be exhaustive. The measures are sorted in chronological order so as to show evolution over time. Scales which were deemed to measure similar constructs at face-value where indicated as uni-dimensional for the sake of this exercise. It is important to note that the majority of measures reviewed are essentially uni-dimensional in scope since they tend to identify one specific aspect of the connection between humans and nature, typically related to affective affiliation, cognitive representation, or relationship commitment (Tam, 2013).[380] On the other hand, other scales like the Environmental Identity scale (EID) seek to measure multiple dimensions of CNT, like the interaction with natural elements, importance of nature, importance of affiliation with nature, and emotions toward nature (Tam, 2013;[381] Clayton, 2003) or behavioural attitudes. The instrument employed in this study is the Nature Relatedness Scale devised by Nisbet, Zelenski, & Murphy (2009) and is marked in bold below.

Table 4 - Measures of CNT, with a brief description of the dimensions identified and variables measured.

(Where CR = Cognitive representation, Affective affiliation = AA, Relationship commitment = RC)

#	Date/ Authors	Measurement scale	Abb.	Dimensions of CNT	CNT constructs identified			Factors, attitudes, constructs or variables measured	Measurement tool
					CR	AA	RC		
1	1994 / Thompson and Barton[382]	Ecocentric and Anthropocentric Attitudes Toward the Environment Scale	EAATE	Uni-dimensional	☒	☒	☒	Measures 2 attitudes (Ecocentric & Anthropocentric) across 3 sub-scales: ▪ Ecocentric attitudes - valuing nature and protecting it because of its inherent value; ▪ Anthropocentric attitudes – a belief that nature is only valued for material benefits that it can give to mankind; ▪ Apathy toward environmental issues - a skepticism of environmental issues and a lack of concern in these issues.	33-item measure, scored on 5-point Likert scale.
2	1998 / Stern and Dietz[383]	Environmental Value Orientations Scale	EVO	Uni-dimensional	☒	☒		Measures value orientations towards the environment: ▪ Egoistic values - respondent's interest in environmental issues that affect people personally; ▪ Socio-altruistic values - environmental actions due to moral obligations and that may have consequences on other human beings; ▪ Biospheric values - cost and benefits to nature as a whole.	23-item measure, scored on a 9-point Likert scale.
3	1997 / Ellis & Thompson[384]	New Ecological Consciousness scale	NEC	Uni-dimensional	☒	☒		Measures general feelings about environmental degradation, limits to economic growth, and potential crises in overpopulation: ▪ Egalitarian biases - favouring equality for all people; ▪ Individualistic biases – favouring the individual approach rather than a collective one; ▪ Hierarchical cultural biases - orderly, well-defined concepts and traditional social roles which justify the elaborate division of labour; ▪ Environmental attitudes and beliefs – inclination towards environmental preservation and utilisation dimensions. .	10-item measure, scored on a 7-point Likert scale.
4	1997 / Hartig, Kaiser & Bowler[385]	Perceived Restorativeness Scale	PRS	Uni-dimensional	☒	☒		Measures qualities of restorative person-environment transactions: ▪ Being away - getting distance from some ordinarily present or routine aspects of one's life;	16-item measure, scored on a 7-point Likert scale.

							▪ Fascination - particular contents and events in the processes of exploration; ▪ Coherence - a function of immediately perceived elements or features of the environment to one another and scope; ▪ Compatibility - match between the person's goals and inclinations, the demands made on the person by environmental conditions, and the patterns of information available in the environment for support of purposive and required activities.	
5	1999 / Kals, Schumacher, and Montada[386]	Emotional affinity toward nature	EATN	Uni-dimensional	☒	☒	Measures emotional inclinations toward nature as love for nature and feeling of oneness with nature: ▪ Love of nature; ▪ Feelings of freedom; ▪ Feelings of safety; ▪ Feelings of oneness with nature.	16-item measure, scored on a 7-point Likert scale.
6	2000 / Dunlap, VanLiere, Mertig, & Jones[387]	New Ecological Paradigm	NEP	Multi-dimensional	☒	☒	Measures sentiments and attitudes towards nature and the environment: ▪ Ecological worldviews ('primitive beliefs'); ▪ Environmental concerns; ▪ Degree to which the respondent views humans as an integral part of the natural environment and their relationship with it.	15-item measure, scored on a 5-point Likert scale.
7	2002 / Schultz[388]	Inclusion of Nature in Self Scale	INS	Uni-dimensional	☒		Measures beliefs regarding one's feelings of connection to the natural world.	Visual measure of 7 pairs of overlapping circles, scored by scoring each of the 7 sets on a scale of 1 to 7.
8	2003 / Clayton[389]	Environmental Identity scale	EID	Multi-dimensional	☒	☒	Measure the extent to which individuals identify with the natural environment and environmental causes: ▪ Individual's past and present interactions with the environment. ▪ His/her self-identification with nature. ▪ Environmental ideology. ▪ Feelings of personal connection.	28 item measure, scored on a 5-point Likert scale.
9	2004 / Schultz, P.	Implicit Associations	IAT	Uni-dimensional	☒	☒	Measures attitudes with strong affective components:	Computer-based test which measures latencies of

	W., Shriver, C., Tabanico, J., & Khazian	Test						▪ Classification of words into four categories – two representing a concept discrimination (such as flowers versus insects), and two representing an attribute discrimination (such as pleasant versus unpleasant); ▪ Distinguishing between 'nature' words (ex. animals, trees) and 'built' words (car, city).	responses to these tasks, and interpreted in terms of association strengths.
10	2004 / Mayer & Frantz[390]	Connectedness to Nature Scale	CNS or CTN	Uni-dimensional	☒	☒		Measures the extent to which respondents feel a part of the natural world and how emotionally connected they are to it.	14-item measure, scored on a 5-point Likert scale.
11	2005 / Beckers[391]	Human actions in and reactions toward nature		Uni-dimensional	☒	☒	☒	Measures behavioural influences by assessing the number of behavioural steps and the difficulties of each step separately: ▪ Reason (i.e. the intention) behind a behaviour ; ▪ People's connection with nature indirectly as a predictor of people's conservation.	21-item measure, scored using a simple yes/no format and two 5-point Likert scales.
12	2007 / Dutcher, Finley, Luloff & Johnson[392]	Environmental Connectivity or Connectivity with nature	ECS or CWN	Uni-dimensional	☒			Measures the extent land owners feel a sense of connection with their natural surroundings.	4 questions scored on a 5-point Likert scale, and three sets of Venn Diagrams depicting configurations of 2 overlapping circles that represent the respondent and nature; respondents are asked to choose a set that reflects how they feel about nature.
13	2008 / Leary , Tipsord and Tate[393]	Allo-inclusive identity	AID	Uni-dimensional	☒	☒		Measures extent to which individuals may include broader categories of people, animals, and inanimate entities in their self-concepts: ▪ Eight items concern other people with or without a relationship to the respondent; ▪ Another eight items refer to animate and inanimate objects in the natural world.	16-item visual measure depicting 8 sets of overlapping circles and 8 sets that depict animate and inanimate objects in the natural world; respondents are asked to choose which best describes their relationship with the depicted entities.
14	2009 Davis , Green, and	Commitment to Environment	COM	Uni-dimensional	☒		☒	Measures commitment to the environment: ▪ Psychological attachment;	11-item measure, scored on a 9-point Likert scale.

	Reed[394]							▪ Long-term orientation.	
15	2009 / Nisbet, Zelenski, & Murphy[395]	Nature Relatedness Scale	NR	Multi-dimensional	☒	☒	☒	Measures the affective, cognitive, and experiential aspects of an individual's connection to the natural world, and a sense of appreciation and understanding of the interconnectedness of life in the world: ▪ Self - an internalised identification with nature, reflecting feelings and thoughts about one's personal connection to nature"; ▪ Perspective - external, nature-related worldview, a sense of agency concerning individual human actions and their impact on all living things; ▪ Experience - a physical familiarity with the natural world and the level of comfort with and desire to be out in nature.	21-item measure, scored on a 5-point Likert scale.
16	2010 / Perkins[396]	Love and Care for Nature Scale	LCN	Multi-dimensional	☒	☒		Measures an individual's personal and emotional connectedness with nature, and his/her underlying construct of love and deep caring for nature: ▪ Psychological determinants of environmental altruism across a range of contexts.	15-item measure, scored on a 7-point Likert type scale.
17	2011 / Brügger, A., Kaiser, F. G., & Roczen, N.[397]	Disposition to connect with nature	DCN	Uni-dimensional	☒			Measures personal attitude which can be indirectly derived from inspecting past bonding activities via responses to statements that reflect an appreciation of nature: ▪ Past bonding activities; ▪ Evaluative appreciation of nature.	Assesses 50 behaviours across a 5-point frequency scale from 1 (never) to 5 (very often) and dichotomous yes/no questions.
18	2013 / Silvas V. Daniel[398]	Emotional connection to nature	ECN	Multi-dimensional	☒	☒	☒	Measures emotional connections to nature and relates them to: ▪ Concepts or attitudes to protect nature (ATPN); ▪ Willingness to protect nature (WTPN).	Assesses 20 polar emotions across a 5-point semantic scale, and assesses AATPN and WTPN across 5-point Likert scales.

There is clearly substantial similarity and possible overlap between the various measures and constructs of CNT reviewed above, even though they theoretically focus on different aspects of CNT. These similarities are even acknowledged by the authors themselves in some cases. Mayer and Frantz (2004) suggest that CTN and INS are highly inter-correlated (r = .55) and have similar correlations with behaviour (Tam, 2013). Nisbet et al. (2009)[399] also noted similarities between the NR and CTN scales, and Howell et al. (2011) confirmed a strong inter-correlation (r = .61) between these two scales. Also, Davis, Le and Coy (2011)[400] show how COM is strongly correlated with CTN, EID, and INS (r = .57 to .68; Tam, 2013). More recently Kim-Pong Tam (2013) undertook an important cross-border and empirical study to understand better how seven of the measures discussed above are similar to, or different from, each other. Table 4 below shows the correlation and respective 95% confidence interval of each possible pair of measures related to CNT against criterion variables for one of the cohort samples. The criterion variables used by Tam included (i) the five traits and values of personality and individual differences (Costa & McCrae, 1992)[401]; (ii) contact with nature; (iii) "*subjective well-being , which includes both a cognitive component (satisfaction with life) and an affective component (pleasantness of emotions)"* (Diener, Suh, Lucas, & Smith, 1999);[402] and (iv) environmental behaviour, including attitudinal support for environmental movement/causes and self-reported ecological behaviour. Tam's findings in fact show "*strong convergent validity and little incremental validity among these measures*", suggesting that they can be considered as measures of the same underlying construct. This should instil more confidence in the use of these measures.

Table 5 - Descriptive statistics, inter correlations and factor loadings of the various measures, incl. Studies 1&2* (Tam, 2013).

	COM	CTN	CWN	EATN	EID	INS	NR	AID	LCN
COM	-	.81	.80	.81	.85	.66	.88	.62	.84
CTN	.78	-	.84	.74	.81	.64	.83	.65	.84
CWN	.67	.72	-	.70	.75	.67	.78	.66	.78
EATN	.78	.71	.66	-e	.76	.59	.77	.53	.82
EID	.85	.77	.66	.79	-	.67	.85	.65	.85
INS	.48	.53	.44	.40	.46	-	.63	.86	.67
NR	.80	.76	.66	.75	.82	.44	-	.63	.82
AID	-	-	-	-	-	-	-	-	.62
LCN	-	-	-	-	-	-	-	-	-
Study 1 mean (SD)	4.66 (.83)	4.47 (.67)	4.70 (.87)	4.59 (.69)	4.55 (.76)	4.01 (1.46)	4.42 (.68)	-	-
Study 1 alpha	.83	.79	.61	.84	.89	-	.83	-	-
Study 1 factor loading	.91	.86	.76	.85	.91	.52	.88	-	-
Study 2 mean (SD)	5.21 (1.15)	4.85 (1.04)	5.01 (1.39)	5.01 (1.05)	4.88 (1.22)	4.53 (1.96)	4.92 (1.00)	3.72 (1.52)	5.26 (1.25)
Study 2 alpha	.93	.89	.86	.93	.96	-	.90	.92	.97
Study 2 factor loading	.93	.90	.86	.85	.91	.73	.92	.71	.92

Based on Fisher's r to z transformation (Fisher, 1915)

** Note. The numbers below the diagonal were findings from Study 1, while the numbers above the diagonal were findings from Study 2. All correlations were significant at the .001 level. Study 1 used undergraduate students only and from a Chinese society (Hong Kong), while Study 2 used participants from the USA.*

These results also suggest that while the subtle statistical divergences of these measures cannot be ignored, it is evident that NRS and EID show a persistent correlation with the criterion variables, and that the NR scale was consistently reliable *"for traits, subjective well-being, and environmental behaviour"* (Tam, 2013)[403]. Tam also shows that multi-dimensional measures consistently showed better results, suggesting that CNT is indeed a multi-dimensional construct (Nisbet et al., 2009;[404] Perkins, 2010[405]).

This Section served as the basis for a paper which was published in the Journal of Environmental Management in 2015, in co-authorship with Dr. Elisabeth Conrad.

4.1.4 Spatial mapping of CNT constructs

Spatial mapping and analysis of geographically referenced information is being used extensively in the environmental and social sciences to gain spatial perspectives that can solve complex environmental problems which are embedded in space and time (Goodchild, 2010).[406] This is especially the case due to the proliferation of location-based personal devices over the last decade. In view of recent efforts towards community involvement in natural resource management, spatial mapping has emerged as a powerful tool to bring communities' knowledge and points of view to the attention of public authorities or decision-makers. Participatory mapping, in particular, is nowadays being used extensively to create maps that represent community values and perceptions, land use patterns, local knowledge and practices that can empower decision making while empowering stakeholders. Participatory mapping refers to "*community-based research and development approaches that use local people to map places*", and which facilitate public involvement in policy making (Sieber, 2006)[407] by projecting cognitive spatial knowledge into cartographic and visual descriptive datasets (Herlihy and Knapp, 2003).[408]

Despite these benefits, this review did not come across any efforts that tried to map CNT specifically, even though a lot of work has gone towards using mapping approaches for measuring and displaying similar cognitive constructs, for example landscape values and place attachment (Brown and Raymond; 2007[409], 2015[410]). Only 4% of the CNT papers reviewed attempted to include this perspective in their research. Applying '*geographic visualisation*' techniques to display social constructs like CNT could provide an alternative cartographic landscape that could provide policy makers with multiple and exploratory perspectives to better understand spatial and social construct patterns (Crampton, 2001).[411] Mapping respondents' response to a CNT measure would allow for the spatial projection of CNT expressions of value towards nature and provide a unique point of view to identify social risks associated with potential land use change. Participatory spatial mapping of intangible assets like CNT

and similar nature-place-human specific priorities can be a useful approach to better integrate local knowledge in conservation planning since it can identify areas of common values or disagreement and also act as an educational tool. CNT spatial mapping can allow planners to identify areas of distinctive human connection and relate that data layer with relevant land characteristics for areas in need of biodiversity protection (Colchester, 1998)[412] and integrated resource management, while contributing towards participatory decision making and providing a reference point for monitoring or evaluation.

4.2 Place attachment (PA) and its relevance to environmental management

This section reviews research in place attachment and subdivides the discussion into three sections: place theory, place attachment theory, and measures for PA, and further reviews a measurement scale used in this study. A search on Scopus for the term "*place attachment*" (PA) between January 2004 and December 2014 revealed 1,064 potential sources which are of direct relevance to the PA literature. For PA a strict systematic literature review was deemed unnecessary since a number of reviews have already been undertaken recently (Scannell & Gifford, R. 2010a;[413] Lewicka 2011) and the topic is already well grounded in academic literature.[414]

4.2.1 Place attachment theory

The term '*place attachment*' has been used in environmental psychology interchangeably with the terms '*sense of place*', "place-identity," and "place identification", and these terms are therefore often difficult to separate (Speller, 2000)[415]. Cantrill (2001)[416] noted that among the wide range of definitions for sense of place, most authors seem to agree that "*a sense of place is the perception of what is most salient in a specific location, which may be reflected in value preferences or how that specific place figures in discourse*." Sense of place can be thought of as a relationship based on "*the collection of meanings, beliefs, symbols, values, and feelings that individuals or groups associate with a particular locality*" (Williams and Stewart 1998)[417]. Prohansky, Fabian and Kaminoff (1983)[418] defined the notion of '*place attachment'* as the psychological bonding that develops between an individual and a place. Similarly Hull & Vigo (1990)[419] and Hull (1992)[420] reported that *"the relationship of an individual to a setting can be viewed as overlapping layers of opportunities, meanings, and emotions resembling a flower with overlapping petals. The denser and more inter-related the layers, the more likely the setting develops the qualities of place significance … and it is those qualities that lead individuals to develop attachments to place"* (Bott 2008)[421]. Giuliani (2002)[422] defines place attachment as both the process of attaching oneself to a place, which creates an emotional connection with familiar locations such as the home or neighbourhood, and the various results of this attachment process (Manzo 2003[423]; 2005[424]) that lead to action at both individual and

collective levels (Manzo & Perkins 2006).[425] Raymond et al. (2010)[426] propose an integrated model based on four place attachment dimensions, defined in (Error! Reference source not found. and Error! Reference source not fo und. below).

Table 6 - Definitions of the four dimensions of place attachment (Raymond et al., 2010)[427]

Pole	Construct	Definition
Personal	Place identity	Those dimensions of self, such as the mixture of feelings about specific physical settings and symbolic connections to place, that define who we are.
Personal	Place dependence	Functional connection based specifically on the individual physical connection to a setting; for example, it reflects the degree to which the physical setting provides conditions to support an intended use.
Community	Social/place bonding	Feelings of belongingness or membership to a group of people, such as friends and family, as well as the emotional connections based on shared history, interests or concerns.
Environment	Nature bonding	Implicit or explicit connection to some part of the non-human natural environment, based on history, emotional response or cognitive representation (e.g., knowledge generation).

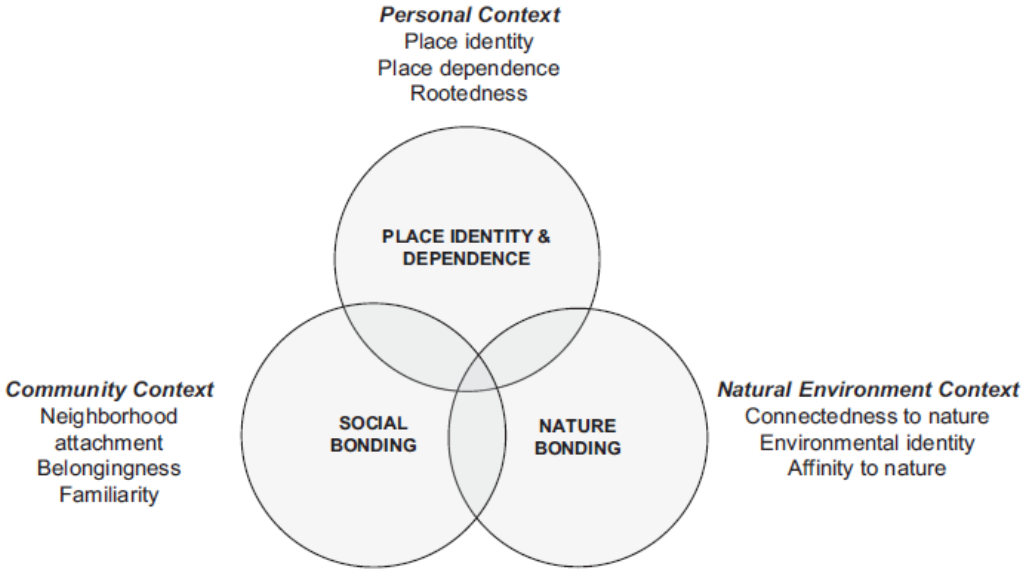


Figure 8 - Three-pole and four-dimensional conceptual model of place attachment (Raymond et al. 2010)

Meanings and interactions in places are crucial for understanding how place shapes human well-being. For example, a "sense of place" might invoke feelings of inclusion and connections with others while a "lack of place" might induce loneliness and depression (Jackson 1984).[428] Scannel and Gifford (2010)[429] propose a tripartite person–process–place (PPP) framework of place attachment (**Figure 9** below) which structures the

plethora of place attachment definitions into a simple, three-dimensional framework, namely:

i) the person - who is attached? To what extent is the attachment based on individually and collectively held meanings?);
ii) the psychological process - how are affect, cognition, and behaviour manifested in the attachment?);
iii) the object of the attachment, including place characteristics - what is the attachment to, and what is the nature of this place?

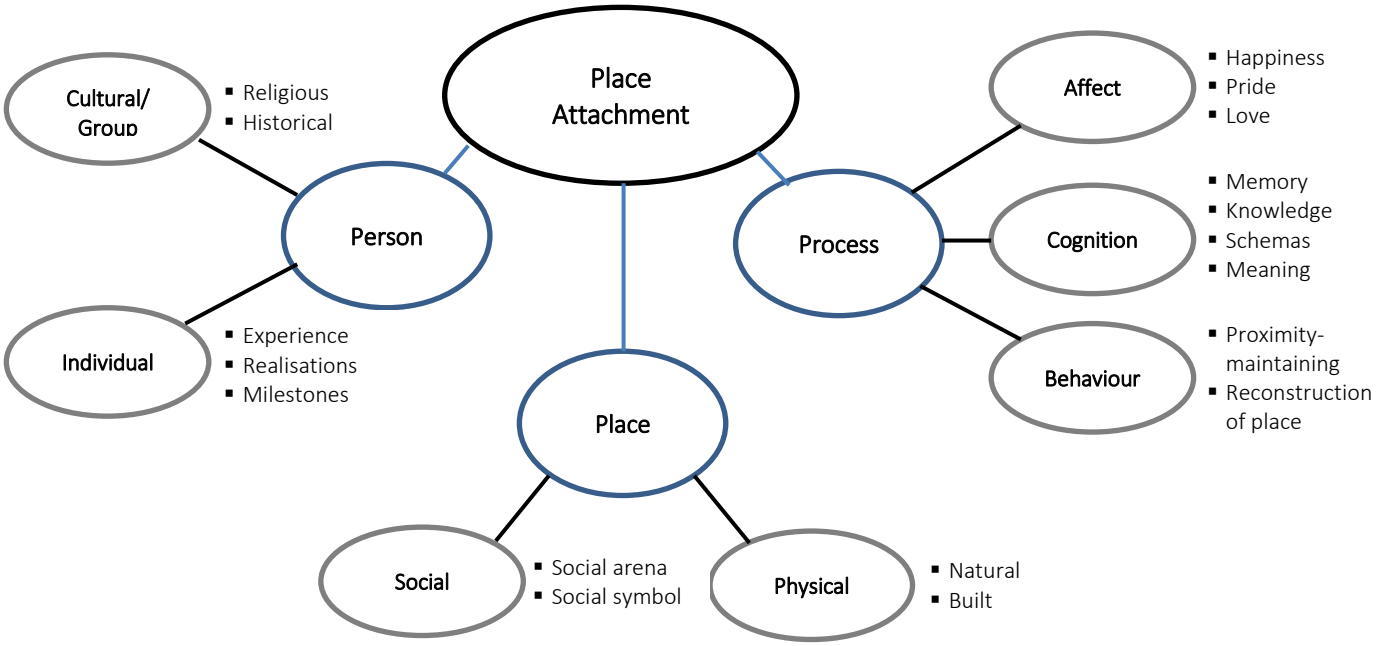


Figure 9 - The tripartite model of place attachment (Scannel and Gifford, 2010).

Norberg-Schulz (1979)[430] noted that human identity is fundamentally based on the ability to find identification within the world based upon the character of a place. Breakwell (1992)[431] focuses on four principles that guide a sense of self over time, namely self-esteem, self-efficacy, continuity over time, and distinctiveness from others, and studies indicate that individuals and groups draw on ties with, and interpretations of, specific places, guided by identity principles (Devine-Wright & Lyons, 1997[432], Knez, 2005[433]; Twigger-Ross & Uzzell, 1996[434]). There are many factors that shape human identity, and one can argue that identity is also a product of the physical environment. For instance, Farrugia (2010)[435] confirms that traditional and rural landscapes play a major role in shaping people's identity on the Maltese Island of Gozo. Undoubtedly, therefore, peoples' environmental preferences are shaped by the places they belong to; and just as much as people personalise their homes trying to make then reflect who they are, the same applies to the macro level where people also shape their extended environment (Hauge 2005)[436]. Proshansky (1983)[437] defines '*place identity*' as the ways in which physical and symbolic attributes of certain locations contribute to an individual's sense of self or identity.

Research in the area of environmental psychology seems to indicate that actions related to place are mostly of an individualistic nature (Bonaiuto & Bonnes, 2000)[438]; however there have been occasions when more socially and spatially extensive characterisations of place attachment have been noted. For example, Brown and Perkins' (2003)[439] study of neighbourhood attachment in Salt Lake City, USA found differences at residence, block and neighbourhood levels. Similarly, a study by Manzo and Perkins (2006)[440] proposed an '*ecological framework*' of community planning at the individual, group, neighbourhood and city levels. Other issues can affect place attachment, and a more holistic framework of place has been proposed that acknowledges spatial scales and less bounded conceptions of place (Canter 1997)[441] where *"place is just a nodal point within a complex web of social interactions which may stretch over local, regional and national boundaries"* (Massey 1995).[442] Manzo (2005)[443] also emphasises the socio-political aspects of place, where attachments can be influenced by group-level interests that could also lead to negative experiences of familiar places, and sometimes the desire to leave or escape.

Williams Anderson, McDonald & Patterson (1995)[444] distinguish between two types of place attachment namely: a) a goal-directed functional attachment called 'place dependence' that occurs when a place is used for a functional activity, and b) an emotional, symbolic attachment 'place identity', such as one fostered by a special childhood or adult memory or a symbol of heritage. Sense of place concepts are presented in ***Table 7*** below in order to help understand the attitudes related to places and the attitudes of human–place interaction, and are based on previous work by Deutsch and Goulias (2010).[445]

Table 7 - Sense of place concepts and related definitions. (Deutsch and Goulias, 2010)

Sense-of-place concept	Related survey topics
Place attachment	Ability or likelihood to relax, happiness due to place, importance of existence, level of importance compared to other places
Place dependence	Needs met, diversity, underlying existence of reasons for a trip
Place identity	Identification with atmosphere, place as a reflection of the individual, level of freedom to be self
Place satisfaction	Satisfaction with food, products, parking, level of service, entertainment, crowd size
Aesthetics	Views on architecture, beauty of the place, balance of decorative and functional attributes, artistic value, peaceful and relaxing atmosphere
Social and cultural	Social atmosphere, reflects culture of the area, risk of unpleasant encounters, level of crowdedness, amount of activity, safety of walking around, family- and kid-friendly, level of friendliness of people

It is indeed reasonable to think of sense of place as a multidimensional construct. Following the empirical work of Jorgenson and Stedman (2001)[446] and Kyle, Mowen and Tarrant (2004),[447] place attachment has been conceptualized as consisting of four dimensions, which can be categorised in three attitudinal components - an 'affective' component which results in an affective attachment, a 'cognitive' component which leads to place identity, and a 'conative' component (*conative, as opposed to the cognitive or affective, relates to*

purposeful, but not necessarily ultimately rational, action) that leads to place dependence and social bonds (Kyle et al., 2004).

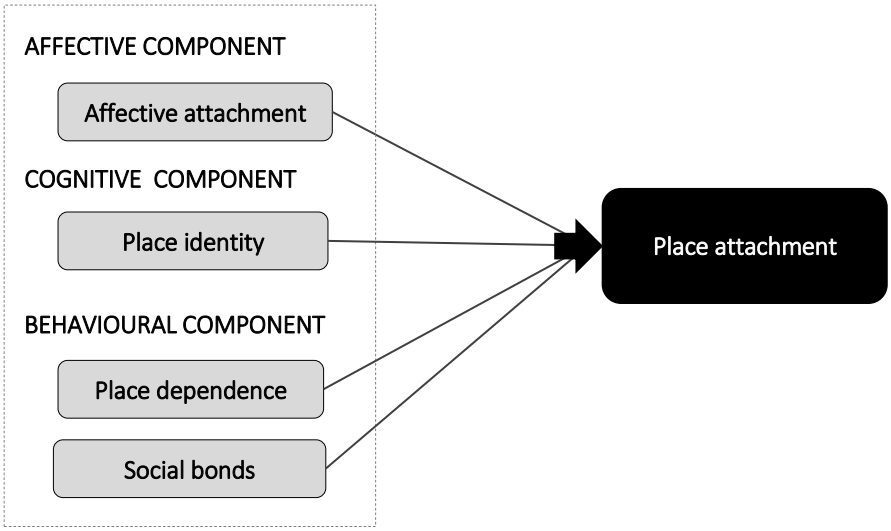


Figure 10 - Attitudinal Framework for Place Attachment Dimensions (Kyle et al., 2004).

Many have attempted to identify whether a relationship exists between place attachment and environmental behaviours. In fact, Vaske and Kobrin (2001)[448] demonstrated that place attachment is a strong predictor for environmentally responsible behaviour (ERB), and that place identity mediates the relationship between place dependence and ERB. Similarly Stedman (2002) showed that people with higher levels of place attachment were more willing to act in ways that protected a lake setting's quality. Halpenny (2006)[449] also concluded that place attachment was a strong predictor of visitors' park-specific behaviours.

This thesis will build further on the research literature, specifically examining links between these constructs. Mapping respondents' response to a CNT or PA measure would allow for the spatial mapping of these social expressions of value towards nature, and provide a unique point of view to identify social risks associated with potential land use change. To the author's knowledge, this is original work that builds on social cartography or mapping literature, and on related efforts in the field by Brown, Raymond et al., (2015)[450] and more recently by Davis et al. (2016). [451]

4.2.2 Measures for PA

The aim of this section is to provide an overview of PA measures mentioned or used in the wider literature to measure, quantify and categorise the human relationship with place. While protected area management has achieved significant progress in defining spatial elements, one of the remaining constraints is the lack of agreed ways to map environmental, socio-economic and societal/cultural views (Safiullin et al. 2015[452],

Smith A.Duncan 2016[453]). This is due to the fact that while environmental data is mostly measurable for specific areas (like for instance precipitation, temperature, biodiversity), the spatial dimensions of place attachment, social implications and cultural heritage are more difficult to project spatially (Blaschke 2006).[454]

Various attempts have already been made to develop place attachment scales (Bricker & Kerstetter 2000[455]; Moore & Graefe 1994[456]; Williams & Roggenbuck 1989[457]; Bonaiuto, Aiello, Perugini, Bonnes, & Ercolani, 1999[458]; Felonneau, 2004; Hidalgo & Hernandez, 2001[459]; Kyle, Mowen et al., 2004[460]; Shamai, 1991; Shamai & Ilatov, 2005[461]; Stedman, 2002[462]; Williams & Roggenbuck, 1989[463]). The instrument employed in this study is the Place Attachment Scale devised by Raymond, Brown and Weber (2010)[464] (*marked in bold within the table below*). For a thorough review refer to Giuliani (2003).[465] The ones that are of note for this thesis, based on the their prominence in the literature, include:

Table 8 - Measures of PA, with a brief description of the dimensions identified and variables measured.

#	Date/ Authors	Measure	Abb.	Factors, attitudes, constructs or variables measured	Measurement tool
1	1991/Shamai[466]	Shamai's Sense of Place		This scale assumes that sense of place occurs on a progressional scale of strength, measured by use of a closed response survey approach format (i.e. are you connected to the place — no, agree, strongly agree etc.) Shamai (1991) proposed a seven-point empirical intensity scale for place attachment, based on Relph's (1976) ranking system, ranging from no sense of place at one extreme, to a willingness to make personal sacrifices on behalf of a place at the other. Shamai and Kaltenborn (1998) showed that an empirical instrument could resolve and measure intensities of place attachment in two geographically and culturally distinct groups.	
2	1992 / Williams et al.	Williams Scale		Williams et al. (1992) identified both place attachment and wilderness attachment through a questionnaire including Likert scale statements (13 place attachment statements and 5 wilderness attachment statements).	
3	1999 / Young[467]	Young's Place Meaning Instrument	YPMI	Young (1999) created an empirical place-meaning survey for a World Heritage parkland in northeast Queensland, Australia, based on a 30-item questionnaire with a five-point scale, which polls tourists on whether each of the items is a poor, fair, good, very good, or excellent description of the place. Respondent place meanings were influenced by the level of prior knowledge of the place, preferences for particular types of surroundings, and sociocultural background.	
4	2000 / Warzecha[468]	Warzecha scale (2000)		To measure emotional/symbolic place attachment and functional place attachment, Warzecha et al. (2000) used place attachment statements (Likert scales) from previous research done by Williams et al. (1995). These consisted of six statements for emotional/symbolic attachment and six statements for functional attachment.	
5	1989 / Williams, D.R . & Roggenbuck, J. W. (1989)[469]. Williams and Vaske (2002)[470], Raymond, Brown and Weber (2010)[471]	Place Attachment Inventory	PAI	Williams and Roggenbuck (2002),[472] and later Williams and Vaske (2002), proposed a two-dimensional approach towards measuring place attachment focused on measuring two dimensions of PA - place dependence which refers to the capacity or potential of a place to support an individual's needs, goals, or activities (Stokols & Shumaker, 1981[473]); and place dependence which refers to an individual's various affective relationships to a place such as memories, preferences, and feelings (Proshansky, 1978[474]; Proshansky, Fabian, & Kaminoff, 1983[475]; Korpela, 1989[476]; Williams & Vaske, 2003).	Six items were selected to represent each dimension of attachment (12 items)and were presented in an alternating order and in a 5-point "strongly disagree" (1) to "strongly agree" (5) format with a neutral point of 3.
6	2005 / Lewicka [477]	Lewicka Scale		Awareness of place history intensifies place attachment, however, probably also the reverse holds true. Lewicka (2005) showed that people attached to a place expressed more interest in the place's past and in their own roots than people with fewer emotional bonds.	

4.2.3 Spatial mapping of PA constructs

One of the first drivers behind place theory research was to embed psychosocial values back into their ''*meaning-filled spatial . . . context*'' (Williams and Patterson 1996), and to understand those meanings, memories, values, interests, and ideas that are situated in specific locations in the landscape (Cacciapaglia, Yung, Patterson , 2011).[478] The participatory mapping of place meanings and related constructs has the potential of democratising decision making (Brown, 2006),[479] and offer a new perspective towards understanding public support for conservation projects while integrating social data with biophysical data. Similarly, socio-spatial mapping can enable the various stakeholders to emplace their views and values spatially, and provide tangible resources for decision makers by demonstrating how agreement or disagreement varies across a landscape (Carver 2003).[480]

In fact, social mapping has already been used to understand various spatial components of public views or support, like for instance public opinion on the placement of nuclear waste (Evans et al., 2004),[481] neighbourhood planning (Kingston et al., 2000),[482] tribal perspectives on fuels management (Watson et al. 2008),[483] preferences for conservation and tourism development (Raymond and Brown, 2007),[484] views of ecosystem services (Raymond et al., 2009),[485] and legislation on national scenic byways (Brown, 2003).[486] However, in most cases mapping exercises tend to assume that relevant social views and values are both spatially situated and spatially discrete.

Despite the above opportunities, this review found a limited effort towards mapping social constructs related to place and nature specifically for environmental management, even though some seminal work has gone towards using mapping approaches for measuring and displaying similar cognitive constructs, for example, landscape values and place attachment (Brown and Raymond, 2007;[487] Brown, Raymond and Corcoran, 2015)[488]

4.3 Environmental behaviour (EB) and its relevance for environmental management

This section reviews research in environmental and pro-environmental behaviour and organises the material into two sections: environmental behaviour (EB) theory, measures for EB, and reviews a scale which will be used in this study.

Environmental behaviour in this context refers simply to preventative action taken by humans to protect their environment by empathizing with nature and addressing environmental issues (Lee et al., 2013[489]; Stern, 2000)[490]. However, Stern (2000) also suggested that individual behaviour is a function of personal, interpersonal, contextual and structural variable. Berenguer (2000) referred to the last three variables as situational, distinguishing

between social and non-social situational variables. However, according to Zhang (2014)[491] the literature suggests that pro-environmental behaviour can be attributed either to:

i) socio-demographic factors wherein age, gender, socioeconomic status, education, ethnicity, religion have been shown to be significant factors underlying pro-environmental behaviours (Bernath & Roschewitz, 2008[492]; Johnson,Bowker, & Cordell, 2004[493]; Schultz & Zelezny, 1998[494]; Stern, Dietz, & Kalof, 1993[495]); or

ii) social-psychological factors which focus on less explicit factors such as values (Karp, 1996[496]; Schultz et al., 2005[497]), morality and norms (Groot& Steg, 2009[498]; Schwartz,1970), environmental beliefs (Stern, 2000[499]), place attachment (Vaske & Kobrin, 2001)[500], affect (Steg & Vlek, 2009)[501], and attitudes (Newhouse, 1990).

This paper is primarily concerned with identifying existing or potential linkages between psycho-social factors and pro-environmental behaviours, particularly in the context of protected areas. It is important to note at this stage that while values are fundamental factors that have a direct influence on attitudes, beliefs, worldviews, norms and behaviours (Stern, 2000[502]; Stern & Dietz, 1994[503]), studies suggest that values do not affect pro-environmental behaviour directly but do so via other factors such as personal norms and environmental beliefs (Schultz et al., 2005; Schultz & Zelezny,1998[504]; Steg et al., 2005[505]; Stern, 2000). Similarly, numerous studies indicate a correlation between positive environmental worldviews and pro-environmental behaviour (Dolnicar & Leisch, 2008[506]; Imran, Alam, and Beaumont, 2014[507]); and that positive environmental worldviews may be a necessary condition to induce pro-environmental behaviour s (Zhang 2014). Related research suggests that even personal norms, which are defined as a personal obligation to engage in a certain behaviour (Schwartz, 1977),[508] are also a strong predictor of pro-environmental behaviour but similarly need to be activated by other factors.

Kollmaus and Agyeman (2002, 257)[509] developed a model that incorporates the major factors behind pro-environmental behaviour (reproduced and adapted in **Figure 11** below), based on prior work by Fliegenschnee and Schelakovsky (1998)[510] who in turn based their diagram on Fietkau and Kessel (1981).[511] It also depicts environmental knowledge, values, and attitudes and emotional involvement as constituting '*pro-environmental consciousness"*. This construct in turn is embedded in broader personal values, shaped by personality traits and other internal and external factors. The arrows indicate how the different factors influence each other and ultimately pro-environmental behaviour. This model indicates clearly that the biggest positive influence on pro-environmental behaviour is achieved when internal and external factors act synergistically. The dashed box shapes indicate some of the possible barriers that tend to influence pro-environmental behaviour and should be self-explanatory.

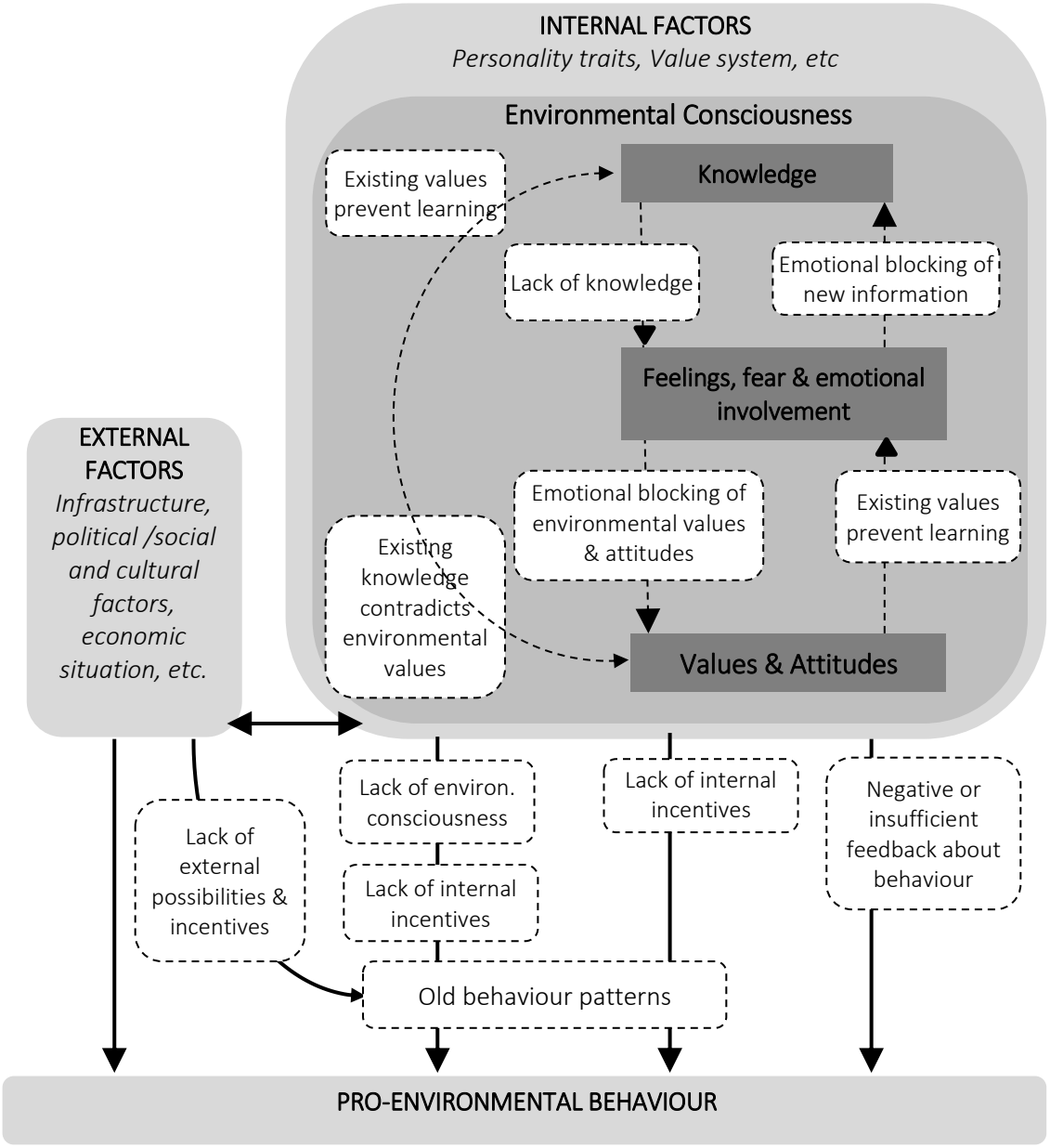


Figure 11 - Model of pro-environmental behaviour (Kollmuss & Agyeman, 2002).

Similarly, Ramkissoon et al. (2010)[512] propose a related framework, based on environmental psychology literature (e.g. Stedman 2002,[513] Thogersen & Olander 2003[514], Vaske & Kobrin 2001[515]) which explores the relationships between different place attachment constructs mentioned earlier and their influence on pro-environmental behavioural intentions in national parks (***Figure 12*** below). The framework presents place attachment as linked to pro-environmental behaviour, but also recognises a second order of the underpinning sub-constructs and their moderating effect on the place attachment – pro environmental behaviour relationship in a national park context. They conclude that place attachment is indeed a multi-dimensional construct comprising place dependence, place identity, place affect, and place bonding and suggest that these constructs may influence pro-environmental behavioural intention of visitors to national parks.

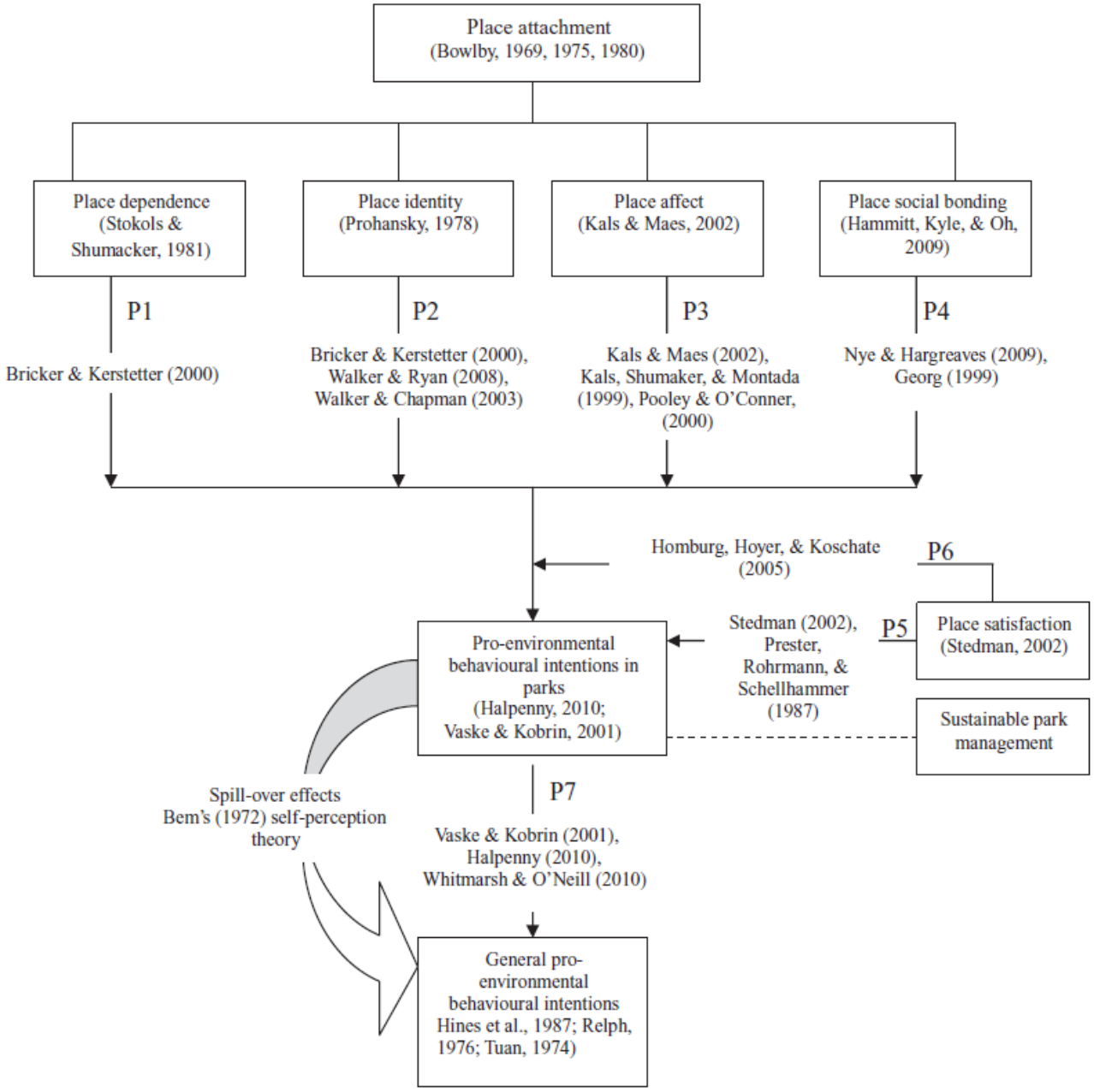


Figure 12 - A conceptual framework depicting relationships between attitudinal dimensions of place attachment, place satisfaction and pro-environmental behavioural intention (Ramkissoon et al., 2010).

Stern (2000) and Gatersleben et al. (2002)[516] agree that it is important to distinguish between two different measures of environmentally significant behaviour. On the one hand, an intent-oriented measure of EB looks at behaviours that are environmentally significant purely from the actor's point of view. These are typically based on social norms for environmentally significant behaviour which do not reflect the actual environmental impact of those behaviour patterns (ex. purchasing of green products or recycling). On the other hand, an impact-oriented measure is more concerned with the actual environmental impact of behaviours (e.g., energy use, water use, or waste production). It is also important to highlight points raised by Liisa Uusitalo (1990),[517] which remain pertinent. She brings attention to two inherent and fundamental flaws in human behaviour:

i) An "attitude-behaviour inconsistency" or "value-action gap" (Chatzidakis, Hibbert & Smith, 2007[518]; Kollmuss & Agyeman, 2002[519]; Gupta & Ogden, 2006[520]) which sheds doubt on whether people are actually capable of behaving according to accepted environmental goals in the first place, especially when consensus can hardly be found with regards to priority ranking of common good measures which need to be taken. This is more so within a market mechanism which treats environmental quality as a free good (global commons, Ostrom et al. (1999) [521]- a mindset which disincentivises us from protecting common property resources, and drives towards 'self-interest' consumerism. This is in sharp contrast to the fact that environmental quality can only be provided by way of co-operative and real environmental behaviour, and stronger moral and social commitment towards the common good. There is no doubt that better ways of integrating behaviour with environmentally favourable attitudes are necessary.

ii) A 'free-rider behaviour' effect which is driven by a complex interplay of cognitive responses. This flaw is attributed to feelings of insignificance when issues are complex and involve numerous actors, which leads to an assumption that others will provide the public good or intervene anyway (Kliemt 1986).[522] Similarly, people remain wired to make decisions atomistically, and are expected to act within social norms of behaviour and to obey legal norms. At the same time, this '*buffered self* ' (Taylor, 2007)[523] is often contrasted with a precursor effect of '*group mind' (*McDougall 1920)[524] or an intense and shared emotionality which is a central feature of group formations, and can be irrational at times (Baldacchino J.P. 2011).[525] Thus, people will only act in an environmentally favourable ways if they believe that others will also co-operate and follow the same rules. Hence, even though an individual believes others are doing their part, each person still acts only on the basis of his/her own individual utility maximisation – undermining that same willingness to support stricter control of the behaviour in question. This is in fact the best option for each individual, but certainly not at the collective level. These decisions are typically attributed to missing or weak collectively binding norms and poor economic incentives, or lack of enforcement to rein in behaviour.

4.3.1 Measures for EB

The aim of this section is to provide an overview of EB measures mentioned or used in the wider literature to measure, quantify and categorise human behaviour towards our natural environment. It is important to keep in mind that studies which reported correlations between a behavioural measure and established measures of independent variables indicate varying degrees of consistency. In fact, a review of the last 20 years of EB research by Markel (2013)[526] indicates little consistency among the many instruments used to measure the concept of pro-environmental behaviour. Consequently, the author undertook a brief review of measures which were deemed relevant to this exercise. Table 9 below provides a short compilation of Pro-Environmental

Behaviour measurement tools found in the literature.

Table 9 - Measures of EB, with a brief description of the dimensions identified and variables measured.

#	Date/ Authors	Measurement scale	Abb.	Factors, attitudes, constructs or variables measured	Measurement tool
1	1992 / Herrera[527]	Questionnaire on Environmental Beliefs	QEB	The Questionnaire on Environmental Beliefs was developed to measure environmental attitude changes that may be occurring in society. It is a 46-item questionnaire used to evaluate the beliefs about nature and society, and the importance of the environmental problems.	Respondents are asked to rate the extent to which they agree or disagree on the following items. The scale responses are answered on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Items 19, 20, 29, and 42 are reverse scored. No total scale score is created for this measure.
2	1998 / Kaiser[528]	General Ecological Behaviour	GEB	The general ecological behaviour scale (GEB; Kaiser, 1998; Kaiser & Wilson, 2000) assesses 51 behaviours that fall within seven domains: ecological garbage removal, water and power conservation, ecologically-aware consumer behaviour, garbage inhibition, volunteering in nature-protection activities, ecological automobile use, and finally, non-environmental prosocial behaviour. The scale discriminates between different groups (e.g., an ecological versus non-ecological transport organization); and can summarise an individual's ecological behaviour while allowing for inconsistency across different domains of behaviour, and taking into account each behaviour's difficulty.	Response options range from 1, -strongly disagree, to 5, -strongly agree. The scale has demonstrated acceptable reliability, internal consistency, and validity.
3	1998 / Schultz, & Zelezny [529]	Self-Reported Pro-environmental Behaviour Scale		This scale measures proenvironmental behaviour s by asking respondents how often they engaged in behaviour s that were found in previous U.S. research such as, recycling behaviour s, conservation behaviour s, consumer behaviour s, and transportation behaviour s.	Respondents were asked to "please indicate how often you have done each of the following behaviour s" using a four point scale, ranging from 4 (daily), 3 (weekly), 2 (monthly), to 1 (never) . A total scale score was created by taking the mean of the responses. Scores range from 1 to 4, where higher scores indicate a higher level of pro-environmental behaviour. Note: this scale has also been used others using a Likert-type scale, ranging from 1 (never), 2 (rarely), 3 (sometimes), 4 (often), and 5 (very often). See Schultz et al. (2005).
4	**2007 / Dutcher, D., Finley, J., Luloff, A., & Johnson, J.**	**Environmental Behaviour scale**	**EBs**	**The Environmental Behaviour scale is a short scale intended to measure the extent to which individuals engage in environmental behaviour.**	**Participant responses to six questions with a simple 1 (Yes) or 2 (No). Scores range from 0 to 6, with a high score on this scale indicating a high level of environmental behaviour, while a low score indicates a low level of environmental behaviour.**

4.3.2 Spatial mapping of EB

GIS projections of environmental behaviour can offer an improved perspective of places through different combinations of behavioural pattern attributes (Goličnik Marušić, 2011[530], 2012)[531]. It can also enable planners to look at places from any desired viewpoint of attribute combinations, and expose deeper angles for investigation. Behaviour mapping is a form of systematic unobtrusive observation research that tracks people's behaviour in relation to features of the physical environment (Cosco, Moore and Islam 2010[532]; Moore and Cosco 2010).[533] The main assumption here is that behavioural maps offer a fairly dynamic means for place planning and design. While numerous efforts have operationalised GIS dynamics to environmental behaviour for traits like mobility, densification, littering, physical activity, happiness or similar tangible constructs. No academic work seems to have tried to combine GIS projections and analysis with social constructs like PA and CNT using EB as a predictor for environmental management.

4.4 Conclusions

Researchers interested in understanding, or influencing people's attitudes and behaviours towards the natural world may benefit from CNT and PA concepts or related measures which assess the subjective experience of the ecological self and the interconnectedness of humans with nature and place. These reflections suggest that the local knowledge of communities has strong reframing power for spatial planning, being policy-holistic, multi-dimensional and experiential in nature (Natarajan, 2015). The assumption from the literature is that a focus on interconnectedness and dependence with the environment may result in enduring and committed conservation action. It is clear that place and nature are in fact critical pillars of socio-spatial planning and identity construction. Furthermore, the meaning of place to an individual or community is a result of social spatialisation since people project meaning onto places, and attach emotionally and politically through the meaning and identity they develop with those places. However, the challenge lies in the integration of a community's interest and right to participation and information which acknowledges their multiple identities and relations to place.

Despite the dynamic progress in CNT and PA literature, there remain unclear relations between CNT concepts and other similar psychological constructs like PA or EB, and the extent to which such constructs combined can be used as predictors of commitment to the environment. The review indicates that the concepts of place attachment and environmental behaviour are much better understood than CNT, indicating an opportunity to review the potential for using CNT more extensively for planning and in environmental management. Further interest in exploring more holistic theoretical frameworks that clarify the overlaps in fragmented CNT and PA concepts, rather than just concentrating on these constructs in isolation, is therefore necessary. Developing a 'progressive' sense of place or nature, clearly requires that the relation between space,

power and identity must be addressed afresh. Operationalising social constructs within socio-spatial planning offers an opportunity to articulate community values and their local identity in order to rationalise and set goals of environmental policy – thus acknowledging that people might hold multiple identities, values and relations to place. It could also ensure a diversion from traditional models of top-down and expert driven environmental planning by enabling local communities to have more responsibility and control, while building a case for distinctiveness of particular places as guidelines to resource use and environmental protection. These general implications all follow, directly or indirectly, from the main argument of this paper - that operationalising social and place values within socio-spatial planning has the potential to improve our understanding of the role these social constructs have in developing a sense of community and a willingness to accept responsibility for environmental resource management, and to engage actively in such management. This potential approach is deemed critical if we are to encourage a stronger role for participatory planning which articulates community values towards place and nature. Similarly more needs to be done towards multi-disciplinary research that is relevant and practical to both environmental managers active in the field in order to ensure that CNT can be useful to conservation research.

The main progress in the literature seems to have been made in the development of CNT and PA measurement tools. Research indicates that there is strong convergent validity amongst the different measures due to their similarity, and functional associations. However, the predictive potential of each measure could depend partially on whether the application of CNT or PA constructs in conservation literature is more focused on the cognitive, affective or behavioural aspects, or is a combination of other factors. Further effort towards the exploration of multi-dimensional measures is recommended since they consistently stand out as showing better results. A case can also be made concerning the absence and application of geographic visualisation techniques to display social constructs like CNT or PA. While many established authors have made significant contributions to the literature over the last decade, this review highlighted new opportunities for research, especially with regards to their spatial representation and potential use in environmental management. This point of view could provide an innovative GIS landscape that can provide policy makers with multiple and exploratory perspectives of CNT/PA expressions towards nature, and provide a unique point of view for guiding participatory protected area planning and management. This research efforts attempts to bridge this gap, by framing CNT and PA within spatial planning imperatives.

5 The study area and its context - The Maltese Islands

Over and above the designation of protected areas, it remains crucial that we understand the relationships that people form with the natural world, which are typically complex and difficult to characterise. Better insight into people and their nature-place relationships has the potential to enhance our ability to effectively meet conservation goals. Understanding how these relationships develop, how they influence personal values and attitudes, and what behavioural implications they may have remains of essence. However, all the above needs to be framed within a geographical context that can itself shape the above aspects; this chapter thus provides a description of the geographical and social context within which this research was conducted.

5.1 The biogeographical context

The study area for this effort is the Maltese islands, a small archipelago and island state in the centre of the Mediterranean Basin. The Mediterranean Basin is considered to be one of 27 biodiversity hotspots on the planet, deemed to have high ecological importance and prioritised for conservation due to its high endemism and threats it is facing (EC, 2009).[534] The unique biota of the Mediterranean region is a product of the region's tectonic development and its geographical location at the intersection of two major landmasses, resulting in a dynamic set of climatic, geological and geomorphological conditions conducive to the evolution of distinctive ecological assemblages (Grove and Rackham, 2001)[535]. Some 25,000 plant species are found specifically here (Myers et al., 2000),[536] when compared to the 6,000 species of vascular plants found in the rest of Europe outside the Mediterranean area, a land area more than four times greater in size (Cassar and Conrad, 2016).[537] Furthermore, some 60% of these species are endemic (Thompson et al., 2005),[538] representing one of the highest levels of plant endemism found anywhere on the planet (Médail and Quexel, 1999[539] and Allen, 2001[540]). It is interesting to note that according to Blondel (2006),[541] continuous human modifications to landscapes and habitats also had a direct impact on the distribution, dynamics, and extinction of species and communities, which were however partly compensated for by intraspecific and interspecific adaptive differentiation in response to man-induced habitat changes (Naveh, 1994).[542]

Human activity in the region has had a tremendous impact on ecology, and the degradation of the landscape is due to man's use over the last 300-plus generations of human occupation (Butzer, 1961;[543] Whyte, 1961;[544] Woodward, 2009).[545] Environmental history literature in fact reveals that this was a result of collective decision-making as people adapted to different agricultural strategies over time as they reacted to market needs or opportunities, demographic growth, limited resources and environmental problems (Butzer 2005)[546] - for instance the extensive deforestation going back to Roman times in order to provide for building material, fuel, agriculture, husbandry, military, shipbuilding and urbanisation. Blondel (2006)[547] refers to this impact as a

complex 'co-evolution' which has shaped and continues to shape the interactions between ecosystem components and human societies. The most obvious consequence of human action in the Mediterranean Basin was undoubtedly forest destruction. The current forest cover in the Mediterranean today extends to over 85 million hectares, and just around 9.4% of the area of the basin (Marchand, 1990).[548] Quezel (1976)[549] and Quezel and Medail (2003)[550] estimated that no more than 15% of the 'potential' Mediterranean forest vegetation remains today, the rest being in more or less advanced stages of deforestation and soil degradation. This has now escalated to the point that Mediterranean biodiversity is at risk of serious and long-term effects on essential functions of ecosystems, reduction in services provided, and species extinction.

Figure 13 - Satellite images of the Mediterranean region showing the Siculo-Tunisian sill (insert left image) and the Maltese islands (right) - Google Maps, 2016[551]

The Maltese archipelago's larger islands are Malta (27 km long by 14.5 km wide), Gozo, and Comino, cumulatively with a surface area of 316 km^2. Malta, which is the largest of the three islands, has an area of 245 km^2 (and a coastline of approximately 100 km), while Gozo and Comino have an area of 67 km^2 and 3 km^2 respectively (MRA)[552]. The islands consist of low-lying coralline limestone plateaus surrounded by impermeable clay slopes, with the highest point being 239 m. above sea level. Erosion of these rock types has created the characteristic Maltese landscape. The main geomorphological features are karstic limestone plateaux, hillsides covered with clay taluses, gently rolling limestone plains, inland scarps, dry valleys, karst terrain and sandy beaches, steep coastal cliffs on the southern, south-western and western coasts, and gently sloping rocky shores to the north-east (Cassar et al. 2008).[553]

Despite uninterrupted and protracted human disturbance, the Maltese Islands harbour an interesting biota, both from an ecological and phyto-geographical viewpoint (Schembri, 1993).[554] The islands and surrounding marine habitats host a remarkable array of flora and fauna, and also depend on various ecosystem services that are vital for supporting the Maltese community. The biodiversity includes circa 2000 species of plants and over 3000 species of animals recorded as at 2104, and with representative ecological populations and communities from the three continents that border the region - Europe, Africa and Asia – even if a high percentage of species

present are of Euro-Mediterranean origin (Cassar & Conrad, 2014).[555] An official assessment of the taxonomic status of species of flora and fauna in the Maltese Islands was last undertaken for the 1989 Red Data Book for the Maltese Islands[1] (Schembri & Sultana editors, 1989) and the State of the Environment report for Malta 2002 (MHAE),[556] with a later terrestrial fauna update by MEPA in 2003[557]. Other descriptions of Maltese ecosystems have been given by Haslam (1969),[558] Lanfranco (1984 & 1989),[559] Thake (1985),[560] Lanfranco and Schembri (1986),[561] Anderson and Schembri (1989),[562] Schembri (1988,[563] 1991,[564] 1992,[565] and 1993[566]) and Ellul (2014).[567] Forty-three floral taxa are endemic to the Maltese Islands. Of these, 23 species are strictly endemic whilst a further twenty are sub-endemic and restricted to the Maltese Islands and circum-Italian islands; Asteraceae contribute 26% of the endemic taxa (11 species) whilst the remaining 32 species represent 16 families including the Orchidaceae (5 species), Iridaceae (4 species), and Brassicaceae (3 species) (Lanfranco et al. 2013).[568] An updated Red Data Book is currently being prepared. For a more exhaustive description of the Mediterranean and Malta's biogeographic context please refer to Thake (1985)[569], Schembri (1994)[570], Hunt and Schembri (1999),[571] Cassar et al. (2007)[572], Cassar et al. (2008)[573] Conrad and Cassar eds. (2010)[574], Cassar (2010),[575] and Conrad & Cassar, 2012.[576]

5.2 The sociological context

The islands had a resident population of 434,403 (up by 1.2% when compared to 2014) in 2016 (NSO, 2016)[577], further compounded by an estimated 1,807,269 in total inbound visitors for 2015 (MTA, 2016).[578] Malta ranks first by far among all EU Member States in terms of population density, with an average 1,359 persons per km^2 (ibid.), compared with the EU 28 average of 116 persons per km^2 (EUROSTAT, 2016).[579] The high density rate is even more pronounced when analysed at the regional level, with an average 1,566 persons per square kilometre in Malta when compared with Gozo's 457 persons per km^2, since the population share of Gozo and Comino is only of 7.5% (NSO, 2011).[580] Consequently, Malta's land area is subject to strong pressures for building development as land is required to provide for housing and other needs.

The central Mediterranean has been shown to be a good workshop for exploring social evolution on islands and larger land-masses because of the variety of the biogeographical contexts and range of "socio-economic trajectories" in the area (Stoddart, 1988).[581] This is especially the case with islands and their communities, which must be examined in the context of their inhabitants' experiences and practices. Stratford (2003)[582] concludes that an island's characteristics are more a combined expression not only of its natural features, but also a result of generations engaging with island places, both socially and materially. Ingold (2000)[583] refers to expression as a '*dwelling perspective*'. Like place, an island's '*islandness*' is a subjective term, and the meaning of an island resides in its very sense of place, arising *"within the current of their involved activity, in the*

specific relational contexts of their practical engagement with their surroundings" (Ibid). Stratford also remarks that even daily human tasks or interactions tend to differ from those typical of mainland locations due to limited mobility, manifesting itself in unique '*taskscapes*'. Vannini (2012)[584] also concludes that islanders tend to engage with islands via increased practicality, creativity or skilful engagement with its affordances, and solving going concerns as they present themselves. Related studies (Baldacchino, 2012;[585] Matulis and Moyer, 2016)[586] also suggest that public environmental values can be pluralistic, that is, encompassing a broad range of environmental philosophies or approaches. They also suggest that these can only be applied to environmental policy in a contextual manner which recognises and respects the ecological significance of place and the socio-political importance of community and related social institutions.

As a small island state, Malta has particular vulnerabilities and constraints (Briguglio, 1995),[587] which include small territory size, high degree of economic openness, dependence on a very narrow range of exports, dependence on imports especially energy and industrial supplies, and insularity (Government of Malta, 2002).[588] The main environmental challenges are mostly related to landscape degradation, land development, water, climate, biodiversity loss, degradation of natural resources, population, waste management, tourism pressures, energy consumption, bird shooting and hunting, air quality and high vehicle dependence (Moncada, Camilleri, Formosa and Galea, 2010;[589] Zammit, 2009)[590]. However, for Bertram and Baldacchino (2009),[591] islandness also provides an opportunity, and is far from just a constraint in a turbulent and dynamic external environment. Their point refers to how islanders tend to exploit opportunities and maximise economic gains in turbulent times by practising economises of scope rather than scale (which they cannot achieve). This implies remaining vigilant and able to adapt rapidly within other sectors locally, as well as transnationally in order to keep growing (Baldacchino, 2012).[592]

Unfortunately, conflicting environmental discourses and interests characterise most of the above issues in Malta. Jeremy Boissevain (1993,[593] 2012)[594] highlighted vested interest and links between local politicians and the construction industry for instance, which seem to have a strong influence on the political scenario. This is reflected in pro-development political discourse for economic growth and neo-liberal ideology (Briguglio M., 2012a),[595] typical of Southern European approaches based on political patronage and obligation. Work by Azzopardi and Mann (2004,[596] 2007[597]) on the sister island of Gozo exposes how different communities develop their own strategies of interaction. They introduced a concept of implicit '*backstage thought*', referred to as the "*Nirrangaw*" (getting by) process, as an underestimated but critical issue in understanding social interactions and participative agency, especially on islands. In a later abridged version of the same paper, Azzopardi (2015)[598] produced a conceptual framework which depicts how Gozitans have learned to revert to informal social processes in order to overcome mistrust and powerlessness. The framework depicts how and why Gozitans tend to turn to their informal network of friends, relatives or friends of friends, gatekeepers to the power, so that they resolve

their most urgent issues, rather than resorting to formal channels. This tendency was also covered extensively by Jeremy Boissevain in his seminal work titled '*Friends of Friends. Networks, Manipulators and Coalitions'* (1974)[599], and further insights can be found in Banfield's '*Moral Basis of a Backward Society*' (1958)[600] based on fieldwork in Sicily. While this strategy could indeed produce the required results and solving the immediate crisis, this process keeps islanders trapped within a '*functioning system*' that has always worked to help them '*just manage'* their most pressing problems. The inherent consequences that can be associated with being locked inside the Nirrangaw routine is the overprotection of the status quo, resistance towards devising innovative problem-solving and creative ways forward, over protectionism, lack of forward planning for resilience, and further 'self-sealing' (Argyris, 1991, 87).[601]

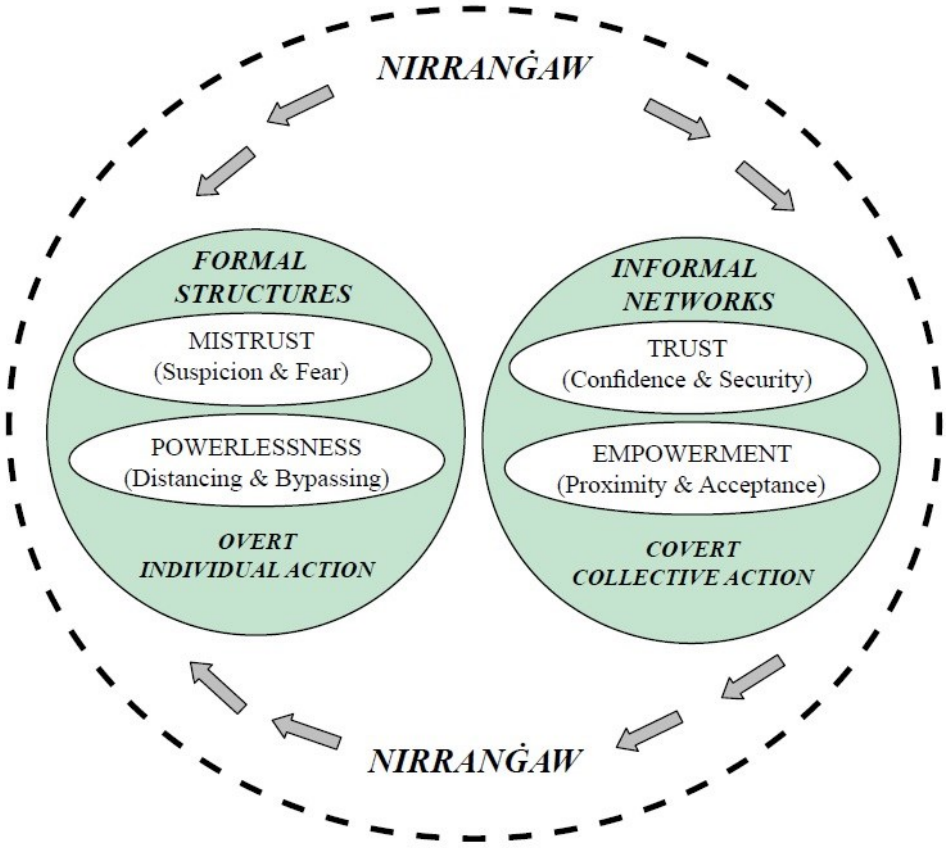


Figure 14 - The NIRRANĠAW Process: Enabling or 'Just Managing' (Azzopardi, 2015).

Furthermore, a recent study by Apap (2013)[602] concludes that the environment is discussed in relation to human activity and the social value it provides mostly as a commodity. In fact all three political parties seem to conceptualise or measure the environment within societal categories like the economy, employment, infrastructure, health and technology, and simply allocate a value to these categories rather than to the natural assets independently. This means that we do not really have any form of natural resource accounting. It is no surprise that Boissevain and Theuma (1998)[603] already warned two decades ago that increased conflict is bound to escalate since there "*is growing awareness that the country's physical and cultural resources are being*

needlessly squandered by massive speculative developments" (115). Consequently, despite being a small island-state, Malta still "*has all the trappings and characteristics of large nation states*", but with its own inevitable spin on socio-political interactions and with impacts in terms of ecological degradation. (9).

In order to set the scene on current societal concerns towards the environment, it is pertinent to provide a quick snapshot from the latest European public attitude studies. The Eurobarometer (Dec 2016)[604] suggests that the environment features quite highly in the expectations of respondents in Malta in terms of what should be the priorities of a European Community, and protection of the environment was the priority that received most mentions at 47%. However, when presented with a set of issues and asked to choose the two most important ones that they are personally facing at the moment. Rising prices, cost of living and inflation was the issue that received most mentions (31%). This was followed by pensions (16%) and environment, climate and energy issues (15%).

Nonetheless, according to another Eurobarometer study (2015)[605] only 29% of Maltese respondents had heard of the term biodiversity and knew what it actually meant (against an EU 28 average of 30%), while only 17% of Maltese respondents indicated that they had heard of and know what NATURA 2000 is (EU 28: 10%). Nevertheless, Maltese respondents still indicated that the two most important roles of nature protection areas were '*Protecting endangered animals and plants'* (78% as against the EU 28 average of 69%) and '*Safeguarding nature's role in providing food and clean air*' (73% against the EU 28 norm of 67%). The Maltese indicated that '*pollution of air, soil and water*' (67%, EU28:62%) and '*man-made disasters*' (61%, EU28: 61%) were the biggest threats to biodiversity. It follows that the chosen roles for protected areas are remedial roles to those same threats. This suggests that further studies on understanding how the Maltese perceive the natural environment and its biodiversity are merited. The third assessment of conservation status is expected to be held in 2018 for the period 2013 to 2018.[606]

Further reading on the sociological context of the Maltese Islands can be found in the "*Sociological Aspects of the Maltese Islands*' edited by Cassar and Cutajar (2004)[607], and more recently in '*Sociology of the Maltese Islands*' edited by Michael Briguglio & Maria Brown (2016).[608]

5.3 Land Use and anthropogenic pressures

The island's natural environment contributes immensely to Malta's natural heritage in terms of scenic, scientific, educational and recreational value (MEPA, 2010[609]). However, anthropogenic demands have created immense pressures on the environment. Numerous studies indicate intense pressure between humans and biodiversity imperatives on the Maltese islands (NEP, 2012;[610] SOER, 2012)[611] which are also observed elsewhere

in the Mediterranean basin (Deidun, 2010)[612] and globally (James et al., 2016).[613] From the beginning of human colonisation, thought to have taken place circa seven thousand years ago (Cassar, 1997),[614] relentless anthropogenic pressures related to high population density, inherent land-resource constraints, limited natural resources, intensive farming, land fragmentation, higher susceptibility to natural hazards and increased urbanisation for human settlement have taken a visible toll on local biodiversity and natural habitats (Bertelsmann Stiftung, 2015).[615]

Land is one of Malta's most important environmental media, providing the physical context for the ecological systems that support biodiversity and human life itself. Social and cultural activities use land as a backdrop, and it is a fundamental economic resource. However, decisions relating to land-use change are often highly contested since people are trapped between their dependence on limited natural resources to meet their local development aspirations and international pressure to conserve these resources with high international value. Agriculture remains Malta's predominant land cover at 51% of land area, followed by natural vegetation at 19.1%. Approximately 22.3% of the Islands' 315 square kilometres (km^2) is characterised by urban areas, and an additional 7.4%is covered by industrial and commercial units, mineral extraction sites, airports, port areas, dump sites green urban areas and sports and recreational facilities (EEA, 2008; MEPA, 2010[616]) .

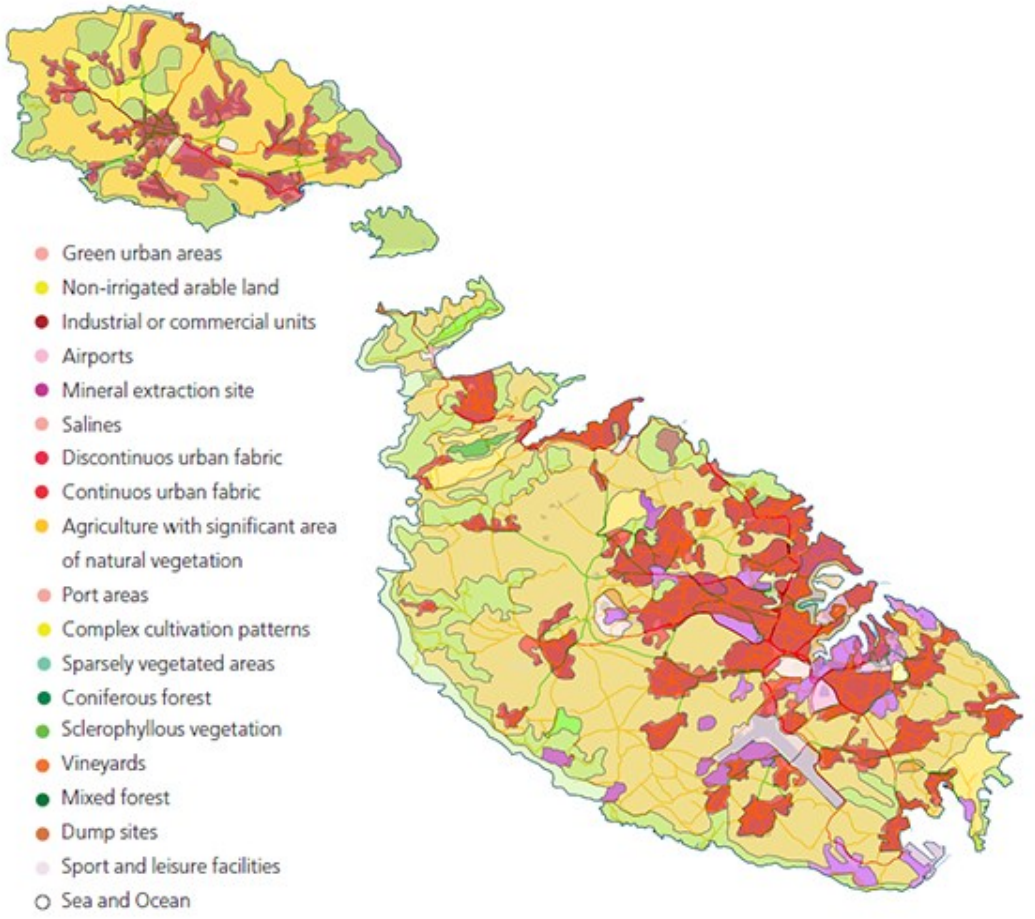


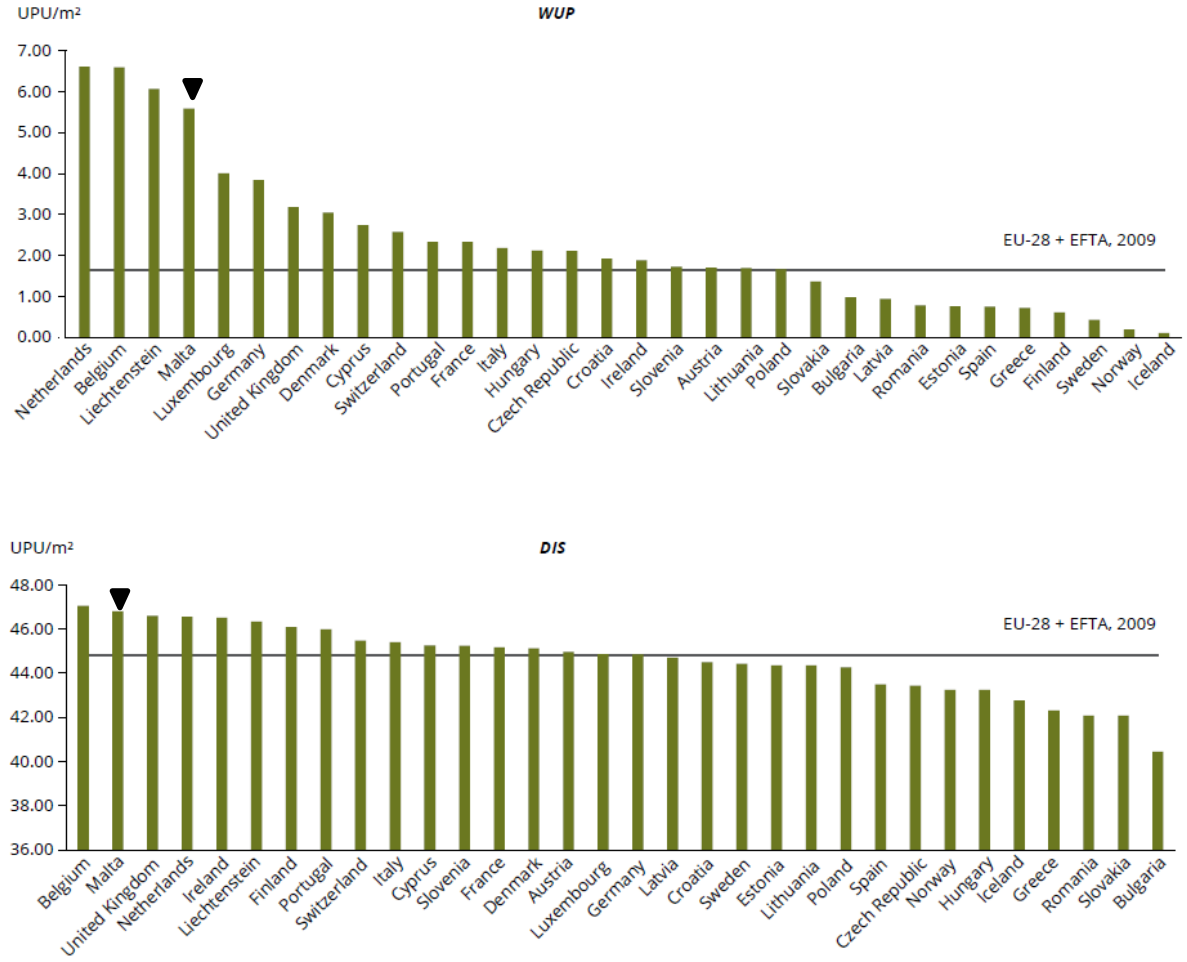
Figure 15 - Land cover by type (PA Mapserver, 2016)[617]

Malta also has the highest share of artificial land cover against population density amongst the EU Member States, with artificial land accounting for 32.9 % of total area (EUROSTAT - LUCAS, 2012)[618].

Table 10 - Share of total area, by type of land cover % (EUROSTAT, 2012)

	Total area (km^2)	Woodland and shrub land	Cropland	Grassland	Water and wetlands; bare land	Artificial
Malta & Gozo	316	20.3	26.6	11.4	8.9	32.9
EU-27	4 306 585	45.2	24.7	19.5	6.1	4.6

Furthermore, a recent report by the European Environment Agency (2016)[619] estimated urban sprawl values for Europe, ranging from 0.1 to 6.6 UPU/m2, with the lowest values for Iceland and the highest values for the Netherlands and Belgium. The other countries that were most affected by sprawl were Liechtenstein and Malta, with sprawl values > 5.5 UPU/m2, more than threefold higher than the combined value for the 28 EU and four EFTA countries.



Note: The horizontal line indicates the overall value for Europe (EU-28 + 4). The countries are ordered by decreasing values.

Figure 16 - Country-level values of weighted urban proliferation (WUP), dispersion of built-up areas (DIS), land uptake per person (LUP) and percentage of built-up area (PBA) in 2009 (EEA, 2016).

These already dire circumstances are compounded by numerous other pressures on this restricted environment, for instance a stock of 358,947 licensed motor vehicles (NSO, Q4/2016)[620] which puts Malta in 3rd place amongst the EU Member States for '*motorisation rates*' at 608 passenger cars per 1000 inhabitants (EUROSTAT, 2016)[621]. Malta has the highest road density in the EU, with 762 kilometres of roads per 100 square kilometres (TOM, 2016).[622]

Furthermore, inbound tourist arrivals reaching nearly two million (an increase of 10.2% over the same period in 2015) with an average stay of 7.1 days in 2016 (MTA, 2017).[623] Similarly, the number of foreigners settling in Malta is increasing drastically and in 2015 alone, nearly 13,000 migrants settled in Malta, with the number of non-Maltese living here more than doubling over the last decade (NSO, 2017).[624] This increase in tourism and foreign residents is driving an increase in short-term vacation rentals available through online operators in order to meet demand and changing Malta's tourism landscape. This is driving more speculative development and property prices, and more residential apartments are being transformed into occasional accommodation or business premises. Rents in Malta are hitting a historical high (GoM, 2017),[625] forcing long-term residents and small business out as they are suddenly priced out of their existing rents or homes, and not really addressing the needs of the local community.

Noise is another critical issue, and relatively noisy areas (Quietness Suitability Index < 0.5) account for more than 90% of the land in Malta (EEA, 2014).[626] This is not only an issue for human health and mental well-being , but is also disturbing to wildlife. Additionally, according to the World Health Organisation (WHO, 2016) Malta has retained the unenviable distinction of hosting the greatest proportion of obese adults aged 18 and over, in the European Union. A recent study, called '*Prevalence of Obesity in Malta*',[627] conducted by the Faculty of Medicine and Surgery between 2014 and 2016 measured the body mass index (BMI) of a sample of 18-to-70-year-olds. The study found that seven in 10 adults are either overweight or obese, a figure well above the EU average of 52% of the population. These figures are indeed more critical with regards to children, with > 40% of children being either overweight or obese (Superintendence of Public Health, 2012,[628] Grech Victor, 2007[629], 2015).[630] This is considered to be one of the most serious global public health challenges of the 21st century. Besides deficiencies in the overall Maltese diet, these concerning figures are also attributed to the over reliance on the car which has a direct effect on the population's health and is a major contributor to high cardiovascular and respiratory diseases, chronic bronchitis and activity reduction (ICCSD, 2015)[631]. A recent TPPI report (2015)[632] states that "*our legendary physical laziness and high rates of both obesity and diabetes are witness to the failure of successive government administrations and health authorities to recognise that encouraging a healthy,*

physically active lifestyle on a nationwide basis is a good investment". This harsh critique is understandable in view of the laissez-faire attitude towards natural areas and parks, and limited investment in facilitating an improved outdoor culture and providing opportunities for people to engage with natural or green spaces.

Despite the above threats, Malta's natural capital remains unaccounted for in national accounts and mismanagement of our natural capital persists primarily because its full value is not reflected in socio-economic policies and choices, despite its fundamental importance for society's welfare (Forum for the Future, 2014)[633]. This scenario creates a complex challenge for policy makers, since it is tempting to group these issues under the social, economic and environmental pillars of sustainability and attempting to treat these issues separately. In actual fact these are closely inter-related and inter-dependent problems, and an isolated analysis of potential policy impact devoid of the wider land-use and policy contexts would be of limited value. Undoubtedly, policy decision-making would need to assess the wider social and environmental losses and gains implied by different policy scenarios before making difficult decisions for priorities and any trade-offs (Morris, Camilleri and Moncada 2008).[634] Having said that, this remains incompatible with current imperatives of economic growth and the pursuit of forever increasing output or GDP growth, which inevitably measures only annual material flow, rather than stocks of wealth and their distribution.

5.4 Designated protected areas

The principal biodiversity and landscape protection tool of the land-use control and planning system in Malta is based primarily on the designation of protected areas, under the provisions of the Development Planning Act (DPA – MEPA 1992, 1996, 2000 and 2006, PA 2016),[635] and the Environment Protection Act (EPA, MEPA 1991, PA 2016),[636] while a number of Legal Notices issued under this parent Act allow for the protection of specific species of flora and fauna. Actions are also integrated across other cross cutting sectors through the local planning process via focused policies like the Rural Development Plan for the Maltese Islands (MRRA, 2009)[637], the National Biodiversity Strategy and Action Plan for the Maltese Islands (NBSAP, MEPA 2010)[638], and the Sustainable Development Strategy for Malta 2007-2016 (NCSD, 2006)[639]; and through cross-compliance procedures with respect to statutory environmental management standards established in relation to the EU Directives listed in Annex III to Council Regulation (EC) No. 1782/2003.[640] The Strategic Plan for Environment and Development (SPED, 2015) replaced the Structure Plan (1992) and provides for long-term spatial frameworks for both the built and un-built environment, while integrating the three main pillars - social, economic and environmental objectives. A geographic and social distinction is made between the western part of Malta, mainly dominated by unbuilt open spaces, natural and semi-natural areas accommodating agricultural activities, and the eastern part which is highly urbanised and including major residential areas, and industrial or commercial areas. However, the

SPED lacks the necessary detail to have practical applicability in defining that vision and remains open to interpretation until the new Local Plans are published.

The Local Plans (2006), mostly focus on the principle of protection and enhancement of greenspaces, and include designations such as 'Strategic Open Gaps', 'Green Areas' and 'Open Space Enclaves' which seek to "*safeguard the countryside from urban encroachments*" and to "*preserve the setting, townscape identity and character of towns and villages and prevent them from merging into one another*" (MEPA, 2006; 47). Other policies which offer protection include 'Valley Protection Areas', 'Areas of Ecological/ Scientific Importance' and 'Areas of High Landscape Value' (RC0 1), to name a few (MEPA, 2006). Other policy instruments under which protected areas have been designated are also a result of compliance to multilateral agreements like the Bern Convention on the Conservation of European Wildlife and Natural Habitats[641], the EC Birds Directive, the EC Habitats Directive, the Ramsar Convention on Wetlands,[642] and the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean.[643] Thanks to these concerted actions, the proportion of legally protected landscapes in the Maltese Islands stands at circa 33% of total land area (SOEI, 2006;[644] TER, 2008[645]).

5.4.1 Protected areas and their management plans

Across the Maltese Islands, 21.5% (67.6 km^2) of the land area is covered by one designation or another, or even more than one. Since joining the European Union in May 2004, Malta has made progress in designating terrestrial sites under the EC Habitats Directive and Birds Directive (MEPA).[646] To date, Malta has 35 Special Areas of Conservation (SACs) declared under the EC Habitats Directive and 21 Special Protection Areas (SPAs) declared under the EC Birds Directive in the NATURA 2000 network (ERA, 2017).[647] Table 11 below provides a list of the National designations for protected areas in Malta.

Table 11 - Protected area profile for Malta from the World Database of Protected Areas (reproduced from UNEP-WCMC, 2017)[648]

Number of Protected areas	Protected areas coverage		
261	*Area terrestrial*		
	23.69% coverage	77.0 km² Protected Land Area	325.0 km² Total Land Area
	Area marine		
	6.26% coverage	3,489.0 km² Marine Area Protected	55,696.7 km² Total Marine Area

National designations

13

Categories	*Count*
Area of Ecological Importance/Site of Scientific Importance	43
Special Areas of Conservation - International Importance	32
Tree Protection Area	30
Bird Sanctuary	26
Area of Ecological Importance	22
Special Protection Areas	13
Protected Beaches	11
Site of Scientific Importance	9
Special Areas of Conservation - National Importance	7
List of Historical Trees Having an Antiquarian Importance	6
Nature Reserve (Islands)	2
No Berthing Zone/No Entry Zone except for Fisheries	1
Nature Reserve (Filfla)	1
No Berthing Zone/No Entry Zone except for Fisheries	1

Regional designations

2

Categories	*Count*
Special Protection Area (Birds Directive)	21
Site of Community Importance (Habitats Directive)	35

International designations

1

Categories	*Count*
Ramsar Site, Wetland of International Importance	2

As of Feb 2016, only thirteen protected areas fall under some sort of active management structure (TPPI, 2016),[649] namely:

- Għadira Nature Reserve (BirdLife Malta);
- Simar Nature Reserve (BirdLife Malta);
- Foresta 2000 (BirdLife Malta, Din l-Art Ħelwa, Resources Ministry);
- Xrobb L-Għaġin Nature Park (Nature Trust Malta, Resources Ministry, Environment Authority);

- Wied Għollieqa (Nature Trust Malta);
- Għajn Tuffieħa (Gaia Foundation);
- Ramla L-Ħamra (Gaia Foundation);
- Buskett Nature Reserve (Resources Ministry);
- Il-Majjistral Nature & History Park Foundation (Din l-Art Ħelwa, Nature Trust Malta, Gaia Foundation, reporting to Majjistral Management Committee including representatives from Lands Department, Environment Authority, Resources Ministry, Mellieħa Local Council and a government-appointed chairperson);
- Dwejra Heritage Park (Government committee led by Environment Authority);
- Comino Blue Lagoon (Malta Tourism Authority and Environment Authority);
- Salini Nature Park (Resources Ministry).
- Pembroke Heritage Project (Malta Tourism Authority)

5.4.2 The NATURA 2000 sites

In addition to protected areas designated by Maltese authorities, the European Union (EU) established the NATURA 2000 (NATURA 2000) network to ensure the long-term survival of its most valuable biodiversity and habitats (European Commission, 2013)[650]. As mentioned earlier, the network is comprised of Special Areas of Conservation (SAC) designated by Member States under the Habitats Directive, and also incorporates Special Protection Areas (SPAs) which Member States designate under the 1979 Birds Directive.[651] Nonetheless, although designation and management of protected areas are fundamental for their conservation across the EU, numerous doubts have been raised on their effectiveness for conservation management. A recent assessment of the effectiveness of Protected Area Management in Europe (BFN, 2010)[652] found management planning to be inadequate and that "*even where plans exist, their quality and applicability needs to be improved, and the links between planning, management and evaluation made more specific"*. This is especially relevant to the Maltese context, especially since few of Malta's sites are actively managed in the first place. Conrad (2006, 2008)[653] suggests that Malta suffers from a *'paper parks'* syndrome where protected areas remain a designation on paper, with little if any effective implementation in practice. In fact, limited attempts to set conservation priorities have been made at the regional level (Schembri, 1993).[654] Similary, according to Agius (2014),[655] numerous Protected Areas in Malta could potentially lose the species for which they were designated. On a positive note, in view of Malta's high country-wide share of artificial land, its NATURA 2000 sites are deemed to have high connectivity index values due to the close distribution of sites and the existence of functional paths in between (JRC, 2013).[656] This is somewhat encouraging but remains a recurrent and serious concern amongst most Member States.

Furthermore, Araujo et al. (2011)[657] suggest that during this century climate conditions across European

conservation areas, especially in the South Mediterranean area, are expected to become less suitable for species and can lead to increased displacement or extinction due to multiple stresses and systemic failures (IPCC, 2014;[658] Giorgi et al., 2008).[659] The Maltese islands are also experiencing warmer temperatures during the whole year and an increase in the frequency and intensity of heat waves, coupled with increased rainfall during the wetter months (October and February) and decreased rainfall in the drier months. Climate change projections indicate a potential increase in precipitation by as much as 22% during the period from October to February (Micallef et al., 2010),[660] an overall rate of air temperature increase of 0.71°C/100 years over the period 1923-2005, sea surface temperature show a steady increase of close to +0.05°C/year in the last 40 years and an average sea level rise of 0.45-0.15 cm/year between 2002-2006. All these changes have a direct influence on the biodiversity and functioning of many ecosystems that respond both physically and biologically to changes in climate. Gradual changes in climate can potentially fuel the progressive loss of biodiversity and resilience of natural ecosystems due to increased drought, deterioration of fresh water resources, food production problems, lessened air quality, increased intensity of flooding, soil and coastal erosion, desertification, and changes in sea level (Council of Europe, 2012).[661] Barredo et al. (2016)[662] suggest in no uncertain terms that climate-driven habitat loss is projected to affect 15-23% of Mediterranean NATURA 2000 sites, with the loss expected to occur in central and southern areas of the Iberian Peninsula, southern Italy and the island of Sicily, south-eastern Greece, Cyprus, Malta and central Turkey. Notwithstanding, decisive action is often not always considered with urgency as noted in Malta despite clear and locally visible warnings of climate change and health risks for instance (Akerlof et al., 2010).[663]

The above threats are not limited to the Maltese islands or the Mediterranean basin only but also prevalent worldwide (EEA, 2015),[664] and clearly, without fundamental changes in population growth, consumption patterns, and environmentally harmful technologies, modern industrial human beings are likely to leave a gradually worn-out earth to future generations (Schmuck and Vlek, 2003)[665]. This is also expected to cause significant mental-health and social challenges in the coming years, including depression and anxiety, post-traumatic stress disorder, substance abuse, suicide and widespread outbreaks of violence (National Wildlife Federation, 2012).[666] The necessity to conserve effectively natural spaces for overall physical and mental well-being in view of the above mentioned pressures is more pronounced now than ever before. The obligation at this critical juncture remains to strive towards a sustainable economy that upholds human values within the context of accountability towards future generations and a respect for the environment.

5.4.3 The NATURA 2000 Management Plans

In reaction to the above concerns, Malta launched management plans and legislative frameworks for 34 terrestrial NATURA 2000 sites in 2017. These final plans consist of Conservation Orders for 8 sites, and 22 management plans for the rest of the sites, some of which were grouped together. The 34 local terrestrial NATURA 2000 sites together cover approximately 13.5% of the total land area of the Maltese Islands (around 42 km^2; ADI, 2014).[667] For a full list of all NATURA 2000 sites and the ecosystems they protect please refer to **Appendix 01 - NATURA 2000 sites in the Maltese Islands (Transport Malta, 2016)** [668] and **Appendix 02 - List of Annex I Habitats in the Maltese Islands**

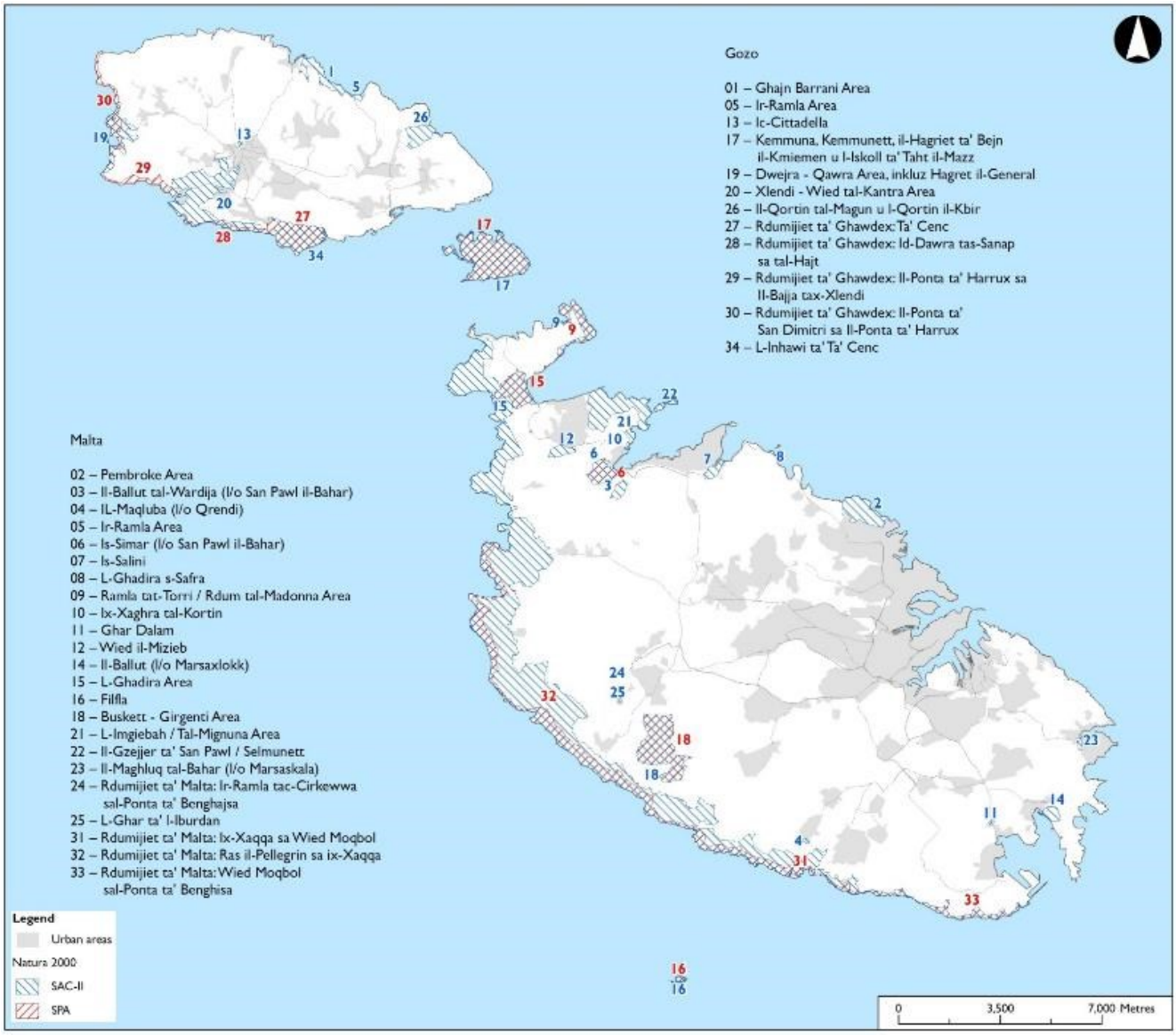


Figure 17 - The 34 local terrestrial NATURA 2000 across the Maltese islands (ADI, 2013)[669]

These management plans do not cover other nature parks designated under national legislation, some of which have their own management plans approved by the Environment Authority and implemented by the site managers. Further to this, more than 3,450 km^2 of marine protected areas have been designated.

Involvement of stakeholders was undertaken to ensure that the management plans are appropriate to each site and can be successfully implemented in the management planning process - including all relevant Government authorities and other national entities, local councils, non-governmental organisations (NGOs), public and private operators, land owners/managers, local residents, farmers, site visitors and other users. The involvement of stakeholders was considered to be a key element in the management planning process, and deemed "*necessary to ensure that the management plans are appropriate to each site and can be successfully implemented*" (MEPA, 2015).[670] Stakeholder engagement took place throughout the preparation of the management plans, and involved circa two workshops over a period of two years per protected area grouping. These public sessions were held throughout the development of the conservation objectives and conservation measures, and eventually in relation to each draft management plan and its implementation measures. These sessions where initially quite well received at the local level and elicited some interesting contributions and concerns. However, overall the sessions where poorly attended and most people did not bother to be involved or lost interest in the process due to the huge delays between the project initiation in 2011 and no clear commitment for their conclusion. These management plans were only approved in February 2017 (along with the necessary conservation orders - ERA 2017),[671] and most sites remain as yet unmanaged (TPPI, 2016).[672] It is yet unclear whether socio-cultural attachments were in fact considered during the implementation of the management plans beyond the obvious biodiversity imperatives, and whether public involvement will be maintained in their implementation. A later section discusses the major public consultation pitfalls prevalent in Malta.

Malta ranks amongst the highest Member States that has undertaken research supporting the EU's NATURA 2000 sites published between 1996 and 2014 (regional, national, multinational, and EU-wide scope) in comparison to the percentage of national territory in NATURA 2000 (Popescu et al., 2014).[673] This implies that Malta does not lack the necessary scientific research for identifying conservation priorities, setting management goals, and reconciling biodiversity protection and society in the complex political European landscape. A study by Bradshaw et al. (2010)[674] however indicates that Malta places sixteenth in a list of worst-ranked countries by proportional composite environmental ranking (pENV; Kendall's W= 0.26, P,0.0001). This study demonstrates that environmental impact in one aspect is partially mirrored by impact in other measures, presumably because high urbanization leads to higher proportional natural forest loss, greater release of CO_2 through land-use change and burning of fossil fuels, and an ensuing higher proportion of species threatened with extinction owing to habitat loss and pollution. Malta performs poorly, especially in view of its high relative fertiliser use and CO_2 emissions.

Table 12 - Malta's proportional composite environmental (pENV) rank (lower ranks = higher negative impact).

Rank	Country	Code	PD	PGR	GOV	GNI	NFL	HBC	MC	FER	WTP	PTHR	CO2	pENV
16	Malta	MLT	4	154	21	36	-	214	127	69	2	138	3	34.0

Shown are country name and code, population density (PD) rank, population growth rate (PGR) rank, governance quality (GOV) rank, Gross National Income (GNI) rank, natural forest loss (NFL) rank, natural habitat conversion (HBC) rank, marine captures (MC) rank, fertilise r use (FER) rank, water pollution (WTP) rank, proportion of threatened species (PTHR) rank, and carbon emissions (CO2) rank. Constituent variables used to create the pENV are in boldface. Missing

5.4.4 Urban Conservation Areas

This research effort includes an analysis of the potential connectedness to place or nature within Urban Conservation Areas, which are similarly protected areas, also of relevance to environmental management planning. Urban Conservation areas (UCA's) were first identified within the legal context of the Temporary Planning Schemes under Section 8 of the Building Permits (Temporary Provisions) Act 1988. The 1992 Structure Plan entrenched the UCA under Policy UC01, which defined a UCA as "*An area of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance*". Their aim is to ensure that evolutionary changes occurring within such areas are in harmony with their historical context. The original Local Plans were eventually rationalised to seven local plans covering six regions and one locality when a new set of local plans was issued in 2006, including a controversial extension of building boundaries (Mallia, 2014).[675]. The SPED, which has replaced the 1990 Structure Plan for the Maltese Islands, remains broad in its ambitions towards UCAs under Urban Objective 2: To improve the townscape and environment in historic cores and their setting with a presumption against demolition of property worthy of conservation' (24). Change was steered originally via the "Design Guidance for Development within UCA's" (Planning Authority, 1995), the "Policy and Design Guidelines 2007" (MEPA, 2007) and more recently the 'Development Control Design Policy, Guidance and Standards 2015 (DC15).

The aim of the UCA designation is to control and manage pressures for change within the urban fabric; and to maintain a balance between these pressures and restraints aimed at safeguarding these vernacular traditional settlements. It is also tasked with providing compatible urban renewal in line with the needs of modern society, while maintaining historical continuum and liveability within the village and town context (MEPA 1995).[676] Open spaces were also included in these Guidance since they are deemed to perform a number of important functions within UCAs, providing refuge from adjacent land uses in often high density areas, and helping protect amenities by providing fresh air and light. Similar consideration was given towards ensuring that trees and other soft landscaping measures are exploited in order to break the urban scene and improve the visual quality of an area. Trees also play an important role for providing shade. Similarly, the Planning Authority was empowered to can take any measures necessary to protect individual or groups of trees through scheduling. Tree Preservation

Orders (TPOs) were also enabled and defined in Section 48 of the Development Planning Act 1992 and Structure Plan policy RCO 33.

Urban Conservation Areas (UCAs) established a streetscape classification hierarchy within urban areas ensure higher quality streetscapes through sensitive and compatible interventions. Generally, Category A streetscapes have been assigned to churches and chapels, Category B streetscapes where interventions have been minimal and streetscapes have generally retained their pristine character. Category B identifies streetscapes which despite various interventions still retains an element of street pattern and harmony. Category C are those streetscapes where interventions in the streetscape are clearly visible and also contain incongruous elements and features (MEPA).[677]

5.5 Public participation in Malta

Public involvement has been recognised as a fundamental aspect of environmental management for over 40 years (Butler, 2014),[678] and was included in landscape planning and policy by the Council of Europe through the European Landscape Convention in 2000.[679] Public participation has also been legitimised in environmental planning by the European Parliament through the Directive on public participation in respect of the drawing up of certain plans and programmes relating to the Environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC (2003/35/EC).[680] It has also been entrenched further within the second pillar of Regulation (EC) N° 1367/2006 of the European Parliament and of the Council on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies (OJ L 264, 25.9.2006, 13).[681] The Convention provides a framework for the public to take part in decisions relating to the environment at an early stage, and thus making the project, development or plan more likely to be acceptable, more sustainable and less damaging to the environment. The implementation of the Aarhus Convention was developed further locally thanks the Twinning project MT/06/IB/EN/01 titled "Further Institution Building in the Environment Sector" (EU Secretariat, 2010).[682]

Malta transposed the provisions of these Directives into Maltese law originally by Article 469A of the Code of Organization and Civil Procedure (Cap. 12)[683] and by various other legal notices. The relevant legislation is being reproduced below from the latest 'AARHUS Convention Implementation Report Certification sheet' (ERA, 2017)[684] and broadly grouped in relation to the respective pillars of the Aarhus Convention as follows:

General (all three pillars):

- The 2016 Environment Protection Act (Cap. 549) and the 2016 Development Planning Act (Cap. 552)

which replaced the 2010 Environment and Development Planning Act (Cap. 504)

1st Pillar - Access to information:

- The Freedom of Access to Information on the Environment Regulations (S.L. 549.39)
- The Freedom of Information Act (Cap 496)

2nd Pillar - Public Participation:

- The Environmental Impact Assessment Regulations (S.L. 549.46)
- The Strategic Environmental Assessment Regulations (S.L. 549.61)
- The Industrial Emissions (Integrated Pollution Prevention and Control) Regulations (S.L. 549.77)
- The Plans and Programmes (Public Participation) Regulations (S.L. 549.41)
- The Water Policy Framework Regulations (S.L. 549.100)
- The European Pollutant Release and Transfer Register Reporting Obligations Regulations (S.L. 549.47)
- The Control of Major Accident Hazard Regulations (S.L. 424.19)
- The Development Planning (Procedure for Applications and their Determination) Regulations (S.L. 552.13)

3rd Pillar - Access to Justice:

- The Environment and Planning Review Tribunal Act (Cap. 551)
- The Administrative Justice Act (Cap. 490)
- The Code of Organization and Civil Procedure (Cap. 12)
- The Data Protection Act (Cap. 440)

It is also relevant to discuss the crucial role and limitations of Environmental Impact Assessments (EIAs) which are designed to evaluate all reasonably foreseeable environmental consequences of human activities at the project or policy appraisal level, before they can be given development consent by the competent planning authorities (NAW, 2000).[685] Unfortunately, in Malta a number of shortcomings are noted which cripple the effectiveness of EIAs which typically stem from inadequate enforcement throughout the whole EIA process, but especially in the follow-up stage when it should be actually verified whether the project reached its sustainability objectives and recommendations or not (Sciberras, 2013).[686] Vella and Borg, 2010[687] have also suggested that in most cases EIAs do not include Social Impacts Assessments by default in the 'Terms of reference (ToR)", and only requested by the Planning Authority at the onset when applicable. They also make a case for the systemic deficiencies of EIA's in Malta, and the need to ensure better integration of public involvement and the plurality of landscapes into Maltese environmental policy via the inclusion of SIAs when relevant (Vella et al., 2015).[688, 689] Therefore, the importance of proper scoping before issuing the ToRs is critical in helping planners decide on the issues of most relevance, and to ensure SIA's are included when relevant in order to avoid fuelling more vociferous

objections especially when the proposal may already have significant public resistance. Consequently, in order to become institutionalised, SIAs must be a well-defined statutory requirement in the EIA process (Burge, 2002) and must look carefully at people's attachment to nature and place.[690]

There are other major risks associated with public consultation in Malta. The first risk originates from politicians who are primarily tasked with serving their constituency and who try to accomodate its voter base irrespective of policy or scientific advice. Consultation is only one critical step in environmental management and should not replace integrated policy analysis simply in order to accommodate vociferous vested interests (ex. bird hunting hours in NATURA 2000 sites). This is especially the case when there is scientific uncertainty, strong personalities fronting incorrect facts, and no one seems certain about the facts, choices, and consequences (Sublet et al., 2013).[691] This approach could lead to increased conflict particularly when public consultations undertaken by authorities are perceived to be blatant attempts to manipulate the electorate towards particular outcomes or to be driven by powerful lobby groups (e.g. building industry, the hunting community). Another risk is the loose interchange or confusion with the terms consultation and participation. Contrary to current practice, it has been long established that meaningful public participation requires much more than simply holding public meetings or hearings or collecting public comment (US EPA, 2014).[692] According to Holmes (2011. P.1),[693] genuine engagement in the '*co-production'* of policy and services requires major shifts in the culture and operations of government agencies.

In conclusion, the Maltese islands present a challenging but very relevant backdrop for the aims of this study. This chapter attempted to set the scene in terms of the complex bio-geo-socio-political realities of the Maltese islands, and the relationships between various external factors which may affect attitudes towards and engagement with protected areas. It also attempts to make a convincing case to go beyond generalised policy proposals for protected area management by providing awareness of CNT and PA constructs in evidence-based policy making, and allow policy-makers to identify priorities based on measurable benefits, especially on an islands state where everything is highly politicised. The following chapter introduces the research methods adopted in this paper.

6 Research methods

This chapter outlines the methodology used in this study to explore any relationships which might exist between CNT, PA and EB with protected areas, both statistically and spatially. It begins with a brief description of the theoretical and methods frameworks which guide this study. This is followed by a description of the statistical approach adopted, the survey instruments used (including sampling), along with a brief overview of the data handling approach. The chapter concludes with a short discussion of potential limitations.

6.1 Data collection questionnaire

Based on the review of the literature relating to measures of CNT, PA and EB constructs (Chapter 4), a questionnaire was drafted. The quantitative measures reviewed and selected were adapted to a structured questionnaire format amenable to face-to-face interviews, that would be able to capture the strength of respondent's attachments to place and nature, and identify where these attachments are placed. The intention was to quantify and evaluate more precisely the quantitative and spatial manifestations of CNT and place attachment. Based on the literature review discussed above, four scales were selected for inclusion in the questionnaire, and adapted in order to ensure consistency with similar studies used elsewhere; these are:

- The Nature relatedness Scale (NRS, Nisbet et al., 2009)[694] - *Retained in its entirety.*
  This study used the NRS in order to assess the personal and emotional relationship the Maltese community has with nature, and to identify any psychological determinants of people's willingness/barriers to make such sacrifices to protect the environment (environmental altruism) across a range of contexts. The Cronbach alpha was 0.83, indicating that items have high internal consistency. (Note that a reliability coefficient of 0.70 or higher is considered 'acceptable' in most social science research situations).

- The Place Attachment Scale (Williams & Vaske, 2003)[695] - *Reduced to an 11-item scale, and modified slightly to be of relevance to the local context and protected areas.*
  Place attachment was measured by adapting items from the Place Attachment Inventory used by Raymond, Brown and Weber (2010)[696] based on a previous adaptation by Kyle et al. (2005).[697] We also included adaptations on social bonding, proposed by these same authors. The Cronbach alphas for place identity and place dependence fall in the ranges of 0.84–0.94 and 0.81– 0.94, respectively, indicating very high internal consistency. The scales used and changes made to the PA Scale are described in the 'Measures' sub-sections of Chapter 4.

- Environmental Behaviour Scale (Dutcher et. al., 2007)[698] - *Retained in its entirety.*

  The Environmental Behaviour scale is a short scale intended to measure the extent to which individuals engage in environmental behaviour. It is composed of six questions, modified from Luloff, Wilkinson, Schwartz, Finley, Jones, and Humphrey (1993)[699] which was scored across a 5-point Likert scale. Participant responses to these questions are binary (Yes or No). The Cronbach alpha of the original scale was 0.67., indicating medium internal consistency.

- Conservation Choices scale - *Devised by author.*

  A fourth scale was developed by the author (question 23) in order to understand respondents' preferences on relatively complex conservation issues that are of relevance to Maltese protected areas. The Conservation Choices Scale is composed of 12 questions that are scored across a 5-point Likert scale. The CC Scale (CCS) was evaluated for internal consistency and was found to have a Cronbach alpha α of 0.875 and hence high reliability.

The draft questionnaire consisted of 28 main lead questions, including the above scales, requiring responses across Likert scales. The following socio-demographic characteristics were also recorded: house type, number of years respondents lived in the area they call home, age, gender, and education. Additional variables where also collected like the perceived importance of protected areas, awareness of NATURA 2000 sites, and perception of nature decline. The questionnaire was pre-tested with a small convenience sample of ten homeowners. These homeowners helped identify unclear or poorly worded questions, and changes were made to the final questionnaire after every one of these test trials until all issues were addressed. This was deemed necessary in order to ensure that items were easy to score, to avoid semantic pitfalls, and to avoid any potential bias, as discussed in Section 6.7 - Limitations. The final questionnaire contained six sections: introductory questions, place attachment, nature relatedness, environmental behaviour, protected area management, and demographics. A final copy of both Maltese and English language versions of the questionnaire can be found in Appendices 5 and 6.

6.2 Population sample

Assuming a population of 430,000 for the Islands, a margin of error of 4.83% and a confidence level of 95%, the number of respondents necessary was deemed to be 400.[700] Malta is divided into 68 localities or local councils, which were grouped into three regions. Face-to-face questionnaire-based interviews were conducted with clusters of 30 householder respondents in each of 13 localities across the Maltese Islands in order to reach the 400 target. Face-to-face data collection was selected in order to ensure a 100%response rate in view of the lengthiness of the questionnaire. It also helped ensure accurate screening, and proper recording of replies while

maintaining respondent focus. These respondents were chosen due to their household's proximity to NATURA 2000 sites (or 'awayness' from NATURA 2000 for the four control sites), and in order to ensure that the sampling frame captured a sufficient spread across the Maltese islands and the diversity of views. The 3rd party entrusted with the interviews was a local research agency specifically offering market research solutions since 1999, and of good market reputation (Informa Consultants - http://informa.com.mt). Interviewers were instructed to explain the instructions and ensure informed consent, and to then provide a version of the questionnaire in the language of choice, with minimal prompting or assistance unless in case of particular circumstances like illiteracy. The informed consent forms can be found in **Appendix 06 - Letter of informed consent for respondents.**

A stratified random sample by age and gender (n=401) was randomly selected from the population and clustered into circa 30/31 households spread across the 13 selected localities. This stratified sampling approach was used in order to ensure an equitable representation across all age groups. Gender, age and education distribution across the sample are discussed in a later section (**6.2 - Population sample**). The sample was determined from 2012 NSO data by adopting a Probability Proportional to Size (PPS) method to identify the respective households. This was done by selecting clusters based on streets within localities sampled with PPS, following which a fixed number of households were systematically selected from each cluster. The following is the process adopted for PPS sampling:

i) The sampling interval is calculated by dividing the total population by the number of clusters;
ii) A random starting point is chosen between 1 and the sampling interval (k) by using a random number table;
iii) The first cluster is where the k^{th} individual is found, based on the cumulative population;
iv) Clusters are subsequently assigned by adding 'k' cumulatively. In towns with larger populations, more than one cluster will probably be selected; and
v) A random selection of streets is drawn from each town depending on the number of clusters selected within that town. From each street a maximum of 6 addresses are taken. The remainder of the cluster is selected as every 4th address by standard random route procedure from the initial address. If less than 6 addresses are obtained from a street (using one every 3rd address system) the interviewer is to go round the block and keep going from there.

All relevant ethical and safety guidelines were adhered to. Stratified quota sampling was used to ensure a representation of the Maltese population on the basis of gender and age. Only one person per household was selected for the interview. If an eligible person was not available at the time of the visit, the interviewer made an appointment to return to conduct the interview. Non-respondents were replaced with those from households next door who met the demographics of the previous expected respondent in order to keep a homogenous stratification and not introduce any systemic bias. Surveys were returned with the corresponding householder

address locations. In total 401 useable surveys were returned, representing a 100 % response rate. Of the 401 respondents, 195 (48.6 per cent) were male and 206 (51.4 per cent) were female, with a homogenous spread across the required bands. This compares closely with the 2011 census (NSO, 2014)[701] where the population of Malta comprised more females (209,807) than males (207,625). Table 13 below indicates the homogenous stratified distribution across gender, age and education for this sample. The mean of 32 years was noted as the average number of years people lived in their area where they were interviewed, with a standard deviation of 19 years and a minimum of 1 year to 88 years. 93% of the respondents considered their current household to be where they call home.

Table 13 - Gender, age and education distribution across the sample (n=401)

Gender		N	%
Male		195	48.62%
Female		206	51.37%
	Total	401	100.00%

Age		N	%
20 to 39 years of age		141	35.16%
40 to 59 years of age		131	32.66%
60 years old plus		126	31.42%
	Total	401	100.00%

Education		N	%
No schooling / Primary		70	17.46%
Lower Secondary		84	20.95%
Upper Secondary		110	27.43%
Post secondary / Non-Tertiary (e.g. MCAST, nursing)		78	19.45%
Tertiary		59	14.71%
	Total	401	100.00%

The occupational status of the sample is presented in *Table 14* below, indicating that 37% of the respondents were employed full-time, retired or taking care of the home.

Table 14 - Occupational distribution across the sample (n=401).

Q27 What is your current occupational status?

	Frequency	Percent
Employed full time	148	36.9
Permanently retired from work	91	22.7
Looking after the home or family	82	20.4
Self employed	34	8.5
Employed part time	20	5
Unemployed and seeking work	10	2.5
At school	7	1.7
In further/higher education	4	1
Permanently sick or disabled	2	0.5
Government work or training scheme	1	0.2
Other	1	0.2
Refused to disclose	1	0.2
Total	401	100.0

Assuming a margin of error of 5%, a confidence level of 95%, and a response distribution of 50%, the margin of error was 4.88%. It is important to note at this stage that, in view of the limited sample size of clusters within the 13 chosen localities (n= 30 or 31), one needs to treat results obtained for clusters as specific to those same clusters, and not representative of the entire host locality. The margin of error (pro-rata per locality) at the locality level with such small samples sizes was noted to be between 17.29–17.83%, as against 4.83% for the whole sample (n=401). The limitations due to sample size, albeit being representative, create an element of uncertainty at the locality level, and larger sample studies would be merited to infer an entire locality's connectedness robustly. The use of household clusters was undertaken to ensure a wider geographical spread across the islands, and was guided by proximity to NATURA 2000 sites for spatial inferences or a control site requirement. Consequently, the quantitative analysis reflects respondent cluster associations with areas around them, and does not necessarily reflect the views of the entire locality they live in. Based on the margin of error, the data is more reliable on a national scale and for the specific clusters mapped.

Table 15 - Population cluster samples and margin of error (n=401)

Ref.	Cluster localities	Population (2011)[702]	Avg. Age	Sample size n = 500	Margin of error %
1	Valletta	5,748	45.5	31	18
2	Siġġiewi	8,202	38.5	32	18
3	Rabat (Għawdex)	6,252	44.2	31	18
4	Birkirkara	21,749	39.7	31	18
5	Marsaxlokk	3,366	38.2	31	18
6	Mellieħa	8,661	40.4	31	18
7	Nadur	3,973	43.1	31	18
8	Naxxar	12,875	38	31	18
9	Rabat (Malta)	11,212	44.3	31	18
10	San Lawrenz	610	40.8	30	18
11	Sannat	1,837	39.8	30	18
12	Sliema	13,621	48.2	31	18
13	Xaghra	3,968	41	30	18
	Totals	**102,074**	**42**	**401**	**4.88**

**Assuming a population of 430,000*

6.3 Sample spatial distribution

The localities selected (with Local Council official reference numbers given in parentheses[703]), were B' Kara, M' Xlokk, Mellieha, Naxxar, Rabat (Malta), Siggiewi, Sliema, Valletta, Nadur, Rabat (Gozo), St Lawrenz , Sannat, and Xaghra (**Figure 18** below). In all cases, 30 or 31 households were surveyed, for a total of 401 households. Four control sites away from NATURA 2000 sites were also included (Birkirkara, Naxxar, Sliema and Valletta). The control sites were selected simply based on the fact that none of them actually have an NATURA 2000 site within their boundaries.

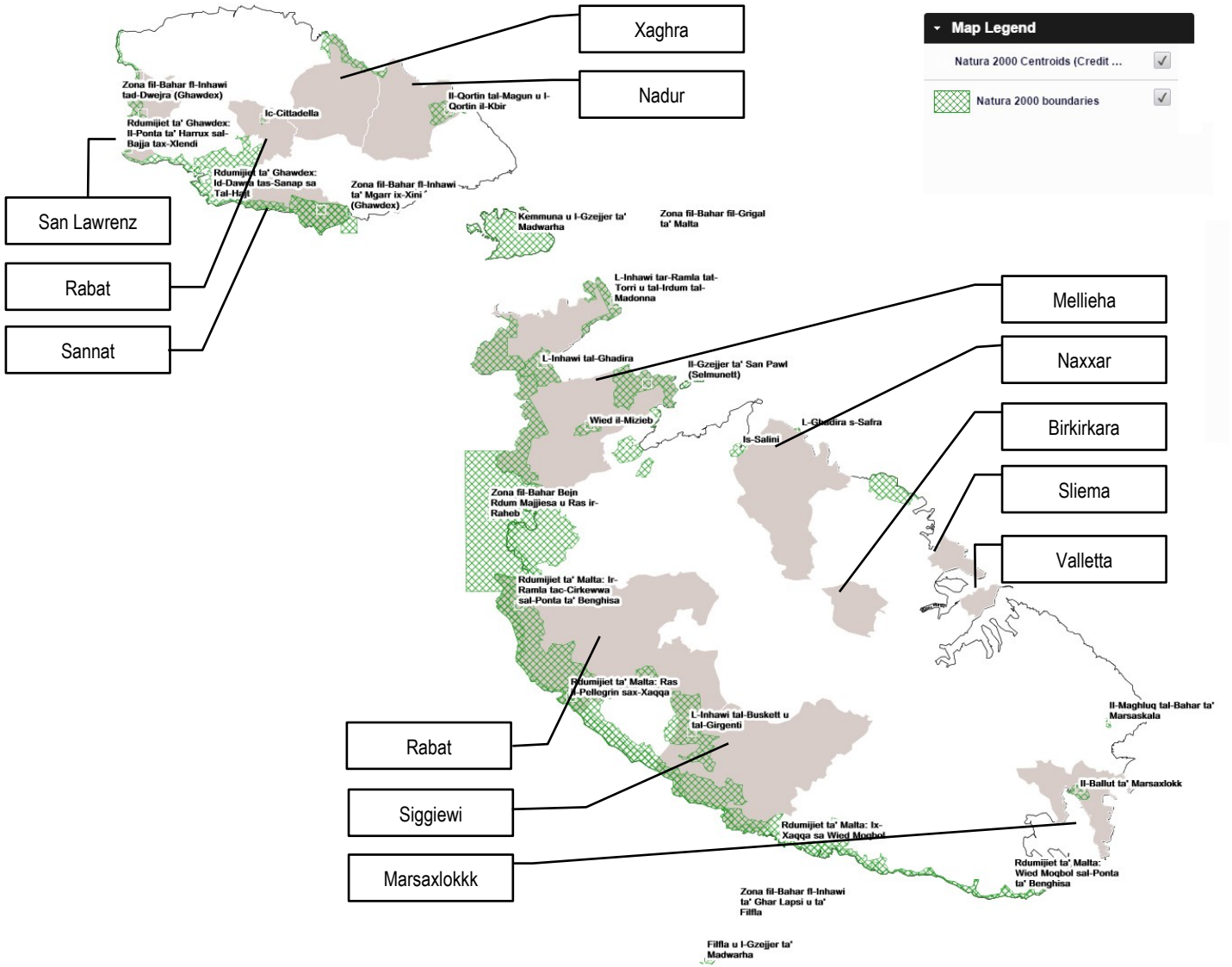
Table 16 below provides the rationale for choosing the localities and lists NATURA 2000 sites found within or around the locality. Underlined links will open the map for the NATURA 2000 site and its data sheet. It is important to highlight here that only 13 sites where selected in order to ensure a good geographical spread across the islands, while keeping the costs of 3rd party interviewers engaged affordable. Unfortunately there are hardly any substantial NATURA 2000 sites in the South and South-East of Malta, so only one locality in the South (excluding Valletta and Siggiewi) was included in this exercise.

Table 16 - NATURA 2000 sites in or around the 13 locality clusters (MEPA 2015)[704]

Ref	Locality Map ref	Locality	Population[705]	Avg . Age	NATURA 2000 sites within locality	NATURA 2000 sites around locality [706]
1	4	Birkirkara	21,749	39.7	Control site	
2	23	Marsaxlokk	3,366	38.2	Il-Ballut (l/o Marsaxlokk) Form, SCI Map Ghar Dalam Form, SCI Map Il-Maghluq tal-Bahar (l/o Marsaskala) Form, SCI Map	Rdumijiet ta'Malta: Wied Moqbol sal-Ponta ta' Benghisa Form, SPA Map
3	25	Mellieħa	8,661	40.4	L-Ghadira Area Form, SCI Map, SPA Map Is-Simar (l/o San Pawl il-Bahar) Form, SCI Map, SPA Map L-Imgiebah / Tal-Mignuna Area Form, SCI Map Ramla tat-Torri / Rdum tal-Madonna Area Form. SCI Map, SPA Map Rdumijiet ta'Malta: Ir-Ramla tac-Cirkewwa sal-Ponta ta' Benghisa Form, SCI MAP Wied il-Mizieb Form, SCI Map	Kemmuna, Kemmunett, il-Hagriet ta' Bejn il-Kmiemen u l-Iskoll ta' Taht il-Mazz Form, SCI Map, SPA Map Is-Salini Form, SCI Map Il-Gzejjer ta' San Pawl / Selmunett Form, SCI Map Il-Ballut tal-Wardija (l/o San Pawl il-Bahar) Form, SCI Map Kemmuna, Kemmunett, il-Hagriet ta' Bejn il-Kmiemen u l-Iskoll ta' Taht il-Mazz Form, SCI Map, SPA Map Ix-Xaghra tal-Kortin Form, SCI Map
4	31	Naxxar	12,875	38.0	Control site	L-Ghadira s-Safra Form, SCI Map
5	37	Rabat (Malta)	11,212	44.3	L-Ghar ta' l-Iburdan Form, SCI Map Buskett - Girgenti Area Form, SCI Map, SPA Map Rdumijiet ta'Malta: Ras il-Pellegrin sa ix-Xaqqa Form, SPA Map	Buskett - Girgenti Area Form, SCI Map, SPA Map Rdumijiet ta'Malta: Ix-Xaqqa sa Wied Moqbol Form, SPA Map
6	44	Siġġiewi	8,202	38.5	Buskett - Girgenti Area Form, SCI Map, SPA Map Rdumijiet ta'Malta: Ix-Xaqqa sa Wied Moqbol Form, SPA Map	Il-Maqluba (l/o Qrendi) Form, SCI Map Filfla Form, SCI Map, SPA Map
7	45	Sliema	13,621	48.2	Control site	L-Ghadira s-Safra Form, SCI Map Pembroke Area Form, SCI Map
8	49	Valletta	5,748	45.5	Control site	

9	62	Nadur	3,973	43.1	Il-Qortin tal-Magun u l-Qortin il-Kbir Form, SCI Map	
10	63	Rabat (Għawdex)	6,252	44.2	Ic-Cittadella Form, SCI Map	Xlendi - Wied tal-Kantra Area| Form, SCI Map
11	64	San Lawrenz	610	40.8	Dwejra - Qawra Area, inkluz Hagret il-General Form, SCI Map Rdumijiet ta' Ghawdex: Il-Ponta ta' Harrux sa Il-Bajja tax-Xlendi Form, SPA Map	
12	65	Sannat	1,837	39.8	L-Inhawi ta' Ta' Cenc Form, SCI Map Rdumijiet ta' Ghawdex: Ta' Cenc Form, SPA Map Rdumijiet ta' Ghawdex: Il-Ponta ta' Harrux sa Il-Bajja tax-Xlendi Form, SPA Map Rdumijiet ta' Ghawdex: Id-Dawra tas-Sanap sa tal-Hajt Form, SPA Map	Xlendi - Wied tal-Kantra Area| Form, SCI Map
13	66	Xaghra	3,968	41.0	Ir-Ramla Area Form, SCI Map	

Figure 18 - Study area indicating 13 localities targeted and NATURA 2000 sites in proximity (Dep. of Local Councils, April 2014)



6.4 Treatment of Data

Data was coded and entered into a database in SPSS version 23 (Statistical Package for Social Sciences). The database was stored securely on the author's computer during and after data analysis. To protect the anonymity of respondents, each survey identification number was removed from individual entries. Data analysis was initiated with a screening of the raw data. Anomalies related to data input errors and data characteristics that would result in statistical analysis challenges, such as outliers were examined. Descriptive statistics (i.e., means, standard deviations, ranges) and frequencies were also used to check integrity of the dataset and to decide on the appropriate statistical method to glean useful results. Collection of data via face-to-face interviews ensured that all 401 surveys received were complete, thereby providing an adequate data set for analysis. Skewness and kurtosis were not anticipated to be a major issue with a data set > 400 cases; however, the shapes of distributions (histograms) from key variables were examined, as recommended by Tabachnich and Fidell (2001)[707]. Procedures for checking the normality of the distributions of scores are described later in the next chapter.

Once initial preparation of the data was complete, a series of treatments was used to analyse the data. Respondents were also asked a series of descriptive questions ranging from respondent's gender to educational attainment. Descriptive statistics were used to highlight the various characteristics and stratification of the respondents identified in 6.2. Correlation coefficients were calculated for each of the conceptual scales used in the study and an examination of the dimensionality of CNT, PA and EB intentions was also conducted using Principal Components Analysis (PCA). Correlation analysis was performed to examine potential relationships between variables. This includes scale reliability tests a priori and principal component analysis of data collected from the study's three measures.

6.5 Statistical scale analysis and results

This section describes further the final measurement scales selected for this research effort. It also presents a preliminary test for each of the scales in order to test respondent comprehension and the overall utility of the survey instrument. Each scale was then also tested for reliability even though the chosen scales and their items had been used in numerous previous studies. This was deemed necessary in order to validate the minor adaptations to the scales for the local context, and to be sure of their reliability for the Maltese context.

6.5.1 The Nature Relatedness Scale (NRS)

The Nature Relatedness Scale (NRS; Nisbet et al. 2009)[708] was designed to assess the affective, cognitive,

and experiential aspects of an individual's connection to the natural world. The scale also explores the sense of appreciation and understanding of the interconnectedness of life in the world. It consists of 21 items that are rated on a 5-point Likert scale. A total score for each respondent is reached by averaging all 21 item scores, after reverse scoring some of the items as described below. Scores on the 3 sub-scale NRS dimensions are also calculated by averaging appropriate items after reverse scoring. While the NRS provides a tangible measure of CNT in its own right, it also allows direct examination of three empirically validated components of connectedness to nature namely:

1) the personal self-concept-related aspect (NR Self),
2) a view of our species' place in the broader ecosystem (NR Experience), and
3) the value of physical experiences in the natural world (NR perspective) (Schultz, 2002)[709].

The three sub-scales are embedded in the score items presented in

Table 17 below, and can be scored individually as sub-scales. The Self subscale consists of items 5, 7, 8, 12, 14, 16, 17, and 21 and measures "a*n internalised identification with nature, reflecting feelings and thoughts about one's personal connection to nature*". The Perspective subscale (items 2, 3, 11, 15, 18, 19, 20) measures "*an external, nature-related worldview, a sense of agency concerning individual human actions and their impact on all living things*". The Experience subscale (items 1, 4, 6, 9, 10, 13) measures "*a physical familiarity with the natural world and the level of comfort with and desire to be out in nature*." Possibly this measure might be the best suited for the current study since the NRS elicits the cognitive, affective, and physical connection we have with nature; and remains distinct from environmentalism or activism but is more focused on obtaining insights for our love for nature. The assumption is that perhaps the strength of our feelings of love and care about nature could be the defining issue for a greater effort, sacrifice and commitment that is necessary for tangible environmental and protected area protection.

The NRS was retained in its entirety. The scale items were preceded by the following instructions: [*For each of the following, please rate the extent to which you agree with each statement, using the scale from 1 to 5, where '1' means you 'Disagree strongly' and '5' means you 'Agree strongly'. Please make you respond on how they really feel, rather than how they think "most people" feel*].

Table 17 - Nature Relatedness Scale (Nisbet, 2009)

Q14	Reverse scored	NR Type	Statements	Disagree 1	2	3	Agree 4	5
1		Nr Experience	I enjoy being outdoors, even in unpleasant weather.					
2	R	Nr Perspective	Some species are just meant to die out or become extinct.					
3	R	Nr Perspective	Humans have the right to use natural resources anyway we want.					
4		Nr Experience	My ideal vacation spot would be a remote, wilderness area.					
5		Nr Self	I always think about how my actions affect the environment.					
6		Nr Experience	I enjoy digging in the earth and getting dirt on my hands.					
7		Nr Self	My connection to nature and the environment is a part of my spirituality.					
8		Nr Self	I am very aware of environmental issues.					
9		Nr Experience	I take notice of wildlife wherever I am.					
10	R	Nr Experience	I don't often go out in nature.					
11	R	Nr Perspective	Nothing I do will change problems in other places on the planet.					
12		Nr Self	I am not separate from nature, but a part of nature.					
13	R	Nr Experience	The thought of being deep in the woods, away from civilization, is frightening.					
14	R	Nr Self	My feelings about nature do not affect how I live my life.					
15	R	Nr Perspective	Animals, birds, and plants should have fewer rights than humans.					
16		Nr Self	Even in the middle of the city, I notice nature around me.					
17		Nr Self	My relationship to nature is an important part of who I am.					
18	R	Nr Perspective	Conservation is unnecessary because nature is strong enough to recover from any human impact.					
19		Nr Perspective	The state of non-human species is an indicator of the future for humans.					
20		Nr Perspective	I think a lot about the suffering of animals.					
21		Nr Self	I feel very connected to all living things and the earth.					

An NRS score is calculated as the total of all responses, divided by 21. Reverse scored items include questions: 2, 3, 10, 11, 13, 14, 15, and 18. Scores range from 1 to 5, with a high score endorsing a cognitive, affective, and physical connection with nature. Scores on the 3 NR dimensions are also calculated by averaging appropriate items after reverse scoring. NR-self items: 5, 7, 8, 12, 14, 16, 17, 21; NR-perspective items: 2, 3, 11, 15, 18, 19, 20; NR-experience items: 1, 4, 6, 9, 10, 13.

The first step of the statistical evaluation provided confirmation of the Nature Relatedness Scales' reliability. This evaluation featured several stages including an examination of descriptive statistics (frequency distributions, means, and standard deviations), correlation analysis, scale reliability tests, and principle factor analysis. During factor analysis, scale items with high cross loadings between factors were removed. A limited description of results from these tests follows. The internal reliability of the Nature Relatedness Scale using Cronbach's alpha in the original paper was fairly high (alpha α) at 0.87 and for the sub-scales: Self = 0.84;

Perspective = 0.66; and Experience = 0.80. Test-retest analysis was r = 0.85 and the sub-scales also showed good test-retest reliability (Self: r = 0.81, Perspective: r = 0.65; and Experience: r = 0.85) (Nisbet et al., 2009).

A number of statistical tests were undertaken in order to establish whether the scale and results were reliable for further analysis. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy met the minimum criteria at 0.848 and is >0.50, and Bartlett's test stood at 2176.39, where $p < .001$ which indicates that the correlations between questions are sufficiently large for factor analysis to be appropriate. The KMO measure is used as an index of whether there are linear relationships between the variables and thus whether it is appropriate to run a PCA on the current data set. Its value can range from 0 to 1, with values > 0.6 suggested as a minimum requirement for sampling adequacy, but values above 0.8 considered good and indicative of PCA being useful. Similarly, Bartlett's test of sphericity tests the null hypothesis that the correlation matrix is an identity matrix, and in this case is statistically significant (i.e. $p < .05$) and hence the data is suitable for a principal components analysis. To assess factor validity, the overall fit of each of the items was analysed by confirmatory factor analyses, which again demonstrated that the data provide an acceptable fit. The scale was kept in its entirety.

6.5.2 The Place Attachment Inventory scale (PAI)

Williams and Vaske showed that a concise survey with no more than six place-dependence items and six place-identity items had good internal consistency (Cronbach's alphas ranging from 0.81 to 0.94), and could be considered highly generalizable (coefficients 0.924 for place dependence and 0.869 for place identity) to different places. The PAI has also been adapted by Vaske and Kobrin (2001)[710], Jorgensen & Stedman (2001)[711], Stedman (2002)[712], Halpenny (2006)[713], and Semken 2009[714].

Place attachment was measured in this study by adapting items from the Place Attachment Scale (PAI) adapted by Raymond, Brown and Weber (2010)[715] based on a previous adaptation by Kyle et al., 2005[716] which in turn adapted eight items from the scale devised by Williams & Roggenbuck's (1989). We also included adaptations on social bonding as used by Raymond, Brown and Weber (2010). The final scale comprised 11 items designed to measure the positive emotional bond that household owners have with the area they live in (below). One of the items "*Without my relationships with family in my locality, I would probably move*" was excluded because of high cross-loadings during sample testing for PCA and was removed from further analyses. The internal consistency or reliability of the individual items was determined. Place identity, place dependence, and nature bonding formed cohesive scales with Cronbach alphas > .80, hence indicating high internal consistency.

In keeping with the literature, we used four scale items to represent place identity which reflect those dimensions of self, such as the mixture of feelings about specific physical settings and symbolic connections to place that define who we are (Proshansky et al., 1983; Williams et al., 1992; Williams & Vaske, 2003). The next four items were used to represent place dependence, referring to the functional connection based specifically on the individual physical connection to a setting; for example, it reflects the degree to which the physical setting provides conditions to support an intended use (Schreyer et al., 1981; Williams et al., 1992; Williams & Vaske, 2003).[717] The final 3 items were used to reflect place (and social) bonding, which refers to feelings of belongingness or membership to a group of people within a place, such as friends and family, as well as the emotional connections based on shared history, interests or concerns.

The scale items were preceded by the following directions: [*For each of the following, please rate the extent to which you agree with each statement, using the scale from 1 to 5, where '1' means you 'Agree strongly', '5' means you 'Disagree strongly, and 3 means 'Neither Agree or Disagree. Please indicate respondents' answer below by selecting the number that best represents how they feel about the area where they live*].

Table 18 - Adapted Place Attachment Inventory scale (PAI)

Q11	Reverse scored	PA sub-scale type	Statements	Disagree 1	2	3	5	Agree 5
1		Place Identity[a]	This area is very special to me.					
2		Place Identity[a]	I am proud of the natural environment in and around my village.					
3		Place Identity[a]	I am very attached to the natural spaces in and around my area.					
4		Place Identity[a]	This area reflects the type of person I am.					
5		Place Dependence[a]	If I had to move away from here I would really miss it.					
6		Place Dependence[a]	No other place can compare to here for me.					
7	R	Place Dependence[a]	As far as I'm concerned there are better places to spend time than in my village.					
8		Place Dependence[a]	This is the best place for the activities I like to do					
9		Place Bonding[b]	I feel a connection to the community in this area.					
10		Place Bonding[b]	I have an extensive network of family or friends here					
11		Place Bonding[b]	I would feel less attached to this area if the natural areas here disappeared.					

[a] *all scale items which measure this dimension were developed and validated in previous studies (e.g., Williams et al., 1992; Williams & Vaske, 2003).*

[b] *all scale items which measure this dimension were developed and validated in previous studies by Raymond M. Christopher, Brown Gregory, Weber Delene (2010)*[718]

A PAI score is calculated as the total of all eleven responses. Question 7 was reverse scored. Therefore the lowest PAI score representing strongest place attachment is 11, a neutral score is 33 and the highest score, representing weakest place attachment or place aversion, is 55 (Semken 2009)[719].

6.5.2.1 Place attachment Inventory (PAI) Scale reliability

The first step of the statistical evaluation provided confirmation of the Place Attachment Inventory Scales' reliability and guidance in the reduction. PCA on a reduced dataset was used to examine the structure and reliability of the place attachment scale. The reliability of the original 12-item place attachment scale was fairly good (Cronbach's alphas ranging from 0.81 to 0.94). To assess factor validity, the overall fit of each of the items were analysed by confirmatory factor analysis which demonstrated that the data provide an acceptable fit for the place identity and dependence dimensions. The factor loadings were consistent with those typically reported in the literature. The reliability of the initial place attachment scale was fairly good (Cronbach's alphas ranging from 0.81 to 0.94). Since the Kaiser-Meyer-Olkin Measure of Sampling Adequacy meets the minimum criterion at 0.903 and is >0.50, this reduced 11-item scale was deemed to have latent common factors and hence was amenable to factor analysis (Kaiser et. Al)[720]. It also indicates that the sample size is adequate to yield distinct and reliable factors. Similarly, Bartlett's test stood at 2182.878, where $p < .001$ indicates that the correlations between questions are sufficiently large for factor analysis to be appropriate. Consequently, the final place attachment scale used (11-items) was retained since it also had high reliability (cronbach alpha $\alpha = 0.889$).

6.5.3 The Environmental Behaviour scale (EB)

Despite showing medium internal consistency the EB scale was chosen simply due to its brevity in order to minimize respondent fatigue. This scale was deemed sufficient since EB here is only used as a predictor for PA and CNT, which remain the primary focus of this study. The Environmental Behaviour scale[721] is a short scale intended to measure the extent to which individuals engage in environmental behaviour . It is composed of six questions, modified from Luloff, Wilkinson, Schwartz, Finley, Jones, and Humphrey (1993)[722]. Participant responses to these questions are simply 1 (Yes) or 2 (No). For purposes of this study, the EB scale was retained in its entirety. While no introductory sentence was included in the original scale, the following intro was included in the questionnaire to respondents "*Please indicate whether or not you have ever done any of the following*".

Table 19 - The Pro-Environmental Behaviour Scale

Q15	Statements	Yes	No
1.	Contributed time or money to an environmental or wildlife conservation group?		
2.	Stopped buying a product because it caused environmental problems?		
3.	Attended a public hearing or meeting about the environment?		
4.	Contacted a government agency to get information or complain about an environmental problem?		
5.	Voted for or against a political candidate, in part, because of his or her position on the environment?		
6.	Changed your behaviour in any way because of concern for the environment?		

Although the authors do not offer a method of scoring for this scale, we suggest that one positive point

be given to all “yes” responses and one point be taken away for all “no” responses. Possible scores therefore range from -6 to +6 with the lowest score being -6 and the highest score being +6. A high score on this scale indicates a high level of environmental behaviour , while a low score indicates a low level of environmental behaviour on the part of the individual being tested. The Environmental Behaviour scale had a Cronbach’s alpha of 0.67 which suggests that the items have a medium internal consistency, and the one factor solution accounted for 38% of the variance which indicates a poor fit of the component solution (Dutcher et al. 2007). [723]

The first step of the statistical evaluation provided confirmation of the EB Scales’ reliability and guidance in the reduction. The reliability of the original 6-item EB scale was fairly good (Cronbach’s alphas ranging from 0.81 to 0.94). To assess factor validity, the overall fit of each of the items was analysed by confirmatory factor analyses which demonstrated that the data provide an acceptable fit for the place identity and dependence dimensions. The factor loadings were consistent with those typically reported in the literature. Since the Kaiser-Meyer-Olkin Measure of Sampling Adequacy meets the minimum criteria at 0.771 and is >0.50, this scale was deemed to have latent common factors and hence be amenable to factor analysis. It also indicates that the sample size is adequate to yield distinct and reliable factors. Similarly Bartlett’s test stood at 0.00, where $p < .001$ which indicates that the correlations between questions are sufficiently large for factor analysis to be appropriate. PCA was used to examine the structure and reliability of the place attachment scale. The final Environmental Behaviour Scale used was retained as is, and had modest reliability (cronbach alpha $\alpha = 0.688$).

6.5.4 Conservation Choices Scale (CCS)

Besides the use of scales for PA, CNT and EB, the author devised a questionnaire which aims to assess community values and preferences for different natural resource management options which are of relevance to Maltese protected areas. Conservation decisions for biodiversity undoubtedly require an appreciation of the social system where these actions are designed, planned for and implemented. However multi-stakeholder and multi-scale decision making for conservation exposes complex interactions between social and ecological systems that are required to drive change, the conditions that enables such processes, and how people relate to the environment. If we want to account for social-ecological system interactions in conservation decision making, it is imperative that we understand how people are connected to each other and their connections to the environment in order to make conservation decisions that are more likely to succeed (Budiharta et al. 2013).[724] It follows then that any place and evidence-based adaptive management recommendations must also consider socio-political factors. This effort is concerned with better understanding public preferences regarding conservation choices, and understanding whether CNT, PA and EB constructs influence significantly those choices.

The author prepared a scale based on 12 statements (question 23) after consulting the NATURA 2000 management plans public consultation report, and identifying the major recurrent themes stemming from public input. The final scale is composed of 12 questions that are scored across a Likert scale from 1 for 'Strongly disagree' to 5 'Strongly agree' with the statement.

Table 20 - Conservation Choices Scale (CCS) devised by author

Q23 - To what extent do you agree with the following measures to safeguard and protect natural areas further? [Mark all - Indicate respondents' answer below by selecting the number that best represents how they feel]

		Disagree				Agree
Q23	Statements	1	2	3	4	5
1.	Prohibit damaging recreational activities in sensitive areas.					
2.	Restore damaged areas by not intervening on the site so that it recuperates alone.					
3.	Restore damaged areas by intervening on the site.					
4.	Reintroduce original species and eradicate invasive ones.					
5.	Provide educational and interpretation services for visitors.					
6.	Provide a ranger/warden service for strict protection zones					
7.	Expropriate land in particularly sensitive areas, and compensate owners.					
8.	Stop renewing expired public land leases in particularly sensitive areas.					
9.	Expand the protected areas where and when possible.					
10.	Create paths and signposting.					
11.	Ensure controlled access and vehicular access bans in sensitive areas.					
12.	Creation of hunting ban areas and quiet zones					

PCA was used to examine the structure and reliability of the Conservation Choices Scale (CCS). To assess factor validity, the overall fit of each of the items was analysed by confirmatory factor analyses which demonstrated that the data provides an acceptable fit. Since the Kaiser-Meyer-Olkin Measure of Sampling Adequacy meets the minimum criterion at 0.868 and is >0.50, the 12-item scale was deemed to have latent common factors and hence was amenable to factor analysis. It also indicates that the sample size is adequate to yield distinct and reliable factors. Similarly, Bartlett's test stood at 439.345, where $p < .001$ which indicates that the correlations between questions are sufficiently large for factor analysis to be appropriate. The CC scale has a cronbach alpha $\alpha = 0.875$) and hence high reliability. Please refer to Table 21 below.

Table 21 - Reliability statistics for the Conservation Choice Scale

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.868
Bartlett's Test of Sphericity	Approx. Chi-Square	439.345
	df	66
	Sig.	.000

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.858	.875	12

PCA, using a Varimax with Kaiser Normalisation rotated solution, identified three components, which together explained 61% of the total variance. Kaiser (1958)[725] will take the output of a non-normalized solution and report the normalized solution Most items loaded highly on the first component except for three items - '*Expropriate land in particularly sensitive areas, and compensate owners*" (0.857), "*Stop renewing expired public land leases in particularly sensitive areas*" (0.843) which loaded on the 2nd component and "*Restore damaged areas by intervening on the site*" (0.748) which loaded on the 3rd component. Table 22 below contains the factor loadings for each item of the CCS, followed by the rotated component matrix.

Table 22 - Factor loadings for the CCS, and its rotated component matrix

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.167	43.055	43.055	5.167	43.055	43.055	3.610	30.086	30.086
2	1.163	9.692	52.747	1.163	9.692	52.747	2.550	21.247	51.333
3	1.004	8.368	61.115	1.004	8.368	61.115	1.174	9.782	61.115
4	.919	7.655	68.770						
5	.744	6.203	74.973						
6	.655	5.457	80.430						
7	.603	5.023	85.453						
8	.506	4.214	89.667						
9	.414	3.452	93.119						
10	.338	2.819	95.938						
11	.248	2.069	98.007						
12	.239	1.993	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component		
	1	2	3
Create paths and put up signs with basic information about the area	.838		
Creation of hunting ban areas and quiet zones	.796		
Ensure controlled access and vehicular access bans in sensitive areas	.728	.343	
Provide educational and interpretation services for visitors	.678	.352	
Reintroduce original Maltese species or plants typical of the area, and eradicate invasive ones	.649		
Expand the protected areas where and when possible	.516		
Expropriate land in particularly sensitive areas, and compensate owners		.857	
Stop renewing expired public land leases in particularly sensitive areas		.843	
Prohibit damaging recreational activities in sensitive areas	.320	.627	
Restore damaged areas by intervening on the site			.748
Provide a ranger/warden service for strict protection zones	.465	.312	-.561
Restore damaged areas by not-intervening on the site so that it recuperates alone	.320	.370	.376

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalisation.
a. Rotation converged in 5 iterations.

An assessment of the Item-Total statistics indicates that all questions had a high Cronbach alpha ranging from 0.837 to 0.861, and all questions were therefore retained for statistical analysis.

6.6 Spatial and GIS methods

We selected a mapping approach which combines spatial methods and quantitative survey results in order to create new views of relevance to protected area management. This multi-disciplinary approach is expected to provide evidence or otherwise of any social determinants that could contribute towards safeguarding protected areas. This section describes the technical approach and procedure for compiling the required vector graphical objects into integrated vector map data files. This process allows for vector graphical objects obtained from the quantitative methods described in the previous section with other contextual and environmental data sets for producing the final maps and figures.

Participants were instructed to recall places that they have the most attachment to around where they live, and areas within which they feel highest connectedness to nature from across the whole Maltese Islands. The research focused explicitly on the respondents' neighbourhood in the first set of questions related to CNT and PA, based on the assumption that this local region is considered home and is of most interest to participants. A limitation of this approach is that these may or may not be the areas of greatest emotional or behavioural significance for the entire population in view of the limited sample size. This runs the risk of over-emphasising places which are visited due to their popularity, and under-representing other areas which people are attached to but do not actually visit (Jorgensen 2010).[726] However, this limitation was not considered critical since this research effort is in fact specifically interested in understanding this unique subjectivity and if it is indeed present.

It is relevant to explain that the author decided against use of PPGIS mapping techniques (both web-based and paper based), which would have allowed respondents to map their special places directly themselves, and preferred to interpret the textual location as part of the face-to-face interview methods. One of the biggest disadvantages of PPGIS mapping techniques is typically poor data quality which ultimately implies that manual data verification and corrections would be necessary. In view of the intention to identify small places which are possibly only meaningful to the respondent and not necessarily visible on a map for the average home user, the potential for error was deemed high. Consequently, PPGIS techniques were not used in favour of a new approach which translates interview responses on special places into spatial attributes via post-processing of the identified locations by the author. This approach allowed for identification of a broader range of place and nature attachments, while ensuring respondents maintain focus (rather than being distracted by trying to identify specific locations on a map).

As previously mentioned, the study collected circa 30 responses from each location; however in view of data protection legislation,[727] it was decided to group the locations according to street centroids. On average, two households where sampled from each street identified, which implies that actual GIS points marked would overlap with each other in most cases when projected at more distant scales. It was decided to not disperse the respondents' home location point co-ordinates before symbolising in order to ensure confidentiality and address data protection concerns. The positioning of respondents' households included precise latitude and longitude coordinates, and can potentially be used to determine where individual people live and visit. Consequently, in order to avoid any potential data protection privacy breaches, the final projections ensured that it was not possible to infer the exact locations of the respondents. The workflow procedure for this approach is adapted from recent work by Shi 2016[728] and is as follows:

a. Assemble vector data sets;
b. Convert the data sets and import into ArcMap;
c. Organise the data sets into different topic layers and group vector graphical objects, in conjunction with contextual data;
d. Perform a quality check and edit graphical objects;
e. Apply appropriate styles of legend, symbols, signs, lines and filling patterns in accordance with widely accepted conventions and standards;
f. Select appropriate data layers and objects to compose topic specific maps and illustrations;
g. Carry out editing tasks and create the final output of maps and illustrations for visualisation;
h. Interpret the outputs and exposed features.

Besides checking for data integrity, the next step was to convert the 410 street names of the respondents' households to actual geo-locations, and to position them spatially. The household respondents' geo-locations were identified. GIS procedures were undertaken on the location excel data and converted to point feature classes in a GIS-compatible format (ESRI shapefile *.shp* or Keyhole Markup Language *.kml*). Preliminary data cleaning and analysis was undertaken using ArcGIS 10.2, including the Geostatistical Analyst and Spatial Analyst extension, and a file Geodatabase was created in ArcCatalog. These feature classes were then projected into an ESRI ARCMap GIS (http://desktop.arcgis.com/en/arcmap/) for analysis, and made available for subsequent processing steps. Furthermore, related environmental datasets were obtained from MEPA's Research and Information Unit. These included local council, NATURA 2000 and Urban Conservation Area boundaries, plus other relevant environmental data layers. NATURA 2000 layers where obtained from http://www.eea.europa.eu/data-and-maps/data/natura-6#tab-gis-data. The following data layers and spatial attributes were obtained from the Information Resources Unit at MEPA in European Datum 1950 (ED 50) format and are available on the online GIS:

- Localities
- Local plan boundaries
- Local council boundaries
- Areas of High Landscape Value
- Areas of Landscape Value
- Panoramic views
- Special areas of conservation,
- Areas of urban conservation, etc,
- Special Protective Areas (SPA)
- Terrestrial Habitats
- NATURA 2000 both terrestrial and marine
- Corine land cover
- Protected Areas
- Green enclaves
- Heritage Scheduling (HPU)
- Listed Natural Heritage

Content completeness checks ensured that all needed features were captured. Figure 19 below indicates a preliminary projection of 3 layers on to the study area, wherein the black points signify coding on a street centroid, the grey polygons signify the area of the 13 localities, and the green polygons indicate the NATURA 2000 boundaries. It is important to note that multiple points in a street would be overlying each other.

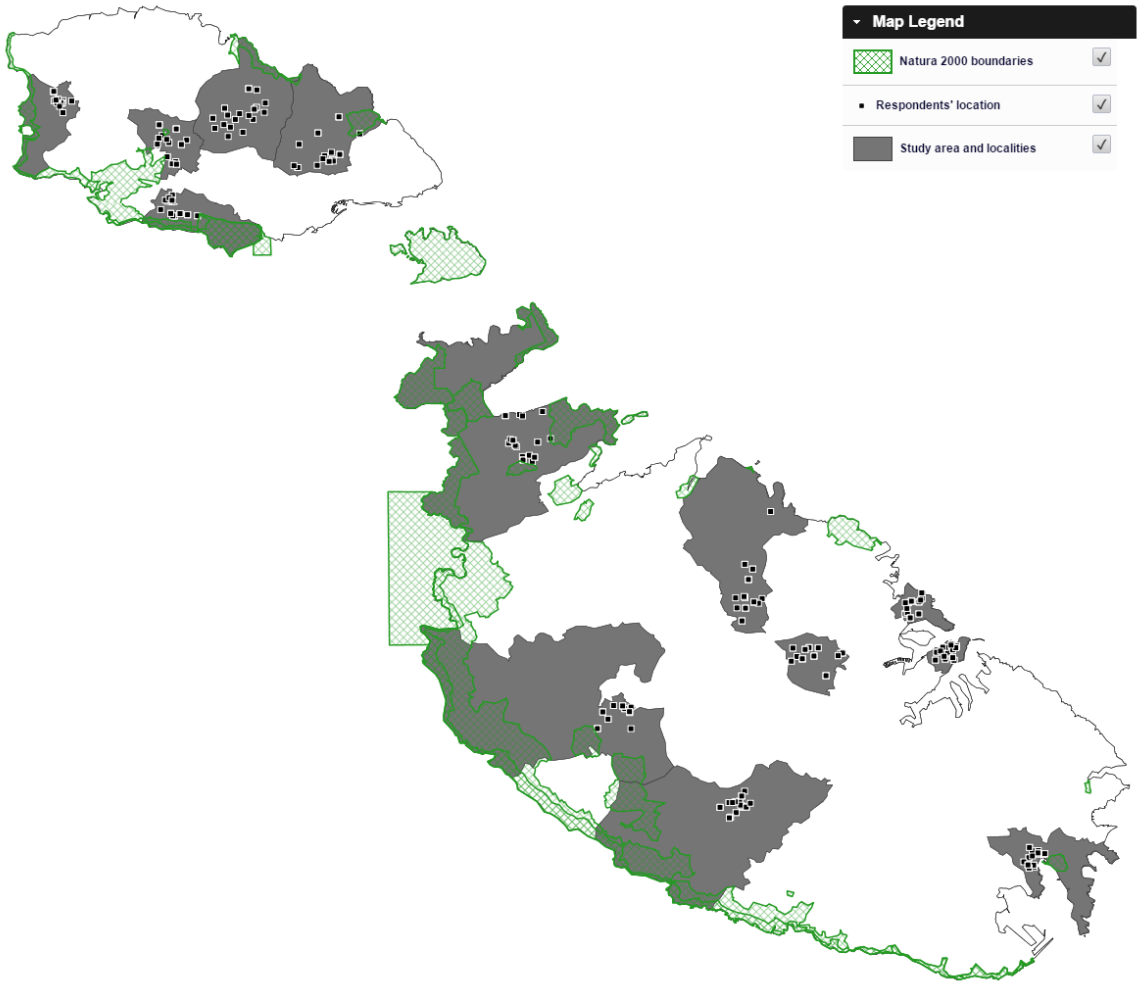


Figure 19 - Geo-locations of respondents across the 13 localities (n=401)

A second step involved converting the 'special places' identified by respondents in response to two specific questions in the questionnaire. Table 23 below provides a breakdown of the definition of a 'special place' for the purposes of this study as presented to respondents, and the number of place-names received per question (respondents were given the option to indicate up to 5 such places):

Table 23 - Number of spatial entries identified in responses to specific questions used in the survey

Question	No. of spatial entries mapped manually
Q10. Are there ANY places or features about **WHERE YOU LIVE** that you think are either distinctive or special? Can you mention up to three such places? *[Respondents were asked to pin down a specific place which could be any physical space - church, village square, niche, public square or garden, beach, promenade, etc]* *Sub-total for PA*	355, 276, 187 *818*
Q13. Can you name a few places where you feel a strong connection with nature? *[Respondents were asked to pin down a specific place, not necessarily in the same area as their place of residence) e.g. Gozo is not a good answer but Marsalforn Bay is].* *Sub-total for CNT*	346, 226, 149 *739*
Total Points	**1539**

All 1539 points where mapped by identifying the place names on Google Maps (https://maps.google.com) or the literature[729], and extracting the longitude/latitude online. The longitude/latitude coordinates obtained individually from Google maps where first converted to full UTM ED 50, and then to truncated format in order to be in line with the geodetic datum used locally by MEPA. The spatial map referencing system taken up by MEPA makes use of the Universal Transverse Mercator (UTM) projection and the European 1950 datum. The spatial transformation is necessary due to the fact that Malta holds all its data in a truncated ED50 format which requires following a number of steps in order to achieve transformation to the final required projection. This required the restoration of the truncated 4 in Northings and 39 in Eastings, a re-projecting to WGS84: EPSG: 36233, conversion to shp format from .tab format (which in Malta was originally in MapInfo .tab polygon format and was converted to ESRI .shp format for this exercise). The latter causes a problem due to the fact that the attribute names are truncated due to the ANSI conversion protocols experienced (Formosa et al., 2011).[730] Taking map reference 27904 88504 as an example, in order to convert this to the full UTM spatial referencing system, it will have to read 427904E, 3988504N. Where points were in close proximity, mis-spelt or referring to the same place but using different place references, the place marks where grouped to the nearest centroid in order to create a more useable dataset for GIS projection. A typical example of those instances which would be grouped as one where entries like: *Marsaxlokk; Marsaxlokk promenade; Marsaxlokk square; Marsaxlokk seafront; Marsaxlokk seaside; Ix-Xatt ta' Marsaxlokk, Il-Bajja ta' Marsaxlokk.* This led to the following reduction to unique place-names after grouping (Table 24):

Table 24 - Final count of points/places mapped after cleaning and grouping

	CNT	PA
Frequency of places indicated by respondents	739	818
Individual places after cleaning and grouping	198	286

An off-the-shelf web-based GIS (WebGIS) platform was used in order to provide an easily accessible online tool for sharing geographic data projection outputs about connectedness to place and nature. A quick review was undertaken to assess the best available online platform at affordable cost. The review included numerous similar platforms like ArcGIS Online, CartoDB, Tableau, Google Maps, and Mango Maps. The author chose to use Mango-maps as being best suited for the multiple-layering necessary due to its interoperability with several formats of raster and vector data, offering a well-integrated platform and easy-to-use interface. It also provided a platform on which to build a virtual environment which could provide sufficient GIS functionality in order to undertake the required spatial analysis, infer planning and management opportunities, and for map publication. This effort is guided by the detailed approach adopted in related work by Pollino et al. (2015)[731]. Consequently, the following GIS spatial schema was organised and followed (Figure 20).

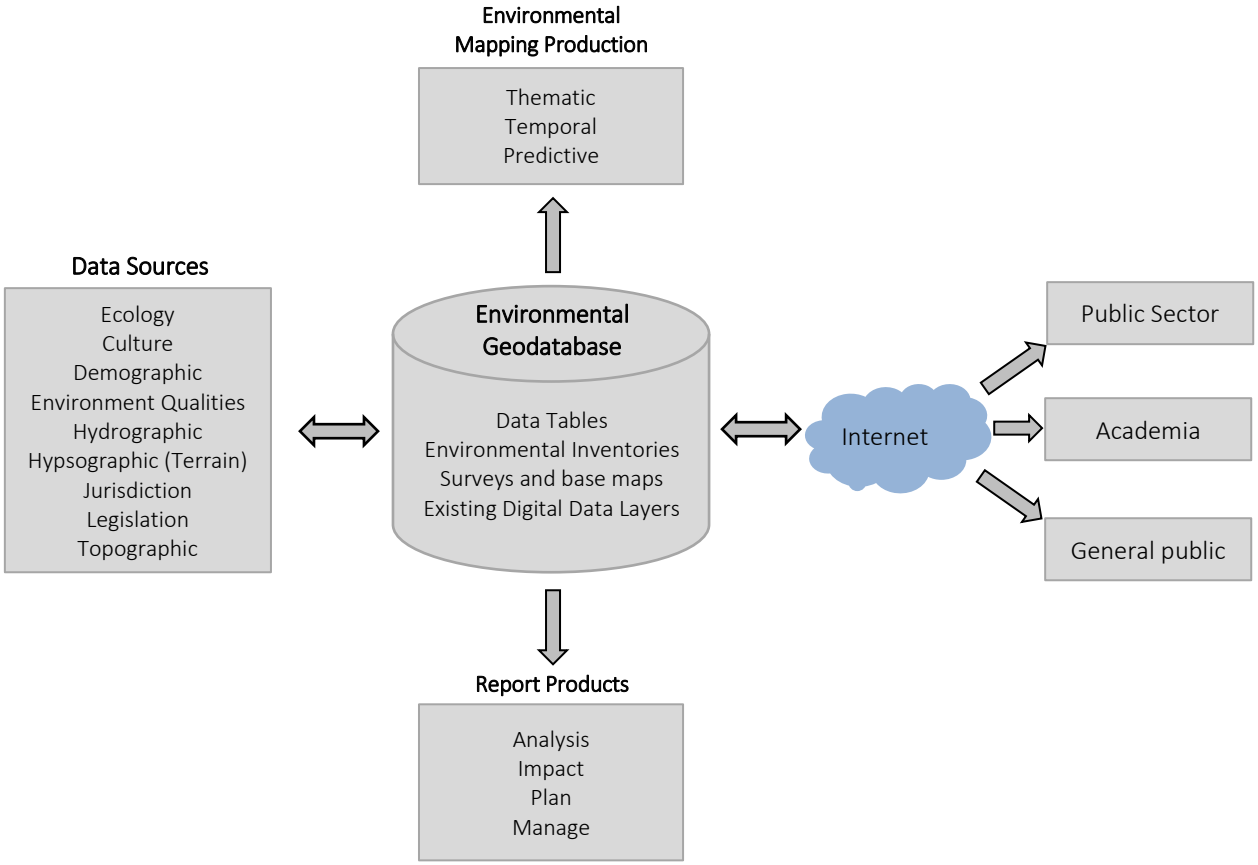


Figure 20 - GIS schema and key elements adopted in order to undertake the required spatial analysis

In 2014, the digital markers and datasets were imported from the desktop ARCGis platform to an online web server for public outreach and use.The WebGIS can be reached at the following URL: http://mgo.ms/s/6oqsg. This made it possible to publish online a comprehensive data-set of geospatial information (thematic maps, according to the standards required by the Open Geospatial Consortium (OGC). The WebGIS solution was designed and implemented in order to store and manage geographic and spatial data concerning natural assets and human constructs on a platform that is accessible to all. Thanks to the WebGIS interface, the user (not necessarily with GIS-specific skills) can view maps representing the results produced within the project activities. This effort also daisy-chained other outputs from similar platform tools like CartoDB in order to provide projections that were either not available on MangoMaps. It is also intended to provide an estimation of potential areas of conflict in such an intensely populated and contested environment like Malta's, and to identify opportunities to better manage our protected areas. The main results are accessible online and are open to interpretation from a broader audience of users.

Implementing these features has required the integration of existing geo-spatial data available at MEPA, in combination with the production of new geo-spatial data related to social constructs of connectedness to place and nature in order to support management and planning activities. The following geo-spatial data projections were compiled for the spatial analysis:

- Local Council (LC) boundaries, NATURA 2000 boundaries, + Respondents (Stratified by locality).
- Geolocations of special places identified in Q5, Q10, Q12 and Q13.

- LC boundaries, NATURA 2000 boundaries, + CNT special places (Q13);
- LC boundaries, NATURA 2000 boundaries, + CNT means (split into NR self, NR experience, Nr perspective and Total).
- CNT distance flow maps.
- CNT heat maps and hotspot analysis.

- LC boundaries, NATURA 2000 boundaries, + PA special places (Q10);
- LC boundaries, NATURA 2000 boundaries, + PA means (split into Place identity, place dependence, place bonding and Total).
- PA distance flow maps,
- PA heat maps and hotspot analysis.

- LC boundaries, NATURA 2000 boundaries, + EB means;

- LC boundaries, NATURA 2000 boundaries, Landscape value maps, + CNT and PA special places.
- LC boundaries, NATURA 2000 boundaries, + CNT total, PA total, and EB total.
- LC boundaries, NATURA 2000 boundaries, UCA boundaries, + CNT and PA special places.

Hotspot analysis was undertaken in order to identify locations of statistically significant high value clustering and point occurrence. This involved converting the special places to points, with each point valued according to the underlying pixel. These maps were similarly grouped by attribute and individually analysed for hotspots with a fixed distance band to ensure inclusion of adequate numbers of neighboring points in the statistical analysis. This produced a series of hotspot maps that are detailed in a later chapter. Finally, the point-feature maps were combined to produce a single map and analysed for cumulative hotspots. Similary, point in polygon analysis was undertaken. The hot spot analysis technique involved as little interaction as possible from the analyst, in order to minimise possible distortion of data due to outside interruption. Results are presented in a later chapter.

6.7 Limitations

This study was based on preparing the questionnaire, instructing the interviewers and analysing the

distributions of the response codes. Face-to-face data collection was selected in order to ensure accurate screening, to capture verbal and non-verbal cues, maintaining focus while capturing emotions and behaviours. However, the face-to-face interview approach could bring about various non-sampling errors resulting from the survey designer, the interviewer, the respondent or a combination of these factors.

A second limitation is related to the GIS method since this sort of mapping can be quite time and resource consuming (Sommer and Sommer 2001)[732] in terms of coding entries and face-to-face interviews. Similarly, if researchers want to compare between sites, different interviewing teams have to operate in the same time-windows in different settings. Beckley (1998) also suggests that people's attachment to the landscape, both psychological and economic, may indeed take ''*different forms depending on the unit of analysis chosen*'' and may only reflect a subset of the views relevant to a particular management issue, and could be somewhat limited and partial. Consequently, it is important to keep in mind that since this research examines specifically people's special places and their personal relationships with those places, this could also reflect their political views and natural resource ideologies into the spatial scale (Cacciapaglia et al. 2012).[733] Another GIS limitation is related to street centroid issues which were rounded down to street level due to data protection issues.

Respondent-induced biases could include issues like 'courtesy bias', or the tendency for respondents to give answers that they think the interviewer wants to hear, rather than what they really feel. Another drawback is that respondents may not remember their previous activities accurately or in enough detail. This method is also prone to social desirability bias, whereby respondents could answer in ways that reflect how they think that they 'should' behave instead of how they actually behave (Gosen, 2014).[734] Recall bias which refers to how people do not really remember well activities performed at a certain time, is also a factor. A 'Respondent load bias' was also possible in cases where the respondent might get overloaded due to survey length, and respondents may complete the questionnaire by picking the easiest route. Interviewers were given clear instructions to watch out for these biases, and to follow the script strictly without interacting beyond posing the questions and optional answers. Interviewers were advised of the risks of potential bias, and to avoid giving any signs of approval/disapproval to replies given, or any other similar emotive cues in order not to influence the process.

Similarly, biases could be induced by the interviewer due to a desire to help the respondent, or by not following the instructions carefully when administering the questions, or by rushing the respondent so that they can interview more people in a given time frame, or by reacting to a response in such a way that it can bias the respondent's subsequent answers. Particular problems may arise if the respondent does not understand the question as stated and the interviewer tries to simplify the question. The altered wording may constitute a different question so it is imperative to ensure that the probes follow instructions faithfully the potential for bias is great (FAO, 1997).[735] These potential biases where explained to the interviewers, and clear instructions where

given to allow respondents sufficient time to answer frankly, and not to drift off script or prompt the respondent. A total of 16 interviewers were engaged to mitigate any interviewer bias effects.

Such potential biases or data errors could potentially lead to systematic errors, as all the respondents for a given interviewer would respond similarly. The author was very careful not to introduce a 'publication bias' or rather a tendency of researchers to prefer some outcomes or results rather than others, by undertaking a comprehensive and systematic literature review of the measures for CNT and PA. Other potential biases were addressed by trialling the questionnaire numerous times before finalising in order to avoid subjectivity; and by providing interviewing training (both initial and ongoing), while implementing standard procedures across the interviewers for dealing with respondents, and by running random checks in order to ensure all staff where meeting an equally high standard.[736]

7 Results and Analysis

This chapter describes results obtained and their statistical and spatial analysis. An analysis of descriptive statistics of the relationship with natural spaces amongst the survey respondents is first given. This is followed by a detailed examination of respondents' connectedness to nature, place attachment, and pro-environment behavioural intentions. For connectedness to nature, this description includes an examination of sub-scales for self, perspective and experience. For place attachment, this description includes an examination of sub-scales for place affect, place dependence and place identity. The analysis also explores the interplay with variable means, variances, and correlations. Next, relations between external factors, connectedness to nature, place attachment, and pro-environmental behaviour are considered. The final section of this chapter presents the findings of a Bayesian network model used to explore the relationships between connectedness to nature, place attachment, environmental behavioural intentions, and various additional factors. A new scale is introduced by the author, the Conservation Choices Scale, in order to understand whether any of the three factors affected respondents' willingness to contribute, and their preferences for different protected area management options.

7.1 Descriptive statistics

The following section analyses respondents' relationship with natural spaces. As a first measure of interest towards public gardens and nature parks, 61% (246) of respondents agreed that having public gardens, parks, countryside or other public spaces nearby was very important to them; 33% (134) thought it was fairly important and only 5% (21) did not consider such spaces important or did not know. This indicates that for most, green urban spaces remain important (Figure 21). When asked to rank the three most important reasons why they visit natural areas or the countryside, 24% (217) ranked '*rest and relaxation*' as their major preference, followed by 17% (155) for '*being together with family or friends*', 17% (151) for '*health and physical activity*', 14% (127) for '*enjoying nature*' and 14% (124) for '*getting away from crowded environments*'. Items related to '*enjoying its culture*' (2%, 14), for '*fishing or hunting*' purposes (2%, 2) '*Learning about the area*' (1%, 10), and '*to meet new people*' (1%, 9) ranked lowest (Figure 22).

(Q7. And how important, if at all, is it for you to have public gardens, parks, countryside or other public spaces nearby?)

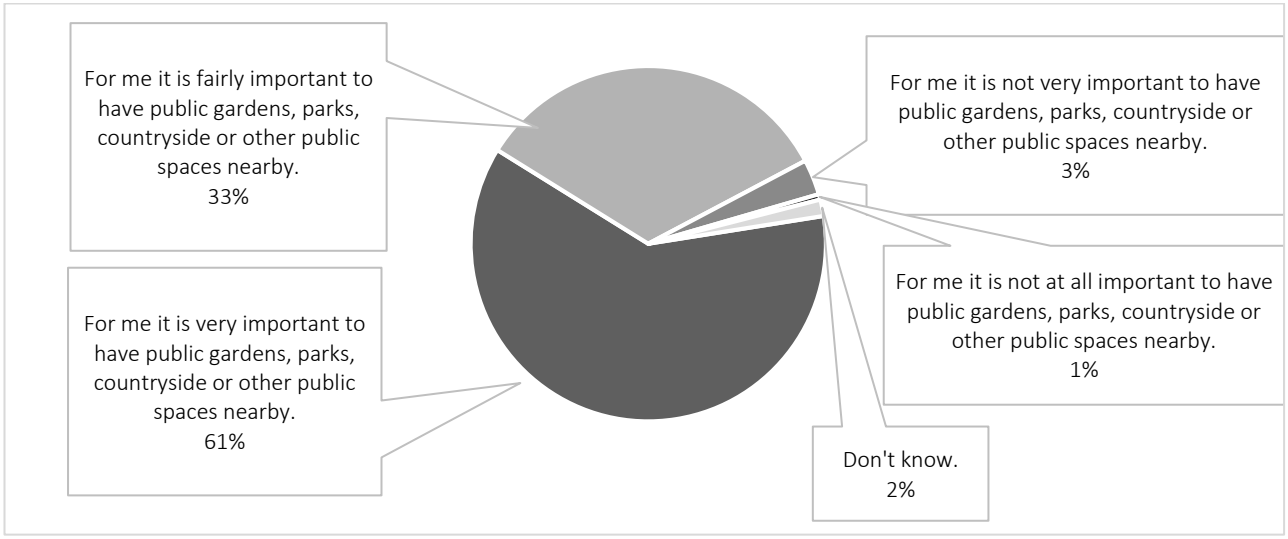


Figure 21 - Importance of 'natural' spaces close to home across the sample (n=401).

(Q8. What are the three most important reasons why you visit natural areas or the countryside?)

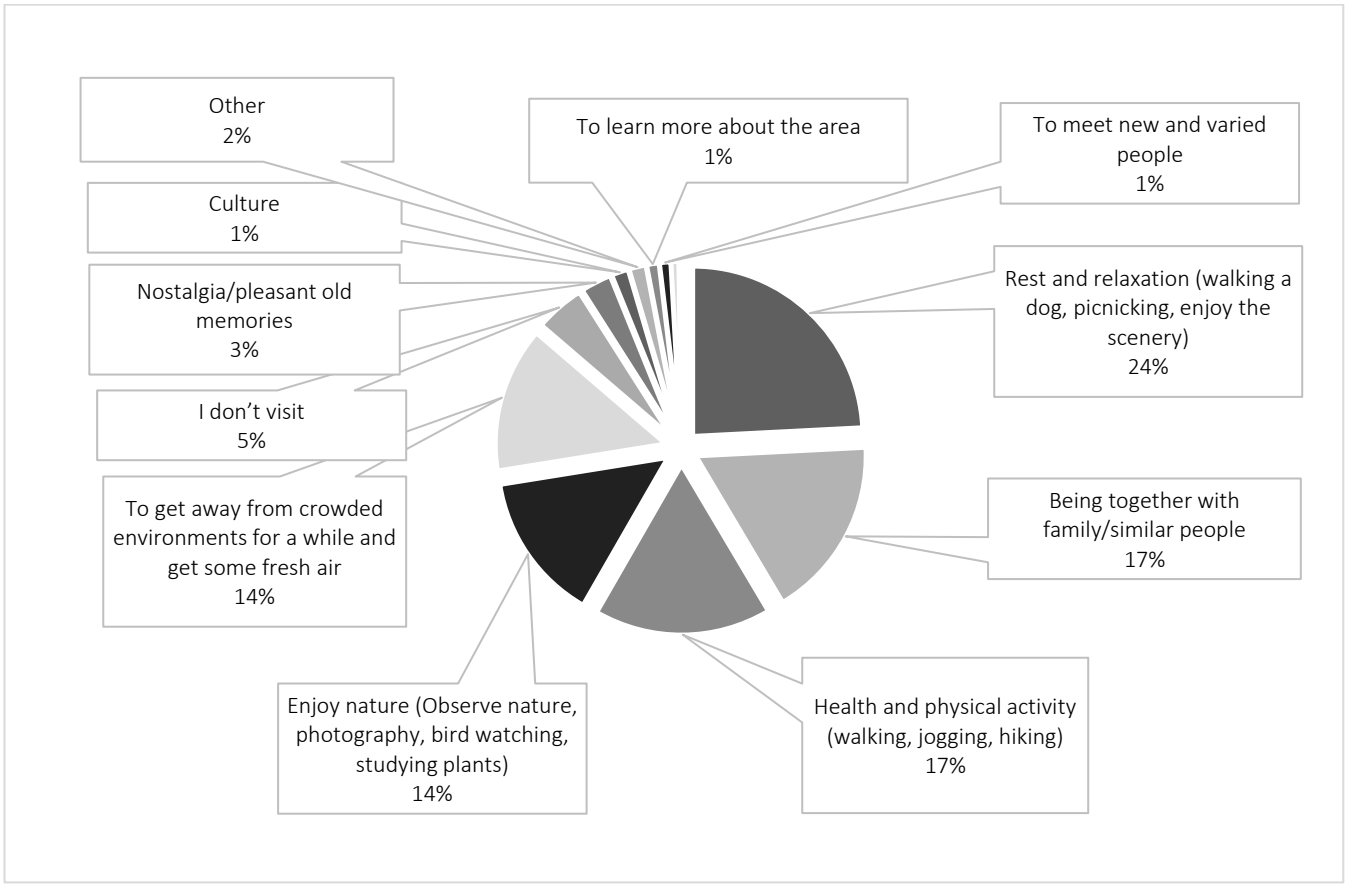


Figure 22 - Motivation for visiting natural areas or nature parks (n=401).

When respondents were asked whether they are aware of any NATURA 2000 sites in their locality's vicinity, only only 29% of respondents (116) NATURA 2000had such awareness. Thus, despite the fact that only 3 localities do not have a NATURA 2000 site within or bordering the locality, with 34 NATURA 2000 sites across the islands' restricted landmass, only one-third of respondents were aware of NATURA 2000 sites in their vicinity. Eighteen percent (74) answered that they did not know what NATURA 2000 sites were in the first place. This suggests that appreciation for these sites is indeed lacking and is possibly due to the fact that these areas are not really being managed in a participatory manner and that community engagement and appreciation remains lacking. This implies that more needs to be done in order to raise awareness about Malta's NATURA 2000 sites to the public at large, also possibly via participatory methods in their management (Figure 23).

(Q8. Are you aware of any NATURA 2000 sites in your vicinity?)

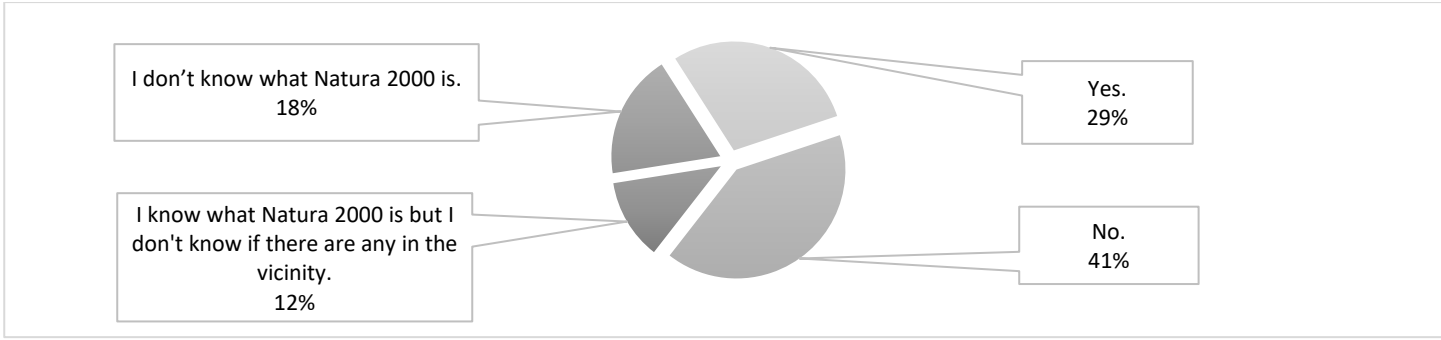


Figure 23 - Awareness of NATURA 2000 sites in vicinity of respondents' home locations (n=401).

When asked for three reasons why they thought natural areas are important, 24% of overall respondents indicated that they are important in order to stop the destruction of valuable areas, 22% for human use and enjoyment, 21% to protect endangered animals and plants, and 19% to provide clean air and water. The promotion of nature friendly uses (7%) and to stimulate eco-tourism and recreational opportunities (4%) ranked lower across respondents' choices (Figure 24).

(Q16. Can you give me three reasons why you think natural areas are protected?)

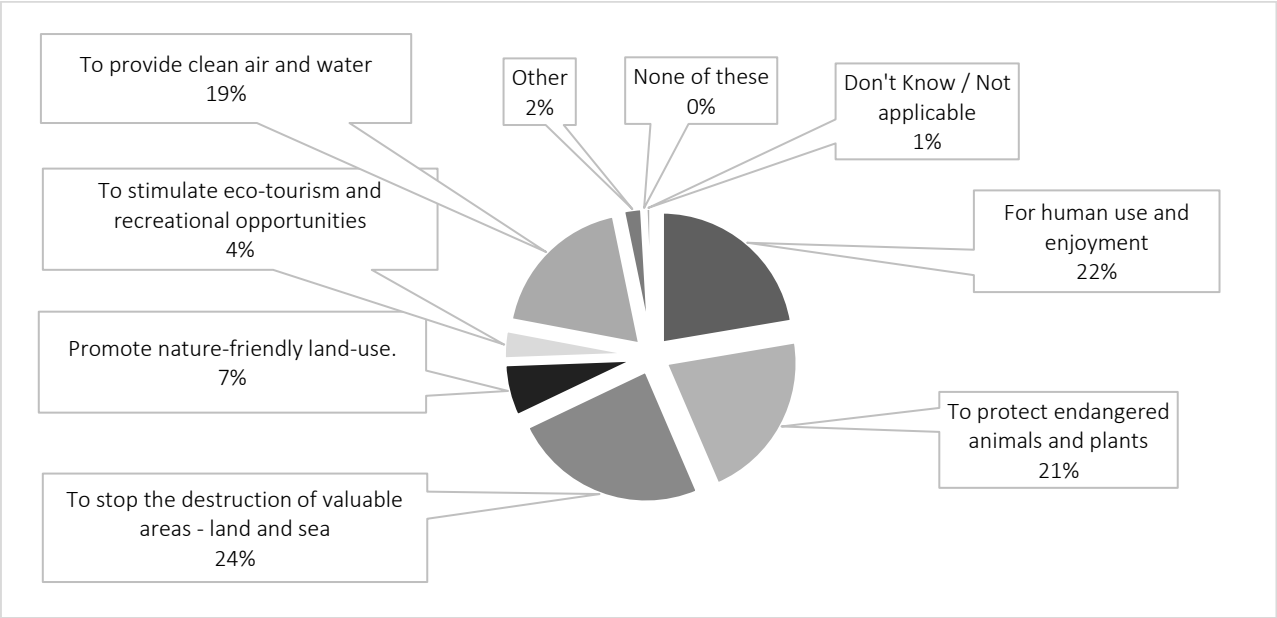


Figure 24 - Main reasons why natural areas are protected

The majority of respondents (83%, 334) noted degradation in countryside, against 17% (67) who have not. When asked whether a potential decline in the natural environment would affect them, only 334 individuals answered this question; 63% of these (211) indicated that they are already affected by a degraded environment, whereas 15% (51) think it will affect them but at a later stage in life. Only 18% did not believe it would affect them, but would affect their children at a later stage. Only 3% (14) did not believe a loss of countryside would affect them or did not really know if it would (Figure 26). These results tally with those of the Eurobarometer survey (Fieldwork: 26/04-06/05/2014n = 1000),[737] which found that Malta has the highest proportions of respondents (90%) who believe that environmental issues are having a direct effect on their daily life. This indicates that a degradation in countryside landscapes is noticeable and actually perceived to affect the greater part of the population. This alienation risks creating a *'continual demand'* on our attention when dwelling on environmental problems which can lead to a re-direction of these stressors, resulting in a condition called "directed attention fatigue - DAF" (Kaplan, 1989).[738] Symptoms from environmental stressors could include a reduced ability to make and follow plans, and the inability to mentally restrain impulsive thought or action (De Young 2009,739 2010).[740] DAF makes both pro-environmental and pro-social behaviour much less likely, and compromises the attention restoration potential of the natural environment (Kaplan 2001)[741]. Similar parallels of environmental fatigue and its impact on the restorative powers of nature and environmental action are noted especially when the environmental threat is considered distant in both time and space, is difficult to visualise or identify a clearly defined root cause or when solutions run up against established ideologies and identities (Nordhaus and Shellenberger, 2009).[742] This is corroborated by further results described later in the next sections.

(Q17. Have you noticed any decline in countryside or nature over the years?)

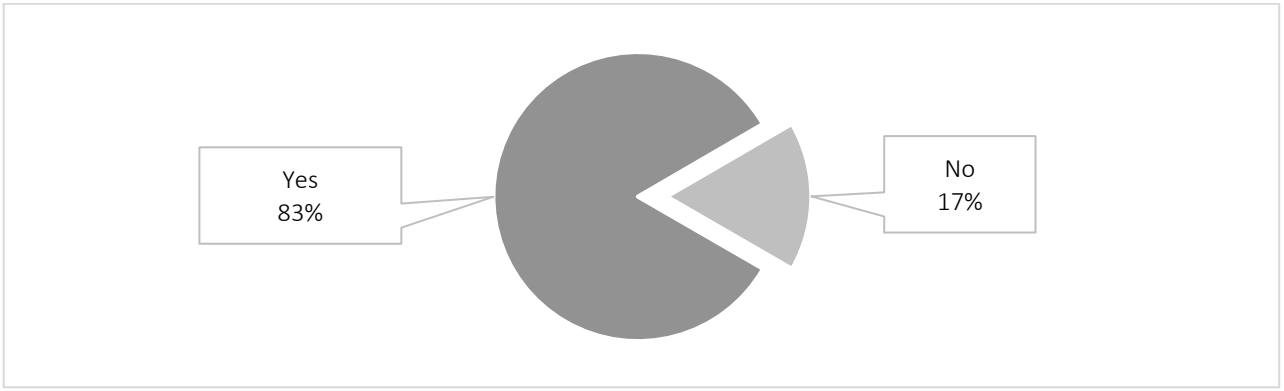


Figure 25 - Perceived decline in countryside

(Q18. Do you think a decline in countryside will have an impact on you personally?)

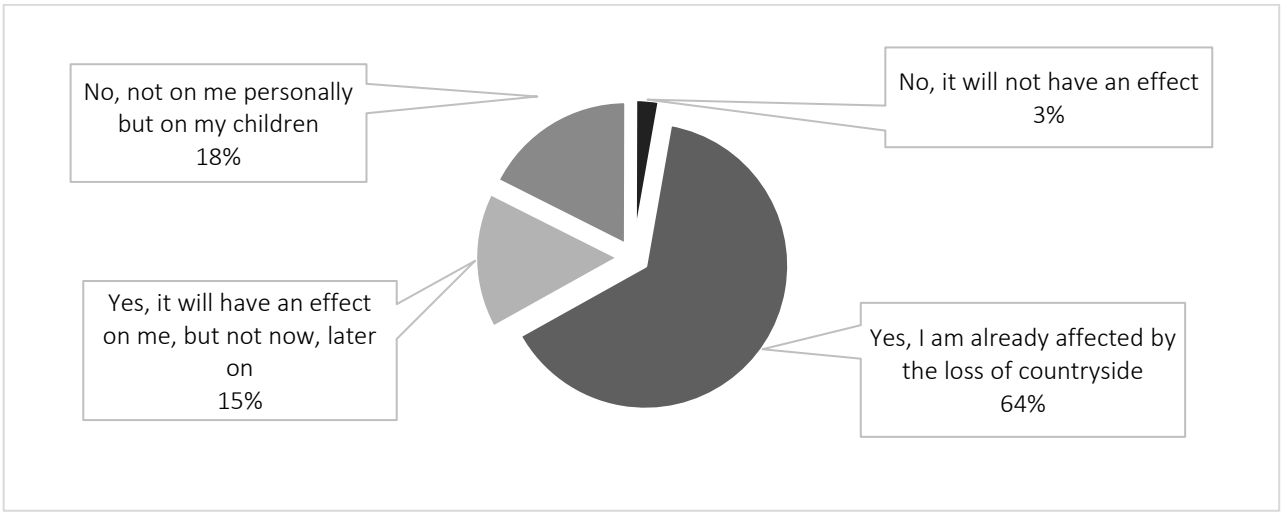


Figure 26 - Perceived impact from loss of countryside (n=401)

When asked for their opinion on whether economic development is justified even when it results in damage to natural areas, 59% (236) said that damaging economic development should be prohibited because natural areas are more important, whereas 30% (119) indicated that this is only acceptable for developments of major public interest and if damage is fully compensated for. Only 4% (15) indicated that economic development is more important, while 8% (31) did not know (**Figure 27**). However, it is relevant to point out that general studies and yearly surveys like the Eurobarometer indicate large shifts in opinion on whether environmental protections should take precedence over economic growth (Baddeley, 2011).[743] Indeed, a 2011 report by the Hayward[744] on environmental trends in the United States, concludes that despite regular results indicating the public choosing the environment by three to one over the economy over the last 25 years, a significant shift was noted in the last years due to the severity of the current economic downturn. Consequently, public attitude tests need to be treated with caution, and always considered as dynamic and set within a specific temporal context.

(Q20. Sometimes economic development results in damage or destruction of natural areas. Which of the following statements comes closest to your opinion?)

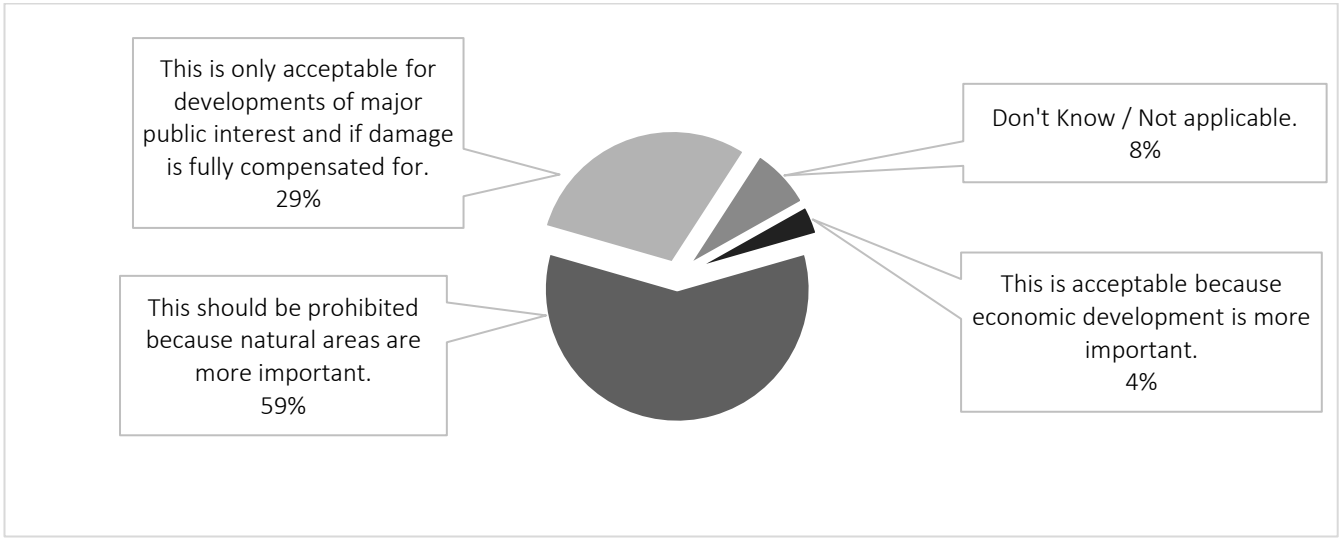


Figure 27 - Perceived importance of economic development and its impact on nature

Respondents were also asked to choose the three biggest threats to the Maltese countryside from a pre-determined list of anthropogenic threats, with the bulk of respondents ranking pollution of air/water (31%), development and land use change (28%), and human-made disasters (15%) as being most worrying to them (Figure 28).

(Q19. Please tell me what you think are the three biggest threats to natural areas in Malta?)

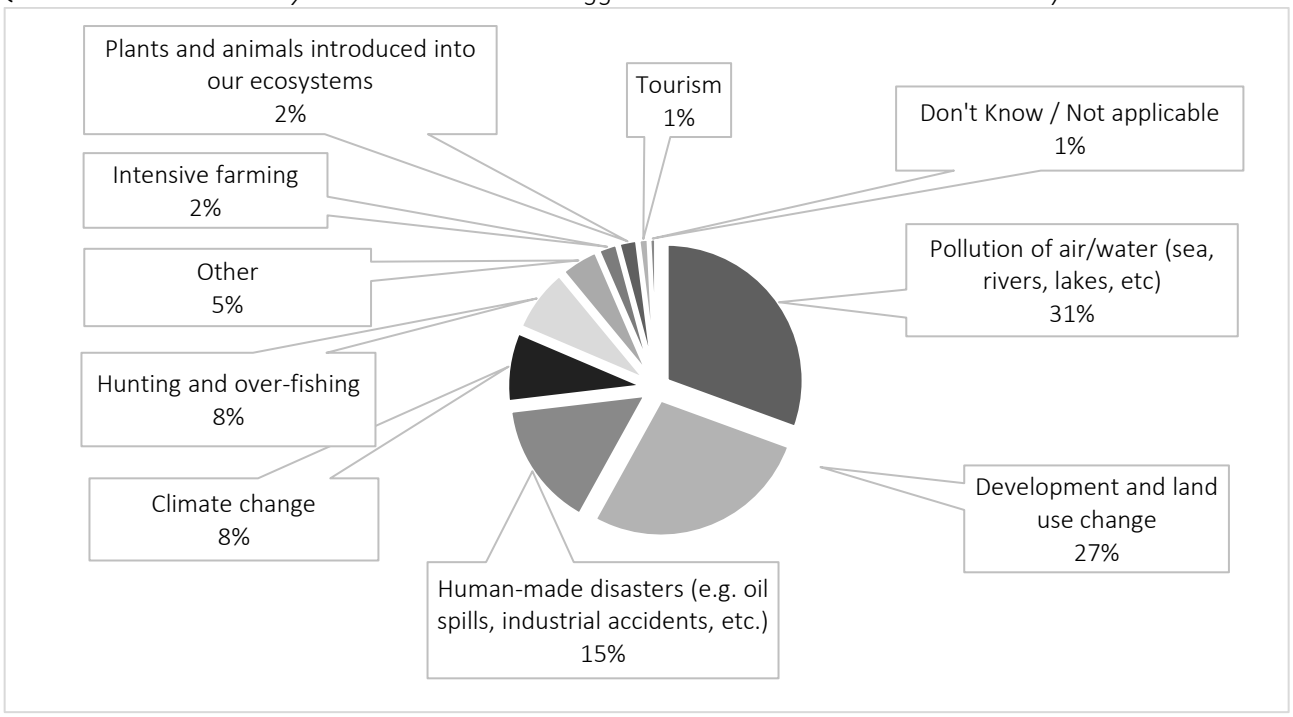


Figure 28 - Perceived biggest threats to natural areas (August 2014)

When asked whether respondents felt they were sufficiently informed and involved in protected area decision making, only 28.4% (244) felt that they were and 61% (114) felt that they were not, while 11% (43) did not know. This suggests a limited success in representing the general public as a relevant stakeholder within the participatory process of the NATURA 2000 framework and protected area designation, and highlights an obligation to engage local actors further and offer them more opportunities to influence actual decisions.

(Q21. Do you feel that you are sufficiently informed and involved by authorities in managing protected areas in or around your locality?)

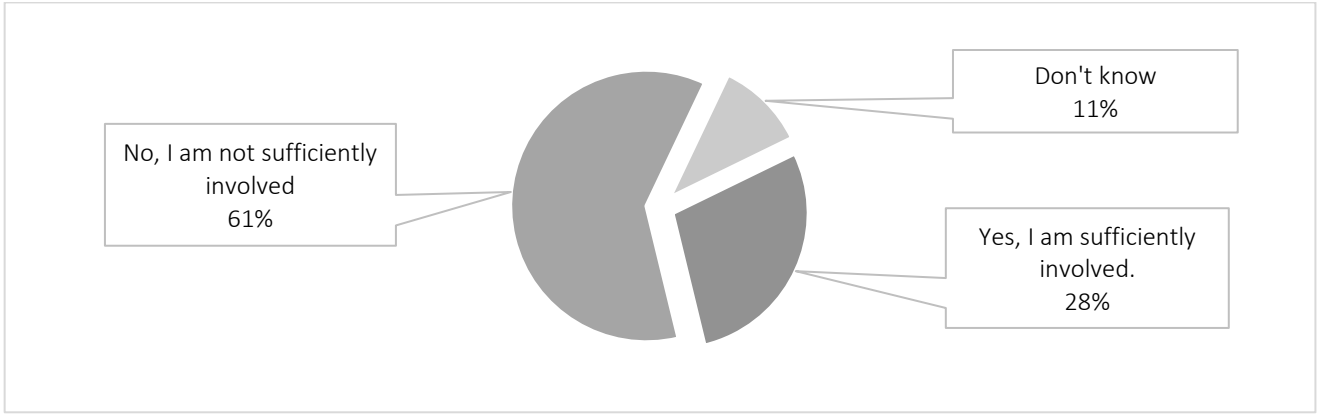


Figure 29 - Perceived level of involvement in protected area decision making.

Despite the above, when asked if they would like to be involved in decisions on protected areas only 23% (94) said they would, 69% (275) would not and 8%(32) did not know (**Figure 30**). This is of concern, and suggests

that more research is needed to understand where this reluctance could be coming from. However, this does not necessarily indicate indifference or over-reliance on planning authorities, but could just indicate a simple reluctance to get involved due to numerous other reasons, like conflict avoidance or perceived lack of competence. This makes a strong case for the need of frameworks which can still represent public views and interests, including those reluctant to get involved directly, and to capture their key affective values via other methods as is being proposed in this work. Further research and stakeholder analysis could address the question of which network structures have the capacity to mobilise and diffuse information to the wider public and are most suitable for local participation in environmental governance (Calvet-Mir et al., 2015).[745]

(Q22. Would you like to be involved in decisions on protected areas in your vicinity?)

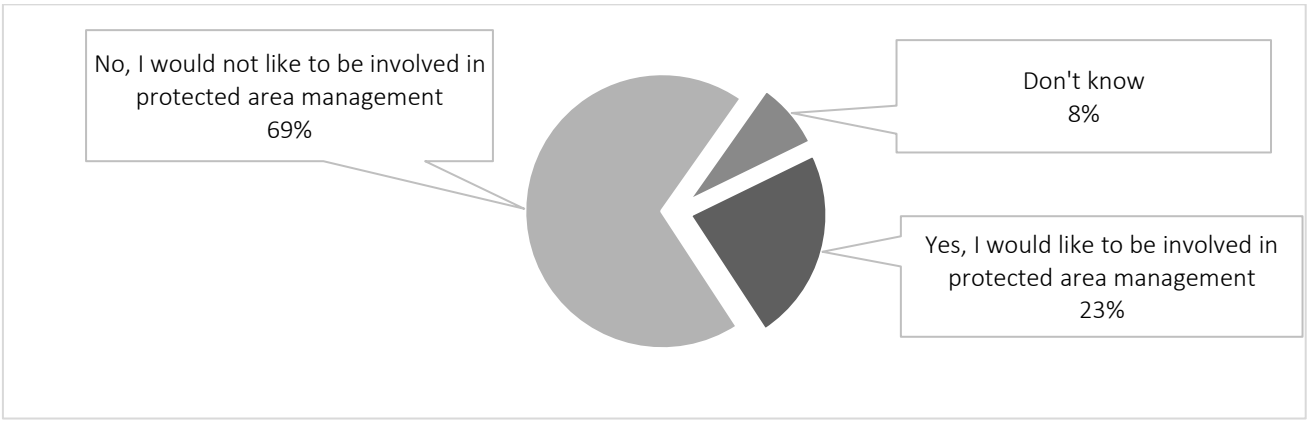


Figure 30 - Willingness to be involved in natural area decision making.

7.2 Statistical and spatial analysis of Connectedness to Nature

This section describes data obtained for the NRS scale as a measure of connectedness to nature. A detailed description of respondents' intensity of connectedness to nature follows. This description includes an examination of sub-scales for experience, perspective and dependence. Characteristics of several "external" factors (gender, age, and education) are also reported. Finally, an attempt at understanding the implications of CNT results according to location clusters and protected areas is undertaken.

7.2.1 CNT means and subscales

Respondents were asked to identify any three places where they felt a strong connection with nature (Q. 13) and then answer the NRS scale to inform their level of agreement with the scale items, and hence the strength of their connectedness to nature. A frequency test was used to compare the mean percent scores for the 13 statements of this scale. The rating scores were based on a scale of 1 (Disagree strongly - *low CNT*) to 5 (agree

strongly - *high CNT*)*;* the composite mean score for CNT intensity (CNT_Overall) specified by the participants was M = 2.572 (*SD = .44, n = 401*). This mean is slightly above the mid-point of the scale, which indicates very average and modest CNT across the population sample overall (Table 25 below).

Table 25 - Nature Relatedness Scale mean, range and variance (n=401)

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.572	1.978	3.125	1.147	1.580	.135	21

PCA, using VARIMAX with Kaiser Normalisation as a rotated solution, identified five components, which together explained 53%of the total variance across all 21 variables (Table 26). These five factors can be said to 'emerge' from the response behaviour of the respondents to the NRS scale, and their particular environmental-social interpretations.

Table 26 - Total variances explained for CNT

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.378	25.612	25.612	5.378	25.612	25.612	3.282	15.629	15.629
2	1.896	9.026	34.638	1.896	9.026	34.638	2.310	11.000	26.629
3	1.493	7.111	41.749	1.493	7.111	41.749	2.097	9.988	36.616
4	1.247	5.940	47.690	1.247	5.940	47.690	1.899	9.045	45.662
5	1.176	5.602	53.292	1.176	5.602	53.292	1.602	7.630	53.292
6	.950	4.522	57.814						
7	.901	4.292	62.106						
8	.852	4.057	66.162						
9	.798	3.802	69.965						
10	.753	3.586	73.551						
11	.721	3.436	76.987						
12	.643	3.064	80.051						
13	.603	2.871	82.922						
14	.578	2.750	85.672						
15	.539	2.564	88.236						
16	.493	2.349	90.586						
17	.477	2.272	92.858						
18	.435	2.074	94.932						
19	.380	1.812	96.743						
20	.348	1.656	98.399						
21	.336	1.601	100.000						

Extraction Method: Principal Component Analysis.

The rotated component matrix (Table 27) estimates the correlations (loadings) between each of the variables and the estimated components - correlations < 0.3 or 0.4 are regarded as being trivial. It also indicates

which statements load best under the five components identified above. The factor loadings were consistent with those typically reported in the literature.

Table 27 - NR Scale Rotated Component Matrix[a]

Component Matrix[a]

	Component				
	1	2	3	4	5
I feel a spiritual connection when in nature	.688				
I take notice of plants and animals wherever I am	.683				
I enjoy digging in soil and getting my hands dirty	.655				
I am very aware of environmental issues	.588	.391			
My relationship to nature is an important part of who I am	.560				
Even in the middle of the city, I notice nature around me (eg birds, flowers, plants, lizards etc)	.540				
I am not separate from nature, but a part of it	.488	.390			
I do think about how my actions affect the environment	.461	.366			
I enjoy being outdoors, even in bad weather		.685			
Nothing I do will change problems in other places on the planet		.679			
I don't often go out in nature		.624			
I think about the suffering of animals			.797		
I feel very connected to all living things and the earth	.362		.680		
The health of plants and animals has an impact on the future of humans			.673		
Some species are just meant to die out or become extinct				.663	.314
The thought of being deep in the woods away from civilisation is frightening		.341		.576	
Animals and plants should have fewer rights than humans			.308	.547	
My feelings about nature do not affect how I live my life				.542	
My ideal vacation spot would be a remote, natural area	.364			.373	-.307
Humans have the right to use natural resources anyway we want					.778
Conservation is not necessary because nature is strong enough to recover from any human impact					.604

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalisation.
a. Rotation converged in 18 iterations.

Interpretation of the data was consistent with the connectedness attributes the questionnaire was designed to measure and indicated in the literature. The five factors identified amongst the strongest loadings were titled as follows:

- '*Deep connection*" items on Component 1 indicating a sense of ease, concern, compatibility and belonging in the environment;
- "*Passive connectedness"* items loading on Component 2 indicating effortless attention, a sense of fascination, humility and insignificance;
- "*Moderate disconnectedness*' items on Component 3;
- "*Human-centric disconnectedness*"' items on Component 4; and
- "*Conscious and active disconnectedness"* items on Component 5 indicating a feeling of power and superiority over the environment especially for human goal achievement.

7.2.1.1 CNT Sub-scales

The three CNT subscales are interpreted as a sense of identification with nature ("self"), contact with nature ("experience"), and pro-nature conservation attitudes ("perspective"). The NR-Self factor might be thought of as the ecological self, or how strongly people identify with the natural environment (M=2.67, SD=0.5). The NR-Perspective factor is an indication of how one's personal relationship with the environment is manifested through attitude and behaviour (M=2.66,SD=0.46). Finally, the NR-Experience factor reflects the physical familiarity and attraction people have to nature (M=2.33, SD=0.65).

Table 28 - Means across the CNT scale and its sub-scales

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NROverall	***401***	***1.33***	***3.81***	***2.57***	***.44***
NRSelf	401	1.00	4.00	2.67	.50
NRPerspective	401	.86	4.00	2.66	.46
NRExperience	401	.33	4.00	2.33	.65

A bivariate Pearson correlation was undertaken in order to assess whether there is statistical evidence of a linear relationship among the same pairs of CNT sub-scales in the population (one listed in the row, the other in the column). The sample correlation coefficient, *r*, measures the strength and direction of linear relationships between pairs of CNT sub-scales, with results presented in Table 29. Correlation can take on any value in the range (-1, 1). The sign of the correlation coefficient indicates the direction of the relationship, while the magnitude of the correlation (how close it is to -1 or +1) indicates the strength of the relationship. The strength can be assessed according to these general guidelines (Cohen, 1988)[746]:

- .1 < | *r* | < .3 … small / weak correlation,
- .3 < | *r* | < .5 … medium/moderate correlation, and
- .5 < | *r* | …… large / strong correlation.

A strong linear relation was observed between NR_Overall and all the sub-scales as expected. NR_Overall with NR-Self has a Pearson correlation = .87, p < .001 (2-sided), with NR_Perspective having a Pearson correlation = .74, p = .000 (2-sided); and with NR_Experience having a Pearson correlation = .86, p < .001 (2-sided). Similarly, the three sub-scales correlated strongly amongst themselves, thus further confirming the validity and reliability of the NR scale.

Table 29 - Pearson correlation results for NR_Overall and its sub-scales

Correlations

		NRSelf	NRPerspective	NRExperience	NROverall
NROverall	***Pearson Correlation***	***.872****	***.738****	***.856****	***1***
	Sig. (2-tailed)	***.000***	***.000***	***.000***	
	N	***401***	***401***	***401***	***401***
NRSelf	Pearson Correlation	1	.463**	.649**	.872**
	Sig. (2-tailed)		*.000*	*.000*	*.000*
	N	401	401	401	401
NRPerspective	Pearson Correlation	.463**	1	.436**	.738**
	Sig. (2-tailed)	*.000*		*.000*	*.000*
	N	401	401	401	401
NRExperience	Pearson Correlation	.649**	.436**	1	.856**
	Sig. (2-tailed)	*.000*	*.000*		*.000*
	N	401	401	401	401

***. Correlation is significant at the 0.01 level (2-tailed).*

7.2.1.2 NRS statement ranking

A Friedman test was used to compare the mean rating scores for the 21 statements of this scale. As noted above, the rating scores ranged from 1 to 5, where 1 corresponds to strong feelings of disagreement with the statement and 5 indicates strong sense of agreement with the statement. The statements ranked in descending order by the highest means are presented in Table 30 below. This table describes the central tendency measures for CNT scale items. Respondents indicated higher levels of agreement with NR Self affect items such as "*The health of plants and animals has an impact on the future of humans*" (M=3.12, SD=0.574) and NR Perspective items like "*I think a lot about the suffering of animals*" (M=3.07, SD=0.541). The exception lies with the lowest scoring item which is indeed a NR Self item: "*My feelings about nature do not affect how I live my life*" (*M* = 1.98, *SD* = 0.998); however this item was characterised by a low score probably because it was a negatively phrased statement. If this is the case, then this item should possibly be re-phrased to address the negative connotations, or removed altogether in subsequent renditions of this sub-scale.

NR experience items are characterized by the lowest mean scores and higher levels of variance overall. Nature-related experience, reflects a physical familiarity with the natural world, a level of comfort with and desire for nature contact. This aspect of nature relatedness would be most evident in respondents who seek or are

drawn to nature and who are aware of nature in their daily life (Nisbet 2015).[747] The next lowest scoring items: "*My ideal vacation spot would be a remote, natural area*." (*M* = 1.99, *SD* = 1.122), "*The thought of being deep in the woods away from civilisation is frightening*" (M=2.04,SD=1.122) and "*I enjoy digging in soil and getting my hands dirty*" (M=2.24, SD=1.194) suggests that a functional experiential relationship with nature may not be the leading contributor to respondents' connectedness to nature overall, and that the Maltese do not particularly value physical experiences in the natural world. A potential explanation is the fact that the island is densely populated and arguably over-developed, and opportunities to enjoy physical experience in natural areas are therefore limited. Furthermore, significant expanses of natural areas are under private ownership (typically as agricultural leases – '*qbiela'* in Maltese), also potentially contributing to diminished interest in visiting the countryside (Ombudsman, 2016).[748] This also ties in with other demographic trends, such as pronounced lack of exercise and high obesity amongst the Maltese (Cuschieri et al., 2016).[749] There is thus a strong challenge to foster stronger connections with nature, and improving an experiential appreciation of nature, particularly for those who may not feel part of the natural world.

Table 30 - NRS mean ranking of each question (n=401, 21 item) ranking of NR overall

Factors	Statements	Mean	Std. Deviation
Self	The health of plants and animals has an impact on the future of humans.	3.12	0.574
Perspective	I think a lot about the suffering of animals.	3.07	0.541
Self	I am not separate from nature, but a part of it.	2.95	0.671
Self	I feel very connected to all living things and the earth.	2.92	0.617
Perspective	Humans have the right to use natural resources anyway we want.	2.89	0.904
Self	I am very aware of environmental issues.	2.87	0.749
Perspective	I do think about how my actions affect the environment.	2.85	0.740
Experience	I take notice of plants and animals wherever I am.	2.82	0.904
Perspective	Conservation is not necessary because nature is strong enough to recover from any human impact.	2.82	0.975
Self	My relationship to nature is an important part of who I am.	2.64	0.810
Self	Even in the middle of the city, I notice nature around me (eg birds, flowers, plants, lizards etc).	2.62	0.906
Experience	I enjoy being outdoors, even in bad weather.	2.54	1.131
Self	I feel a spiritual connection when in nature.	2.53	0.933
Experience	I don't often go out in nature.	2.37	1.174
Perspective	Nothing I do will change problems in other places on the planet.	2.34	0.998
Perspective	Animals and plants should have fewer rights than humans.	2.33	1.087
Experience	I enjoy digging in soil and getting my hands dirty.	2.24	1.194
Perspective	Some species are just meant to die out or become extinct.	2.07	1.058
Experience	The thought of being deep in the woods away from civilisation is frightening.	2.04	1.121
Experience	My ideal vacation spot would be a remote, natural area.	1.99	1.122
Self	My feelings about nature do not affect how I live my life.	1.98	0.998

It is relevant to point out that Desira (2014)[750] used a different connectedness to nature scale by Mayer

and Frantz (2004) (CTN scale; n=291) and concluded that the majority of the participants scored more than 28, which is the mid-point of the scale. In her study, which was somewhat less representative (n=291), only 8.2% of participants scored less than this, with a mean score of 38.32 showing a strong connection to nature. Furthermore, the highest means were obtained for the following statements: "*I recognise and appreciate the intelligence of other living organisms*" (M = 3.36, SD = 0.750), "*I think of the natural world as a community to which I belong*" (M=3.36, Sd=0.897) and "*I have a deep understanding of how my actions affect the natural world*" (M=3.04, Sd=0.914). Although her results indicates a reasonable CNT, she suggests that this is not necessarily manifest in daily life, as suggested by Baldacchino (2011)[751] who concluded that Maltese participants tend to exhibit knowledge of environmental responsibility but then fail to combine this with their actions. This dichotomy is confirmed at a later stage in this work when one looks at the same respondents' means for the Environmental Behaviour scale.

7.2.1.3 Cross country comparison between NRS scale means

While the above results demonstrate that the NRS scale is well suited to providing a measure of CNT, the author attempted to compare the mean results obtained for Malta with results from related studies using the same NRS scale. Barthelmess et al. (2013)[752] used the same NRS scale with South Korean, Swiss, and Czech students, finding that, on average, South Koreans reveal greater closeness towards nature than Swiss and Czech students. This observation is interesting in view of the fact that South Koreans have higher percentages of people living in urban areas and reveal the least physical familiarity with the natural world amongst the three sample groups. Malta's means were included in the cross-comparison between NRS scale means, in Figure 31 below.

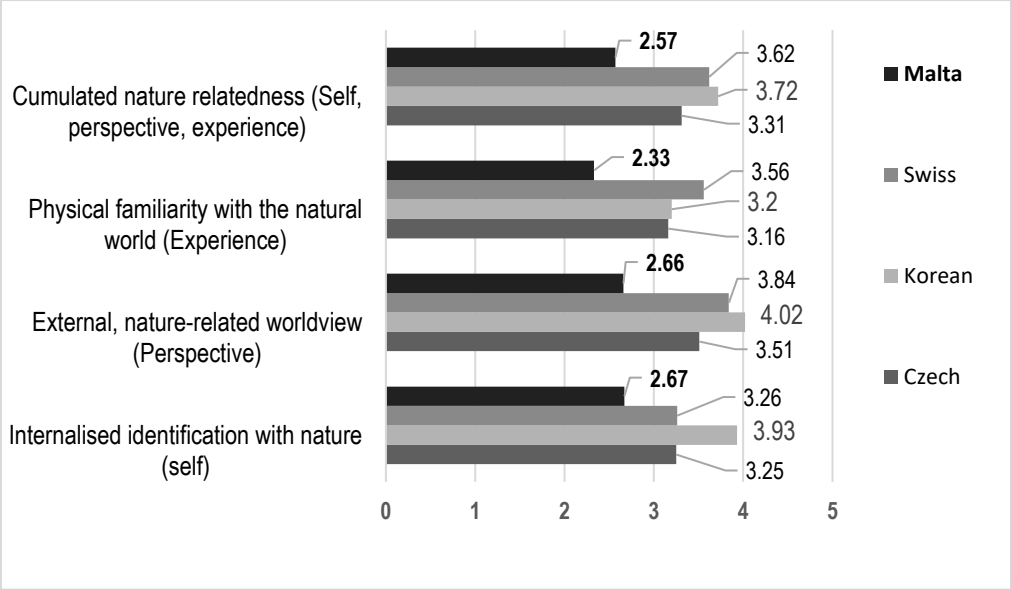


Figure 31 - Cross country comparison between NRS scales among South Korean, Swiss, and Czech students (n=1,600, and Maltese adults (n=401). [Adapted from Barthelmess et. al, 2013]

This comparison illustrates significant variances and suggests that such social scales are probably most useful if employed within a specific context, even on a longitudinal basis, rather than as a means of comparison between countries (Madden, 2005)[753]. It also shows the strong cultural differences between people and how they connect with nature in different ways. Despite ranking lower on all sub-scales, Malta overall ranks high in terms of Eurobarometer results on environmental awareness, concern and interest (Eurobarometer, 2014)[754]. This apparent disjoint could be attributed to differences in social and institutional environments between countries which are inherently difficult to account for, and can significantly bias data or cross-country comparisons even when using the same survey instrument (Madden, 2005). This implies a need for caution when generalising about the way people connect to nature on the basis of studies conducted only within a few cultural frameworks; and benchmarking or drawing policy implications from such analysis could potentially limit a true understanding of CNT as a universally-applicable concept (Restall and Conrad, 2015). Consequently, the above discussion suggests that there may be alternative interpretations for the low connectedness scores found in this study to those given above. These potential factors affecting the Maltese results will be discussed in a later section.

7.2.2 CNT relationships with demographic predictors

This section discusses NRS correlations with independent variables, namely gender, age and education in order to understand better whether any of these variables are indeed significant predictors. Gender, age and education were analysed as moderators because according to the literature, being older, being female and being educated tend to be associated with higher environmental concern, and more environmentally-friendly attitudes and behaviours (e.g., Grønhøj and Thøgersen, 2009[755]; Scannell and Gifford, 2013)[756].

7.2.2.1 CNT and Gender

An analysis of mean differences with gender presented in **Table 31** below indicates overall that there is hardly any tangible difference between the means of males (M=2.60) and females (M=2.54).

Table 31 - Means ranking between NR_Overall and Gender

Gender:	Mean	N	Std. Deviation
Male	2.60	195	.43
Female	2.54	206	.45
Total	**2.5720**	**401**	**.44014**

In fact, an analysis of correlations with gender presented in **Table 32** indicates that there are no significant

differences amongst the two age cohort means as determined by one-way ANOVA (p = .186).

Table 32 - Statistical significance between NR_Overall and Gender

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
NROverall * Gender:	Between Groups	(Combined)	0.34	1	0.34	1.759	0.186
	Within Groups		77.15	399	0.19		
	Total		**77.49**	**400**			

Table 33 below indicates a similar proximity in means with regards to NR Self and NR Perspective, while a minor discrepancy in favour of a slightly higher NR experience mean score for men is noted.

Table 33 - Means ranking of NR_Overall and its sub-scales stratified by Gender (sorted by NROverall mean)

Gender:	NROverall	NRSelf	NRPerspective	NRExperience
Male	2.60	2.66	2.68	2.44
Female	2.54	2.68	2.65	2.24
Total	**2.57**	**2.67**	**2.66**	**2.33**

7.2.2.2 CNT and Age

Table 34 below indicates the means and standard deviations of NR_Overall against the age cohorts.

Table 34 - Means ranking between NR_Overall means and Age

Age:	Mean	N	Std. Deviation
20-29	2.46	77	.45907
30-39	2.55	67	.37451
40-49	2.72	57	.41901
50-59	2.72	74	.47803
60-69	2.52	70	.41678
70 or more	2.47	56	.41087
Total	**2.5720**	**401**	**.44014**

An analysis of correlations with age presented in Table 35 indicates that there are relatively significant differences amongst the six age cohort means as determined by one-way ANOVA (p < .001).

Table 35 - Statistical significance between NR_Overall and Age.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
NROverall * Age:	Between Groups	(Combined)	4.432	5	0.886	4.792	.000
	Within Groups		73.058	395	0.185		
	Total		**77.49**	**400**			

For NR_Overall, the 40 to 49 (2.72) and 50 to 59 (2.72) cohorts have the highest CNT. The 30 to 39 cohort remain close to the median as they build a sense of attachment towards the later years. However, the 60 to 69 (2.52) and the 70+ (2.47) cohort means suggest that CNT tends to decrease with older age. This is related to decreased mobility and health, hence less exposure to nature. This is corroborated by Mifsud et al., (2017)[757] who conclude that as age increases, the percentage of drivers in Malta declines for both genders. Another explanation could be offered by 'social disengagement theory' (Cumming and Earl Henri, 1961)[758] which argues that ageing can lead to a natural and mutual withdrawal or social disengagement which occurs between the ageing person and others. This occurs due to a diminished social role and ties when the ageing person leaves the work force, children move out of the house and peers start to die off (Toepoel, 2013).[759] This process of social isolation tends to remove the individual from a certain amount of normative control, towards more individualised actions and reluctance or difficulty to assimilate into new groupings (Cumming and Earl Henri, 1961).[760] Another reason behind this anomaly is possibly related to sensory loss which is prevalent amongst older adults (Heine C, Browning C., 2004).[761] This tends to prevent them from participating in activities they enjoy and influences negatively how they engage with nature.

The youngest cohort (20-29) scores are lower, probably a result of the digital age which is influencing how adults (but especially the younger generation) use their time. For instance, a related study (PFWS, 2015)[762] identifies 'Problematic Internet Use' (PIU) among a representative sample of young people in Malta aged between 18-30 years (n=1,507). The study reveals that while 65.9% were average internet users , one third of the sample (33.3%) were excessive Internet users who experienced some problems in their lives due to internet overuse and only 0.8% were problematic Internet users (scores of 70-100) but not addicted (scores of 40-69). Younger cohorts (those aged between 18-21 years) also had higher mean 'implicit-association test' (IAT- the strength of a person's automatic association between mental representations of concepts in memory) scores and were also more likely to be excessive users than average users. Being single and not in a relationship also emerged as another factor for higher IAT scores. Also, those who were single were more likely to be excessive Internet users as opposed to average users. Similarly, according to Ofcom (2015),[763] in the UK, adults spend an average of eight hours and 41 minutes a day on media devices, compared with the average night's sleep of eight hours and 21 minutes. Almost four hours a day are spent watching TV. This is particularly marked among young people and newer users

(n=2,800).

This disproportionate attachment to devices and virtual media is on the increase as more mobile services and devices are coming online, and the lower amounts of time spent outdoors connecting with nature must be taken seriously. In fact, research by Wilson (1984)[764] and others (Wells and Lekies, 2006) argues for early opportunities in nature, with sufficient experiences ideally prior to age 11 in order to counteract "videophilia"- a new human tendency to focus on sedentary activities involving electronic media (Zaradic and Pergams, 2007[765], 2008).[766] The argument put forward by Wilson is that it is harder to instil a deeper meaning about the environment and place without actual nature-based recreation, environmental engagement or biophilia. However, the digital age must be looked at as an opportunity and Keeso (2016)[767] rightly challenges the perception that technology plays an antagonistic role in nature connectedness. He proposed that we "*approach nature connections as a process of building connectedness through curiosity, wonder, intrigue, and captivation by way of different mediums — including technologies - that generate a 'next step' in our pursuit of understanding, engagement, interaction, well-being, and stewardship."* His argument does not imply that our CNT will achieve its end-state through technology, but posits that while interacting with digital platforms, our CNT "*is not necessarily dead, absent, or even idle, because through these platforms we can be in the process of connecting to nature."* Related work by Arendt and Matthes (2014)[768] however, also revealed that while exposure to mass-mediated nature like nature documentaries can have beneficial behavioural effects by increasing protective actions toward nature, this in itself is not sufficient to elicit an increase in connectedness to nature.

Table 36 below presents the means across the sub-scales, which indicates a similar proximity in means ranking in terms of age with regards to NR Perspective and NR_Experience, while a minor discrepancy in favour of a slightly higher NR Perspective mean score for respondents in the 40-49 cohort is noted.

Table 36 - Means ranking of NR_Overall and its sub-scales stratified by age (sorted by NR_Overall)

Age:	NROverall	NRSelf	NRPerspective	NRExperience
50-59	2.72	2.82	2.73	2.57
40-49	2.72	2.75	2.84	2.53
30-39	2.56	2.61	2.67	2.33
60-69	2.52	2.67	2.58	2.25
70+	2.47	2.64	2.55	2.15
20-29	2.46	2.54	2.63	2.173
Mean	**2.57**	**2.67**	**2.66**	**2.33**

7.2.2.3 CNT and Educational achievement

An analysis of mean differences with educational achievement is presented in **Table 37** below and indicates overall that there is tangible difference between the means of of the six educational cohorts.

Table 37 - Means ranking between NR_Overall and Educational Achievement

What is the highest level of education that you attained?			
	Mean	**N**	**Std. Deviation**
No schooling / Primary	2.4327	70	.39731
Lower Secondary	2.4274	84	.37706
Upper Secondary	2.6268	110	.44275
Post-secondary / Non-Tertiary (e.g. MCAST, nursing)	2.6313	78	.43647
Tertiary	2.7627	59	.47153
Total	**2.5720**	**401**	**.44014**

In fact, an analysis of correlations with education presented in **Table 38** indicates that there are statistically significant differences amongst the six educational achievement cohort means as determined by one-way ANOVA ($p < .001$).

Table 38 - Statistical significance between NR_Overall and educational achievement

ANOVA Table

		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
NROverall * What is the highest level of education that you attained?	Between Groups (Combined)	5.865	4	1.466	8.107	.000
	Within Groups	71.624	396	.181		
	Total	**77.490**	**400**			

Clearly, in Malta, CNT is affected by educational achievement levels across respondents, both in terms of NR Overall, and similarly across the sub-scales. This is in line with other studies elsewhere which indicate that level of education explains significant differences in environmental attitudes (Buttel, 1979)[769] and that less educated people seem to be less aware of environmental problems (Liefländera et al., 2013)[770]. A potential explanation could be the fact that higher academic-achievers have higher cognitive abilities and a wider perspective on nature's value (Hirsch, 2010),[771] which in itself could lead to a greater connectedness to nature. A second potential cause can be attributed to socioeconomic differences between high and low academic achievers. In fact, adolescents in Finland and Iceland living with parents who have a higher level of education tend to watch less TV , be more physically active (Kantomaa et al., 2007)[772] and have higher Inclusion of Nature in Self Scale (INS) scores (Bruni A.K. Liefländer et al.,[773] and Bruni & Schultz ,2010[774]). This augurs well for Malta, which has been investing significantly in its education and training system in recent years, but there is no doubt that more needs

to be done to address some bottlenecks in the education and training system namely the high early school leaving rate, low basic skills proficiency, low tertiary education attainment, and the largest gender gap among EU countries with girls strongly outperforming boys in all fields tested (reading, mathematics and science - DG EAC, 2015).[775]

Table 39 below presents the CNT Means for NR_Overall and the three sub-scales, against educational achievement, ranked by NR_Overall. It indicates a similar proximity in means ranking with regards to all three sub-scales, while a minor discrepancy in favour of a slightly higher NR Self mean score for the Upper Secondary cohort is noted.

Table 39 - Means ranking of NR_Overall and its sub-scales stratified by Educational achievement (ranked by NR_Overall)

Education:	NROverall	NRSelf	NRPerspective	NRExperience
Tertiary	2.76	2.86	2.84	2.55
Post secondary / Non-Tertiary	2.63	2.69	2.72	2.44
Upper Secondary	2.63	2.70	2.74	2.40
No schooling / Primary	2.43	2.57	2.51	2.16
Lower Secondary	2.43	2.55	2.52	2.15
Mean	**2.57**	**2.67**	**2.66**	**2.33**

7.2.2.4 Correlations between NR_Overall and all three demographic variables Gender, Age and Educational Achievement

A multiple regression was run to predict NR_Overall from gender, age, and education. The assumptions of linearity, independence of errors, homoscedasticity, unusual points and normality of residuals were met. Table 40 shows that the statistical significance level of the three-way interaction term is 0.000 (i.e., $p = 0.001$). This value is < 0.05 (i.e., it satisfies $p < .05$), which means that there is a statistically significant three-way age*gender*education interaction effect for NR_Overall. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.799. The Durbin-Watson statistic can range from 0 to 4, and a value of approximately 2 indicates that there is no correlation between residuals. Our value is very close to 2, so it can be accepted that there is independence of errors (residuals) which means that there is no relationship between the observations in each group or between the groups themselves.

Table 40 - Summary of multiple regression analysis for age, gender and education on a continuous dependent variable (NR_overall)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.320[a]	.102	.095	.41862	1.799

a. Predictors: (Constant), Age:, Gender:, Education

b. Dependent Variable: NROverall

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.919	3	2.640	15.064	.000[b]
	Residual	69.570	397	.175		
	Total	77.490	400			

a. Dependent Variable: NROverall

b. Predictors: (Constant), Age:, Gender:, Education

These independent variables significantly predicted NR_Overall, $F(3,397) = 15.064$, $p < .0005$, adj. $R^2 = 0.095$. However, only education ($r^2=0.64$) and age ($r^2=0.95$) were statistically significant predictors, $p < .05$. Age is a very strong predictor for NR, while gender was rejected as a significant predictor of NR_Overall. Regression coefficients and standard errors can be found in Table 41.

Table 41 - Summary of NR overall multiple regression analysis and three-way ANOVA

Model Summary

Model	Predictor	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	Education	.257[a]	.066	.064	.42591
2	Age	.315[b]	.099	.095	.41878

a. Predictors: (Constant), What is the highest level of education that you attained?

b. Predictors: (Constant), What is the highest level of education that you attained?, Age:

Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.230	.068		32.895	.000	2.097	2.364
	What is the highest level of education that you attained?	.087	.016	.257	5.308	.000	.055	.119
2	(Constant)	1.887	.112		16.916	.000	1.668	2.107
	What is the highest level of education that you attained?	.126	.019	.372	6.612	.000	.089	.164
	Age:	.056	.015	.216	3.835	.000	.027	.084

a. Dependent Variable: NROverall

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.110	1	5.110	28.172	.000[b]
	Residual	72.379	399	.181		
	Total	77.490	400			
2	Regression	7.689	2	3.845	21.922	.000[c]
	Residual	69.800	398	.175		
	Total	77.490	400			

a. Dependent Variable: NROverall

b. Predictors: (Constant), What is the highest level of education that you attained?

c. Predictors: (Constant), What is the highest level of education that you attained?, Age:

7.2.3 CNT relationships with locations

A first analysis of the NRS means against cluster localities is presented in Table 42 below.

Table 42 - Nature Relatedness Scale means (NR_Overall) across 13 localities, ranked in descending order.

Locality:	N	Mean	Std. Deviation	NATURA 2000 sites within locality	NATURA 2000 sites around locality
Mellieha	31	2.84	0.33	5	5
Rabat (Malta)	31	2.75	0.44	4	2
M' Xlokk	31	2.71	0.51	3	1
Siggiewi	32	2.71	0.33	2	2
Sliema	31	2.68	0.48	Control site	2
Xaghra	30	2.60	0.47	1	0
St Lawrenz	30	2.58	0.31	2	0
Rabat (Gozo)	31	2.57	0.47	1	1
Valletta	31	2.51	0.56	Control site	0
Naxxar	31	2.48	0.36	Control site	2
Sannat	30	2.44	0.32	4	1
B' Kara	31	2.34	0.27	Control site	0
Nadur	31	2.20	0.38	1	0
Total	**401**	**2.5720**	**.44014**		

As predicted, localities with increased proximity to protected areas generally scored higher (e.g. Mellieha (M=2.84, SD=0.33), Rabat (Malta) (M=2.75, SD=0.44), M' Xlokk (M=2.71, SD=0.51) as against sites like Valletta (M=2.51, SD=0.56), Naxxar (M=2.48, SD=0.36), Rabat, Gozo (M=2.57, SD=0.47), Nadur (M=2.20, SD=0.38). However, an unpaired t-test analysis of correlations of means for localities having NATURA 2000 sites in their vicinity and the four control sites (Table 43) indicates that the difference is not statistically significant since the two-tailed P value equals 0.0975. The *Cohen's d* is 0.583232 indicating a medium effect size. Cohen (1988)[776] suggested that d=0.2 be considered a 'small' effect size, 0.5 represents a 'medium' effect size and 0.8 a 'large' effect size. This means that if two groups' means do not differ by 0.2 standard deviations or more, the difference is trivial, even if it is statistically significant.

Table 43 - CNT means of nine localities with NATURA 2000 in the vicinity against four control sites

Localities with NATURA 2000 sites	
Locality:	Mean
Mellieha	2.84
Rabat (Malta)	2.75
M' Xlokk	2.71
Siggiewi	2.71
Xaghra	2.60
St Lawrenz	2.58
Rabat (Gozo)	2.57
Sannat	2.44
Nadur	2.20
Mean	2.60
SD	0.1908
n	274

Control sites	
Locality:	Mean
Sliema	2.68
Valletta	2.51
Naxxar	2.48
B' Kara	2.34
Mean	2.5025
SD	0.1396
n	124

An interesting observation is noted with Marsaxlokk which ranks amongst the highest CNT means, but only has three small minor NATURA 2000 sites (SACs) in its vicinity (Ghar Dalam, Il-Ballut ta' Marsaxlokk, and Il-Maghlaq tal-Bahar ta' Marsaskala. This high CNT mean is of note not only in view of the limited protected areas in the region, but also the agglomeration of critically important national infrastructure in the wider locality - like the Delimara Power Station, fuel and LPG storage depots, intense bunkering services, a hardstanding facility and increased maritime traffic due to hosting a major maritime transhipment logistic centres in the Mediterranean in the grander port harbour area (Spiteri, 2011) [777] - which was expected to detract from the 'naturalness' of the wider area. This high mean suggests that despite all the anthropogenic threats, people living in this unique fishing village still develop a close relationship with nature and a socially embedded "connectedness" to it due to the Xlukkajri's strong bonds with the sea (Cumbo, 2013).[778] Marsaxlokk is home to a particularly small but occupation-specific (fishing) community which still depends directly on natural resources for their day-to-day survival. The creates a deep bond with nature, which can even transcend environmental degradation at times. Work by Takahashi (2003)[779] provides an interesting insight into the process of value transformation which took place side by side with actual environmental degradation and economic changes experienced by fishermen in Karakuwa, Japan. He concludes that in practice local people manage with those contradictions and maintain attachment to place by categorising events along a continuum between "reality" and "ideal." The study area has been studied in related detail more recently by Hussain et al. (2015).[780] The control sites Valletta (M= 2.51, SD=0.55), B'Kara (M=2.34, SD = 0.27) and Naxxar (M=2.44, SD=0.36) showed significantly reduced CNT in comparison. The curious exception is Gozo (especially Nadur), with localities scoring significantly lower than most other sites, including B'Kara, despite having numerous protected areas in their vicinity.

A Tree Cluster Analysis (TCA) of NR_overall was undertaken using AMOS SPSS in order to understand significant groupings across the cluster localities - presented in Table 44 below. TCA refers to a class of techniques used to classify cases into groups that are relatively homogeneous within themselves and heterogeneous between each other, on the basis of a defined set of variables. These groups are called clusters or nodes, and the TCA indicates a gain summary of three clusters.

The first cluster includes M'Xlokk; Rabat (Malta); Siggiewi; Mellieha, and Sliema, and suggests that while most of these sites indeed have protected areas in the vicinity, the same grouping also includes coastal communities amongst high ranking CNT localities. The TCA also indicates that Node 2 comprises six localities which includes four of the five localities studied in Gozo, with only Nadur being in Node 3 along with the B'Kara control sites. This reaffirms the significantly different means between Malta and Gozo. The particular case of Gozo is discussed later in this section.

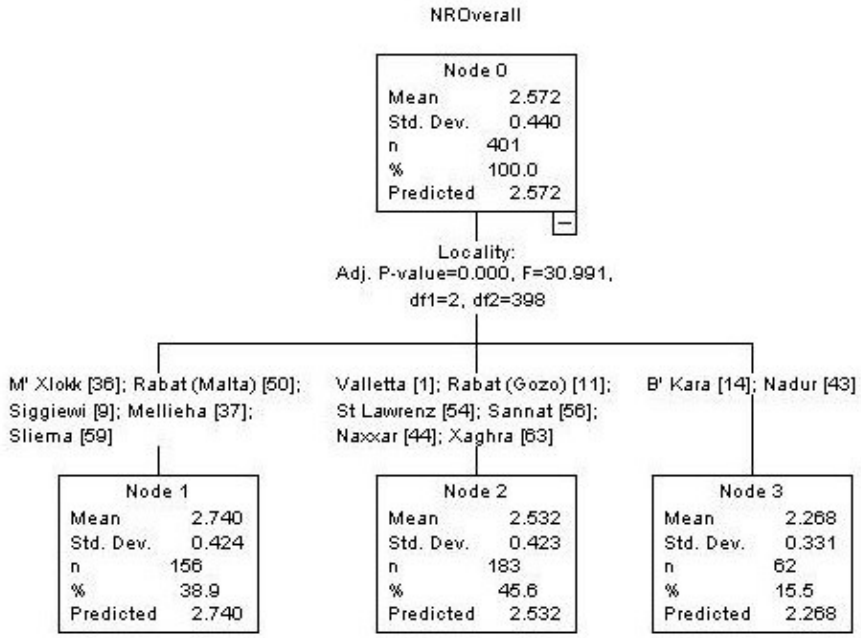
Table 44 - Tree Cluster Analysis for NR Overall (n=401) vs locality

Gain Summary for Nodes

Node	N	Percent	Mean
1 - M'Xlokk; Rabat (Malta); Siggiewi; Mellieha; Sliema.	156	38.9%	2.7402
2 - Valletta; Rabat (Gozo); St. Lawrenz; Sannat; Naxxar; Xaghra.	183	45.6%	2.5316
3 - B'Kara; Nadur	62	15.5%	2.2680

Growing Method: CHAID

Dependent Variable: NROverall



7.2.3.1 NRS sub-scales and localities

A similar effort was undertaken in order to present the means for subscales. Subtle differences between the three NRS sub-scales can be identified even on the local level, as indicated in Table 45 below. As mentioned earlier, the NR-Self factor might be thought of as the ecological self, or how strongly people identify with the natural environment. NR_Self rankings suggest that Rabat (M=2.94), Mellieha (M=2.90) and Sliema (M=2.88) ranked higher on this sub-scale and remains in line with the assumption that residents of localities in close proximity to NATURA 2000 sites tend to identify strongly with nature. Sliema is an exception under this sub-scale probably due to it being a coastal site that inherently still provides a 'natural' escape across its promenade and easy access to the sea. It could also be a direct result of the constant onslaught on the locality by speculative construction and escalating conflict with residents, which tends to affect residents' life experience towards commodified natural spaces, and can still instil a stronger CNT at the local level despite the absence of protected areas in close proximity. A recent study by Portelli (2017)[781] which looked at the effectiveness of consultation in the Sliema district, suggests that for most residents developments in Sliema have not really enhanced the locality overall, and that "*developments are changing the way we live*". Figure 32 below indicates the views and

appreciation of Sliema residents on development in their locality over the last twenty years.

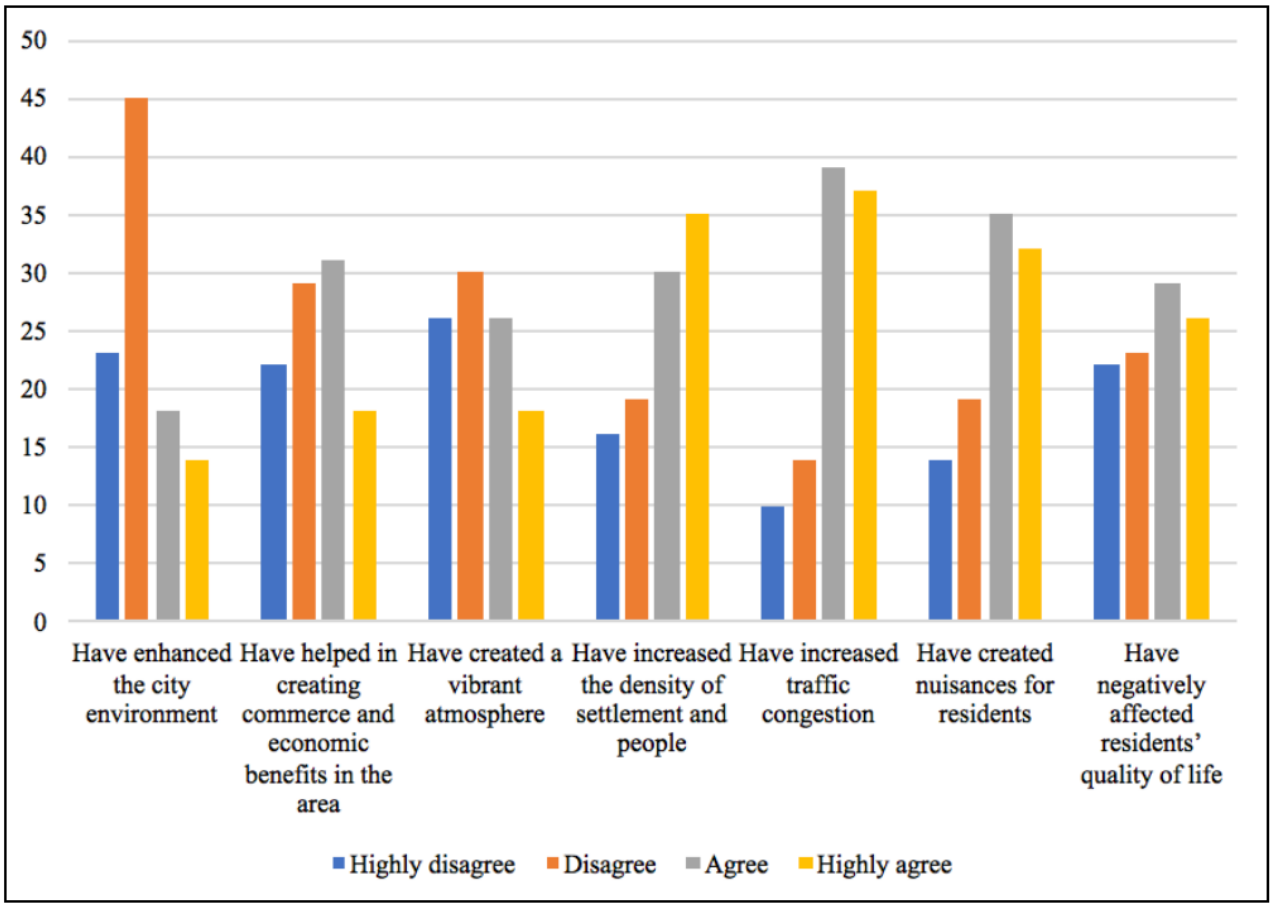


Figure 32 - Perceptions of residents in Sliema on recent developments in the locality , where the vertical axis indicates % of respondents (Portelli, 2017).

Furthermore, Portelli reports that respondents indicated access to project data by interested participants was at times lacking, doubts remain as to whether the input of participants actually affect the final decision, and in some cases participants felt that they are just not given an opportunity to give their input in the participatory process right from the onset.

At the lower end of the ranking are places like Naxxar (M= 2.48), B' Kara (M= 2.42) and Nadur (M=2.26). While Naxxar and B'Kara fit the model which predicts reduced attachment to nature due to the limited exposure to nature at the local level, CNT in Nadur and other sites in Gozo scored markedly less, suggesting that indeed fundamental individual psychology and life experience dimensions remain crucial determinants of CNT, irrespective of place.

The NR_Self factor follows the same ranking as NR_Overall, with marginal differences, and seems to respondents had a homogenous statistical measure about their personal connection to nature. The NR-Perspective factor is an indication of how one's personal relationship with the environment is manifested through attitude and behaviour. Here M' Xlokk (M=2.94), Mellieha (2.88) and Rabat (Malta, M= 2.77) rank higher, as

expected, while Sannat (M=2.47), B' Kara (M= 2.46) and Nadur (M=2.29) rank lower. Again, this suggests that proximity to protected areas or indeed coastal sites may have an effect on NR_perspective, but is certainly also influenced by personal psychology and experiences, as in the case of Sannat and Nadur. The NR_Experience factor reflects the physical familiarity and attraction people have to nature. For this scale, Mellieha (M=2.72), Siggiewi (M=2.55) and Rabat (Malta, M=2.47) rank higher, while Naxxar (M=2.15), B' Kara (2.08) and Nadur (M=2.01) rank lower. This suggests that areas with NATURA 2000 connectivity and relatively rural surroundings do tend to draw more people towards them. Siggiewi in this case shows a slightly higher NR_Experience than Marsaxlokk.

Table 45 - NR scale means for the 13 localities and its sub-scales means for CNT (ranked by NR Overall).

Case Summaries

Locality:	NR_Overall			NR_Self			NR_Perspective			NR_Experience		
	N	Std.	Mean	N	Std.	Mean	N	Std.	Mean	N	Std.	Mean
Mellieha	31	0.33	**2.84**	31	0.39	**2.90**	31	0.40	**2.88**	31	0.60	**2.72**
Rabat (Malta)	31	0.44	**2.75**	31	0.48	**2.94**	31	0.46	**2.77**	31	0.69	**2.47**
M' Xlokk	31	0.51	**2.71**	31	0.54	**2.75**	31	0.55	**2.94**	31	0.67	**2.40**
Siggiewi	32	0.33	**2.71**	32	0.45	**2.88**	32	0.30	**2.66**	32	0.44	**2.55**
Sliema	31	0.48	**2.68**	31	0.47	**2.88**	31	0.65	**2.75**	31	0.73	**2.32**
Xaghra	30	0.47	**2.60**	30	0.51	**2.77**	30	0.51	**2.61**	30	0.70	**2.38**
St Lawrenz	30	0.31	**2.58**	30	0.40	**2.68**	30	0.29	**2.66**	30	0.53	**2.36**
Rabat (Gozo)	31	0.47	**2.57**	31	0.50	**2.65**	31	0.47	**2.64**	31	0.70	**2.38**
Valletta	31	0.56	**2.51**	31	0.66	**2.55**	31	0.48	**2.73**	31	0.80	**2.22**
Naxxar	31	0.36	**2.48**	31	0.36	**2.48**	31	0.40	**2.77**	31	0.58	**2.15**
Sannat	30	0.32	**2.44**	30	0.43	**2.52**	30	0.37	**2.47**	30	0.48	**2.29**
B' Kara	31	0.27	**2.34**	31	0.36	**2.43**	31	0.33	**2.46**	31	0.44	**2.08**
Nadur	31	0.38	**2.20**	31	0.44	**2.26**	31	0.37	**2.29**	31	0.67	**2.01**
Total	401	0.44	**2.57**	401	0.50	**2.67**	401	0.47	**2.66**	401	0.65	**2.33**

NR Overall is statistically significant to a 95% confidence interval and a 4 % margin error but the 3 sub-scales have a margin of error of 18%

Table 46 below presents the sub-scales sorted in descending order of highest CNT, according to locality. This provides insights into how the locality clusters associate with these cognitive factors of nature attachment. This indicates that respondents living in Rabat, Mellieha and Sliema identify strongly with the natural environment, whereas respondents in Nadur, B'Kara and Naxxar identify marginally less (NR-Self). Similarly, clusters in M' Xlokk, Mellieha and Rabat (Malta) show an increased relationship with the environment which manifests itself through attitude and behaviour (NR-Perspective) over respondents in Nadur, B'Kara and Sannat. Finally, respondents in Mellieha, Siggiewi and Rabat (Malta) also showed increased physical familiarity and attraction to nature than Nadur, B'Kara and Naxxar respondents (NR-Experience).

Table 46 - NR sub-scale means ranked in descending order per locality clusters.

Locality:	NR Self	Locality:	NR Perspective	Locality:	NR Experience
Rabat (Malta)	2.94	M' Xlokk	2.94	Mellieha	2.72
Mellieha	2.90	Mellieha	2.88	Siggiewi	2.55
Sliema	2.88	Rabat (Malta)	2.77	Rabat (Malta)	2.473
Siggiewi	2.88	Naxxar	2.77	M' Xlokk	2.40
Xaghra	2.77	Sliema	2.75	Xaghra	2.38
M' Xlokk	2.75	Valletta	2.73	Rabat (Gozo)	2.38
St Lawrenz	2.68	St Lawrenz	2.66	St Lawrenz	2.36
Rabat (Gozo)	2.65	Siggiewi	2.66	Sliema	2.32
Valletta	2.55	Rabat (Gozo)	2.64	Sannat	2.29
Sannat	2.52	Xaghra	2.61	Valletta	2.22
Naxxar	2.48	Sannat	2.47	Naxxar	2.15
B' Kara	2.43	B' Kara	2.46	B' Kara	2.08
Nadur	2.26	Nadur	2.29	Nadur	2.01
Mean	**2.66**	**Mean**	**2.66**	**Mean**	**2.33**

7.2.3.2 NRS mean differences between Malta and Gozo

To more fully explore the nature of the variation in levels of connectedness in different spatial contexts we examined differences in these variables between the two local regions, Malta and Gozo. Table 47 below separates the means for NR_Overall between Malta and Gozo, with a mean for Gozo of 2.48 as against a mean of 2.63 for Malta. An Unpaired Samples t-Test was undertaken using GraphPad[782] to compare two population means and whether they have different average values. Since the two-tailed P value equals 0.151745, this difference is considered to be not statistically significant.

Table 47 - NR_Overall mean differences between Malta and Gozo, ranked in descending order.

	Malta				Gozo			
NR_Overall					NR_Overall			
#	Locality:	Mean	N	Std. Deviation	#	Locality:	Mean	N	Std. Deviation
1	Mellieha	2.8449	31	.33355	1	Xaghra	2.6048	30	.46943
2	Rabat (Malta)	2.7512	31	.44069	2	St Lawrenz	2.5825	30	.30777
3	M' Xlokk	2.7143	31	.51493	3	Rabat (Gozo)	2.5684	31	.46737
4	Siggiewi	2.7128	32	.32891	4	Sannat	2.4381	30	.31843
5	Sliema	2.6790	31	.47856	5	Nadur	2.1966	31	.37591
6	Valletta	2.5146	31	.55525					
7	Naxxar	2.4823	31	.36489					
8	B' Kara	2.3395	31	.26733					
	Total	**2.6298**	**249**	**0.167655**		**Total**	**2.4781**	**152**	**0.170256**

Despite the lack of significance, the lower results for Gozo were not anticipated which seems to suggest that the Gozitan respondent is on average somewhat less connected to nature than the average Maltese

respondent. However, this difference in means from the mainland could simply be due to the fact that Gozitans are more sheltered from anthropogenic loss or threat of loss to their personal or psycho-social environmental resources. In fact, Gozo is still considered as possessing high quality landscape character since it remains largely undisturbed by development (SOER, 2005); and its habitats and biota are rare, specialised and endemic (Evelpidou et al., 2010).[783] The reduced exposure to overcrowding and destruction, coupled with a more pronounced rural environment, is possibly conducive to a reduced sense of environmental sensitivity or concern for their natural environment and lower connectedness (Russell et al., 2013).[784] This is especially the case in Gozo since the Gozitan's interaction with natural elements is more inherent (or embedded) in their way of life, and perhaps taken for granted - as against a more romanticised outlook to nature on the mainland. On a regional basis, the population density of Malta is more than three times that of Gozo, with a resident population of approximately 31,000 in 2014 (NSO).[785] In fact, Malta has a population density of 1,562 persons per square kilometre, compared to 454 for Gozo. In addition, population density in Malta has increased at a higher rate since 2005 (45 persons/km^2) compared to Gozo, where the increase was marginal (2 persons/km^2). This implies that Gozitans are less exposed to the severe population density of mainland Malta, and hence have more opportunity to live a tranquil and idyllic life close to nature.

Furthermore, Gozo's hillier and clay-dominated topography allow for a more abundant greener landscape than mainland Malta, which in turn seems to affect how the Maltese and Gozitans perceive and interact with the natural environments around them. Cassar (2006)[786] suggests that while many Maltese would look for green open spaces and rural areas for their recreation and relaxation during the weekend, Gozitans tend to avoid the countryside and would rather converge on built-up areas in coastal locations such as Marsalforn, Xlendi and Mgarr harbour throughout much of the year. The most plausible explanation for this is that while people in Gozo are still very much attached to rural living and agricultural practices, Maltese people yearn for a countryside that has drastically diminished on mainland Malta. Moreover, the geographical isolation and political neglect or administrative stagnation, coupled by a dire lack of resources and an austere environment, has resulted in a frugal approach towards the use and re-use of local resources especially with the older generations (Cassar 2006).[787] Further research would be necessary, with more appropriate sample sizes specific to Gozo, in order to establish what causes these subtle differences, and why Gozitans seem to have a different baseline for CNT mean scores.

7.2.4 CNT spatial analysis

This section undertakes spatial mapping and analysis of geographically-referenced data collected in this study, in order to better visualise communities' attachments to nature and place and to bring such attachments to the attention of public authorities or decision-makers, with the intention of contributing to public involvement in policy making. This section also presents a simple method for a GIS-based approach to identify and visualise

places where respondents feel a connectedness to nature, and provides a way to identify areas where such a connection is established. The evaluation of diverse spatial functions, interests, values and desires is important for spatial planning (Dramstad et al., 2002;[788] Vizzari, 2011).[789] CNT spatial mapping can allow planners to identify areas of distinctive human connection and relate that data layer with relevant land characteristics for areas in need of biodiversity protection (Colchester, 1998)[790] and integrated resource management, while contributing towards participatory decision making and providing a reference point for monitoring or evaluation (AFROMAISON, 2014[791]; Dorninger et al., 2017). [792]

This section combines macro scale mapping of nature areas where people feel a specific connection to nature against designated policy boundaries. This work builds further on very recent work by Davis et al. (2016)[793] which attempted to specify and map distinct emotional nature experiences and compare them against NATURA 2000 sites. We use the term ''special places'' throughout this section to refer to site-specific, geographically discrete locations that have meaning to people. It also presents a number of GIS outputs related to nature attachment, followed by an interpretation of results. The desktop GIS platform is freely available online at the following link: http://mgo.ms/s/6oqsg. To better explore the nature of the variation in levels and type of nature connectedness across the different spatial contexts, we also examined the effect of several other variables that could provide a richer understanding of the factors that may have contributed to differing place meanings.

7.2.4.1 Spatial projection of CNT means

Means of the cluster respondents residing in the identified localities were projected in ArcMap, along with layers for locality and NATURA 2000 boundaries. The map in **Figure 33** overleaf suggests that respondents living in proximity of NATURA 2000 sites have a higher CNT mean, while control sites like Birkirkara have the lowest mean, as discussed above.

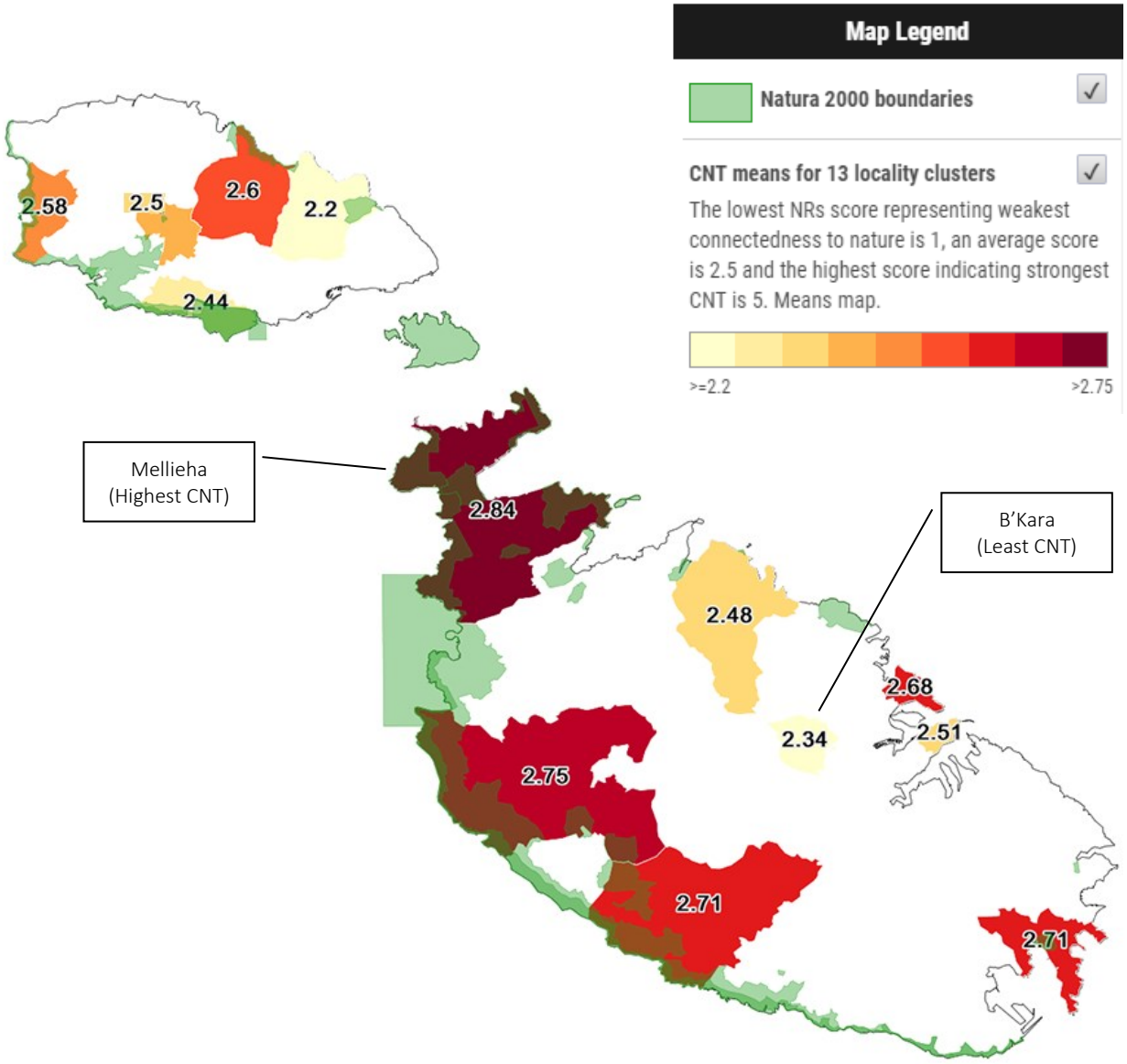
Figure 33 - CNT means across 13 cluster localities.

High CNT

Locality:	Mean	N	Std. Deviation
Mellieha	2.84	31	0.33355
Rabat (Malta)	2.75	31	0.44069
M' Xlokk	2.71	31	0.51493
Siggiewi	2.71	32	0.32891
Sliema	2.68	31	0.47856
Xaghra	2.60	30	0.46943
St Lawrenz	2.58	30	0.30777
Rabat (Gozo)	2.57	31	0.46737
Valletta	2.51	31	0.55525
Naxxar	2.48	31	0.36489
Sannat	2.43	30	0.31843
B' Kara	2.34	31	0.26733
Nadur	2.20	31	0.37591

Low CNT

The lowest NRs score representing weakest connectedness to nature is 1, an average score is 2.5 and the highest score indicating strongest CNT is 5 - (CNT means map).
Range - >=1 (pale yellow) to <28.56 (dark red)



7.2.4.2 CNT Hotspots

Respondents were also asked to mention three places or features within which they feel a strong connection with nature (not specific to their locality) in order to identify potential places of nature connectedness or relatedness. This location could be any physical space, ranging from church, the village square, public squares, gardens, beach or a promenade; the question was intentionally open-ended in order not to influence the respondents' choice. Answers provided resulted in 737 places that respondents identified as special places of connectedness. Using the XY-point location (coordinates which describe points on the earth's surface) of CNT places identified by respondents in the sample, special places were clustered based on point density to spatially delineate wider hotspot within which people connect with nature, overlaying these over designated NATURA 2000 areas (polygons). These places of CNT were consequently grouped into 198 'hotspots' and projected on the online GIS platform. This grouping was done first and foremost in order to remove mis-spelled names, vague locations referring to similar places listed by other respondents (Ex. Sliema promenade, Sliema beach would be grouped in one Sliema centroid). It was also undertaken in order to minimise the overall number of possible origins/destinations for GIS projection thus avoiding swamping the maps with masses of data. This implies losing the specific detail for the sake of clarity and simplicity. A final reason for this grouping is also due to accommodating the online GIS tool and its limitations since large data delivered as vectors to a web browser can cause the web browser to run slowly or run out of memory, affecting the user experience.

Table 48 below lists the first 100 out of 198 places of high CNT, ranked according to frequency (n=198). Dwejra was noted as the spot with highest CNT counts and remains a beloved and monumental landscape in the hearts and minds of the Maltese and tourist alike (Gatt, 2013).[794] Most of the sites in the top ten are in fact sites of natural beauty and protected by NATURA 2000 designation. Dwejra illustrates the relevance of landscape and social affections, epitomised more recently by the national 'grief' when the iconic Azure Window arch collapsed on March 8, 2017. However, it is interesting to note that some of these sites, like Buskett, have been extensively shaped by man over the years, but still considered to be areas of high CNT due to their semi-natural (Buskett, Chadwick Lakes) features. Others special places are almost entirely anthropogenic (e.g. St. John's Co-Cathedral) and deemed of high CNT probably due to the interconnectedness between '*spiritual ecology*' which certain sacred places elicit due to their socio-cultural or natural settings. Other sites also elicit strong CNT (ex. San Anton Gardens or Upper Barrakka), and an outcome of 'artificial' nature and impressive anthropogenic landscape features around them.

A full list of high CNT places is provided in Appendix 11 - CNT places listed with spatial coordinates (Q. 13).

Table 48 - Top 100 places of high CNT ranked according to frequency (n=198, 599 frequencies)

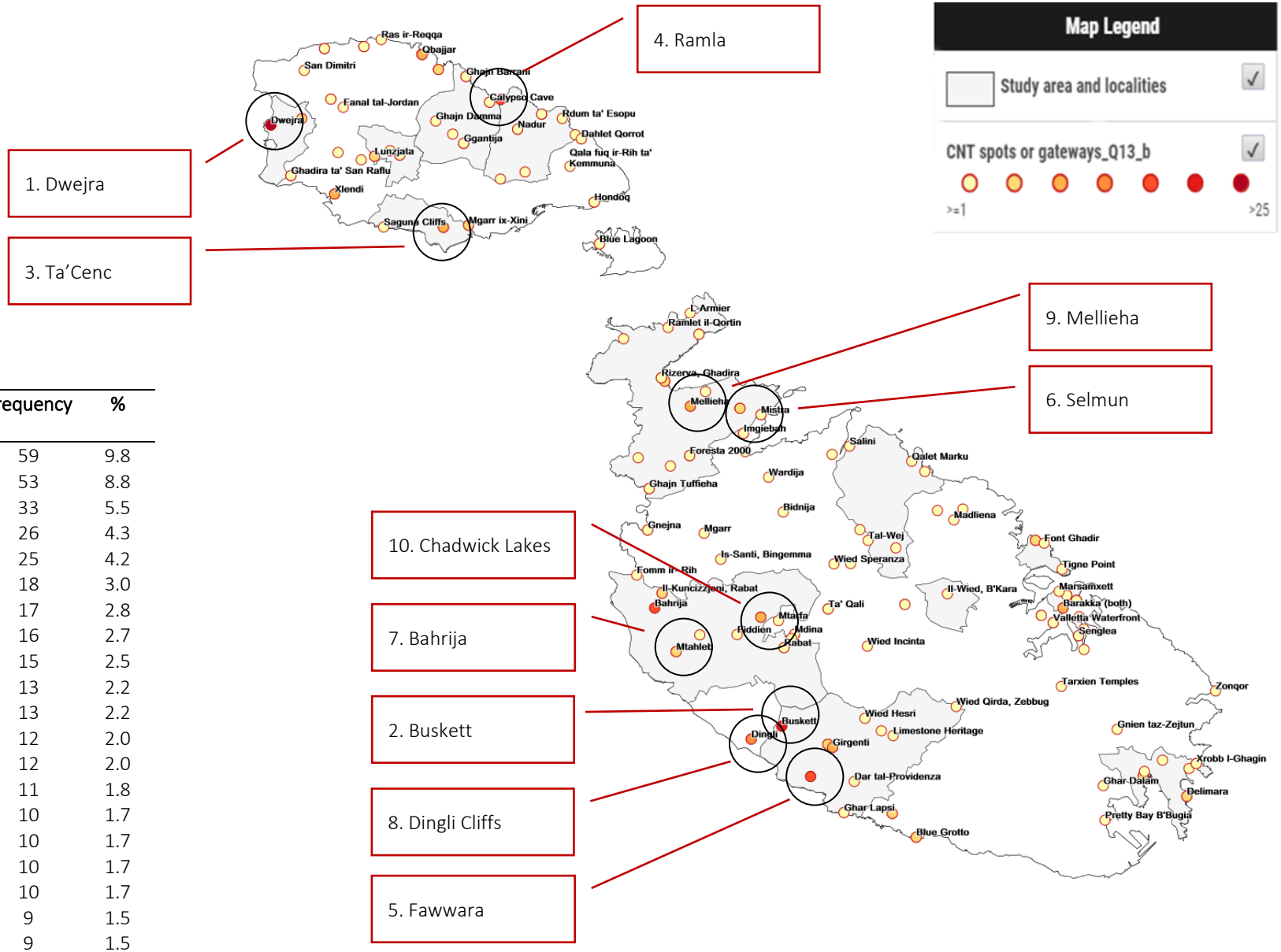
Ranking	Index match (unique records)	Frequency	%
1	Dwejra	59	9.8
2	Buskett	53	8.8
3	Ta' Cenc	33	5.5
4	Ramla	26	4.3
5	Fawwara	25	4.2
6	Selmun	18	3.0
7	Bahrija	17	2.8
8	Dingli Cliffs	16	2.7
9	Mellieha	15	2.5
10	Chadwick Lakes	13	2.2
11	Ghar Lapsi	13	2.2
12	Xlendi	12	2.0
13	Girgenti	12	2.0
14	Ghajn Tuffieha	11	1.8
15	Dingli	10	1.7
16	Mgarr ix-Xini	10	1.7
17	Delimara	10	1.7
18	Dahlet Qorrot	10	1.7
19	M'Xlokk	9	1.5
20	Upper Barrakka	9	1.5
21	Xwejni	9	1.5
22	Rabat	8	1.3
23	Lunzjata	8	1.3
24	Ghadira	8	1.3
25	Marsalforn	8	1.3
26	Blue Grotto	7	1.2
27	San Anton Gardens	7	1.2
28	San Blas	7	1.2
29	Qbajjar	7	1.2
30	Mtahleb	6	1.0
31	Hagar Qim	6	1.0
32	Ghajn Barrani	6	1.0
33	Comino	6	1.0
34	Mdina	5	0.8
35	Ta' Qali	5	0.8
36	Wied il-Ghasri	5	0.8
37	Salib tal-Gholja	5	0.8
38	Mizieb	5	0.8
39	Wied il- Mielah	5	0.8
40	Is-Salib tal-Gholja	5	0.8
41	L-Ahrax tal-Mellieha	5	0.8
42	Kuncizzjoni	4	0.7
43	Gnejna	4	0.7
44	Howard Gardens	4	0.7
45	Mistra	4	0.7
46	Imgiebah	4	0.7
47	Ggantija	4	0.7
48	Mdina Bastions	4	0.7
49	Barrakka Gardens	4	0.7
50	Lower Barrakka	3	0.5
51	Valletta	3	
52	Ramla l-Hamra	3	
53	St. John's Cathedral	3	
54	Sliema	3	
55	Wied iz-Zurrieq	3	
56	Sliema Promenade	3	
57	Ghadira ta' San Raflu	3	
58	Countryside, Delimara	3	
59	Bidnija	3	
60	Marnisi, M'Xlokk	2	
61	Marnisi, M'Xlokk	2	
62	M'Xlokk Bay	2	
63	Hondoq	2	
64	Ta' Pinu	2	
65	Villa Rundle	2	
66	Zurrieq	2	
67	Mgarr	2	
68	Ahrax tal-Mellieha	2	
69	Blue Lagoon	2	
70	Xrobb l-Ghagin	2	
71	Wied il-Mielah	2	
72	Near Ta' Pinu	2	
73	Qbajjar Bay	2	
74	San Lawrenz	2	
75	Wied ta' Marsalforn	2	
76	Calypso Cave	2	
77	Il-Bajja tal-Mellieha	2	
78	Ghar Dalam	2	
79	Nadur	2	
80	Marsalforn Valley	2	
81	Hondoq ir-Rummien	2	
82	L-Armier	2	
83	Ramla Bay	2	
84	Hofor	1	
85	Fomm ir- Rih	1	
86	Zonqor	1	
87	Naxxar	1	
88	Floriana Gardens	1	
89	Rdum, San Lawrenz	1	
90	Fort St. Angelo	1	
91	Birgu streets	1	
92	Mdina Cathedral	1	
93	Festa, Senglea	1	
94	Limestone Heritage	1	
95	Mellieha Bay	1	
96	Valletta Waterfront	1	
97	Santa Katerina, Rabat	1	
98	Wied tal-Qlejja, Chadwick Lakes	1	
99	Il-Qammieh l/o Ghadira	1	
100	Gnien taz-Zejtun	1	

The GIS density points are represented in Figure 34 below by applying point density analysis to generalised location area polygons on a numerical scale, from yellow symbol fill for lower frequencies to darker shades of red fill for highest frequencies, across a range from 1 to 28.56. The hotspot clusters indicate intensely appreciated areas, and that places of CNT are spread across both islands. However, the areas of greatest overlap mostly refer to places of high scenic or natural value within close proximity to respondents' homes. A proximity analysis to quantify this overlap is undertaken overleaf.

As mentioned earlier, particular landscapes within the Maltese Islands are also scheduled in the 1990 Structure Plan and through the various Local Plans. These sites of landscape value were designated in order to develop further specific policies and, where appropriate, management procedures for protecting and enhancing their value, and environmental quality generally. Figure 35 overleaf indicates overlays for areas designated as 'Areas of High Landscape Value' (AHLV) and 'Very High Landscape Value' (AVHLV). Areas of High Landscape Value (AHLVs) were designated in 1996 and 2000 based on the 'Structure Plan' Policy RCO 1 (1990). It also indicates that the vast majority of CNT places fall within the broader reaches of both AHLVs and AVHLVs An assessment of the potential linkages with landscape protected areas could help determine whether there are any linkages between these constructs and, whether it is justified to maintain two landscape categories in view of Malta's small landmass.

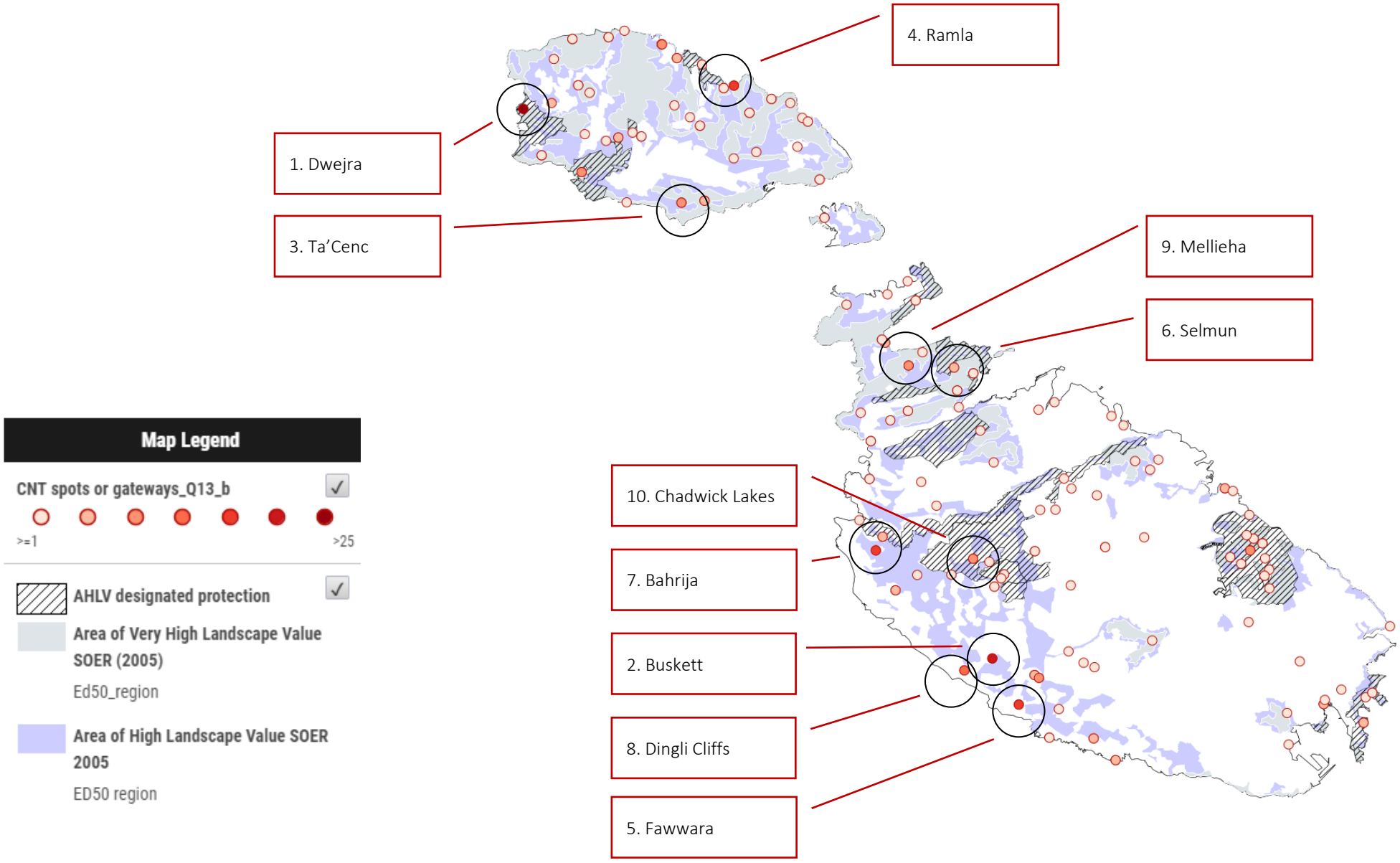
For more focused GIS outputs of the places of attachment to place and nature at the thirteen localities please refer to Appendix 17 - CNT Focused map - Gozo to Appendix 22.

Figure 34 - Distribution of top 20 places of high CNT (n=198 places)



Ranking	Index match (unique records)	Frequency	%
1	Dwejra	59	9.8
2	Buskett	53	8.8
3	Ta' Cenc	33	5.5
4	Ramla	26	4.3
5	Fawwara	25	4.2
6	Selmun	18	3.0
7	Bahrija	17	2.8
8	Dingli Cliffs	16	2.7
9	Mellieha	15	2.5
10	Chadwick Lakes	13	2.2
11	Ghar Lapsi	13	2.2
12	Xlendi	12	2.0
13	Girgenti	12	2.0
14	Ghajn Tuffieha	11	1.8
15	Dingli	10	1.7
16	Mgarr ix-Xini	10	1.7
17	Delimara	10	1.7
18	Dahlet Qorrot	10	1.7
19	M'Xlokk	9	1.5
20	Upper Barrakka	9	1.5

Figure 35 - Top 10 places of CNT against areas of landscape value as per scheduling and Local Plans 1996, 2000 & 2006 (MEPA).



GIS allows visualisation of complex data using "heat maps", rectangular colour-coded arrays indicating the intensity (or amount) of the dependent variable. Heat maps are flexible in that they offer visual representations of quantitative data on two axes and offers a valuable screening tool for testing broad hypotheses regarding relationships among measurements are expanded (Pleil et al. 2011).[795] In this case a heat map was used to identify clusters amongst the dense point data where there is a high concentration of CNT special places. The measured concentrations were coded across a sliding logarithmic colour scale where the lowest values are represented by light yellow blue = 0.001, the mid-range values to light red and the highest values dark red, with a corresponding transition (or gradient) between these extremes. The heat map in **Figure 36** below indicates immediately the concentration areas and appreciable scatter relative to the respondent localities. It provides a different perspective to the hotspot map since it brings attention to those same points on a larger neighbourhood scale, and highlights other minor hotspots by aggregating point density overall across the islands, which are not immediately obvious from the quantitative statistical results or the previous hot spot map. This is expected to provide an immediate understanding of CNT hotspots for environmental planning, and its utility was validated by professional planners during a semi-structured interview, as discussed in a later chapter.

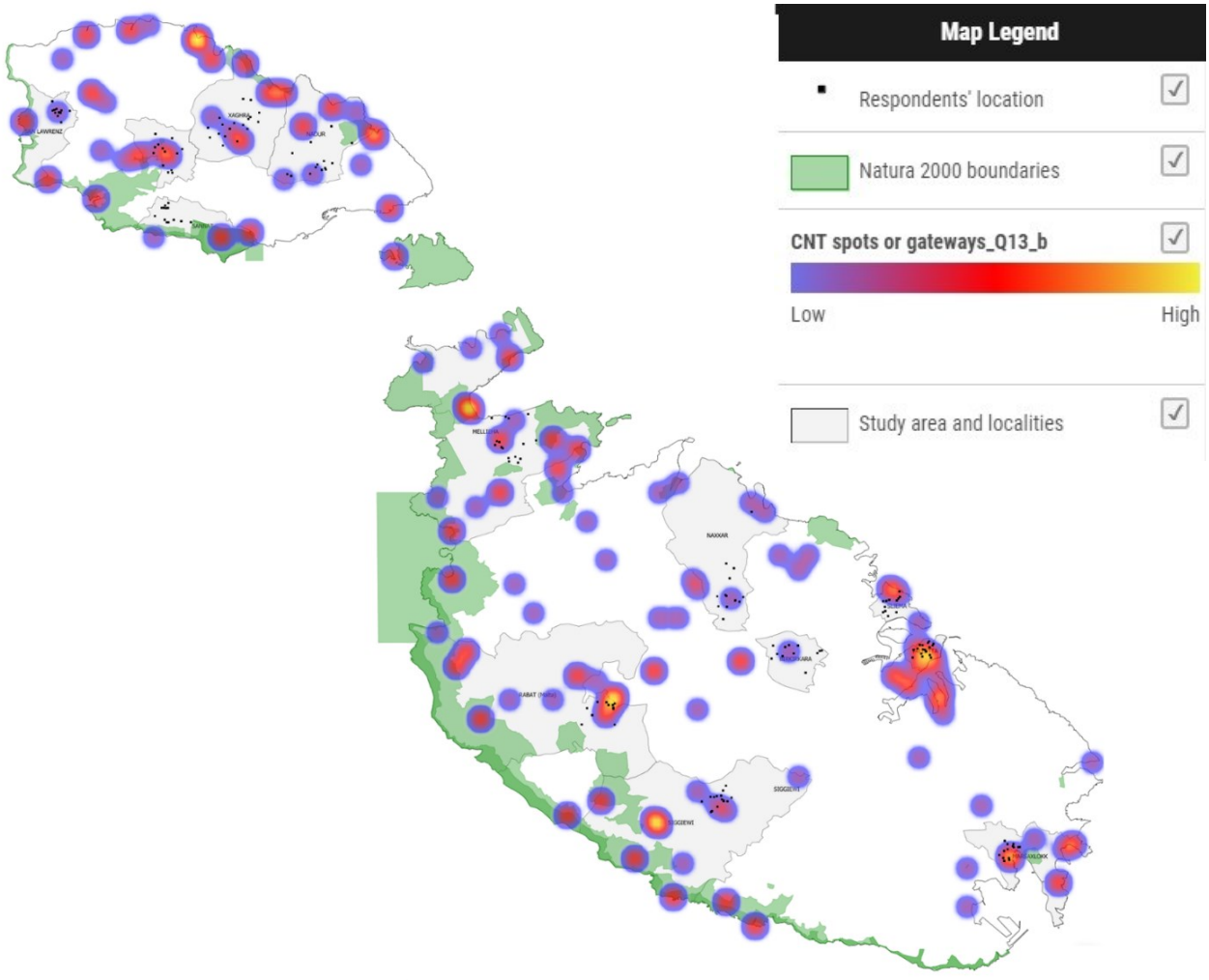


Figure 36 – CNT heat map based on frequency counts of special CNT places.

7.2.4.3 CNT and NATURA 2000 Overlap

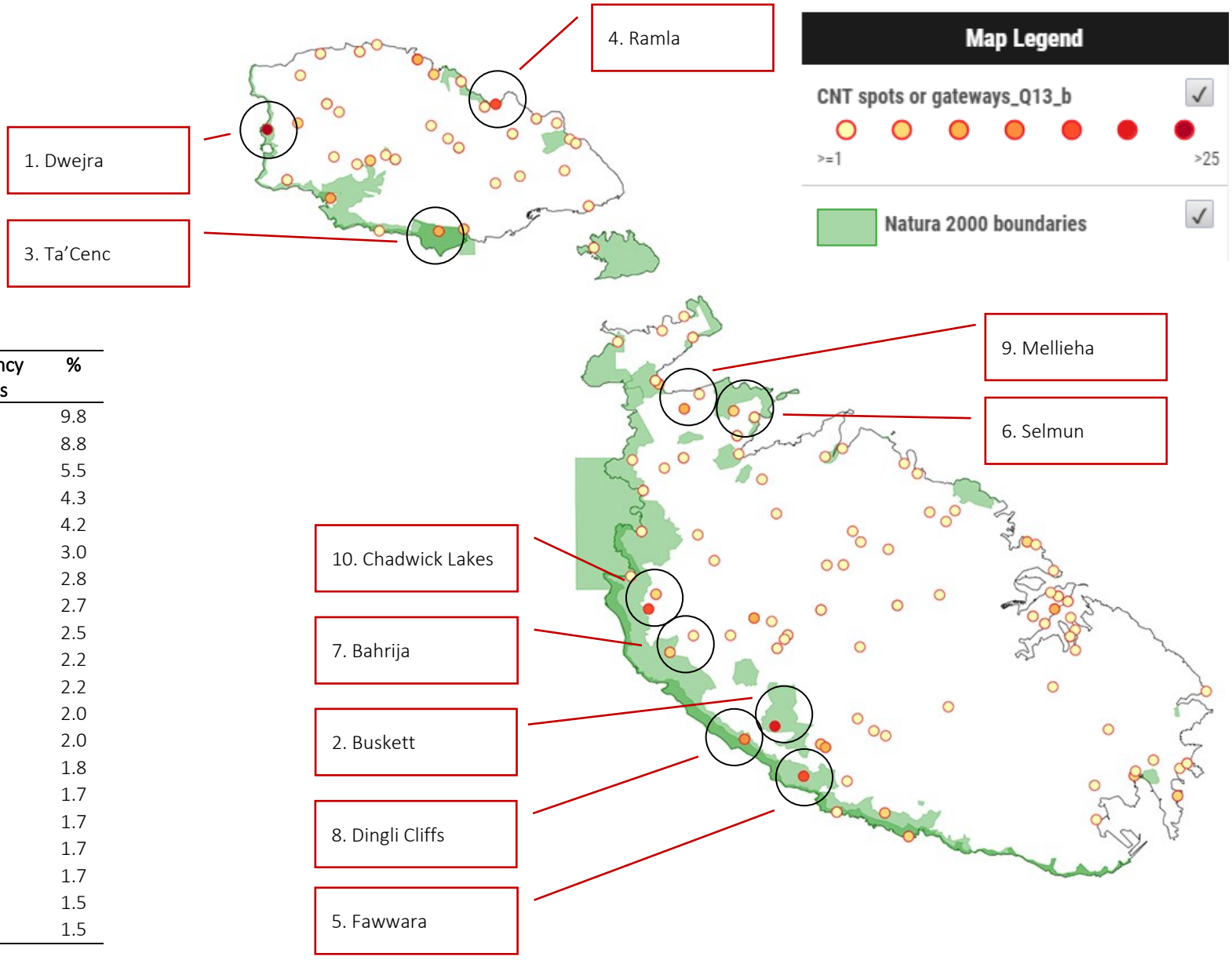
A point in polygon exercise via a spatial join was run in ARCMap in order to identify which of the 737 places identified for high CNT actually fall within NATURA 2000 sites. Table 49 provides a complete breakdown of CNT point frequencies (prior to grouping) lying in proximity or within NATURA 2000 polygons. The table indicates that 467 instances (frequencies) of these points mentioned by correspondents (61%) indeed lie within NATURA 2000 sites, but only involve 18 of the 34 NATURA 2000 designated areas (53%). It is interesting to note that no marine protected areas were highlighted as such, even though a number of coastal entry points do feature. This suggests that people seem to attach easily to terrestrial sites and possibly less tangibly to vague boundaries in the fluid environment of the sea (Steele, 1974),[796] and there remains a need to increase the understanding of the connection between people and marine environments in order to better manage the MPAs better (Wynveen et al., 2015).[797]

These findings in many ways remain inconclusive due to the limited sample size per locality and limited localities, but congruent with results published by Klassen in 2010 indicating that survey results using the Connectedness to Nature scale (Mayer, McPherson and Frantz, 2004 - coefficient alpha results for reliability were .79-84)[798] suggest that urban and rural populations are statistically similar in CNT scoring. This reaffirms arguments which imply that people can establish meaningful CNT irrespective of the environment they choose to live in, and these environments are in practice not necessarily protected or rural areas, as is commonly assumed. In Malta however this premise is somewhat a bit less distinct since the rural-urban divide is less pronounced due to the limited geographical size of the islands.

Table 49 - CNT points in relation to NATURA 2000 polygons

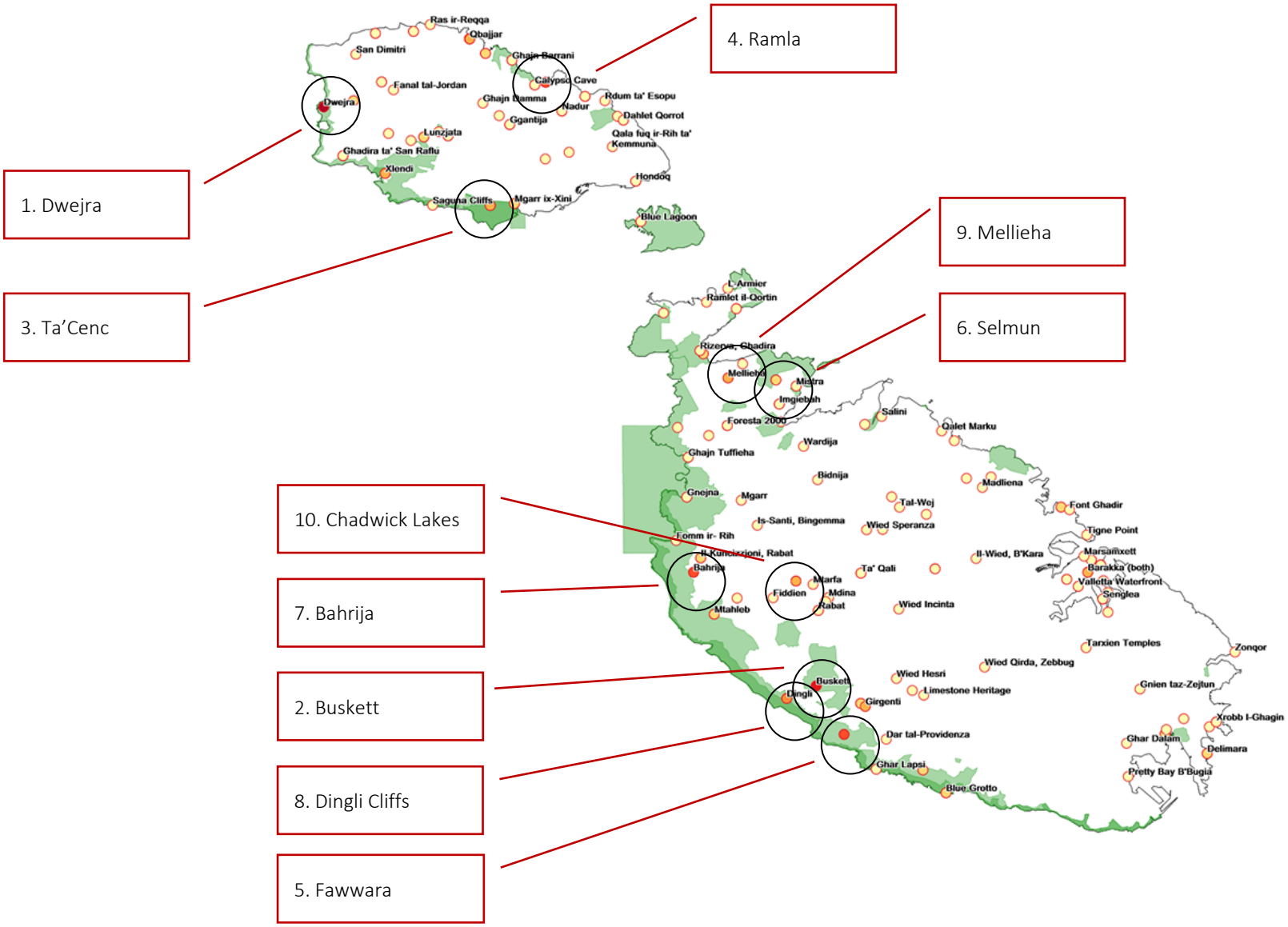
SITECODE[799]	SITENAME	Count	Frequency	Ranking
MT0000024	Rdumijiet Ta' Malta: Ir-Ramla Tac-Cirkewwa Sal-Ponta Ta' Benghisa	17	102	*1*
MT0000019	L-Inhawi Tad-Dwejra U Tal-Qawra, Inkluz Hagret Il-General	2	62	*2*
MT0000030	Rdumijiet Ta' Ghawdex: Il-Ponta Ta' San Dimitri Sal-Ponta Ta' Harrux	2	62	*3*
MT0000018	L-Inhawi Tal-Buskett U Tal-Girgenti	2	53	*4*
MT0000027	Rdumijiet Ta' Ghawdex: Ta' Cenc	2	35	*5*
MT0000034	L-Inhawi Ta' Ta' Cenc	2	35	*6*
MT0000005	L-Inhawi Tar-Ramla	2	33	*7*
MT0000032	Rdumijiet Ta' Malta: Ras Il-Pellegrin Sax-Xaqqa	2	26	*8*
MT0000015	L-Inhawi Tal-Ghadira	4	15	*9*
MT0000031	Rdumijiet Ta' Malta: Ix-Xaqqa Sa Wied Moqbol	2	13	*10*
MT0000017	Kemmuna U L-Gzejjer Ta' Madwarha	2	9	*11*
MT0000009	L-Inhawi Tar-Ramla Tat-Torri U Tal-Irdum Tal-Madonna	2	7	*12*
MT0000001	L-Inhawi Ta' Ghajn Barrani	2	6	*13*
MT0000010	Ix-Xaghra Tal-Kortin	2	4	*14*
MT0000006	Is-Simar (Limiti Ta' San Pawl Il-Bahar)	1	2	*15*
MT0000020	L-Inhawi Tax-Xlendi U Tal-Wied Tal-Kantra	1	1	*16*
MT0000026	Il-Qortin Tal-Magun U L-Qortin Il-Kbir	1	1	*17*
MT0000028	Rdumijiet Ta' Ghawdex: Id-Dawra Tas-Sanap Sa Tal-Hajt	1	1	*18*
MT0000002	L-Inhawi Ta' Pembroke	0	0	*19*
MT0000003	Il-Ballut Tal-Wardija	0	0	*20*
MT0000004	Il-Maqluba (Limiti Tal-Qrendi)	0	0	*21*
MT0000007	Is-Salini	0	0	*22*
MT0000008	L-Ghadira S-Safra	0	0	*23*
MT0000011	Ghar Dalam	0	0	*24*
MT0000012	Wied Il-Mizieb	0	0	*25*
MT0000013	Ic-Cittadella	0	0	*26*
MT0000014	Il-Ballut Ta' Marsaxlokk	0	0	*27*
MT0000016	Filfla U L-Gzejjer Ta' Madwarha	0	0	*28*
MT0000021	L-Inhawi Tal-Imgiebah U Tal-Mignuna	0	0	*29*
MT0000022	Il-Gzejjer Ta' San Pawl (Selmunett)	0	0	*30*
MT0000023	Il-Maghluq Tal-Bahar Ta' Marsaskala	0	0	*31*
MT0000025	L-Ghar Tal-Iburdan U L-Inhawi Tal-Madwar	0	0	*32*
MT0000029	Rdumijiet Ta' Ghawdex: Il-Ponta Ta' Harrux Sal-Bajja Tax-Xlendi	0	0	*33*
MT0000033	Rdumijiet Ta' Malta: Wied Moqbol Sal-Ponta Ta' Benghisa	0	0	*34*
	TOTALS	49	467	

Figure 37 - Top 10 places of high CNT and 32 NATURA 2000 boundaries ranked by site frequency (n=198)



Ranking	Index match (unique records)	Frequency counts	%
1	Dwejra	59	9.8
2	Buskett	53	8.8
3	Ta' Cenc	33	5.5
4	Ramla	26	4.3
5	Fawwara	25	4.2
6	Selmun	18	3.0
7	Bahrija	17	2.8
8	Dingli Cliffs	16	2.7
9	Mellieha	15	2.5
10	Chadwick Lakes	13	2.2
11	Ghar Lapsi	13	2.2
12	Xlendi	12	2.0
13	Girgenti	12	2.0
14	Ghajn Tuffieha	11	1.8
15	Dingli	10	1.7
16	Mgarr ix-Xini	10	1.7
17	Delimara	10	1.7
18	Dahlet Qorrot	10	1.7
19	M'Xlokk	9	1.5
20	Upper Barrakka	9	1.5

Figure 38 - Top 10 places of high CNT and 32 NATURA 2000 boundaries ranked by site frequency and including labels (n=198)



7.2.4.4 CNT and UCA Overlap

A point in polygon exercise via a spatial join was run in ARCMap in order to identify which of the 737 places identified for high CNT actually fall within an Urban Conservation Area (UCA). For the purposes of this study, UCAs are not considered protected areas as intended here, for the simple reason that they are urban rather than natural/semi-natural environments. However, results clearly show that the urban-rural-natural divide is more ambiguous than might be expected and that these sites therefore have relevance to the discussion, especially when one considers NATURA 2000 sites like MT0000013 Ic-Cittadella (EU, 2012), [800] an urban settlement but with natural aspects of conservation value. Table 50 below provides a breakdown of the CNT points which lie in UCA polygons. While only 114 of the points indicated by respondents indeed lie within UCA designated areas (15%), and these only involve 19 out of the 60 UCA designated areas (53%), this is nonetheless an interesting finding, considering that these sites are protected for their urban characteristics, yet still valued by respondents for providing a connection with nature.

It is interesting to note that the bulk of point counts that fall in UCA lie within localities which stand out for their socio-cultural development and dynamic adaptation over the years as a reflection of the societies that built and lived in them (Ex. Sliema, Valletta). They also remain a national symbol of Maltese society, culture and identity, and hubs of social life or creative activity for most Maltese, but especially for those living in their vicinity, even when more natural areas are available within close proximity. This high level of connectedness even within urban streetscapes provides interesting scope for urban planners to accommodate nature in the urban fabric of our towns, and provide more opportunities for biophilic interactions via improved green or public spaces for residents and visitors alike.

Table 50 - CNT points in relation to UCA polygons

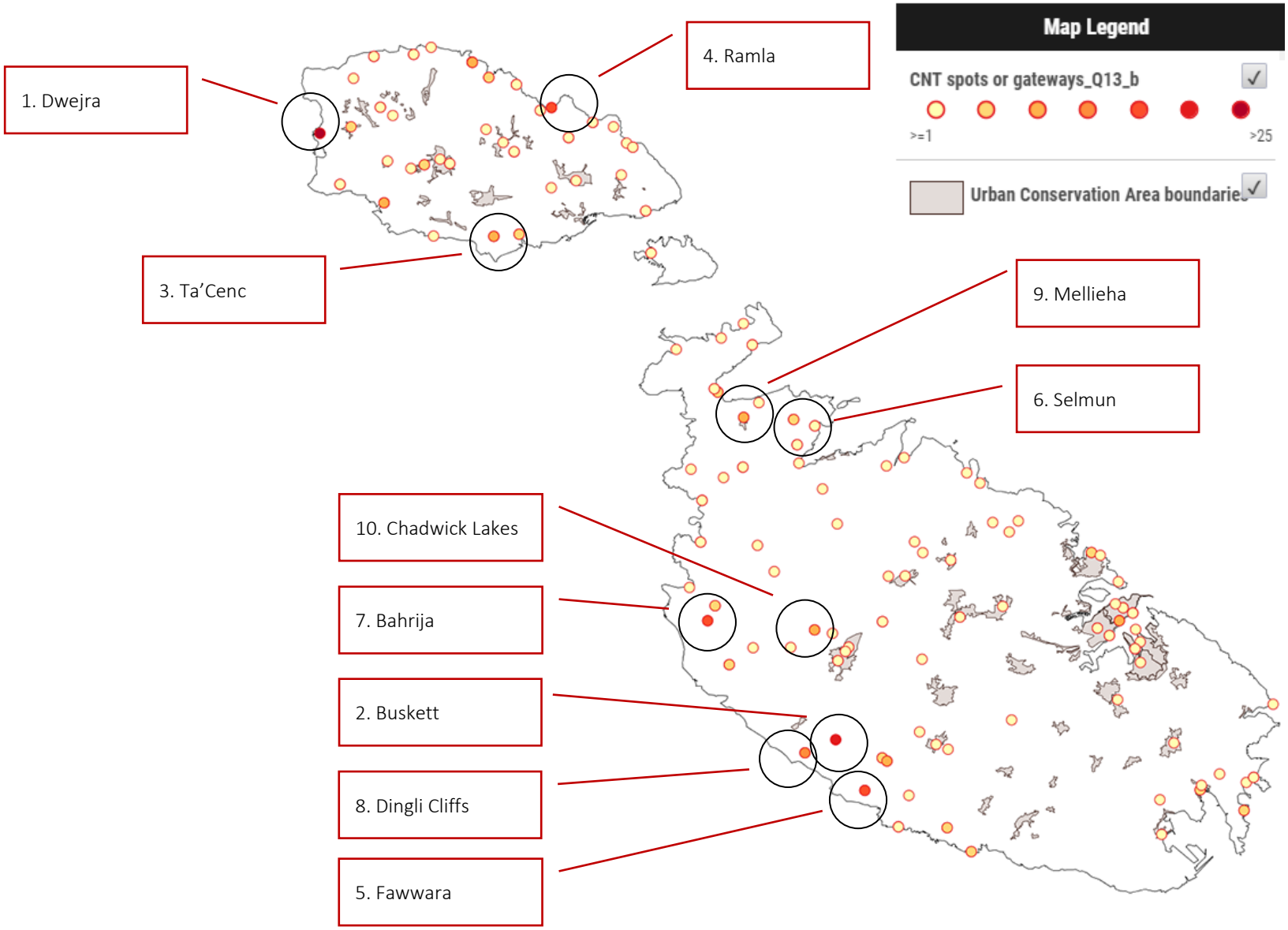
SITECODE	UCA SITENAME	Count	Frequency	Ranking
UCA	VALLETTA	5	23	*1*
UCA	RABAT (Malta)	4	17	*2*
UCA	MELLIEHA	2	16	*3*
UCA	MARSAXLOKK	3	15	*4*
UCA	KERCEM	3	9	*5*
UCA	MDINA	2	6	*6*
UCA	SLIEMA	2	6	*7*
UCA	FLORIANA	2	4	*8*
UCA	SAN LAWRENZ	1	4	*9*
UCA	RABAT (Victoria)	3	3	*10*
UCA	QALA	1	2	*11*
UCA	XAGHRA	1	2	*12*
UCA	BIRKIRKARA	1	1	*13*
UCA	BORMLA	1	1	*14*
UCA	MOSTA	1	1	*15*
UCA	NADUR	1	1	*16*
UCA	SIGGIEWI	1	1	*17*
UCA	TARXIEN	1	1	*18*
UCA	ZEJTUN	1	1	*19*
UCA	ATTARD	0	0	*20*
UCA	BALZAN	0	0	*21*
UCA	BIRGU	0	0	*22*
UCA	BIRZEBBUGIA	0	0	*23*
UCA	DINGLI	0	0	*24*
UCA	FGURA	0	0	*25*
UCA	FONTANA	0	0	*26*
UCA	GHAJNSIELEM	0	0	*27*
UCA	GHARB	0	0	*28*
UCA	GHARGHUR	0	0	*29*
UCA	GHASRI	0	0	*30*
UCA	GHAXAQ	0	0	*31*
UCA	GUDJA	0	0	*32*
UCA	HAMRUN	0	0	*33*
UCA	ISLA	0	0	*34*
UCA	KALKARA	0	0	*35*
UCA	KIRKOP	0	0	*36*
UCA	LIJA	0	0	*37*
UCA	LUQA	0	0	*38*
UCA	MARSA	0	0	*39*
UCA	MARSASCALA	0	0	*40*
UCA	MGARR	0	0	*41*
UCA	MQABBA	0	0	*42*
UCA	MSIDA	0	0	*43*
UCA	MUNXAR	0	0	*44*
UCA	NAXXAR	0	0	*45*
UCA	PAOLA	0	0	*46*
UCA	PIETA	0	0	*47*
UCA	QORMI	0	0	*48*
UCA	QRENDI	0	0	*49*
UCA	SAFI	0	0	*50*
UCA	SAN GILJAN	0	0	*51*
UCA	SAN PAWL IL-BAHAR	0	0	*52*
UCA	SANNAT	0	0	*53*
UCA	SANTA VENERA	0	0	*54*
UCA	TA' XBIEX	0	0	*55*
UCA	XEWKIJA	0	0	*56*
UCA	ZABBAR	0	0	*57*
UCA	ZEBBUG (Ghawdex)	0	0	*58*
UCA	ZEBBUG (Malta)	0	0	*59*
UCA	ZURRIEQ	0	0	*60*
	TOTALS		**114**	

In order to summarise:

- 467 of points indicated by respondents (61%) lie within NATURA 2000 designated areas, but only involve 18 of the 34 designated NATURA 2000 sites (53%);
- 114 of points indicated by respondents lie within UCAs (15%), involving 19 of 60 UCA designated areas (53%);
- 24% of points (156) are scattered elsewhere.

CNT points in relation to both NATURA 2000 and UCA sites are presented in ***Figure 39*** below.

Figure 39 - Places of high CNT against Urban Conservation Areas.



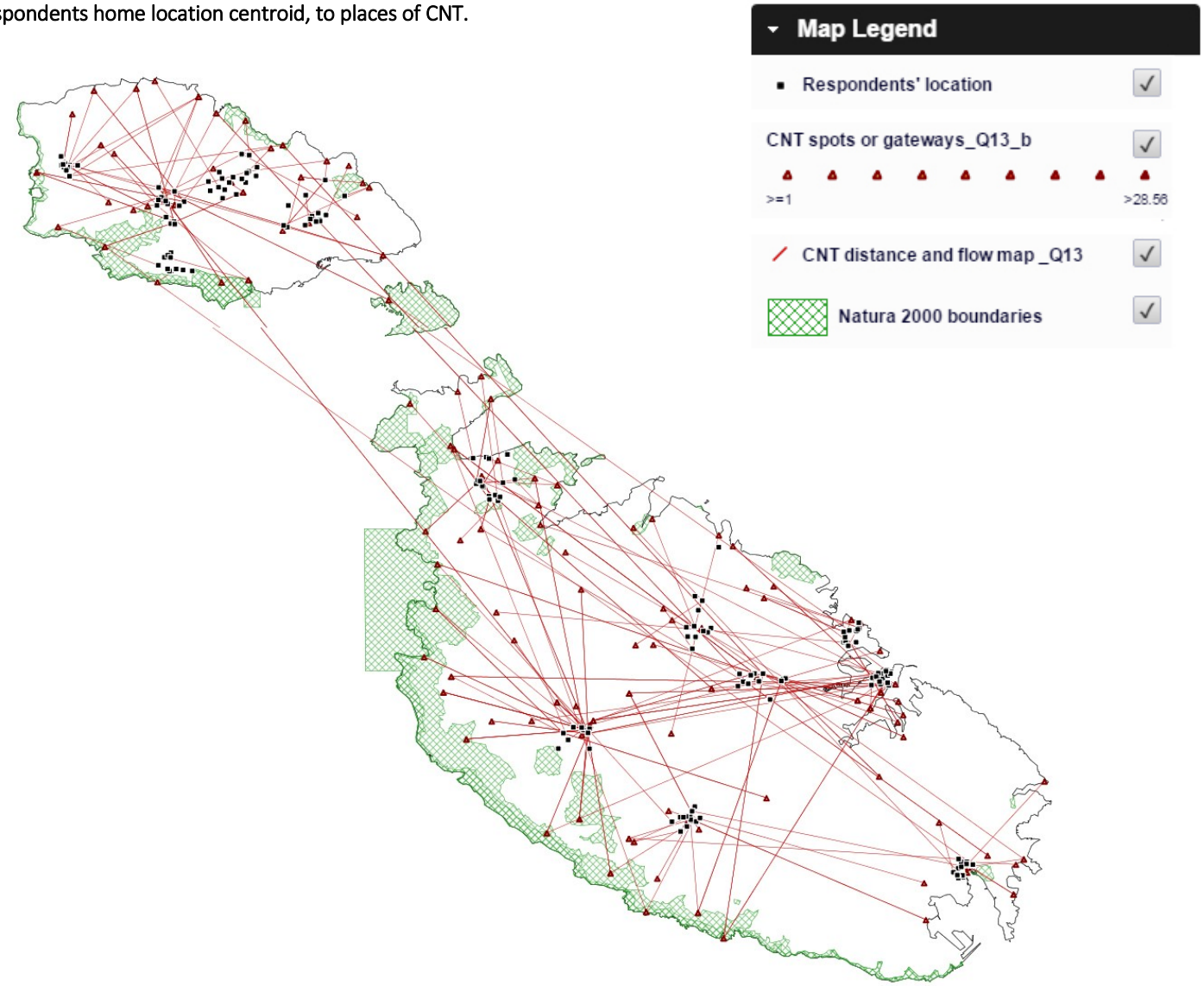
7.2.4.5 CNT Directional Flow Maps

A directional flow map presented in **Figure 40** visualises the origin-destination matrix of where people indicated that they connect with nature. Directional flow lines radiate from an origin node (respondent home location) to three destination nodes (places of nature connectedness). However, it is important to keep in mind that places of CNT could also imply places they visit for other reasons but still are associated with natural connectedness; or places which respondents may have possibly romanticised in their mind due to past experiences but barely visit them at all. In fact research indicates that in certain cases people may not even need to visit places physically to feel a strong connection or attachment, such as Americans' feeling toward the the Grand Canyon or Yellowstone National Park (Nash, 1982).[801]

The map indicates that most of the activity and connectedness seems to be in central and northern areas, with limited attachment from the North towards wider places in the South region. Respondents from Marsaxlokk, on the other hand, prefer northern areas, and do not seem to explore many other places in the South-West and South East of the islands. This may be due to the lack of protected areas in the South in general. The map also shows that places of CNT were mentioned by Maltese respondents on the island of Gozo (Ramla, Cittadella, and Xlendi), and vice versa (Rabat and Marsaxlokk), indicating clearly that CNT goes beyond the neighbourhood level and is not rooted to the immediate proximity of home.

Spatial and temporal flow patterns like mean distances and specific traffic trajectories were not detailed due to time limitations, and further analysis of mean distances and correlations with specific localities would be necessary in order to reveal any patterns.

Figure 40 - Flow map indicating respondents home location centroid, to places of CNT.



7.3 Statistical and spatial analysis of Place Attachment

This section presents data obtained for the PAI scale, as a measure of attachment to place. A detailed description follows of respondents' intensity of place attachment. This description includes an examination of sub-scales for experience, perspective and dependence. Characteristics of several "external" factors (gender, age and education) are also reported. Finally, an attempt at understanding the spatial implications of PA results according to location clusters and protected areas is undertaken.

Before proceeding, it is important to highlight that respondents were asked to indicate the place that they now consider to be their 'home', with this intended as a particularly significant type of place (Easthope 2004)[802] irrespective of where they are actually living now. The focus on '*home place*s' is expected to provide insight into the relationship between places considered home and identity. 93% of respondents indicated that in fact they considered their current location of residence to be 'home'.

Table 51 - Respondents perception of where their home place is

		Frequency	Percent
Valid	Here	374	93.3
	Elsewhere	27	6.7
	Total	401	100.0

Respondents were also asked how long they have lived in their area of residence, and a mean residence time of 32 years was noted, with SD of 19 years (Table 52). This large variance between the data and the average is primarily due to the strict adherence to a stratified sampling across five age cohorts during data collection.

Table 52 - Duration of residence in the area or locality

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Locality:	401	1	13		
No. of years of residence:	399	1	88	**31.61**	19.04
Valid N (listwise)	399				

Table 53 below lists the mean residency time of respondents within their localities, sorted in descending order. This suggests that, overall, Maltese people tend to spend relatively long years in the location they call home and this familiarity with a place could increase the strength of attachment (Ahlbrandt, 1984;[803] Brown 2003[804], Lalli 1992)[805]. Indeed, research suggests that people feel more at ease in the type of landscape

they grew up in, and that individuals experience a reduction in stress when they recreate in settings where they feel most at home (Adevi, 2011).[806]

Table 53 - Average residency duration in mean years per location (sorted in descending order)

Case Summaries

Locality:	N	Mean Yrs	Std. Deviation	% of Total N
Xaghra	29	23.52	12.58	7.30%
Nadur	31	24.39	14.20	7.80%
B' Kara	31	24.87	15.06	7.80%
Mellieha	31	26.32	16.67	7.80%
Sannat	30	26.5	14.64	7.50%
Naxxar	31	28.35	16.28	7.80%
Valletta	31	30.71	17.21	7.80%
Rabat (Gozo)	31	34.13	14.18	7.80%
Sliema	31	35.65	26.05	7.80%
St Lawrenz	29	37.62	19.08	7.30%
M' Xlokk	31	39.03	22.63	7.80%
Rabat (Malta)	31	39.23	25.04	7.80%
Siggiewi	32	40	18.34	8.00%
Total/Avg	399	31.61	19.04	100.00%

As mentioned in 'Chapter 6 - Research Methods', place attachment was measured by adapting items from the Place Attachment Scale (PAI), adapted by Raymond, Brown and Weber (2010)[807] based on a previous adaptation by Kyle et al., 2005[808], which in turn adapted eight items from the scale devised by Williams & Roggenbuck (1989). We also included adaptations on social bonding, as proposed by Kyle and colleagues (Kyle et al., 2005)[809] and later used by Raymond, Brown and Weber (2010). The final scale comprised 11 items designed to measure the positive emotional bond that household owners have with the area they live in (below). In the questionnaire, respondents were asked to identify any three places or features about their place of residence that they thought were either distinctive or special, indicating that these places could be any physical space (church, village square, nicca, public square or garden, beach, promenade, etc.) and then answer the scale using their relationship with the area where they live in to inform their level of agreement with the scale items, and hence the strength of their place attachment.

7.3.1 PA means and sub-scales

The rating score range is based on the Place Attachment Inventory (PAI) score, with strongest place attachment scoring 11, a neutral score being 33 and the highest score, representing weakest place attachment or place aversion, being 55. Consequently, unless normalised, ranking for this construct is inverted. The mean of 24.4 is slightly below the mid-point of the scale range (>33). The composite mean score for PAI specified by

participants was 24.4 (SD = 7.3, n = 401). Table 54 below indicates the normalised mean for the PA scale.

Table 54 - Place Attachment Scale mean, range and variance (n=401)

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.015	1.701	4.299	2.599	2.528	.844	21

A PCA with a non-rotated solution, since the initial solution resulted in stronger correlations, provided the best perspective and identified two components, which together explained 59%of the total variance. All items loaded highly on the first component. Only two items – '*As far as I'm concerned there are better places to spend time than in my village'*(0.673) and '*I would feel less attached to this area if the natural areas here disappeared*' (-0.578) loaded on the 2nd component. Table 55 provides more detail on total variances.

Table 55 - Variances explained for the PA scale

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.492	49.929	49.929	5.492	49.929	49.929	4.010	36.456	36.456
2	1.015	9.228	59.156	1.015	9.228	59.156	2.497	22.701	59.156
3	.931	8.461	67.617						
4	.740	6.730	74.347						
5	.607	5.516	79.862						
6	.577	5.249	85.111						
7	.459	4.170	89.281						
8	.412	3.748	93.029						
9	.318	2.891	95.920						
10	.253	2.299	98.219						
11	.196	1.781	100.000						

Extraction Method: Principal Component Analysis.

Table 56 presents the factor loadings for the items of the place attachment scale which load highest under the two factors.

Table 56 - PAI Component Matrix[a]

Component Matrix[a]

	Component	
	1	2
I am very attached to the natural spaces in and around my area.	.847	
If I had to move away from here I would really miss it.	.811	
This area is very special to me.	.785	
This area reflects the type of person I am.	.783	
No other place can compare to here for me.	.779	
This is the best place for the activities I like to do	.742	
I am proud of the natural environment in and around my village.	.736	
I feel a connection to the community in this area.	.706	
I have an extensive network of family or friends here	.559	
As far as I'm concerned there are better places to spend time than in my village	.359	.673
I would feel less attached to this area if the natural areas here disappeared.	.497	-.578

Extraction Method: Principal Component Analysis.
a. 2 components extracted.

The interpretation of the matrix was consistent with the place attachment attributes the questionnaire was designed to measure, and indicated in the literature. The two factors identified amongst the strongest loadings were grouped as follows:

- '*Significantly attached*' items on Component 1 indicating a sense of ease, attachment to the social and physical factors, pride and appreciation to the environment;
- '*Marginally attached*" items loading on Component 2 indicating effortless attention, a sense of fascination, humility and insignificance.

7.3.1.1 PA sub-scales

The three PA sub-scales are interpreted as a sense of identity with place (PA_identity), dependence on a place (PA_dependence), and the bond created with place (PA_bonding). The PA_identity factor might be thought of as how strongly certain locations contribute to an individual's sense of self or identity (M=7.96, SD=3.07). The PA_dependence factor reflects the degree to which a place is used for a functional activity (M=9.89, SD=3.077). Finally, the PA_Bonding factor reflects the feelings of belonging to a group of people within a place (M=6.55, SD=2.20). These are presented in Table 57 below.

Table 57 - Means for PA Overall and its sub-scales

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PAoverall_again	401	11.00	50.00	**24.40**	7.33
PA_identity	401	4.00	20.00	**7.96**	3.07
PA_dependence	401	4.00	19.00	**9.89**	3.08
PA_bonding	401	3.00	13.00	**6.55**	2.20

A bivariate Pearson Correlation was undertaken in order to assess whether there is statistical evidence of a linear relationship among the same pairs of PA sub-scales in the population (one listed in the row, the other in the column in Table 58). The sample correlation coefficient, *r*, measures the strength and direction of linear relationships between pairs of PA sub-scales. A strong linear relation was observed between PA_Overall and all the sub-scales, as expected. PA_Overall with PA_Identity has a Pearson correlation = 0.911, p = 0.000 (2-sided), with PA_Dependence having a Pearson correlation = 0.899, p < .001 (2-sided); and with NR_Experience having a Pearson correlation = 0.86, p = 0.000 (2-sided). Similarly, the three sub-scales correlated strongly amongst themselves, thus further confirming the validity and reliability of the NR scale. It also reaffirms the the validity of considering identity, dependence and bonding constructs when looking at place attachment.

Table 58 - Pearson correlation results for PA_Overall and its sub-scales

Correlations

		PA_overall	PA_identity	PA_dependence	PA_bonding
PAoverall_again	Pearson Correlation	1	.911**	.899**	.806**
	Sig. (2-tailed)		.000	.000	.000
	N	401	401	401	401
PA_identity	Pearson Correlation	.911**	1	.728**	.624**
	Sig. (2-tailed)	.000		.000	.000
	N	401	401	401	401
PA_dependence	Pearson Correlation	.899**	.728**	1	.583**
	Sig. (2-tailed)	.000	.000		.000
	N	401	401	401	401
PA_bonding	Pearson Correlation	.806**	.624**	.583**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	401	401	401	401

***. Correlation is significant at the 0.01 level (2-tailed).*

7.3.1.2 PAI statement ranking

A Friedman test was used to compare the mean rating scores for the 11 statements of this PA scale. The

rating scores ranged from 1 to 5, where 1 corresponds to strong feelings of disagreement with the statement and 5 indicates a strong sense of agreement with the statement. The statements, ranked in descending order by the highest means, are presented in Table 59 below. This table describes the central tendency measures for the PA scale items. Subtle differences between the three PA sub-scales can be identified, even at the local level.

Respondents indicated high levels of agreement with 'Place Identity' affect items such as "*This area is very special to me*" (M=4.30, SD=0.78), "*I am proud of the natural environment in and around my village*" (M=3.97, SD=0.93), and "I am very attached to the natural spaces in and around my area" (M=3.94, SD=.943). An exception lies with one of the place dependence scoring items which ranks highly: "*If I had to move away from here I would really miss it*" (*M* = 4.19, *SD* =0.93) and indicates that attachment to place remains an important element of identity, despite the relative small size of the island.

Place bonding items like "*I have an extensive network of family or friends here*" (M=3.88, SD=0.97) score close to the median and suggest that Maltese tend to build average attachment to their immediate community and social networks. This could also be due to the limited size of the islands, where friends are relatives are always close by and within reach of the locality of residence, and these results do not necessarily reflect the vertical and horizontal bonds between groups at the macro and micro levels. Nonetheless, place bonding remains critical in place attachment since it can be negatively related with acceptance of place disruption (Devine-Wright & Howes, 2010;[810] Vorkinn & Riese, 2001).[811]

PA dependence items are characterised by the lowest mean scores and higher levels of variance overall. The place dependence dimension reflects physical familiarity with the natural world, and a level of comfort with and desire for nature contact. The next lowest scoring items: "*As far as I'm concerned there are better places to spend time than in my village*" (M=3.32,SD=0.99), "*This is the best place for the activities I like to do*" (M=3.62,SD=1.01) and "*No other place can compare to here for me*" (M=3.63, SD=1.11) suggests that a functional dependence relationship with place may not be the leading contributor to respondents' place attachment overall, and that Maltese do not particularly feel dependent on places in their immediate locality probably since they find other places alternatives to better serve their intended or desired needs as an extension of the self (Jorgensen & Stedman, 2001).[812] However, it is important to mention that the last ranking item was characterised by a low score, more probably because it was a negatively phrased statement.

Table 59 - PA mean ranking of each question (n=401, 21 item) ranking of NR overall

PA sub-scale type	Item Statistics	Mean	Std. Deviation	N
Place Identity	This area is very special to me	4.30	.78	401
Place Dependence	If I had to move away from here I would really miss it	4.19	.93	401
Place Identity	I am proud of the natural environment in and around my village	3.97	.98	401
Place Identity	I am very attached to the natural spaces in and around my area	3.94	.94	401
Place Bonding	I have an extensive network of family or friends here	3.88	.97	401
Place Identity	This area reflects the type of person I am	3.83	.94	401
Place Bonding	I feel a connection to the community in this area	3.80	.94	401
Place Bonding	I would feel less attached to this area if the natural areas here disappeared	3.77	1.03	401
Place Dependence	No other place can compare to here for me	3.63	1.11	401
Place Dependence	This is the best place for the activities I like to do	3.62	1.01	401
Place Dependence	As far as I'm concerned there are better places to spend time than in my village	3.32	.99	401

Respondents were also asked to mention three places or features where they live that they thought were distinctive or special to them, in order to identify potential places of attachment. This location could have been any physical space ranging from a church, the village square, public squares, gardens, beach or a promenade, and was left rather open in order not to influence respondent choice, and without over-emphasising the focus on the specific local environs in view of the geographic and mobility realities of the population. This was done intentionally to elicit immediate but unbounded recall from working memory in order to understand whether the named locations indeed reflect respondents' real places of attachment as they come to mind. This request resulted in 811 places of note that respondents highlighted as special places of attachment. As was done for CNT, these places of attachment were then projected on an online GIS platform in order to provide a visual depiction of results. The spatial results are discussed later on.

7.3.2 PA relationships with demographic predictors

This section discusses PAI mean correlations with other independent variables, namely gender, age and education, in order to understand better whether any of these independent variables are indeed significant predictors. Gender, age and education were analysed as moderators.

7.3.2.1 PA and Gender

An analysis of mean differencewith gender presented in **Table 60** indicates that there is hardly any tangible difference between the means of males (M=24.77) and females (M=24.06).

Table 60 - Means ranking between PA_Overall and Gender

Gender:	Mean	N	Std. Deviation
Male	24.77	195	7.75
Female	24.06	206	6.91
Total	**24.40**	**401**	**7.33**

In fact, an analysis of correlations with gender presented in **Table 61** indicates that there are no significant differences amongst the two gender cohort means as determined by one-way ANOVA (p = .333).

Table 61 - Statistical significance between PA_Overall and Gender

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
PAoverall_* Gender:	Between Groups	(Combined)	50.637	1	50.637	.941	.333
	Within Groups		21463.916	399	53.794		
	Total		21514.554	400			

This finding is somewhat different to literature reporting that women are more attached to their homes than men (Hidalgo & Hernandez, 2001;[813] Rollero & De Piccoli, 2010b[814]). This considerably more equitable gender result can possibly be a reflection of current trends where women are spending less time home minding children or doing chores in the neighbourhood, while working part or full-time when possible (NSO 2016).[815]

Table 62 below indicates a similar proximity in means ranking with slightly increased means for females with regards to PA_Identity and PA_Dependence, while a minor discrepancy in favour of a slightly higher NR_Bonding effect for men is noted. PA_Dependence indicates that women tend to be more dependent on their locality, and in many ways ties in with the literature mentioned above - wherein women tend to grow attachment to the home for maternal reasons, but do not necessarily develop a bond to the locality as much as men do since men tend to make more use of the environs.

Table 62 - Means ranking of PA_Overall and its sub-scales stratified by Gender (sorted by PA_Overall mean)

Gender:	PA_overall_again	PA_identity	PA_dependence	PA_bonding
Female	24.06	7.82	9.76	6.48
Male	24.77	8.10	10.04	6.63
Total	**24.40**	**7.96**	**9.89**	**6.55**

7.3.2.2 PA and Age

An analysis of mean differencewith age presented in **Table 63** indicates that there are relatively significant differences amongst the 6 age cohort means.

Table 63 - Means ranking between PA_Overall and Age

Age:	Mean	N	Std. Deviation
20-29	27.03	77	7.786
30-39	25.45	67	8.156
40-49	24.28	57	6.897
50-59	24.78	74	8.455
60-69	21.99	70	4.698
70 or more	22.20	56	5.744
Total	24.404	401	7.334

An analysis of correlations with age (**Table 61**) indicates that there is indeed a statistically significant difference between the 6 age cohort means as determined by one-way ANOVA (p =0 .000).

Table 64 - Statistical significance between PA_Overall and Age

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
PAoverall_ * Age:	Between Groups	(Combined)	1296.164	5	259.233	5.065	.000
	Within Groups		20218.39	395	51.186		
	Total		21514.55	400			

This tendency indicates that **for PA_Overall, the 60 to 69 (M=21.99) and 70+ (M=22.20) cohorts have the**

lowest PA score, hence higher attachment. The 40-49 (M=24.28) and 50-59 (M=24.78) remain close to the median. However, the 30-39 (M=25.45) and 20-29 (M=27.03) cohort means suggest that PA tends to be lower amongst the younger age cohorts. This is the exact opposite of the CNT results, and is in line with literature elsewhere wherein older people are often found to be more attached to place than younger people and usually linked with length of residence in the locality (Bonaiuto et al., 1999[816]; Hidalgo & Hernandez, 2001[817]; Lewicka, 2010[818]; Riger & Lavrakas, 1981[819]; Sampson, 1988)[820]. This suggests that older people understandably tend to internalise their home place over time and eventually the place becomes an extension of the self (Rowles, 1983)[821]. However, various other studies report no correlation between age and place attachment (Rollero & De Piccoli, 2010a),[822] and suggest that this could be due to personal differences amongst the respondents. For instance, Hay (1998)[823] noted that people who were born in a place report a higher sense of place attachment than people who had lived there longer but had moved there later in life.

Table 65 - Means ranking of PA_Overall and its sub-scales stratified by Age (sorted by PA_Overall)

Age	PAoverall	PA_identity	PA_dependence	PA_bonding
60-69	21.99	6.94	8.64	6.4
70 or more	22.20	7.37	8.96	5.86
40-49	24.28	7.75	10	6.53
50-59	24.78	8.23	10.09	6.46
30-39	25.45	8.37	10.30	6.78
20-29	27.02	8.84	11.078	7.10
Mean	**24.40**	**7.96**	**9.89**	**6.55**

7.3.2.3 PA and Educational achievement

An analysis of mean differencewith age (Table 66) indicates that there are relatively significant differences amongst the five educational achievement cohort means.

Table 66 - Means ranking between PA_Overall and Educational Achievement

What is the highest level of education that you attained?

	Mean	N	Std. Deviation
No schooling / Primary	22.41	70	5.557
Lower Secondary	23.92	84	7.532
Upper Secondary	24.76	110	7.216
Post-secondary / Non-Tertiary (e.g. MCAST, nursing)	24.77	78	7.566
Tertiary	26.31	59	8.363
Total	**24.40**	**401**	**7.334**

An analysis of correlations with education (Table 69) indicates that there is indeed a statistically significant difference between the five educational cohort means as determined by one-way ANOVA (p = .04).

Table 67 - Statistical significance between PA_Overall and Educational achievement

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
PAoverall_ * Education	Between Groups	(Combined)	534.942	4	133.736	2.524	**0.04**
	Within Groups		20979.61	396	52.979		
	Total		21514.55	400			

Table 68 presents the PA Means for PA_Overall and the three sub-scales, ranked in descending order by PA Overall.

Table 68 - Means ranking of PA_Overall and its sub-scales stratified by Education: (sorted by PA_Overall).

Education	PAoverall_again	PA_identity	PA_dependence	PA_bonding
No schooling / Primary	22.41	7.31	8.9	6.2
Lower Secondary	23.92	7.98	9.58	6.36
Upper Secondary	24.76	8.15	10.24	6.37
Post secondary / Non-Tertiary (e.g. MCAST, nursing)	24.77	7.85	10.13	6.79
Tertiary	26.31	8.49	10.56	7.25
Avg. Mean	**24.40**	**7.96**	**9.89**	**6.55**

Contrary to CNT findings, PA is stronger the lower the educational achievement of the respondent, both in terms of PA Overall, and consistently across the three sub-scales. This is in line with other studies in which education predicted both home and local area place dependence, with less educated people reporting higher dependence (Charis and Carmen, 2014).[824] This is also attributed to socioeconomic differences between high and low academic achievers, as explained for CNT, which also affect income levels and limits people's choices of where they want to and can live. Charis and Carmen suggest that this could increase attachment through cognitive dissonance, with a lack of choice contributing to people convincing themselves that their home/local area is better than others. They also warn however that it could also decrease place attachment when they compare their homes or neighbourhoods to other better ones or in the media.

7.3.2.4 Correlations between PA_Overall and all three demographic variables Gender, Age and Educational Achievement

Finally, a three-way ANOVA[825] was used to determine if there is an interaction effect between three independent variables (age, gender and education) on a continuous dependent variable (PA_Overall). The assumptions of linearity, independence of errors, homoscedasticity, unusual points, and normality of residuals were met. The "Sig." column presents the statistical significance level (i.e., *p*-value) of the three-way interaction term of the three-way ANOVA. It can be noted that the statistical significance level of the three-way interaction term is .000 (i.e., $p = .001$). This value is less than .05 (i.e., it satisfies $p < .05$), which means that there is a statistically significant three way age*gender*education interaction effect for PA_Overall.

Table 69 - Three-way ANOVA for age, gender and education on a continuous dependent variable (PA_Overall).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.235[a]	.055	.048	7.15598	1.399

a. Predictors: (Constant), Age, Gender, Education

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1184.942	3	394.981	7.713	.000[b]
	Residual	20329.611	397	51.208		
	Total	21514.554	400			

a. Dependent Variable: PAoverall_again

b. Predictors: (Constant), Age, Gender, Education.

In view of the above, it was decided to analyse the data further in order to identify the nature of this three-way interaction. There was also a weak independence of residuals (errors), as assessed by a Durbin-Watson statistic of 1.399. The Durbin-Watson statistic can range from 0 to 4, but a value of approximately 2 indicates that there is no correlation between residuals, and therefore independence of errors (residuals). Consequently, a multiple regression was run to predict PA_Overall from gender, age, and education. These variables marginally predicted PA_Overall, F (3,397) = 7.713, p < .0005, adj. R2 = .055. Only age was statistically significant to the prediction (p < 0.05), while education and gender were rejected. Only Age is a significant predictor for PA F(p=.015). Regression coefficients and standard errors can be found in Table 70 below.

Table 70 - Summary of PA overall multiple regression analysis and three-way ANOVA.

Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	27.362	2.206		12.405	.000	23.026	31.698
	Education	.203	.326	.036	.621	.535	-.439	.844
	Gender:	-.465	.717	-.032	-.648	.517	-1.875	.945
	Age:	**-.897**	**.248**	**-.209**	**-3.616**	**.000**	**-1.384**	**-.409**

a. Dependent Variable: PAoverall_again

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3394.740[a]	53	64.052	1.227	.146
Intercept	110484.304	1	110484.304	2115.808	.000
Gender	31.021	1	31.021	.594	.441
Age	**744.395**	**5**	**148.879**	**2.851**	**.015**
Education	111.606	4	27.901	.534	.711
Gender * Age	200.002	5	40.000	.766	.575
Gender * Education	31.106	4	7.777	.149	.963
Age * Education	923.412	18	51.301	.982	.479
Gender * Age * Education	653.146	16	40.822	.782	.706
Error	18119.814	347	52.218		
Total	260332.000	401			
Corrected Total	21514.554	400			

a. R Squared = .158 (Adjusted R Squared = .029)

7.3.3 PA relationships with locations

A first analysis of PAI means against the 13 cluster localities (**Table 71**) ranks the 13 locality PA means in ascending order. This indicates that, overall, the respondent population has place attachment to areas of residence lower than the scale median (= 33). However, it is also evident that areas close to NATURA 2000 sites scored higher. As predicted, localities with high connectedness to NATURA 2000 sites like Rabat-Malta (M=19.42, SD=5.63), San Lawrenz (M=19.80, SD=7.20) and Mellieha (M=20.10, SD=5.86) are the subjects of significantly higher PA. Conversely, control sites like Valletta (M= 26.13, SD=9.94), Naxxar (M=26.35, SD=6.29) and B'Kara (M=32.68, SD=8.98) show significantly reduced PA in comparison. The results suggest that people who live in proximity to NATURA 2000 sites are more attached to their homes and local areas than people who live in localities which are not. This finding fits with evidence which has shown that place attachment is greater for places of good environmental quality (e.g., Uzzell et al., 2001;[826] Mesch & Manor, 2001[827]). In fact, interaction

with nature does play a role in enhancing place attachment and people's willingness to protect those places. (Russel et al. 2013).[828]

Table 71 - PA means across the 13 localities, ranked in descending order (reverse scored scale).

Locality:	N	Mean	Std. Deviation	NATURA 2000 sites within locality	NATURA 2000 sites around locality
Rabat (Malta)	31	19.42	5.63	4	2
St Lawrenz	30	19.80	7.20	2	0
Mellieha	31	20.10	5.86	5	5
Siggiewi	32	22.38	4.92	2	2
M' Xlokk	31	22.81	8.48	3	1
Xaghra	30	24.57	3.95	1	0
Sannat	30	24.90	4.00	4	1
Nadur	31	25.10	4.48	1	0
Sliema	31	25.35	6.53	Control site	2
Valletta	31	26.13	9.94	Control site	0
Naxxar	31	26.35	6.29	Control site	2
Rabat (Gozo)	31	27.61	5.36	1	1
B' Kara	31	32.68	8.98	Control site	0
Total	**401**	**24.40**	**7.33**		

An unpaired t-test analysis of correlations of means for localities having NATURA 2000 sites in their vicinity and the four control sites (Table 72) indicates that the difference is statistically significant since the two-tailed P value equals 0.0249. The *Cohen's d* is 1.493721, indicating a large effect size.

Table 72 - PA means of 9 localities with NATURA 2000 in the vicinity against four control sites

Localities with NATURA 2000 sites	
Locality:	Mean
Rabat (Malta)	19.42
St Lawrenz	19.80
Mellieha	20.10
Siggiewi	22.38
M' Xlokk	22.81
Xaghra	24.57
Sannat	24.90
Nadur	25.10
Rabat (Gozo)	27.61
Mean	22.9656
SD	2.8199
n	274

Control sites	
Locality:	Mean
Sliema	25.35
Valletta	26.13
Naxxar	26.35
B' Kara	32.68
Mean	27.6275
SD	3.3955
n	124

Rabat-Gozo (M=27.61, SD=5.36) is somewhat of an exception due to the fact that it actually hosts an NATURA 2000 site but shows low attachment. It is important to note that certain localities in Gozo, despite their high environmental quality and attributes, still scored average which suggests that not all types of place

attachment depend upon pristine physical quality but may be derived from other positive environmental features, such as economic or social aspects (Scannel 2003).[829] This average Gozitan attachment can possibly be explained by dependence on the mainland. For instance, tertiary students who are away from home while receiving education in Malta, tend to consider their place of usual residence to be their term-time residence in Malta. Furthermore, Gozo's double insularity could also have an effect on how Gozitans might perceive their attachment to Gozo to be more fluid and temporal since they are increasingly choosing to move to the mainland seeking a lifestyle change and wanting to live close to improved services and more employment hubs (Azzopardi 2012).[830] Further research would be necessary, with larger sample sizes, to establish what causes these subtle differences, and why Gozitans seem to have a different baseline for PA.

A Tree Cluster Analysis (TCA) of PA overall was undertaken using SPSS. TCA refers to a class of techniques used to classify cases into groups that are relatively homogeneous within themselves and heterogeneous between each other, on the basis of a defined set of variables. These groups are called clusters or nodes, and the TCA indicates a gain summary of four clusters indicated in Table 73 below. The TCA provides a practical group ranking of the sample's attachment to place across the 13 locality clusters. Higher PA means are noted with the "*Rabat (Malta); St. Lawrenz; Mellieha*' cluster, as opposed to the '*Valletta; Rabat (Gozo); B'Kara; Naxxar*'.

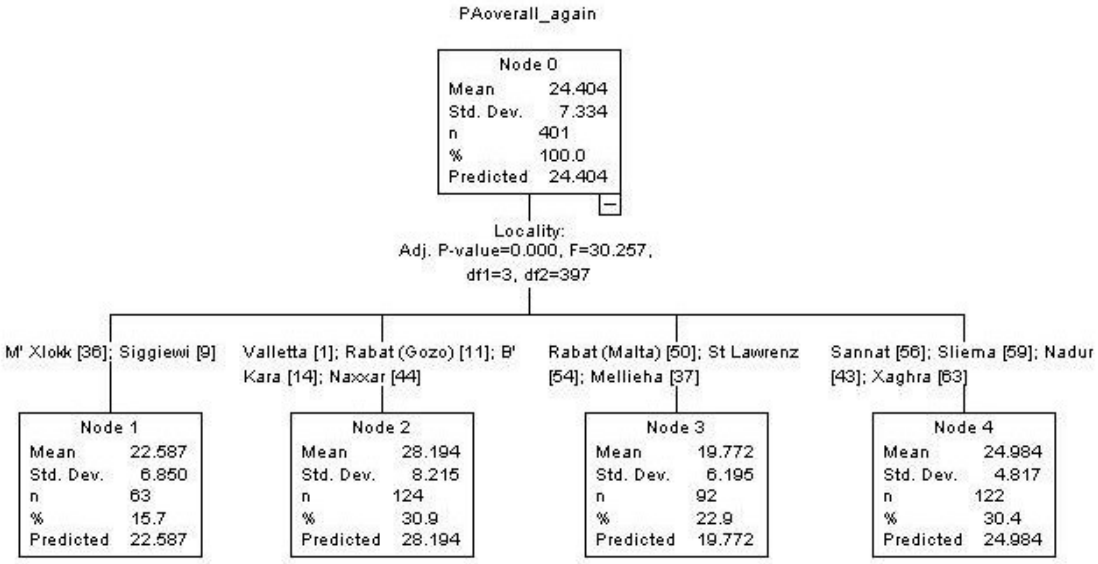
.

Table 73 - Tree cluster analysis of PA overall vs locality; and gain summary for nodes

Gain Summary for Nodes

Node	N	Percent	Mean
3 – Rabat (Malta); St. Lawrenz; Mellieha.	92	22.9%	19.77
1 – M'Xlokk; Siggiewi.	63	15.7%	22.59
4 – Sannat; Sliema; Nadur; Xaghra.	122	30.4%	24.99
2 – Valletta; Rabat (Gozo); B'Kara; Naxxar.	124	30.9%	28.19

Growing Method: CHAID
Dependent Variable: PAoverall_again



7.3.3.1 PA sub-scales and localities

A similar effort was undertaken in order to present the means for the PA sub-scales in Table 74 below. These subscales were interpreted as a sense of a place's ability to satisfy needs and goals ("dependence"), identification with that place ("identity"), and feelings of belongingness ("bonding"). Rankings across the sub-scales suggests that most of the sites with protected areas in their vicinity, also have higher mean score rankings for PA Identity, Dependence and Bonding. Control sites like Naxxar, Rabat (Gozo) and B'Kara score markedly lower across all sub-scales, suggesting that natural exposure remains a crucial determinant of PA. The PA_Identity factor, which measures place as a reflection of the individual and his/her symbolic connection with place, mostly follows the same ranking of PA_Overall with only one marked exception of Sliema, which ranks amongst the control sites. This possibly reflects the notion that Sliema residents have a fluid approach to place identity, and might have a more mobile sense of "home" which can cultivated wherever they are.

With regards to PA_Dependence, the means ranking suggests that proximity to protected areas or indeed coastal sites may have an effect on PA_Dependence, but is certainly also influenced by personal psychology and experiences, as in the case of M'Xlokk and Sannat. These means, however, are noted to be overall higher reflecting the changing patterns of social interaction that distance our dependence of places around us, and a reduced ability of a particular place to satisfy the needs or behavioural goals of an individual or group as compared to other place alternatives (Stokols et al., 1981).[831]

The PA_Bonding factor reflects similar patterns of ranking with the exception of Xaghra (M=7.93), and suggest that respondents in this locality are less likely to build cognitive or affective connections with their natural settings or community. Since place bonding is thought to be a time related, developmental process (Low

& Altman, 1992),[832] one could argue that perhaps Gozitan respondents are likely to have built a '*place repertoire*' of substitute places and are less dependent on or rooted to any one specific place or community. It could also suggest deep-seated community conflict and social bonds among the members of the village (Henriet 1972)[833] which could detract respondents from bonding with places or the community within, irrespective of the natural settings around them.

Table 74 - PA_Overall scale means for the 13 localities and its sub-scales means for PA (ranked by PA_Overall)

Case Summaries

Locality:	PAoverall_again			PA_identity			PA_dependence			PA_bonding		
	N	Std.	Mean	N	Std.	Mean	N	Std.	Mean	N	Std.	Mean
Rabat (Malta)	31	5.63	**19.42**	31	2.13	**5.55**	31	2.22	8.52	31	2.15	**5.35**
St Lawrenz	30	7.20	**19.80**	30	2.34	**6.23**	30	3.29	8.30	30	2.05	**5.27**
Mellieha	31	5.86	**20.10**	31	2.34	**6.32**	31	2.61	8.06	31	2.00	**5.71**
Siggiewi	32	4.92	**22.38**	32	2.03	**6.47**	32	2.12	9.41	32	1.68	**6.50**
M' Xlokk	31	8.48	**22.81**	31	3.77	**7.13**	31	3.25	10.03	31	2.50	**5.65**
Xaghra	30	3.95	**24.57**	30	1.83	**7.77**	30	2.45	8.87	30	1.78	**7.93**
Sannat	30	4.00	**24.90**	30	1.55	**7.93**	30	2.12	10.07	30	1.52	**6.90**
Nadur	31	4.48	**25.10**	31	1.88	**8.74**	31	2.38	9.87	31	1.29	**6.48**
Sliema	31	6.53	**25.35**	31	2.57	**9.10**	31	3.25	9.81	31	2.16	**6.45**
Valletta	31	9.94	**26.13**	31	4.51	**8.81**	31	3.75	10.84	31	2.29	**6.48**
Naxxar	31	6.29	**26.35**	31	1.91	**9.00**	31	2.70	10.39	31	2.11	**6.97**
Rabat (Gozo)	31	5.36	**27.61**	31	2.66	**9.19**	31	2.63	11.81	31	1.50	**6.61**
B' Kara	31	8.98	**32.68**	31	3.70	**11.23**	31	3.54	12.58	31	2.54	**8.87**
Total	401	7.33	**24.40**	401	3.07	**7.96**	401	3.08	9.89	401	2.20	**6.55**

7.3.3.2 PA mean differences between Malta and Gozo

To more fully explore the nature of the variation in levels and type of attachment across the different spatial contexts it was decided to examine how these variables varied between the two regions of Malta and Gozo. When segregating the means across both islands (**Table 75** below), an unpaired t-test suggests that the difference in means is not considered to be statistically significant (two-tailed P value = 0.9977). Consequently, there does not seem to be a statistically significant difference in attachment means between Malta and Gozo, which suggests that attachment to places close to home is somewhat more universal as a concept, hence more

stable across the two regions.

Table 75 - PA mean differences between Malta and Gozo, ranked in descending order.

Malta					Gozo				
PA_Overall					PA_Overall				
#	Locality:	Mean	N	Std. Deviation	#	Locality:	Mean	N	Std. Deviation
1	Rabat (Malta)	19.42	31	5.63	1	St Lawrenz	19.8	30	7.2
2	Mellieha	20.1	31	5.86	2	Xaghra	24.57	30	3.95
3	Siggiewi	22.38	32	4.92	3	Sannat	24.9	30	4
4	M' Xlokk	22.81	31	8.48	4	Nadur	25.1	31	4.48
5	Sliema	25.35	31	6.53	5	Rabat (Gozo)	27.61	31	5.36
6	Valletta	26.13	31	9.94					
7	Naxxar	26.35	31	6.29					
8	B' Kara	32.68	31	8.98					
	Totals	**24.40**	**249**	**4.2453**		**Totals**	**28.35**	**152**	**2.8387**

7.3.4 PA spatial analysis

This section undertakes a spatial analysis of place attachment locations identified in this study. These locations were geographically referenced in order to bring communities' attachments to place to the attention of public authorities or decision-makers. Understanding peoples' relationships with special places 'can help identify issues and concerns that are important in managing and planning for these places (Schroeder 2002).[834]

As mentioned earlier, it is important to think of sense of place as a multidimensional construct comprising cognitive, affective and behavioural components. This is critical in order to understand its potential complexity, as well as highlighting issues concerning the perceived socio-spatial scale of places and the beliefs, behaviours and emotions a place elicits. Socio-spatial mapping enables different stakeholders to spatially situate the views and values they deem important, and thus empowers members of the public to create tangible resources for decision makers. A spatial view of place attachment could help understand inherent complexities in how people perceive places of attachment, and can provide a place-based approach to foster engagement or civic action across resident groups based on understanding the preferences of those who live in them (Jorgensen 2010).[835]

The following section presents a number of GIS outputs related to place attachment, followed by an interpretation of the results. The GIS platform can be accessed at the following link: http://mgo.ms/s/6oqsg.

7.3.4.1 Spatial projection of PA Means

Figure 41 below projects PA means across the Maltese islands, showing that localities in proximity of NATURA 2000 sites show an increase in PA. This is in line with the literature which also suggests that certain settings, especially landscapes of high value or places which offer intense experiences can cause an almost "immediate, intimate, and emotional association" (Tuan 1977)[836], which in turn can instil a sense of well-being and become places we want to return to (Jackson 1994).[837] Clearly, respondents living in localities with high NATURA 2000 connectivity or other natural features (coastal sites) do seem to experience higher attachment to their localities. However, results also indicate that certain urban and cultural localities also elicit high attachment, probably due to shared socio-cultural ideologies and interactions with place and residents (Farnum 2005).[838]

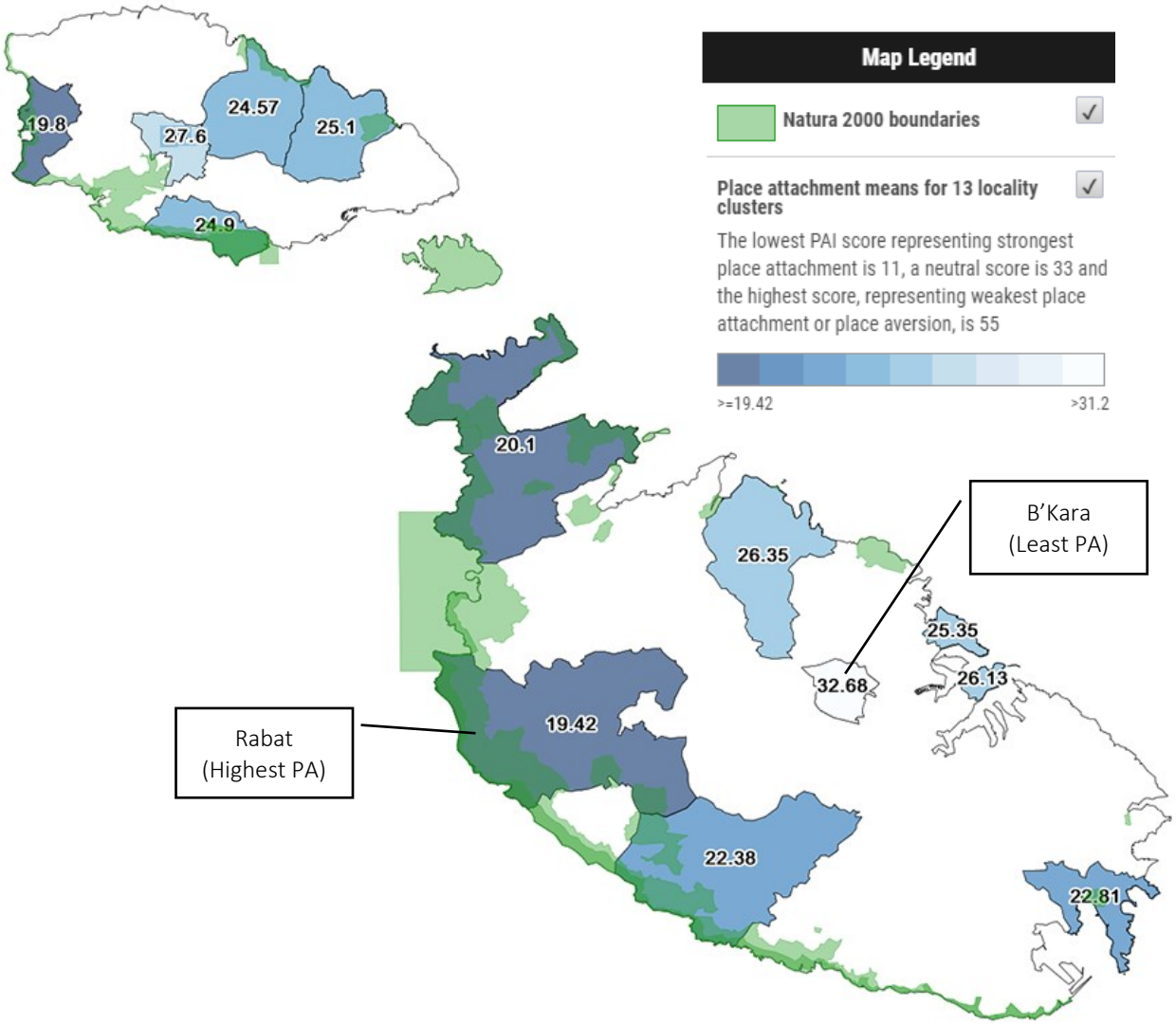
Figure 41 - PA means across the 13 localities ranked in descending order.

High PA

Locality:	N	Mean	Std. Deviation
Rabat (Malta)	31	19.42	5.63
St Lawrenz	30	19.80	7.20
Mellieha	31	20.10	5.86
Siggiewi	32	22.38	4.92
M' Xlokk	31	22.81	8.48
Xaghra	30	24.57	3.95
Sannat	30	24.90	4.00
Nadur	31	25.10	4.48
Sliema	31	25.35	6.53
Valletta	31	26.13	9.94
Naxxar	31	26.35	6.29
Rabat (Gozo)	31	27.61	5.36
B' Kara	31	32.68	8.98
Total	**401**	**24.40**	**7.33**

Low PA

The lowest PAIs score representing weakest connectedness to nature is 11, an average score is 33 and the highest score representing weakest place attachment or place aversion is 55. *Range - <=19.42 (dark blue) to <31.12 (light blue-white)*



7.3.4.2 PA hotspots

As noted above, respondents **indicated 811 mentions (frequency counts) of places of high PA overall collectively.** The XY-point locations of PA places identified by respondents were clustered based on point density to spatially delineate wider hotspot areas of places to which people feel attached. Data was coded and filtered, for example, to merge minor place name variations referring to the same locations (different Maltese place names, features in same village squares) to address misspelling, or for grouping to the next fit when too generic or non-descript. After this analysis and after points were grouped based on proximity or place name similarity, 286 individual locations were identified. **Table 76** below indicates the top 100 out of the 286 places of high PA, ranked according to frequency. A full list is provided in **Appendix 14 - Places of high PA ranked according to frequency (n=286, 602 frequencies)**..

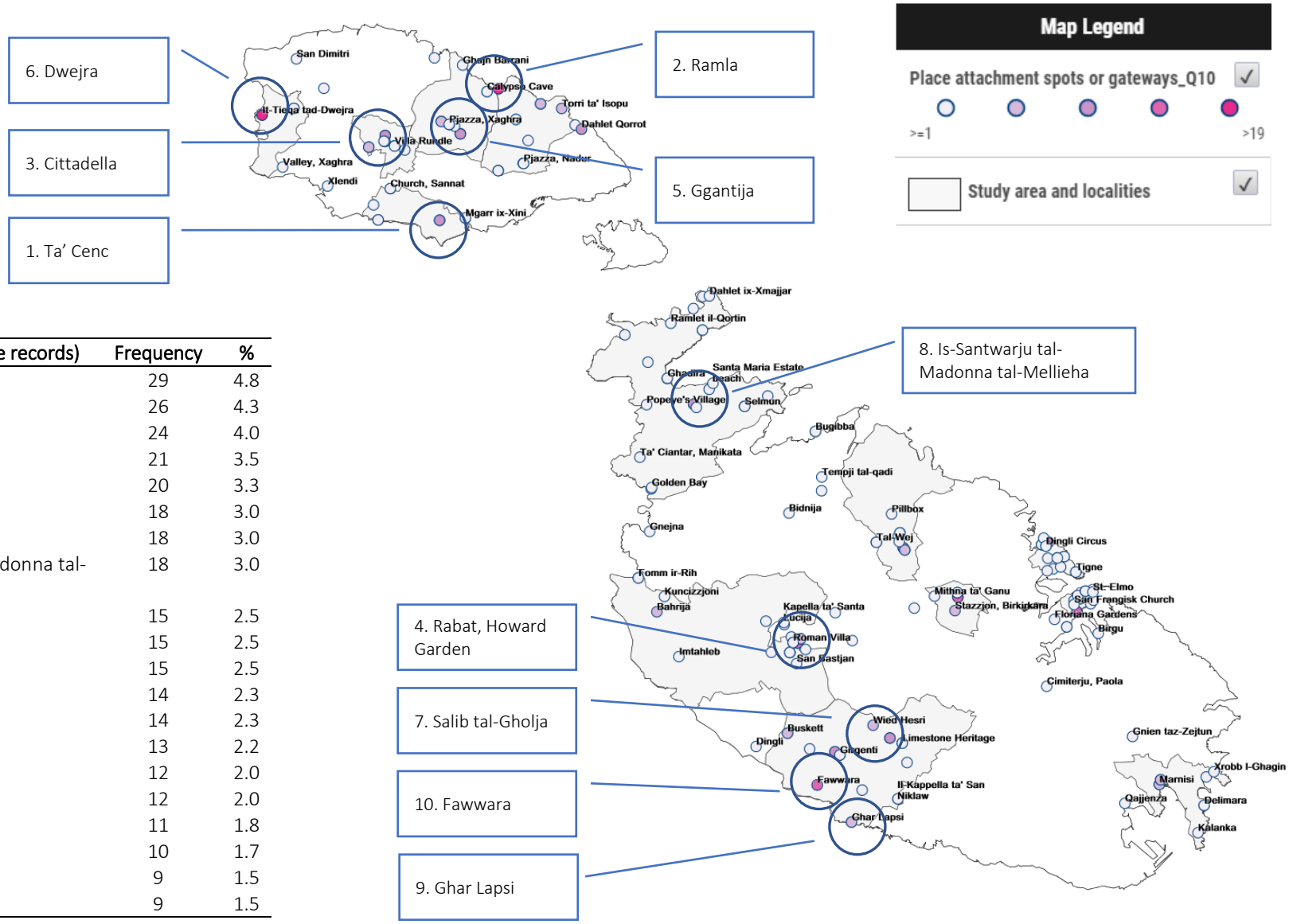
Table 76 - Places of high PA ranked according to frequency (n=284, 811 frequency counts)

Ranking	Index match (unique records)	Frequency	%
1	Ta' Cenc	29	4.8
2	Ramla	26	4.3
3	Howard Gardens	21	3.5
4	Ggantija	20	3.3
5	Dwejra	18	3.0
6	Salib tal-Gholja	18	3.0
7	Is-Santwarju tal-Madonna tal-Mellieha	18	3.0
8	Cittadella	16	2.7
9	Ghar Lapsi	15	2.5
10	Fawwara	15	2.5
11	Sliema Promenade	15	2.5
12	Mdina	14	2.3
13	Villa Rundle	14	2.3
14	Palazzo Parisio	13	2.2
15	Dahlet Qorrot	12	2.0
16	San Blas	12	2.0
17	Ghadira	11	1.8
18	Buskett	10	1.7
19	Delimara	9	1.5
20	Tigne	9	1.5
21	Citadella	8	1.3
22	Azure Window, Dwejra	8	1.3
23	Mgarr ix-Xini	8	1.3
24	Xerri's Grotto	8	1.3
25	M'Xlokk Promenade	7	1.2
26	Selmun	7	1.2
27	Ninu's Cave	7	1.2
28	Katidral	6	1.0
29	Stazzjon, Birkirkara	6	1.0
30	Bastions, Valletta	6	1.0
31	Torri ta' Kenuna	6	1.0
32	Lunzjata	6	1.0
33	Basilica St. Elena	6	1.0
34	Torri ta' Isopu	6	1.0
35	Gebla tal-General	6	1.0
36	Girgenti	5	0.8
37	Pjazza San Gorg, Rabat, Gozo	5	0.8
38	Il-Pjazza ta' San Nikola	5	0.8
39	Belvedere, Nadur	5	0.8
40	Bahrija	5	0.8
41	Pjazza, San Lawrenz	5	0.8
42	Barrakka Gardens	5	0.8
43	Wied Hesri	5	0.8
44	Fortifications	5	0.8
45	Lower Barrakka	4	0.7
46	Basilica St. Helen	4	0.7
47	Limestone Heritage	4	0.7
48	Roman Villa	4	0.7
49	Ghar id-Dud	4	0.7
50	Independence Gardens, Sliema	4	0.7
51	Knisja, San Lawrenz	4	
52	Village Square, San Lawrenz	4	
53	Calypso Cave	4	
54	Knisja ta' San Pawl	4	
55	Cart Ruts	4	
56	Inland Sea	4	
57	Dwejra Cliffs	4	
58	Is-Salib tal-Gholja	4	
59	Il-Knisja l-Qadima	3	
60	Il-Knisja ta' San Pawl	3	
61	Nadur Church	3	
62	Kapella ta' Santa Lucija	3	
63	Torri tal-Kaptan	3	
64	Tal-Wej	3	
65	Chadwick Lakes	3	
66	Independence Gardens	3	
67	Church, Birkirkara	3	
68	Ahrax tal-Mellieha	3	
69	Knisja, Naxxar	3	
70	Church, San Lawrenz	3	
71	Chapel, San Lawrenz	3	
72	Ta' Cenc Cliffs (Sanap)	3	
73	Fomm ir-Rih	2	
74	Marsaxlokk Square	2	
75	Ta' Pompei Church	2	
76	Torri tad-Dwejra	2	
77	Xrobb l-Ghagin	2	
78	Parocca San Nikola	2	
79	Saguna Cliffs	2	
80	Foss	2	
81	Valletta Waterfront	2	
82	L-Ahrax tal-Mellieha	2	
83	Gharukasa	2	
84	Stella Maris Church	2	
85	Triq Santa Lucija	2	
86	Il-Knisja, Naxxar	2	
87	Dingli Circus	2	
88	Dwejra Tower	2	
89	Il-Mithna ta' Kola	2	
90	Dingli	2	
91	Upper Barrakka	2	
92	Mtarfa	2	
93	It-Tokk, Rabat, Gozo	2	
94	It-Tieqa tad-Dwejra	2	
95	San Dimitri	2	
96	L-Istazzjon	2	
97	Pjazza San Nikola	2	
98	Pjazza, Rabat	2	
99	Katakombi ta' San Pawl	2	
100	It-Torri l-Ahmar	2	

The projection of the PA hotspot clusters (Figure 42) indicates several intensely appreciated areas. The GIS points are represented as a numerical scale ascending from white blue symbol fill for the lower no. of frequency up to darker shades of red fill for higher frequencies - Range from 1 to 19. Places of PA are spread across both islands; however, the areas of greatest overlap are near the northern and central parts of the island, and rest within or in the vicinity of both NATURA 2000 and UCA sites. The South also provides numerous sites that score relatively high, even though only one southern locality was included. The higher proportion of top-ranked sites in Gozo are of note since clearly these sites are also appreciated by Maltese respondents just as much as the Gozitans, which also suggests that certain places of attachment extend also beyond the respondents' immediate locality and still illicit a collective attachment or identity due to their outstanding features.

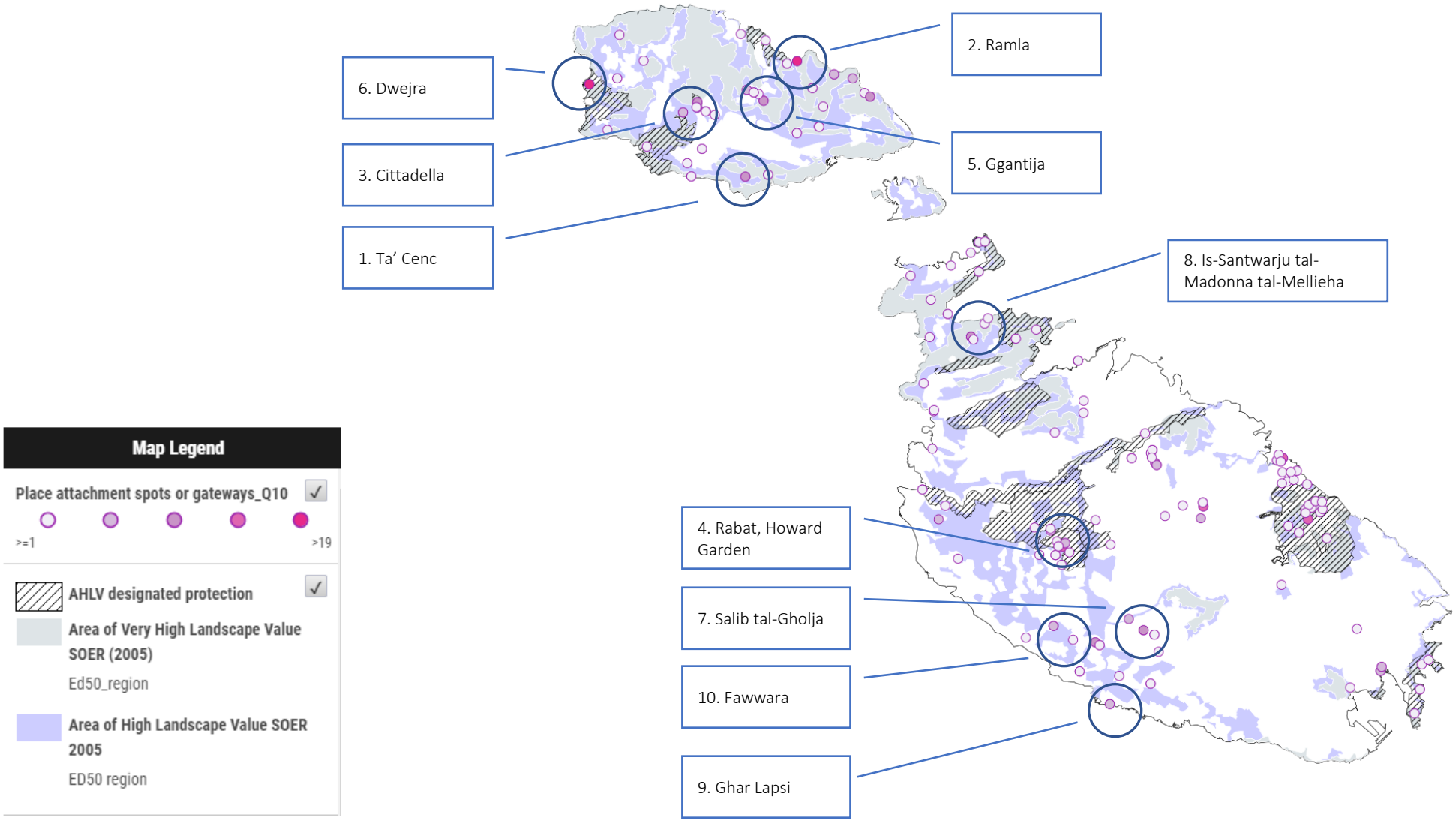
Figure 43 indicates overlays for areas designated as 'Areas of High Landscape Value' (AHLV) and 'Very High Landscape Value' (AVHLV). It is also indicates that the vast majority of PA places fall within areas of High Landscape Value.

Figure 42 - Distribution of top 20 places of high PA.



Ranking	Index match (unique records)	Frequency	%
1	Ta' Cenc	29	4.8
2	Ramla	26	4.3
3	Cittadella	24	4.0
4	Howard Gardens	21	3.5
5	Ggantija	20	3.3
6	Dwejra	18	3.0
7	Salib tal-Gholja	18	3.0
8	Is-Santwarju tal-Madonna tal-Mellieha	18	3.0
9	Ghar Lapsi	15	2.5
10	Fawwara	15	2.5
11	Sliema Promenade	15	2.5
12	Mdina	14	2.3
13	Villa Rundle	14	2.3
14	Palazzo Parisio	13	2.2
15	Dahlet Qorrot	12	2.0
16	San Blas	12	2.0
17	Ghadira	11	1.8
18	Buskett	10	1.7
19	Delimara	9	1.5
20	Tigne	9	1.5

Figure 43 - Places of PA against designated landscape areas (Areas of High Landscape Value and Areas of Very High Landscape Value) as per scheduling and Local Plans 1996, 2000 & 2006 (MEPA).



A heat map was prepared for the PA hotspot clusters (**Figure 44**) based on frequency counts (merge radius in pixels = 20, opacity =80%). The default colour gradient sets the lowest value in the heat map to light blue, mid-range values to light red and the highest value to a bright yellow, with a corresponding transition (or gradient) between these extremes. This map indicates that the PA hotspots indeed lie mostly within the proximity of the respondents' home location, but equally in urban core areas of historical value as much as they also lie in natural protected areas - Cittadella, Xaghra, Naxxar, Rabat , B'Kara, and the Grand Harbour area overall being more of note.

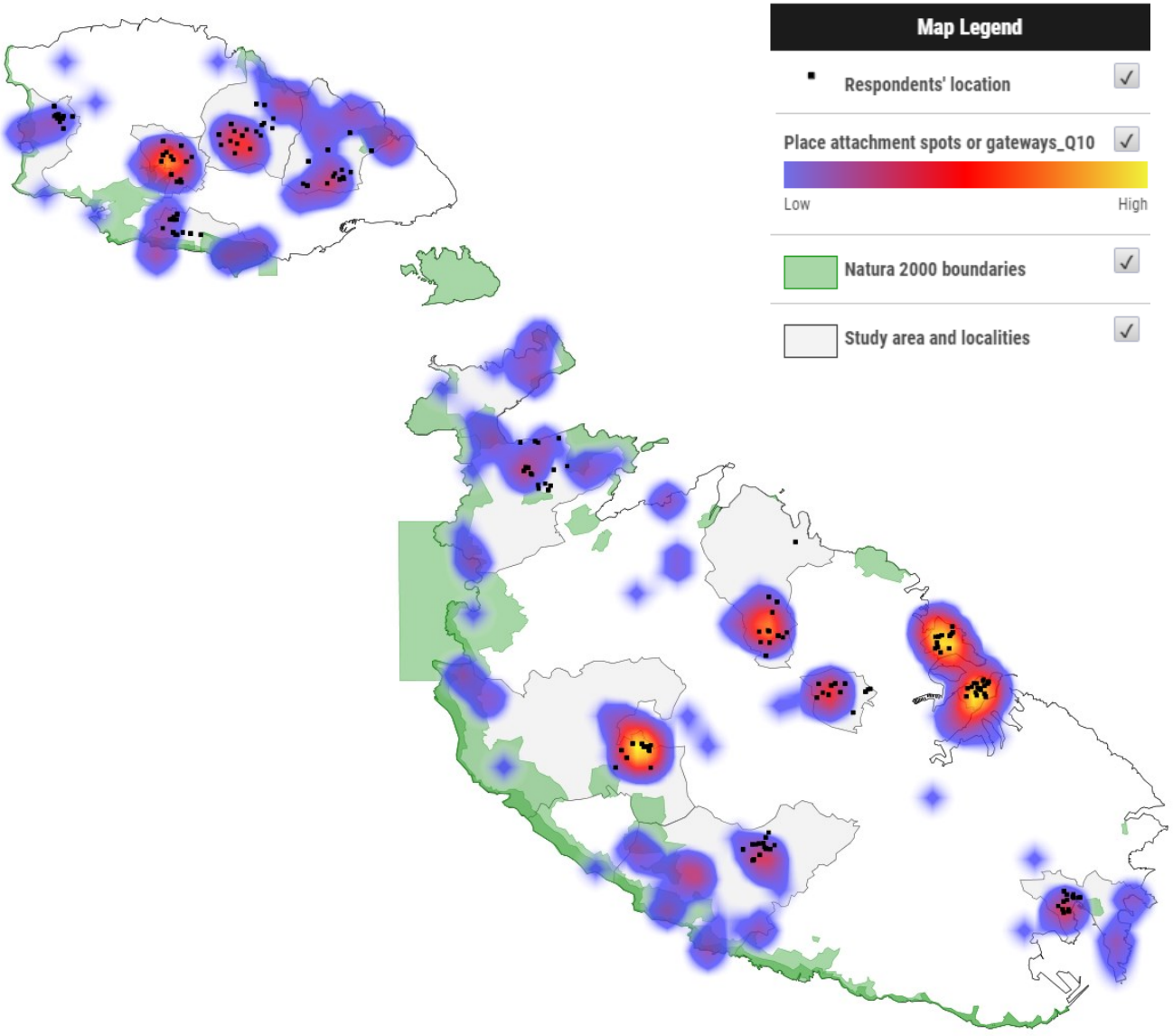


Figure 44 - PA heat map based on frequency counts of special PA places

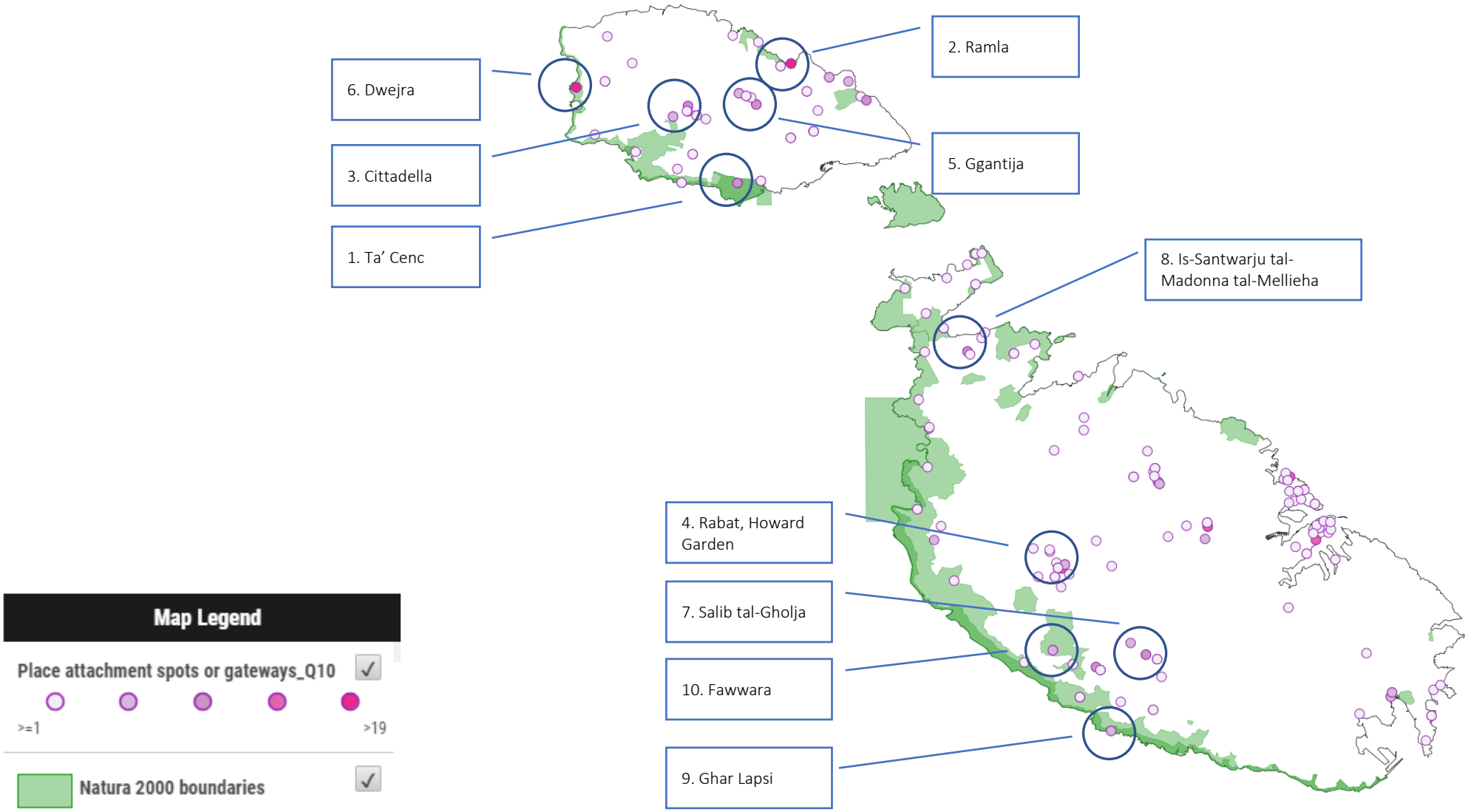
7.3.4.3 PA and NATURA 2000 Overlap

A point in polygon exercise via a spatial join was run in ARCMap in order to identify which of the 811 places identified for high PA actually fall within NATURA 2000 sites. Figure 45 overleaf shows PA points lying in NATURA 2000 polygons. Table 63 below indicates that 332 of the points (41%) indicated by respondents lie within NATURA 2000 designated areas, but only involve 16 out of the 34 NATURA 2000 designated areas (53%). It is interesting to note that some of these sites (Dwejra, Ramla, Ta' Cenc and Fawwara) were also spots of CNT.

Table 77 - PA points lying in NATURA 2000 polygons

SITECODE	SITENAME	Sitetype	Count	Frequenc	Rank
MT000001	L-Inhawi Tad-Dwejra U Tal-Qawra, Inkluz Hagret Il-General	B	2	50	1
MT000003	Rdumijiet Ta' Ghawdex: Il-Ponta Ta' San Dimitri Sal-Ponta Ta'	B	2	50	2
MT000002	Rdumijiet Ta' Malta: Ir-Ramla Tac-Cirkewwa Sal-Ponta Ta'	A	12	44	3
MT000001	Ic-Cittadella	C	2	32	4
MT000002	Rdumijiet Ta' Ghawdex: Ta' Cenc	A	2	32	5
MT000003	L-Inhawi Ta' Ta' Cenc	B	2	32	6
MT000000	L-Inhawi Tar-Ramla	B	2	29	7
MT000001	L-Inhawi Tal-Ghadira	A	3	15	8
MT000003	Rdumijiet Ta' Malta: Ix-Xaqqa Sa Wied Moqbol	C	2	15	9
MT000001	L-Inhawi Tal-Buskett U Tal-Girgenti	A	3	11	10
MT000000	L-Inhawi Tar-Ramla Tat-Torri U Tal-Irdum Tal-Madonna	C	4	10	11
MT000002	L-Inhawi Tax-Xlendi U Tal-Wied Tal-Kantra	C	2	3	12
MT000002	Rdumijiet Ta' Ghawdex: Id-Dawra Tas-Sanap Sa Tal-Hajt	B	2	3	13
MT000003	Rdumijiet Ta' Malta: Ras Il-Pellegrin Sax-Xaqqa	B	1	3	14
MT000000	L-Inhawi Ta' Ghajn Barrani	C	1	2	15
MT000002	Il-Qortin Tal-Magun U L-Qortin Il-Kbir	B	1	1	16
MT000000	L-Inhawi Ta' Pembroke	B	0	0	17
MT000000	Il-Ballut Tal-Wardija	A	0	0	18
MT000000	Il-Maqluba (Limiti Tal-Qrendi)	B	0	0	19
MT000000	Is-Simar (Limiti Ta' San Pawl Il-Bahar)	B	0	0	20
MT000000	Is-Salini	B	0	0	21
MT000000	L-Ghadira S-Safra	B	0	0	22
MT000001	Ix-Xaghra Tal-Kortin	B	0	0	23
MT000001	Ghar Dalam	B	0	0	24
MT000001	Wied Il-Mizieb	B	0	0	25
MT000001	Il-Ballut Ta' Marsaxlokk	B	0	0	26
MT000001	Filfla U L-Gzejjer Ta' Madwarha	B	0	0	27
MT000001	Kemmuna U L-Gzejjer Ta' Madwarha	C	0	0	28
MT000002	L-Inhawi Tal-Imgiebah U Tal-Mignuna	B	0	0	29
MT000002	Il-Gzejjer Ta' San Pawl (Selmunett)	B	0	0	30
MT000002	Il-Maghluq Tal-Bahar Ta' Marsaskala	B	0	0	31
MT000002	L-Ghar Tal-Iburdan U L-Inhawi Tal-Madwar	B	0	0	32
MT000002	Rdumijiet Ta' Ghawdex: Il-Ponta Ta' Harrux Sal-Bajja Tax-Xlendi	A	0	0	33
MT000003	Rdumijiet Ta' Malta: Wied Moqbol Sal-Ponta Ta' Benghisa	A	0	0	34
	TOTALS			332	

Figure 45 - Top 10 ranking places of high Place Attachment against 32 NATURA 2000 (n=401, unique place names identified = 286)



7.3.4.4 PA and UCAs Overlap

Typically place attachment and meaning research has mostly been concerned with rural, scenic, and residential settings (Ryan 2005)[839] and only recently have studies started to explore place attachment with urban spaces (Ujang, 2012;[840] Madgin et al., 2016).[841] In fact, several factors make urban public spaces preferred and meaningful places at both the individual and community scale, namely: "restorative effects and escape, active use and value, similarity to the familiar, community and public significance, and emotional importance" (USDA Forest Service 2014).[842] Consequently, PA hotspots were projected against UCA in order to assess the attachment to urban core areas as an indicative baseline.

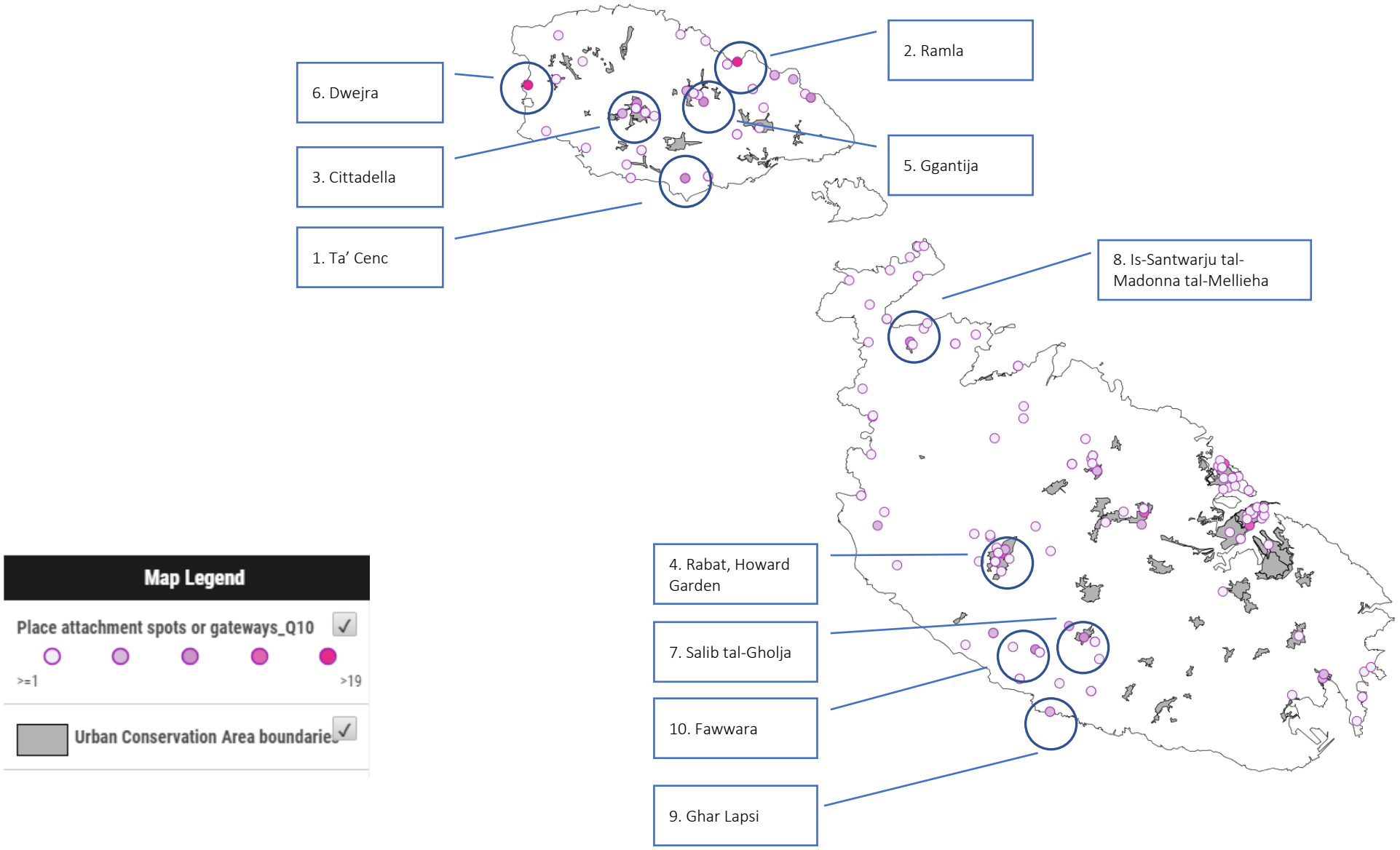
A point in polygon exercise via a spatial join was run in ARCMap in order to identify which of the 811 places identified for high PA actually fall within NATURA 2000 sites or an Urban Conservation Area (UCA). Table 78 gives a breakdown of the PA points lying in UCA polygons. The table below indicates that 334 (41%) of the 811 points selected by respondents lie within UCA designated areas, but only involve 17 out of the 60 UCA designated areas (53%). 18% of the points are scattered elsewhere. It also indicates that places like Rabat (Victoria), Rabat (Malta), Valletta and Sliema seem to elicit high count frequencies, and ties in with expectations due to the rich cultural assets and urban history built over the last few centuries. This brings new meaning to the values, symbols, associations, sensory experiences and narrative which these conservation areas and streetscapes convey to the residents or visitors.

This projection suggests that places of attachment overall lie equally distributed within UCAs and NATURA 2000 boundaries. It also exposes a complex understanding of place and how people develop relationships (both perceptual and conceptual) with urban environments based on dynamic affordances of a place and its demographics, neighbourhood narratives, and complex social networks which shape these public urban spaces (Heynen, Kaika and Swyngedouw, 2006).[843] This insight can help guide planners towards the production of quality and sustainable urban places in our cities (Adams et al., 2016),[844] while ensuring place meanings and aesthetic or utilitarian aspects of the spaces are taken into consideration in urban regeneration efforts.

Table 78 - PA points lying in UCA polygons

SITECODE	SITENAME	Count	Frequency	Rank
UCA	RABAT (Victoria)	7	56	*1*
UCA	RABAT (Malta)	9	51	*2*
UCA	VALLETTA	11	45	*3*
UCA	SLIEMA	7	30	*4*
UCA	MELLIEHA	3	26	*5*
UCA	SAN LAWRENZ	2	23	*6*
UCA	BIRKIRKARA	4	22	*7*
UCA	MARSAXLOKK	4	18	*8*
UCA	SIGGIEWI	2	18	*9*
UCA	MDINA	2	14	*10*
UCA	NAXXAR	2	13	*11*
UCA	NADUR	3	7	*12*
UCA	KERCEM	2	6	*13*
UCA	FLORIANA	1	2	*14*
UCA	BIRZEBBUGIA	1	1	*15*
UCA	XAGHRA	1	1	*16*
UCA	ZEJTUN	1	1	*17*
UCA	ATTARD	0	0	*18*
UCA	BALZAN	0	0	*19*
UCA	BIRGU	0	0	*20*
UCA	BORMLA	0	0	*21*
UCA	DINGLI	0	0	*22*
UCA	FGURA	0	0	*23*
UCA	FONTANA	0	0	*24*
UCA	GHAJNSIELEM	0	0	*25*
UCA	GHARB	0	0	*26*
UCA	GHARGHUR	0	0	*27*
UCA	GHASRI	0	0	*28*
UCA	GHAXAQ	0	0	*29*
UCA	GUDJA	0	0	*30*
UCA	HAMRUN	0	0	*31*
UCA	ISLA	0	0	*32*
UCA	KALKARA	0	0	*33*
UCA	KIRKOP	0	0	*34*
UCA	LIJA	0	0	*35*
UCA	LUQA	0	0	*36*
UCA	MARSA	0	0	*37*
UCA	MARSASCALA	0	0	*38*
UCA	MGARR	0	0	*39*
UCA	MOSTA	0	0	*40*
UCA	MQABBA	0	0	*41*
UCA	MSIDA	0	0	*42*
UCA	MUNXAR	0	0	*43*
UCA	PAOLA	0	0	*44*
UCA	PIETA	0	0	*45*
UCA	QALA	0	0	*46*
UCA	QORMI	0	0	*47*
UCA	QRENDI	0	0	*48*
UCA	SAFI	0	0	*49*
UCA	SAN GILJAN	0	0	*50*
UCA	SAN PAWL IL-BAHAR	0	0	*51*
UCA	SANNAT	0	0	*52*
UCA	SANTA VENERA	0	0	*53*
UCA	TA' XBIEX	0	0	*54*
UCA	TARXIEN	0	0	*55*
UCA	XEWKIJA	0	0	*56*
UCA	ZABBAR	0	0	*57*
UCA	ZEBBUG (Ghawdex)	0	0	*58*
UCA	ZEBBUG (Malta)	0	0	*59*
UCA	ZURRIEQ	0	0	*60*
	TOTALS		334	

Figure 46- Places of high PA against 60 UCA sites.

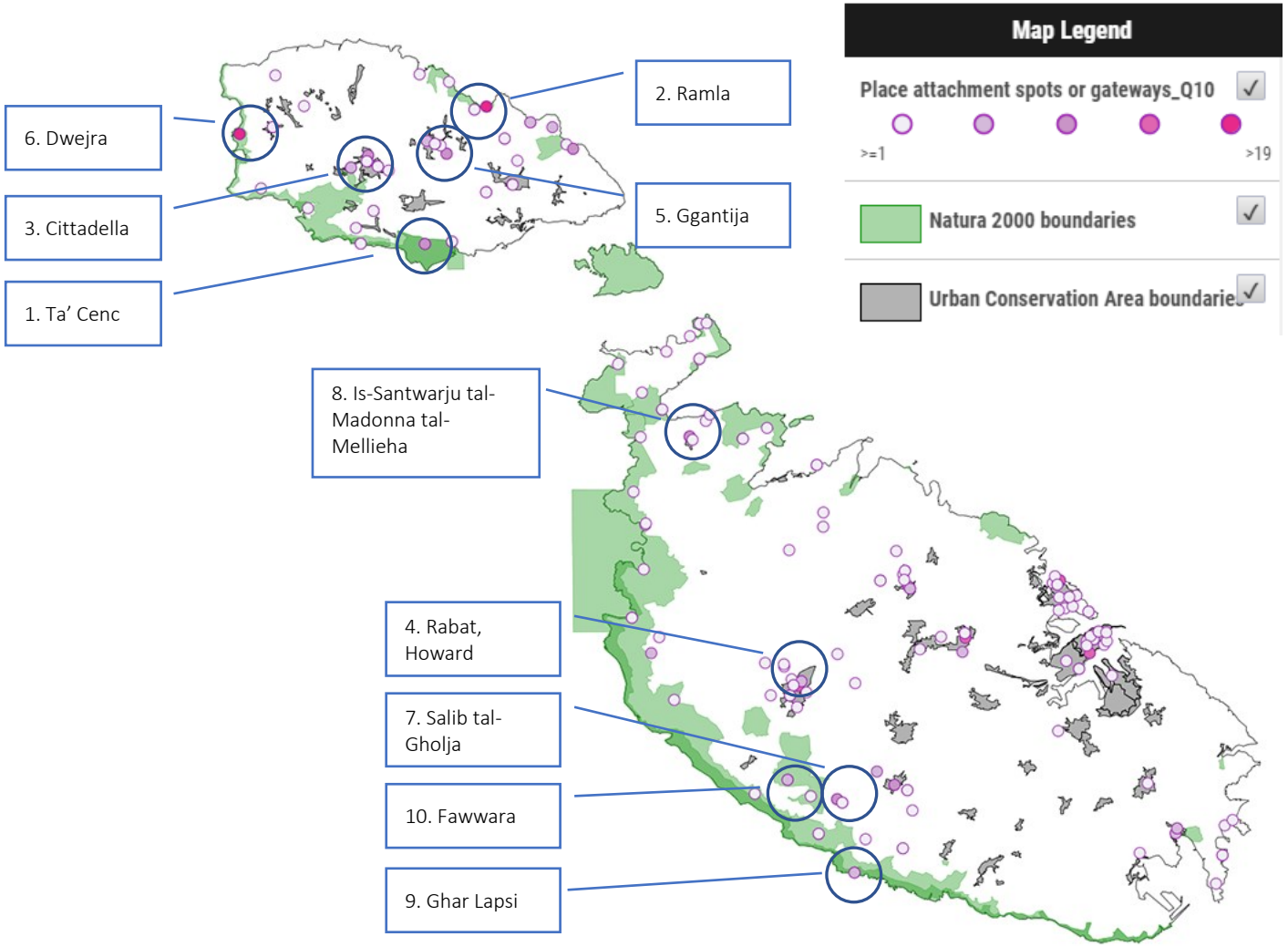


In order to summarise, the spread of PA points falling in NATURA 2000 and UCA polygons was as follows:

- 332 of the points (41%) indicated by respondents lie within NATURA 2000 designated areas, but only involve 16 out of the 34 NATURA 2000 areas (53%).
- 334 of these points (41%) indicated by respondents lie within UCA designated areas, but only involve 17 out of the 60 UCA designated areas (53%).
- 18% of the points are scattered elsewhere.

Figure 47 below shows the projection of PA points against both NATURA 2000 and UCA.

Figure 47 - Places of high PA and distribution against NATURA 2000 protected areas and UCAs



While there is merit in looking at places of attachment at the broader macro level, it remains important to also look at the strong emotional bonds people develop with specific non-descript locations of '*homeyness*' (McCracken 1989)[845] simply due to the fact that they patronise a place. When one looks more carefully at places of attachment listed (before clustering), then it becomes clear that salient connections do arise with specific sites from day-to-day personal experiences and exchanges within sites related to the urban environment and even in some cases sacred (Mazumdar and Mazumdar, 2004)[846] or commercial settings (Debenedetti 2014).[847] In fact, numerous studies have shown the importance of '*servicescapes*' as a source of emotion and meaning - such as shopping centres and malls (Maclaran and Brown 2005)[848], workplaces (Milligan 1998),[849] sports fields (Charleston 2009),[850] theme parks (O'Guinn and Belk 1989)[851] or a simple village diner (Rosenbaum et al.'s 2007)[852]. Rosenbaum et al. (2007) attribute these attachments possibly to the lack of social support from elsewhere which drives individuals to make connections with such servicescape environments.

A cursory examination of the places identified indicates clearly that a lot of attachment exists with local 'invisible' features (niches, bastions, squares and statues) - both at the individual and collective levels. The frequencies indicate that the intensity of attachment is often personal and specific to the habitual regularity or routine of the individual. That same intensity could also shift over time and range from disinterest or basic awareness to superficial fondness, devotion, or a willingness to defend or die for a place (Seamon 2013).[853] This could also be an effect of "*proximity-seeking*" wherein the intensity of attachment to a place close-by can invoke clinginess to home and continuity which reduces the overall range. It could also be a symbolic attachment based on an interpersonal experience or ritual in the past. Either way, it is evident that place attachment or place meaning can range in environmental locus in scale - from a physical setting (like an object, a monument, a room, a building, a pilgrimage route, a square, sacred place, a neighbourhood) to natural settings (arches, wayside chapels, crosses, stream) with equal intensity (Kianicka et al. 2006,[854] Casey 2009, Sowers 2010,[855] Seamon 2013).[856]

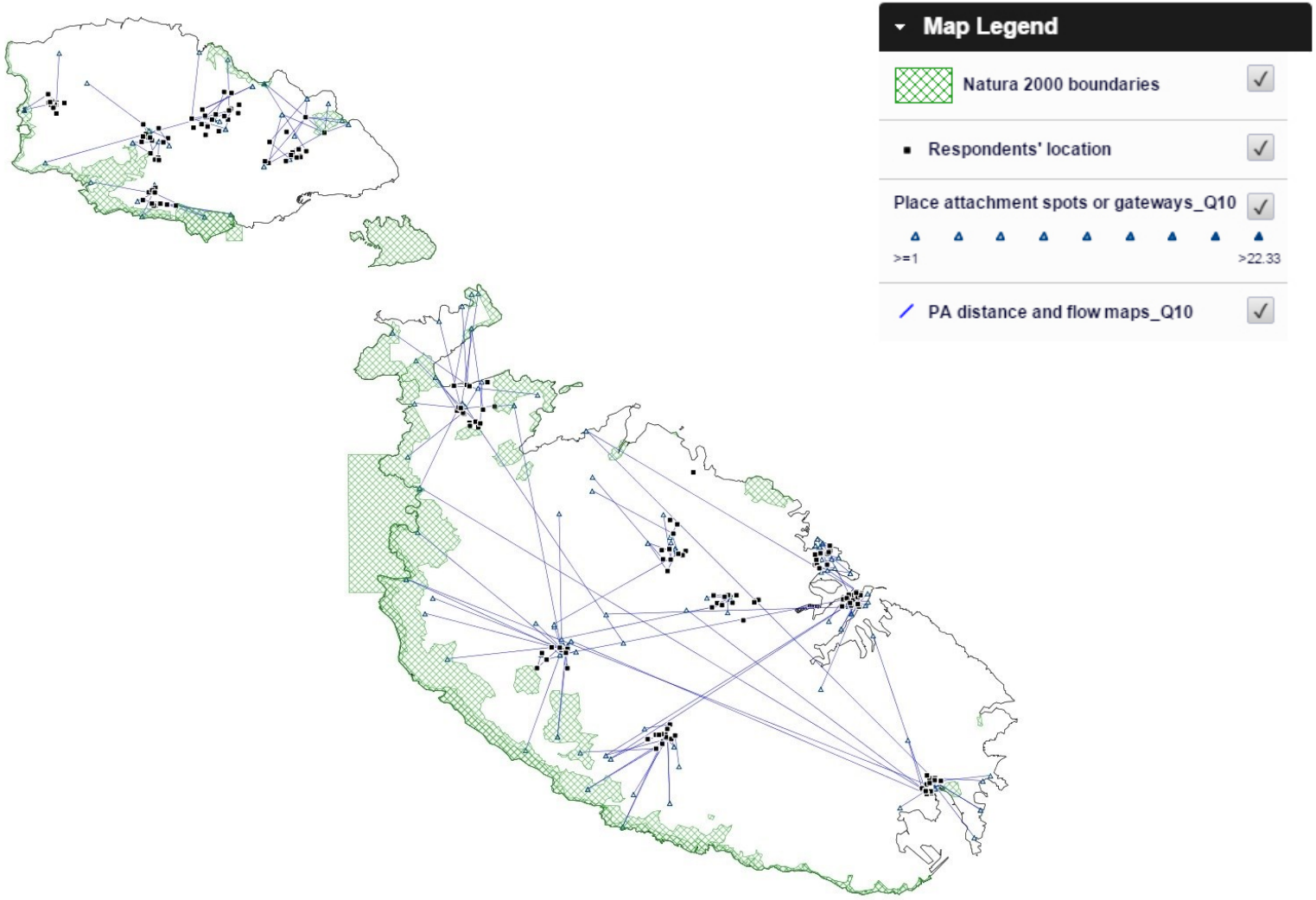
Furthermore, religious sites or sacred place frequencies account for 142 of the 818 frequencies listed (17%). This confirms that religion remains a significant component of many people's private and public lives in Malta, which also involves an active cultural & experiential component of place attachment, in addition to the individual one. Clearly, the attachment to place is very dependent on Maltese culture but there is also the possibility that individuals involved in their own routines ultimately come together as a collective in time and space, and participate in community ensembles for a '*place ballet*' (Seamon, 2013). More recently, an active interest in mapping these cultural spaces in the city of Valletta has started to take root, and involves examining the various cultural practices undertaken by local communities and how these activities are mediated and negotiated through the city's space and cultural infrastructure (Valletta 2018; www.culturemapmalta.com).[857]

7.3.4.5 PA Directional Flow Map

The flow map presented in Figure 48 below visualises the origin-destination matrix of where people commute to connect with place. Directional flow lines radiate from an origin node (respondent home location) to three destination nodes (Places of attachment).

This indicates that most of the activity and connectedness seems to be in the central and northern areas, with limited attachment from the North towards places in the South. Residents from the South on the other hand indicate a preference for Northern areas. Respondents living in Malta did not indicate places of attachment on the island of Gozo, and vice versa. While this is primarily a function of the wording used for data collection(requesting a focus on places close to home), it could also reflect findings in the literature which suggest that PA is more localised and does not necessarily drift beyond the neighbourhood level (Friedmann, 2010).[858] In Malta, the line between the local and regional level is somewhat blurry due to the limited geographical size.

Figure 48 - Flow map indicating respondents' home location centroid to places of PA across the Maltese islands.



7.4 Statistical and spatial analysis of Environmental Behaviour

This section provides a summary of data analysis for the EB scale as a measure of pro-environmental behaviour intentions, based on a population sample of the Maltese islands. A detailed description follows of respondents' intensity of environmental behaviour. Characteristics of several "external" factors (gender, age and education) are also reported. Finally, an attempt at understanding the spatial implications of the PA results according to location clusters and protected areas is undertaken.

7.4.1 EB means and sub-scales

A frequency test was used to compare the mean percent scores for the six statements of this scale (Table 79). Respondents were asked whether they undertook any of the pro-environmental behaviours listed. The rating scores were based on a simple Yes (+1) and No (-1) score. Consequently one positive point was given to all "yes" responses and one point was deducted for all "no" responses. Possible scores therefore range from -6 (lowest) to +6 (highest). A high score on this scale indicates a high level of environmental behaviour , while a low score indicates a low level of environmental behaviour on the part of the individual being tested. The composite mean score for EB intensity specified by the participants was -1.9601 (SD = 3.367, n = 401). This suggests that overall the sample population scored below the median of this scale, indicating low pro-environmental behaviour. This suggests that there is a divergence between the value people place on the natural environment and the relatively low level of action taken by individuals to counter environmental problems. This highlights the fact that there is still a "*value-action gap*" or situational constraints which impede the development of behaviours that can help solve environmental issues (Kollmuss and Agyeman,2002;[859] Godin et al., 2005).[860]

Table 79 - Environmental Behaviour mean, range and variance (n=401)

	Mean	Minimum	Maximum	Range	Std. Deviation	Variance
EB_overall	-1.9601	-6.00	6.00	12.00	3.36725	11.338

A PCA without a rotated solution (since the initial solution resulted in stronger correlations) identified one component, which explained 40 % of total variance. All items loaded highly on the first component. Table 80 below contains the factor loadings for each item of the environmental attachment scale.

Table 80 - EB Component Matrix

Component Matrix[a]

	Component 1
Stopped buying a product because it caused environmental problems?	.684
Attended a public hearing or meeting about the environment?	.648
Contacted a government agency to get information or complain about an environmental problem?	.647
Changed your behaviour in any way because of concern for the environment?	.645
Voted for or against a political candidate, in part, because of his or her position on the environment?	.601
Contributed time or money to an environmental or wildlife conservation group?	.545

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

7.4.1.1 EB scale statement ranking

A Friedman test was used to compare the mean rating scores for the six statements of this EB scale. The rating scores ranged from +1 to -1, where +1 corresponds to the pro-enviromental behaviour activity having been engaged in the past, or -1 which indicates that the behaviour activity was not undertaken. The statements ranked in descending order by the highest means are presented in Table 81. This also describes the central tendency measures for the EB scale items.

Respondents indicated higher levels of agreement with items such as "*Attended a public hearing or meeting about the environment*" (M=1.85, SD=0.36) and "*Voted for or against a political candidate, in part, because of his or her position on the environment*" (M1.84, SD=0.371). Items which ranked low included "*Contributed time or money to an environmental or wildlife conservation group*" (*M* = 1.51, *SD* =0.501) and "*Changed your behaviour in any way because of concern for the environment*" (M=1.5, SD=0.501). This suggests that while Maltese respondents might indeed take an interest in environmental matters which concern them and reach out to authorities or the politician, actual behavioural changes which might be beneficial to the environment are harder to come by. As discussed in the literature, this might be related to a collective 'obsession' with materialism and consumerism leading to us ultimately acting in our own, short-term interests, holding extrinsic, egoistic values over more transcendental values, no matter what the wider consequences are (Champniss and Vila, 2011).[861] Nevertheless, further study is necessary before drawing any concrete conclusions since there might be other factors of possible influence.

Table 81 - EBS mean ranking of each question (n=401, 6 item) for EB_overall

Item Statistics

	Mean	Std. Deviation	N
Attended a public hearing or meeting about the environment?	1.85	0.36	401
Voted for or against a political candidate, in part, because of his or her position on the environment?	1.84	0.371	401
Contacted a government agency to get information or complain about an environmental problem?	1.74	0.44	401
Stopped buying a product because it caused environmental problems?	1.55	0.498	401
Contributed time or money to an environmental or wildlife conservation group?	1.51	0.501	401
Changed your behaviour in any way because of concern for the environment?	1.5	0.501	401

Items which loaded highly on the first component included '*Stopped buying a product because it caused environmental problems'* (.684) and '*Attended a public hearing or meeting about the environment*' (0.648), while the lowest ranked items were "*Voted for or against a political candidate, in part, because of his or her position on the environment*" (0.601) and "*Contributed time or money to an environmental or wildlife conservation group*" (0.545).

7.4.2 EB relationships with demographic predictors

This section discusses pro-environmental scale correlations with other independent variables, namely gender, age and education, in order to understand better whether any of these independent variables are significant predictors.

7.4.2.1 EB and Gender

An analysis of correlations with gender in **Table 82** below indicates an overall slight difference between the means of males (M=-2.1436) and females (M=-1.7864). This indicates that females tend to be more inclined towards pro-environmental behaviour actions, in line with results in the literature reporting that females have more favourable and appreciative attitudes towards the environment, and tend to engage in more desirable pro-environmental behaviour than males (Zelezny, Chua, and Aldrich 2000;[862] Plavsic 2013).[863]

Table 82 - Means ranking of EB_Overall and its sub-scales stratified by Gender: (sorted by EB_Overall mean)

Gender:	Mean	Std. Deviation	N
Female	-1.79	3.466	206
Male	-2.14	3.259	195
Total	**-1.96**	**3.367**	**401**

However, an analysis of mean differencewith gender (Table 83) indicates that there are no statistically significant differences amongst the two gender cohort means as determined by one-way ANOVA (p = .289).

Table 83 - Statistical significance between EB_Overall and Gender

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
EBoverall * Gender:	Between Groups	(Combined)	12.78	1	12.78	1.128	0.289
	Within Groups		4522.581	399	11.335		
	Total		**4535.36**	**400**			

7.4.2.2 EB and Age

An analysis of mean differencewith age presented in **Table 84** indicates that there are relative differences (not statistically significant) amongst the 6 age cohort means. The tendency indicates that for EB_Overall, the highest tendency towards pro-environmental behaviour lies with the 50 to 59 cohort (M=-1.0541) followed by the 40 to 49 cohort (M=-1.614), and the 60 to 69 (-2). The 30 to 39 (-2.1493), followed by the 20 to 29 (-2.3377) cohorts indicate low environmental behaviour rankings and that EB tends to be lower with younger age. This is of concern according to the biophilia hypothesis which argues that exposure to nature at childhood is critical, and possibly unlikely to increase over time if exposure is very diminished when young; even increased environmental education is sufficient to replace this critical affective experience (Stevenson et al., 2014;[864] Ajaps et al., (2015)[865] There is no doubt that attachments to connectedness to nature and place typically develop stronger with more time and exposure to nature. This implies that people build a sense of responsibility towards the environment as they grow older, with this peaking in the 50s' when people internalise environmental values and responsibilities better (Lynn, 2010).[866] The strength and direction of age-effects observed here and in the previous sections indicate that older individuals appear more likely to internalise an engagement with nature, avoid environmental harm, and conserve raw materials and natural resources (Brenton et al., 2013).[867] However, it seems that the relationship between age and environmental behaviour also depends on the specific behaviour under study. For instance, Diekmann et al. (1998)[868] found a negative relationship between age and recycling, with older

people less willing to participate in recycling; but then found that older people seem more willing to use cars less frequently.

Table 84 - Means ranking of EB_Overall and its sub-scales stratified by Age: (sorted by EB_Overall means)

Age:	Mean	Std. Deviation	N	%
50-59	-1.05	3.719	74	18
40-49	-1.61	3.347	57	15
60-69	-2	3.139	70	17
30-39	-2.15	3.120	67	17
20-29	-2.34	3.267	77	19
70 or more	-2.71	3.442	56	14
Total	**-1.96**	**3.367**	**401**	**100**

An analysis of correlations with age (Table 85) indicates that there are no statistically significant differences amongst the two age cohort means as determined by one-way ANOVA (p = 0.075).

Table 85 - Statistical significance between EB_Overall and Age

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
EBoverall * Age:	Between Groups	(Combined)	112.912	5	22.582	2.017	0.075
	Within Groups		4422.449	395	11.196		
	Total		4535.362	400			

7.4.2.3 EB and Educational achievement

An analysis of mean differencewith educational achievement (Table 86) suggests that there are relatively significant differences amongst the 5 educational achievement cohort means. The table below presents the EB Means for EB_Overall, and shows that the higher a respondent's educational achievement, the higher the environmental behaviour ranking. This is in line with other studies that have found that people with higher levels of education are more likely to be pro-environmental (Engel and Pötschke0 1998;[869] Klineberg et al.0 1998;[870] Marquart-Pyatt 2007;[871] Gelissen 2007).[872] This is also attributed to socioeconomic differences between high and low academic achievers as explained for PA, based on Franzen and Meyer's (2010)[873] '*prosperity thesis*'. However, this thesis is contested and remains debatable since it discount's individuals' post-materialist values according to previous findings by Gelissen (2007)[874] and Dunlap and York (2008),[875] and more recently by Fairbrother (2012)[876]

who show that if anything, environmental concern is higher in poorer countries. These finding are in line with the results noted earlier for CNT, where connectedness increases with educational achievement, but contrary to PA results, where attachment was stronger the lower the education level of the respondent.

Table 86 - Means ranking of EB_Overall and its sub-scales stratified by Educational achievement (sorted by EB_Overall mean)

	Mean	Std. Deviation	N	Sum
Tertiary	-0.44	3.697	59	-26
Post secondary / Non-Tertiary	-1.10	3.313	78	-86
Upper Secondary	-1.58	3.417	110	-174
Lower Secondary	-3.24	2.577	84	-272
No schooling / Primary	-3.26	2.972	70	-228
Total	**-1.96**	**3.367**	**401**	**-786**

An analysis of correlations with age (Table 87) indicates that there are indeed statistically significant differences amongst the five educational achievement cohort means as determined by one-way ANOVA ($p < .001p < .001$).

Table 87 - Statistical significance between EB_Overall and Educational Achievement

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
EBoverall *education	Between Groups	(Combined)	464.267	4	116.067	11.29	.000
	Within Groups		4071.095	396	10.281		
	Total		4535.362	400			

7.4.2.4 Correlations between EB_Overall and all three demographic variables - Gender, Age and Educational Achievement

A multiple regression was run to predict EB_Overall from gender, age, and education. The assumptions of linearity, independence of errors, homoscedasticity, unusual points and normality of residuals were met. Table 88 below indicates that the statistical significance level of the three-way interaction term is 0.000 (i.e., $p = 0.001$). This value is less than 0.05, which means that there is a statistically significant three-way age*gender*education interaction effect for EB_Overall.

Table 88 - Summary of multiple regression analysis for age, gender and education against EB_overall

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.370[a]	.137	.130	3.14049	1.799

a. Predictors: (Constant): Age, Gender, and Education.

b. Dependent Variable: EBoverall

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	619.889	3	206.630	20.951	.000[b]
	Residual	3915.472	397	9.863		
	Total	4535.362	400			

a. Dependent Variable: EBoverall

b. Predictors: (Constant), Age, Gender, and Education.

In view of the above, it was decided to analyse the data further in order to determine the nature of this three way interaction. There was weak independence of residuals (errors), as assessed by a Durbin-Watson statistic of 1.799 so it was accepted that there is independence of errors (residuals). Consequently, a multiple regression was run to predict EB_Overall from gender, age, and education. These variables marginally predicted EB_Overall, $F(3,397) = 7.713$, $p < 0.0005$, adj. $R2 = 0.137$. Age and Education were statistically significant to the prediction, $p < 0.05$, while gender was rejected. Related studies have also concluded that older people are more concerned for the environment, and act more responsibly towards it than younger ones (Shen and Saijo, 2008).[877] This disparity may reflect a tendency in older people to be less materialistic and are less concerned about financial stability issues, and more concerned about their future. Moreover, better educated people report higher levels of EB possibly due to a more intellectual interaction with the physical environment typically associated with participating in higher levels of education (Casey and Scott, 2006).[878] Another explanation could be that better-educated people are typically in the middle income bracket, and tend to live in more pleasant environments which they would not like to see damaged, which is in contrast to results noted in lesser educated samples who earn less and live in more deprived or degraded neighbourhoods. Klineberg et al. (1998)[879] and Gelissen (2007)[880] for instance correlated the demographic variables of age, education, gender, ethnicity, household income, political ideology, and religiousness with environmentalism. Only age and education yielded significant results, with age correlating negatively and education correlating positively, in line with the findings obtained in this study. Consequently, age and education are significant predictors for EB. Nonetheless, we cannot be sure from this data whether the association with age is a 'life-stage effect' or a cohort effect and further studies to that effect would be necessary. Regression coefficients and standard errors can be found in Table 89 below.

Table 89 - Summary of EB_Overall multiple regression analysis and three-way ANOVA

Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-8.611	.968		-8.896	.000	-10.514	-6.708
	Education:	**1.123**	**.143**	**.434**	**7.846**	**.000**	**.842**	**1.404**
	Gender:	.461	.315	.068	1.463	.144	-.158	1.079
	Age:	**.453**	**.109**	**.230**	**4.160**	**.000**	**.239**	**.667**

a. Dependent Variable: EBoverall

Tests of Between-Subjects Effects

Dependent Variable: EBoverall

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1064.604[a]	53	20.087	2.008	.000
Intercept	662.119	1	662.119	66.197	.000
Gender	19.358	1	19.358	1.935	.165
Age	**228.656**	**5**	**45.731**	**4.572**	**.000**
Education	**463.591**	**4**	**115.898**	**11.587**	**.000**
Gender * Age	56.083	5	11.217	1.121	.349
Gender * Education	39.886	4	9.972	.997	.409
Age * Education	143.719	18	7.984	.798	.703
Gender * Age * Education	144.820	16	9.051	.905	.564
Error	3470.757	347	10.002		
Total	6076.000	401			
Corrected Total	4535.362	400			

a. R Squared = .235 (Adjusted R Squared = .118)

7.4.3 EB relationships with locations

Table 90 below ranks the 13 locality PA means in descending order. This indicates that, overall, the sample population reports a relatively low EB (> than the median = 0). However, it is also evident that areas close to NATURA 2000 sites scored higher (e.g., Mellieha (-0.3871) and Rabat (Malta) (-0.6452), Sliema (-0.6452) and Xaghra (-1). As expected, most of the control sites ranked poorly, including B' Kara (-2.3871), Valletta (-2.5806) and Naxxar (-2.9032), with the exception of Sliema which ranked in 3rd place. This is probably due to the fact that Sliema residents are regularly up in arms against speculative development, and the locality includes a relatively more educated community that is more sensitised to the environmental cause, as explained in earlier sections.

Table 90 - EB means across the 13 localities, ranked in descending order.

Locality:	N	Mean	Std. Deviation	N	NATURA 2000 sites within locality	NATURA 2000 sites around locality
Mellieha	31	-0.39	3.0733	31	5	5
Rabat (Malta)	31	-0.65	3.808	31	4	2
Sliema	31	-0.65	3.440	31	Control site	2
Xaghra	30	-1	2.665	30	1	0
Siggiewi	32	-1.06	3.592	32	2	2
Rabat (Gozo)	31	-1.23	4.462	31	1	1
St Lawrenz	30	-1.6	2.647	30	2	0
M' Xlokk	31	-1.74	3.044	31	3	1
B' Kara	31	-2.39	2.848	31	Control site	0
Valletta	31	-2.58	2.433	31	Control site	0
Naxxar	31	-2.90	2.914	31	Control site	2
Sannat	30	-4.27	2.716	30	4	1
Nadur	31	-5.10	1.989	31	1	0
Total	**401**	**-1.96**	**3.367**	**401**		

An unpaired t-test analysis of correlations of means for localities having NATURA 2000 sites in their vicinity and the four control sites (Table 91) indicates that the difference is not considered as statistically significant since the two-tailed P value equals 0.7976. This result is skewed by a significantly higher mean of Sliema in the control site cohort, and the low ranking of means from respondents in the localities of Sannat (-4.2667) and Nadur (-5.0968) despite both hosting NATURA 2000 sites. The *Cohen's d* is 0.173392, indicating no effect size.

Table 91 - Statistical significance between PA_Overall and Locality

Localities with NATURA 2000 sites	
Locality:	Mean
Nadur	-5.0968
Sannat	-4.2667
M' Xlokk	-1.7419
St Lawrenz	-1.6000
Rabat (Gozo)	-1.2258
Siggiewi	-1.0625
Xaghra	-1.0000
Rabat (Malta)	-0.6452
Mellieha	-0.3871
Mean	-1.891778
SD	1.649414
n	274

Control sites	
Locality:	Mean
Naxxar	-2.9032
Valletta	-2.5806
B' Kara	-2.3871
Sliema	-0.6452
Mean	-2.129025
SD	1.011864
n	124

7.4.3.1 EB mean differences between Malta and Gozo

An unpaired samples t-Test was undertaken to compare the means between Malta and Gozo for PA. Since the two-tailed P value equals 0.1955, this difference is considered to not be statistically significant. The EB mean differences between the localities in Malta and Gozo are presented in Table 92 below.

Table 92 - EB Mean differences between Malta and Gozo, ranked in descending order

Malta					Gozo				
EB_Overall					EB_Overall				
#	Locality:	Mean	N	Std. Deviation	#	Locality:	Mean	N	Std. Deviation
1	Mellieha	-0.39	31	3.073	1	Xaghra	-1	30	2.665
2	Rabat (Malta)	-0.65	31	3.808	2	Rabat (Gozo)	-1.23	31	4.463
3	Sliema	-0.65	31	3.440	3	St Lawrenz	-1.6	30	2.647
4	Siggiewi	-1.06	32	3.592	4	Sannat	-4.27	30	2.716
5	M' Xlokk	-1.74	31	3.044	5	Nadur	-5.10	31	1.989
6	B' Kara	-2.39	31	2.848					
7	Valletta	-2.58	31	2.433					
8	Naxxar	-2.90	31	2.914					
	Total	**-1.54**	**249**	**0.9898**		**Total**	**-2.64**	**152**	**1.901**

It is important to note that certain localities in Gozo, despite their high environmental quality and attributes, still scored the lowest means, suggesting that pro-environmental behaviour does not necessarily depend on natural environments but may be derived from other aspects. However, one cannot rule out that these results could be coincidental, in that they do not necessarily show characteristics of place but characteristics of the cluster of residents that were interviewed. This situation has possibly been brought about by a number of factors but overall residents of Sannat and Nadur seem to have lower means and less positive actions towards the environment in comparison to other localities. These lower means could be tied to Gozitans having a less romantic vision of nature and environment, since the threats are not as pronounced as discussed in earlier sections. The influence of attitudes like media, family and friends, local context, social norms and knowledge need to be explored further since they are significantly related to pro-environmental behaviour (Mifsud, 2011; Plavsic 2013).[881]

The overall weak averages are of concern for protected area management. Researchers suggest that stakeholders' intention to engage and participate in protected areas conservation depends largely factors such as perceptions and attitudes (Sirivongs & Tsuchiya, 2012).[882] Nonetheless, despite the emergence of new ecological norms and worldviews (Kortenkamp & Moore, 2001,[883] Felonneau and Becker, 2008),[884] both in terms of attitudes and behaviour, these are not necessarily being expressed in individual action. While social pressure may lead to conformity to the norm simply through what is referred to as '*normative clear-sightedness',* defined

as *"the knowledge of the normative or counter-normative aspect of certain types of behaviour or certain types of judgements*" (Py and Somat, 1991; 1), this may not transform itself completely into true '*normative adherence*' (Py and Ginet, 2003).[885] Similar challenges are posed by the 'attitude-behaviour gap' which refers to individuals who say they are concerned about ethical issues to present oneself favourably but do not necessarily express this inclination in their market behaviour (Kollmuss and Agyeman, 2002),[886] weakening the argument that a person's attitudes and behaviours are directly related. Another potential constraint or barrier to pro-environmental behaviour could be cognitive and emotional limitations, like '*cognitive dissonance*' wherein an individual might still not act pro-environmentally even if they are experiencing an emotional reaction to environmental degradation (Rees, 2010).[887] This is usually attributed to complex and inherent psychological schemas which can mitigate these negative emotions by justification strategies based on 'motivated reasoning / cognition'. Motivated cognition in this case refers to an inherent tendency by individuals to reconcile their environmental behaviour conflicts by fitting their processing of information to conclusions that suit some end or goal (Nir, 2011).[888] Unfortunately, these hidden motivators of human individual or group behaviour could be concealing a low degree of public awareness and lack of change of behaviour.

Further research would be necessary, with more appropriate sample sizes, in order to establish what causes these significant differences, and why some Gozitan localities (Sannat and Nadur) seem to have a different baseline for EB. A recent study by Satariano (2016)[889] attempted to understand the socio-geographical processes influencing health and well-being in deprived Maltese neighbourhoods. Her results suggest that while familial and neighbourhood ties, networks and social capital are indeed highly significant and often beneficial for health and well-being , other factors, like the physical built environment, housing conditions, service provision, welfare benefits, and employment opportunities also seem to influence social processes and impact on health and well-being in diverse ways. The findings therefore highlight the importance of a relational approach in order to understand the connection between people, place and health. Unfortunately, the application of social-cognitive theory to explain pro-environmental behaviour specific to Malta remains lacking.

A Tree Cluster Analysis (TCA) of EB_overall was undertaken using SPSS. The TCA indicates a gain summary of three clusters. The first cluster includes nine of the 13 localities which account for 67% of the respondents having a PA mean of -1.04 - namely M'Xlokk, Rabat (Malta), Rabat (Gozo), St. Lawrenz, Siggiewi, Mellieha, Sliema. This suggests that while most of these sites indeed have protected areas in the vicinity, coastal communities also ranked high in EB means (Sliema and M'Xlokk), and is also a reflection of social norms besides the attachment to place. The TCA also indicates that Node 2 comprises of three control sites in Malta, and Node 3 identifying specifically Sannat and Nadur in Gozo as having substantially lower EB means. This reaffirms the significantly different means between Malta and Gozo as discussed in an earlier Section 7.2.4.1.

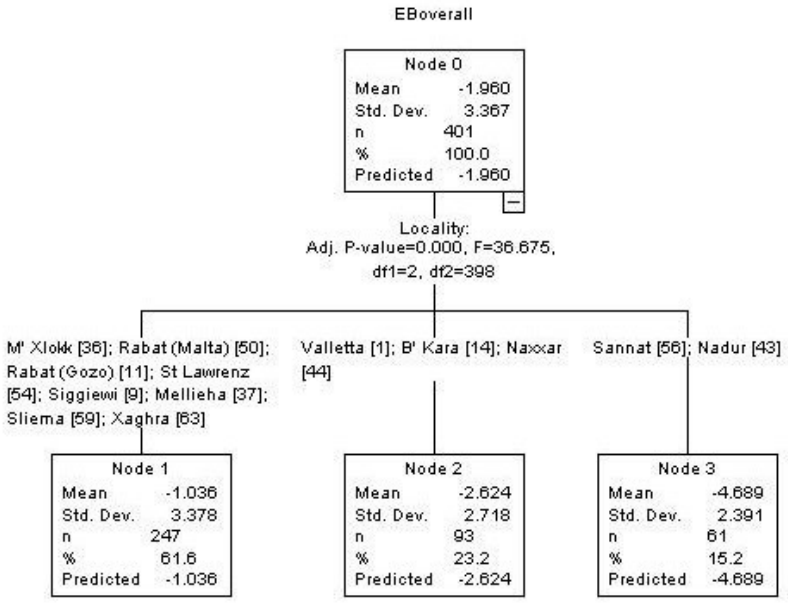
Table 93 - Tree cluster analysis of PA overall vs locality; and gain summary for nodes

Gain Summary for Nodes

Node	N	Percent	Mean
1 - M'Xlokk; Rabat (Malta); Rabat (Gozo); St. Lawrenz; Siggiewi; Mellieha; Sliema; Nadur; Xaghra.	247	61.6%	-1.0364
2 - Valletta; B'Kara; Naxxar.	93	23.2%	-2.6237
3 - Sannat; Nadur.	61	15.2%	-4.6885

Growing Method: CHAID

Dependent Variable: EBoverall



7.4.4 EB spatial analysis

Behavioural mapping, or behaviour mapping, is typically a form of systematic research that tracks people's behaviour in relation to features of the physical environment (Cosco, Moore and Islam 2010;[890] Moore and Cosco 2010).[891] Behavioural mapping theory is grounded in two concepts (Rigolon 2013)[892], namely:

i) Gibson's concept of affordances (1977)[893] which is concerned with relational features of the environment, simultaneously defined by intrinsic characteristics of the environment and abilities of the organism, - aimed specifically at understanding how the physical environment could influence individuals' activities; and

ii) Barker's idea of behaviour settings (1968)[894] aimed at identifying regular patterns of behaviour, specifiable by time and place, and dependent on the physical characteristics of the place and prescribed social roles for what is expected to happen there.

The spatial view of environmental behaviour this paper is concerned with is in relation to Barker's behaviour setting theory, and is expected to account for the predicted influence the physical environment has on the behaviour of individuals and groups. The following section undertakes a spatial analysis of Environmental Behaviour means across the 13 locations identified in this study, and is expected to be useful in identifying underlying patterns of participant environmental behaviour (Golicnik 2007,[895] Bell et al. 2011[896]) within the Maltese environment.

7.4.4.1 Spatial projection of EB Means

Figure 49 below presents a GIS output of average means per locality. The map suggests that localities in proximity of NATURA 2000 sites experience a relatively higher value of EB, with the exception of Nadur. Having said that, the low Gozo means can also be considered a consequence of socio-economic inequalities concentrated in particular districts, irrespective of NATURA 2000 proximity. The National Strategic Reform Framework 2007-2013[897] indicates that Gozo's GDP per capita has declined from 73.2% of the GDP in Malta in 1999 to 69.3% in 2003, and is hence considered to be regionally distinct. As described earlier, this is attributed to constraints on economic production and the inability to reap economies of scale, the lack of diversification of products, high transport costs, low attractiveness for investment opportunities, a large dependence on public-sector employment, a strong informal economy, and a lack of technological capacities. Furthermore, political patronage and widespread 'playing of the system' creates inequalities which clearly have an impact on the Gozitan level of environmental concern and commitment. This is further compounded by the fact that Gozo is somewhat more sheltered from speculative development and excessive construction is not considered an immediate threat to their day to day; and possibly perceived as a long overdue pecuniary opportunity overall. Further related points were raised in 'Section 7.3.1 - PA Means and subscales'.

Figure 49 - EB means across the 13 localities ranked in descending order.

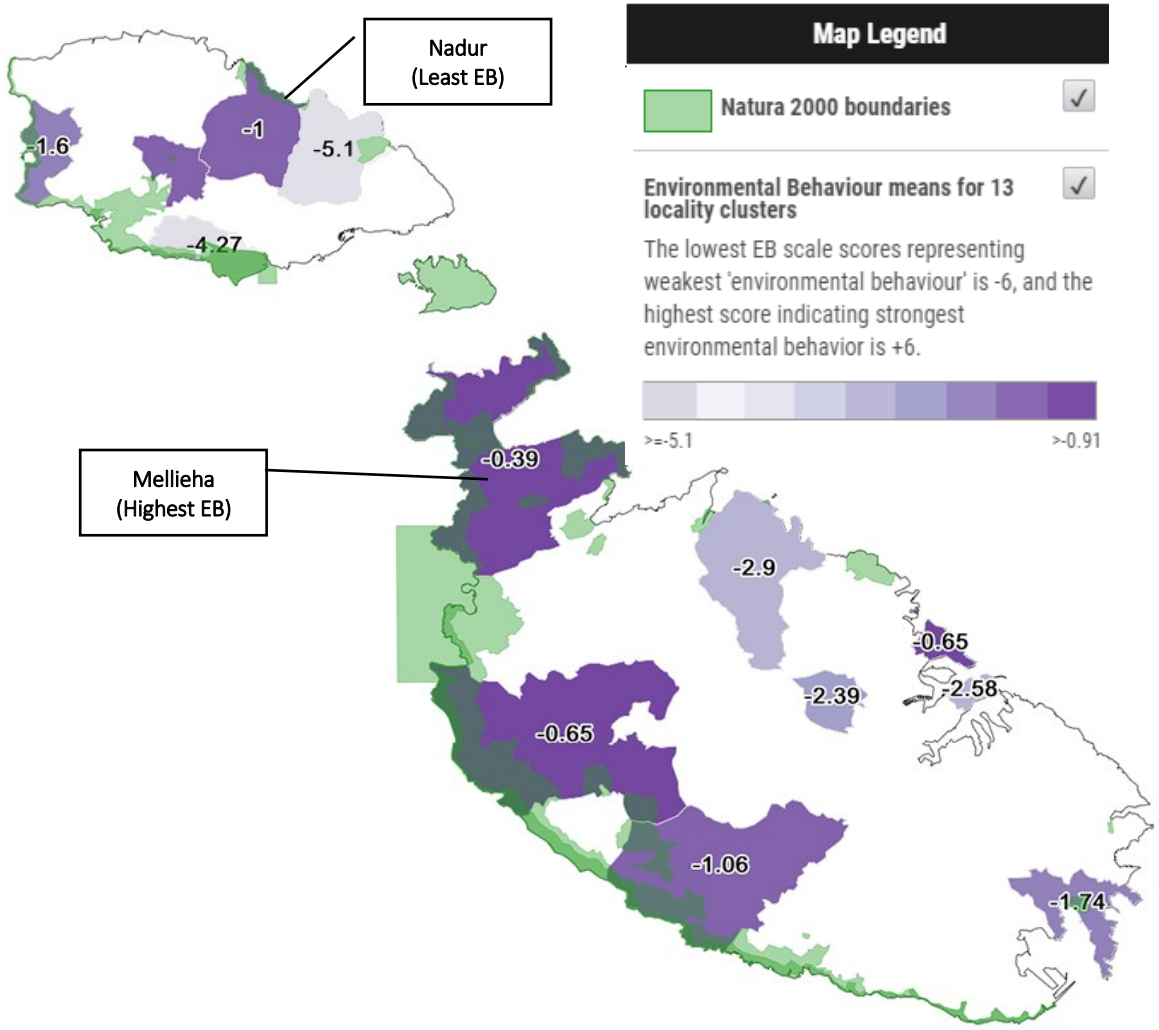
High EB

Locality:	Mean	Std. Deviation	N
Mellieha	-0.3871	3.0733	31
Rabat (Malta)	-0.6452	3.80831	31
Sliema	-0.6452	3.44043	31
Xaghra	-1	2.66523	30
Siggiewi	-1.0625	3.59154	32
Rabat (Gozo)	-1.2258	4.46251	31
St Lawrenz	-1.6	2.64705	30
M' Xlokk	-1.7419	3.04377	31
B' Kara	-2.3871	2.84813	31
Valletta	-2.5806	2.43275	31
Naxxar	-2.9032	2.91382	31
Sannat	-4.2667	2.71564	30
Nadur	-5.0968	1.98922	31
Total	-1.9601	3.36725	401

Low EB

The lowest EBs scores representing weakest environmental behavior is -6, and the highest score indicating strongest 'environmental behavior' is +6. An average score is 0 (EB means map).

Range - >=1 (pale yellow) to <28.56 (dark red)



7.5 Correlations between CNT, PA and EB

This section is concerned with assessing the relationship between CNT and PA, and whether responses for the CNT and PA scales used, and their means, were strong predictors for environmentally responsible behaviour (ERB).

Hypothesis Model: EBoverall is influenced by PAoverall + NROverall

A stepwise linear regression was undertaken in order to regress multiple variables while simultaneously removing those that are not important.[898] **Table 94** below indicates that PA was not a strong predictor for EB, and was excluded by the stepwise regression. The following table indicates a partial correlation of 0.065 should PA be retained in the model, and was too low to actually impact the overall R^2 (coefficient of determination).

Table 94 - Regression analysis of EB, PA and NR

Excluded Variables[a]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	PAoverall	,054[b]	1,295	,196	**,065**	,957

a. Dependent Variable: EBoverall

b. Predictors in the Model: (Constant), NROverall

Similarly, the standardised beta weight presented below indicates that the contribution of PA is very low and adds no weight to predicting EB.

Coefficients[a]

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-14,034	1,040		-13,489	,000
	PAoverall	,025	,019	**,054**	1,295	,196
	NROverall	4,458	,321	**,583**	13,887	,000

a. Dependent Variable: EBoverall

Consequently, a linear regression using stepwise regression with CNT and PA as predictor variables of EB indicates that in fact the model only has 1 predictor, NR, with a significant r^2 of 0.321. The following table provides the R^2 of this model, where R^2 is the proportion of variance that is explained by the independent variables (the predictor), and indicates how close the data are to the fitted regression line. This represents the proportion of variance in the dependent variable that can be explained by the independent variables (technically, it is the

proportion of variation accounted for by the regression model above and beyond the mean model). Typically, values of $R^2 < 0.2$ are considered weak, between 0.2 and 0.4, moderate, and > 0.4, strong. In this case, our regression for CNT (PA excluded) explains 32.5% of the variation of EB, and indicates that the independent variable NR is moderately correlated with EB.

Table 95 - Model Summary for NR_Overall

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,571[a]	,327	,325	2,76683

a. Predictors: (Constant), NR_Overall

As a further check, a Pearson product-moment correlation was run to determine the relationship between an individual's PA_Overall and their scores for NR_Overall and EB_Overall. The data outputs showed no violation of normality, linearity or homoscedasticity. The results are presented in Table 96 below.

Table 96 - Correlation between PA, CNT and EB

Correlation

		PAoverall_again	NROverall	EBoverall
PAoverall	Pearson Correlation	1	-.207**	-0.066
	Sig. (2-tailed)		.000	0.185
	N	401	401	401
NROverall	Pearson Correlation	-.207**	1	.571**
	Sig. (2-tailed)	.000		.000
	N	401	401	401
EBoverall	Pearson Correlation	-0.066	.571**	1
	Sig. (2-tailed)	0.185	.000	
	N	401	401	401

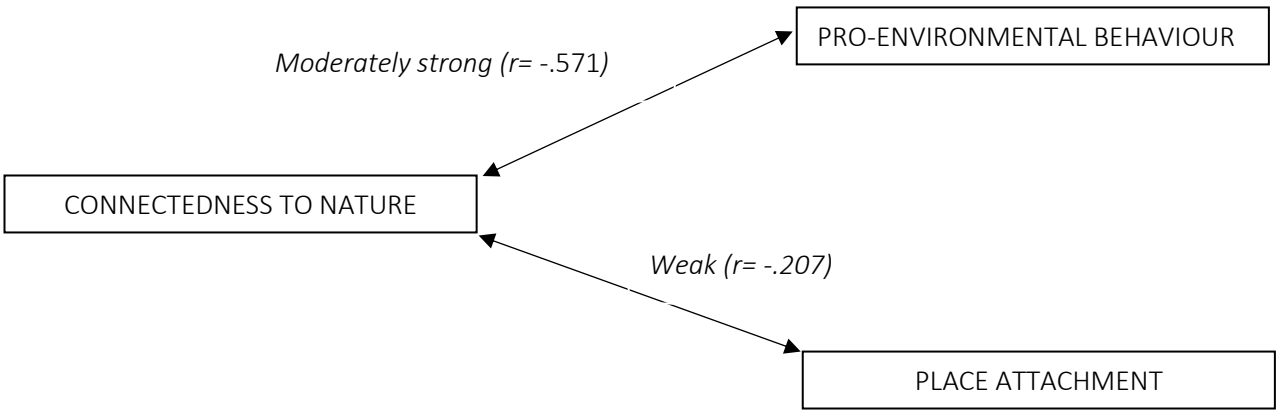
***. Correlation is significant at the 0.01 level (2-tailed).*

There was a weak, negative correlation between PA_Overall and NR_Overall, which was statistically significant (r = -.207, n = 401, p < .0005). The correlation coefficient r measures the strength and direction of a linear relationship between two variables and always ranges between +1 and –1. To interpret its value, an r closest to -1 indicates a perfect negative linear relationship, -0.30 a weak negative relationship, 0 no linear relationship, +0.30 a positive relationship, and a +1 a perfect positive linear relationship.

However, there was a moderately strong and positive correlation between NR_Overall and EB_Overall, which was statistically significant (r = 0.571, n = 401, p < .0005). This suggests that respondents with high NR

scores engage in higher environmental behaviour across 50% of the population. This is a significant result for social research of this sort, where so many inherent other forces can be at play. The positive relationship between connectedness to nature and pro-environmental behaviour is similar to other positive relationships found by previous research (Davis et al., 2009;[899] Dutcher et al., 2007;[900] Gosling and Williams, 2010;[901] Mayer and Frantz, 2004)[902], confirming that affective connections like CNT play a role in people's motivation to protect the natural environment. It is also in line with similar studies which suggest that a cognitive representation of the self in nature will determine an individual's willingness to protect nature (Pereira and Forster, 2015).[903] This latter point vindicates the premise that for people to engage with nature and be environmentally committed, it remains critical to understand their connectedness with nature. No statistically significant correlations between PA_Overall and EB_Overall were noted (r = -0.066 (n = 401, p < .0005). The block diagram below (**Figure 50**) below indicates the strength of the relationships noted.

Figure 50 - Causal path model showing the correlations between CNT, PA and EB



7.5.1 Correlations across the sub-scales

This section is concerned with assessing whether responses for the NR and PA sub-scales used were strong predictors for environmentally responsible behaviour (ERB). A further item breakdown was undertaken across the sub-scales of PA and CNT, with EB for all their means (**Table 97**). The intention is to understand how the above relationships work within the sub-scales. NR_Overall correlates poorly and negatively with only two of the three PA sub-scales including PA_identity (r= -0.252) and PA_Bonding (r= -.174) but does not correlate with PA_dependence (r = -.118). NR_Overall correlates strongly and positively with all its own sub-scales. PA_Overall correlates strongly with its own sub-scales. PA_Overall also correlates poorly with NR_Self (r = -0.280), NRPerspective (r= -0.31) and NRExperience (r = -0.176). However only a weak correlation is noted between the PA_identity construct and EB_Overall. This is in line with similar research from Stedman (2002)[904] and Walker and Ryan (2008)[905] which indicated that individuals who strongly identify with rural landscapes are more willing to

advocate place-protective behaviours or to support and engage in conservation initiatives to protect them (Ramkissoon et al. 2012).[906] However, environmental behaviour correlates strongly and positively with all three NRS sub-scales namely NR_Self (r = 0.872), NR_Perspective (r = 0.738), and NR_Experience (r =0 .856).

Table 97 - Item Item Correlation Matrix for all three scales, and the sub-scales.

Inter Item Correlation Matrix

		PAoverall	PA_identity	PA_dependence	PA_bonding	NRSelf	NRPerspective	NRExperience	NROverall	EBoverall
PAoverall_again	Pearson Correlation	1	.911**	.899**	.806**	-.280**	-.031	-.176**	-.207**	-.066
	Sig. (2-tailed)		.000	.000	.000	.000	.533	.000	.000	.185
	N	401	401	401	401	401	401	401	401	401
PA_identity	Pearson Correlation	.911**	1	.728**	.624**	-.311**	-.068	-.221**	-.252**	-.119*
	Sig. (2-tailed)	.000		.000	.000	.000	.172	.000	.000	.017
	N	401	401	401	401	401	401	401	401	401
PA_dependence	Pearson Correlation	.899**	.728**	1	.583**	-.191**	.013	-.094	-.118*	-.006
	Sig. (2-tailed)	.000	.000		.000	.000	.793	.061	.018	.907
	N	401	401	401	401	401	401	401	401	401
PA_bonding	Pearson Correlation	.806**	.624**	.583**	1	-.233**	-.027	-.149**	-.174**	-.046
	Sig. (2-tailed)	.000	.000	.000		.000	.589	.003	.000	.356
	N	401	401	401	401	401	401	401	401	401
NR_Self	Pearson Correlation	-.280**	-.311**	-.191**	-.233**	1	.463**	.649**	.872**	.553**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000
	N	401	401	401	401	401	401	401	401	401
NR_Perspective	Pearson Correlation	-.031	-.068	.013	-.027	.463**	1	.436**	.738**	.392**
	Sig. (2-tailed)	.533	.172	.793	.589	.000		.000	.000	.000
	N	401	401	401	401	401	401	401	401	401
NR_Experience	Pearson Correlation	-.176**	-.221**	-.094	-.149**	.649**	.436**	1	.856**	.458**
	Sig. (2-tailed)	.000	.000	.061	.003	.000	.000		.000	.000
	N	401	401	401	401	401	401	401	401	401
NR_Overall	Pearson Correlation	-.207**	-.252**	-.118*	-.174**	.872**	.738**	.856**	1	.571**
	Sig. (2-tailed)	.000	.000	.018	.000	.000	.000	.000		.000
	N	401	401	401	401	401	401	401	401	401
EB_Overall	Pearson Correlation	-.066	-.119*	-.006	-.046	.553**	.392**	.458**	.571**	1
	Sig. (2-tailed)	.185	.017	.907	.356	.000	.000	.000	.000	
	N	401	401	401	401	401	401	401	401	401

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

7.5.2 Non-Causal Bayesian Network analysis

A Bayesian network analysis method was also undertaken in order to search for the best fitting model and to identify probabilistic relationships among variables of interest in an uncertain-reasoning problem scenario like this (Howard & Matheson, 1981; Pearl, 1988). Bayesian network modelling is a data analysis technique which is well suited for complex data visualisation since it applies *'structure discovery'* statistical models which describes the inter-relationships in the underlying processes which could potentially generate the study data (Puorret, 2008). It can also help define relevant spatial relationships when understanding social-environmental interactions in combination with GIS tools, especially where a complex set of variables could affect outcomes of the environment and subsequent human decisions in landscape or ecological management (Gonzales et al., 2016).[907]

The correlation matrices are the first stage in developing and comparing different models and examining relationships using Structural Equation Modeling. For each model a correlation matrix was developed to examine the relationships between model variables and how the different variables or factors in the questionnaire relate. The structural model is presented in a Directed Acyclic Graph (DAG), and depicts the relationships and affect of CNT, PA, and EB. It also shows the most likely connections between the different variables used (**Figure 52**), namely: NR Overall (incl. Self, Perspective and Experience sub-scales independently); PA Overall scale (incl. Bonding, Dependence and Identity sub-scales independently); Environmental behaviour, and other key factors in the dataset. The findings indicate that only NR (CNT) is a moderate predictor of pro-environmental behaviour however other interesting relationships emerge. The 'self' aspect of our nature relatedness is mediated by place attachment and the personal aspect of relatedness to nature. Furthermore, connectedness to nature is mediated by NR_Self and NR_Perspective, and influences NR_Experience and environmental behaviour. This confirms that there is no significant relationship between place attachment and environmental behaviour. connectedness to nature constructs, and seem to act independently towards EB. Only Place Identity and Nature Self seem to have a negative-cost edge in the shortest path of the DAG analysis.

Other interesting factors emerge like the influence of 'Age' on Place Dependence, the importance of parks for Environmental Behaviour and increased NR Experience, and the relationship between people who feel at home and exhibit place attachment, or the regional difference between Malta and Gozo with regards to NR perspective, and attachment to place.

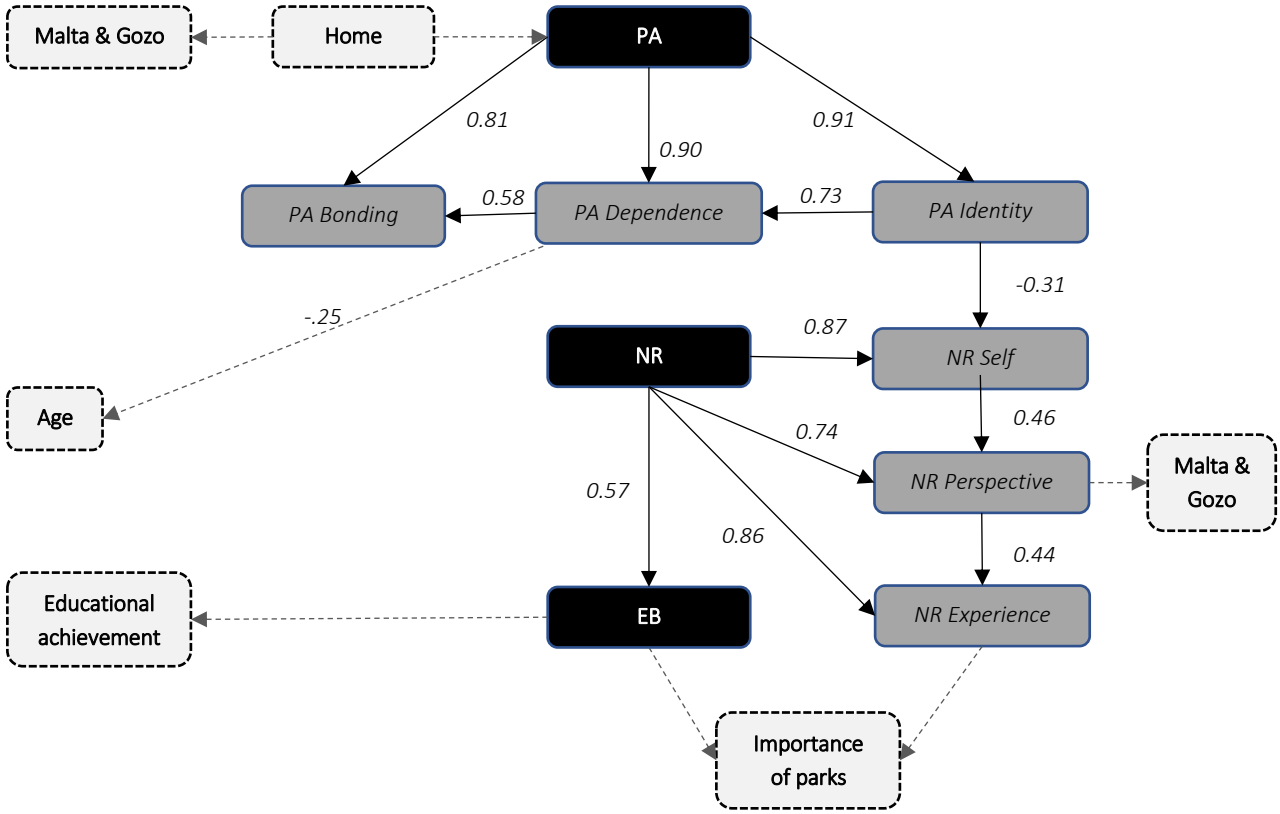


Figure 51 - Bayesian analysis of inter-relationships between CNT, PA, EB and key other variables queried (p values indicate the strength and direction of those relationships).

7.6 Conservation Choices Scale

As a supplementary element of analysis, the author devised a scale which aims to assess community preferences for different protected area management options, with these considered to be of particular relevance to Maltese protected areas. As mentioned in an earlier Research Methods Chapter, the author prepared a scale of 12 statements (Question #23) after consulting the NATURA 2000 management stakeholder workshop notes (2013, 2014) and identifying the major recurrent themes. The threats and possible management actions identified were restricted only to those that were deemed to be understandable for respondents to the questionnaire. The final scale is composed of 12 questions, scored across a Likert scale from 1 for 'Strongly disagree' to 5 'Strongly agree' with the statement.

It is important to keep in mind that this scale in Q23 was preceded by Q22, which asked whether respondents would like to be involved in decisions on protected natural areas in their vicinity. Respondents who replied with a 'No' or Don't know' were asked to skip the scale. Only 24% (94) of total respondents (n=401)

chose to participate in the CCS, with the remainder excluded from the analysis for this effort; this result could possibly be due to respondent fatigue (Table 98).

Table 98 - Case processing summary for CCS

Case Processing Summary

		N	%
Cases	Valid	94	23.4
	Excluded[a]	307	76.6
	Total	401	100

a. Listwise deletion based on all variables in the procedure.

7.6.1 CCS Means

A Friedman test was used to compare the mean rating scores for the 12 statements of the CC scale. The composite mean score for the CCS specified by the participants was 50.94 (SD = 5.779, n = 94). The maximum CCS score across 12 items is 60, a neutral score is 30 and the weakest score is 12. The statements ranked in descending order by the highest means are presented in Table 99 below. This table describes the central tendency measures for the CC scale items. Respondents indicated higher levels of agreement with conservation affect items such as "*Creation of hunting ban areas and quiet zones*" (M=4.52, SD=0.563) and "*Ensure controlled access and vehicular access bans in sensitive areas*" (M=4.5, SD=0.524) and "*Create paths and put up signs with basic information about the area*". The lowest mean scores and higher levels of variance are noted for items: "*Restore damaged areas by not-intervening on the site so that it recuperates alone*" (M=3.62,SD=1.146), "*Expropriate land in particularly sensitive areas, and compensate owners*" (M=3.97,SD=1.031) and "*Reintroduce original Maltese species/plants typical of the area, & eradicate invasive ones*" (M=4.09, SD=0.912). The one-way ANOVA indicates the means are in fact statistically significantly different from each other. It is interesting to note that actions like the provision of hunting ban areas, reduced vehicle areas, signposting trails and quiet zones are considered salient by respondents; however this also indicates a degree of self-interest since these conservation choices are arguably inward looking and self-centred. Items like restoring damaged areas, or reintroduction of local species seem to be a low priority for most, further reinforcing the above assumption.

Table 99 - CCS means ranking and ANOVA.

Item Statistics

Items	Mean	Std. Deviation	N
Creation of hunting ban areas and quiet zones	4.52	0.563	94
Ensure controlled access and vehicular access bans in sensitive areas	4.5	0.524	94
Create paths and put up signs with basic information about the area	4.49	0.6	94
Provide a ranger/warden service for strict protection zones	4.47	0.651	94
Provide educational and interpretation services for visitors	4.34	0.597	94
Expand the protected areas where and when possible	4.34	0.756	94
Stop renewing expired public land leases in particularly sensitive areas	4.21	0.774	94
Restore damaged areas by intervening on the site	4.2	0.665	94
Prohibit damaging recreational activities in sensitive areas	4.19	0.752	94
Reintroduce original Maltese species/plants typical of the area, & eradicate invasive ones	4.09	0.912	94
Expropriate land in particularly sensitive areas, and compensate owners	3.97	1.031	94
Restore damaged areas by not-intervening on the site so that it recuperates alone	3.62	1.146	94

ANOVA

		Sum of Squares	df	Mean Square	F	Sig
Between People		258.801	93	2.783		
Within People	Between Items	72.511	11	6.592	16.727	.000
	Residual	403.156	1023	0.394		
	Total	475.667	1034	0.46		
Total		734.468	1127	0.652		

Grand Mean = 4.24

7.6.2 CCS correlations against the CNT, PA and EB scales

Before actually correlating the means of the Conservation choices scale against EB, NR and PA, it was decided to correlate the independent variables EB, NR and PA against Q22 which indicates which respondents were interested in participating in the Conservation scale scoring *(Q22 - Would you like to be involved in decisions on protected natural areas in your vicinity? – YES, NO or Don't know).* This was deemed necessary before undertaking a multiple correlation coefficient in view of the fact that only 94 respondents completed the conservation scale, as described above. Scoring the full dataset without sample restrictions directly against the Conservation scale would produce a score that includes a narrower range of possible scores and the variance would be far smaller than the variance of the entire data set since the 94 which have shown an interest in completing this scale, already have relatively high EB scores in comparison to the entire dataset (n=401). This is referred to as a 'range restriction' and could lead to limited and skewed correlation results.

Consequently, a group T-test was undertaken, but restricted to the 94 responses received. The tables below indicate a significant difference between the groups, especially the environmental behaviour scale. Those who replied 'no' in fact show an average of -2.77, while those who did average at 0.707, which is almost a 3.4 point difference and confirms that the "restriction of range" assumption is very likely.

Table 100 - Group Statistics and Independent Samples Test

Would you like to be involved in decisions on protected areas…?

Group Statistics

	Range	N	Mean	Std. Deviation	Std. Error Mean
PAoverall	>= 2	307	24,7459	7,53514	,43005
	< 2	94	23,2872	6,54779	,67535
NR_Overall	>= 2	307	2,2231	,60909	,03476
	< 2	94	2,6968	,63026	,06501
EB_Overall	>= 2	307	-2,7752	3,02684	,17275
	< 2	94	,7021	3,04387	,31395

Independent Samples Test

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
PAoverall	Equal variances assumed	,092	1,45869	,86252
	Equal variances not assumed	,070	1,45869	,80065
NR_Overall	Equal variances assumed	**,000**	-,47368	,07239
	Equal variances not assumed	**,000**	-,47368	,07372
EB_Overall	Equal variances assumed	**,000**	-3,47737	,35727
	Equal variances not assumed	**,000**	-3,47737	,35834

A one-way analysis of variance (ANOVA) was used to determine whether there are any significant differences between the means of the independent (unrelated) groups in order to answer the following hypothesis model:

EB_overall and PA_overall and NR_Overall are predictors for increased agreement with management options

The dataset was tested to ensure that there are no outliers, and the data was normally distributed for each group as assessed by the Boxplot and Shapiro-Wilk test (p=<0.05). Similarly, a one-way Anova with factor Q22: for 3 levels ("*yes*", "*no*", "*maybe*": separately) was undertaken, and indicates that PA_Dependence and PA_Overall has no significant correlation whatsoever on replies to Q22, but all the other constructs do. There was a statistically significant difference between most sub-scale factors as determined by one-way ANOVA, except for PA-dependence (p = 0.613) and PA overall (p = 0. 0.07), which are both greater than 0.05. Once again, this confirms that respondents indicate that EB_Overall and NR_Overall are in fact significant determinants for the Conservation Choices scale proposed. This suggests that people who score highly on

NR_Overall and EB_Overall tend to priorities items in the scale like the 'creation of hunting ban areas and quiet zones', 'controlled access and vehicular access bans', 'the creation of paths and signage' and, the 'provision of ranger services and educational services for visitors'. It is also pertinent to point out that while PA_Overall was not deemed to be a significant predictor of Conservation Choices per se, the result seems skewed negatively by PA_dependence, however both PA_identity and PA_Bonding are indeed determining factors.

Table 101 - Anova of CNT, PA and EB against factor Q22

Q.22 - Would you like to be involved in decisions on protected natural areas in your vicinity?

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
PAoverall	Between Groups	176,810	1	176,810	3,312	**,070**
	Within Groups	21245,430	398	53,380		
	Total	21422,240	399			
PA_identity	Between Groups	75,377	1	75,377	8,157	,005
	Within Groups	3677,623	398	9,240		
	Total	3753,000	399			
PA_dependence	Between Groups	2,426	1	2,426	,257	**,613**
	Within Groups	3759,814	398	9,447		
	Total	3762,240	399			
PA_bonding	Between Groups	38,102	1	38,102	8,011	,005
	Within Groups	1892,898	398	4,756		
	Total	1931,000	399			
NROverall	Between Groups	12,973	1	12,973	80,951	,000
	Within Groups	63,781	398	,160		
	Total	76,754	399			
NRSelf	Between Groups	16,637	1	16,637	78,160	,000
	Within Groups	84,718	398	,213		
	Total	101,355	399			
NRPerspective	Between Groups	7,852	1	7,852	39,630	,000
	Within Groups	78,851	398	,198		
	Total	86,703	399			
NRExperience	Between Groups	15,200	1	15,200	40,557	,000
	Within Groups	149,158	398	,375		
	Total	164,358	399			
EBoverall	Between Groups	866,857	1	866,857	94,145	,000
	Within Groups	3664,653	398	9,208		
	Total	4531,510	399			

7.7 Key results of relevance to protected area management

A number of practical policy implications for Malta emerge from this study. Key results and relationships for each of the three constructs are discussed in further detail below. For a detailed summary of the statistical outputs please refer to '**Appendix 09 - Statistical result summaries for CNT, PA and EB**'.

7.7.1 CNT results

This section provided a baseline assessment of CNT. CNT baselines and analysis offer another crucial perspective beyond that offered by the natural, social, cultural, political and economic sciences, and remains especially relevant in local environmental planning debates, or behavioural change. This is particularly crucial to Malta in view of its intense population density and limited carrying capacity. In fact, Camilleri (2004)[908] suggests that environmental issues in Malta are not perceived to be solely about "*biodiversity or historical architecture, but also quality of life in daily environments, social cohesion and environmental justice".*

Overall, the analysis suggests that the Maltese value well-connected green spaces to enjoy physical activity and recreation, recover from stress, psychological relaxation and to share natural or social contact. The composite mean score for CNT intensity (CNT_Overall) specified by the participants was M = 2.572 (*SD = .44*), and slightly above the mid-point of the scale, which indicates a modest CNT across the population sample overall. Respondents indicated higher levels of agreement overall with NR_Self affect items and NR_Perspective items. However, NR_experience items were characterised by the lowest mean scores and higher levels of variance overall which implies that a functional experiential relationship with nature may not be the leading contributor to respondents' connectedness to nature overall, and that Maltese do not particularly value physical experiences in the natural world. Research shows that people who spend more time outdoors in nature tend to feel more connected to nature and it remains critical to ensure children and adults alike are provided with ample opportunities to establish CNT by facilitating unstructured outdoor exposure.

To more fully explore the nature of the variation in levels and type of attachment across the different spatial contexts we further examined the effect of several other variables that could provide a richer understanding of the factors that may have contributed to the differing place meanings. An analysis of correlations with age indicates that there are relative differences (statistically significant) amongst the age cohort means, which tend to increase with age until the late 50s but then decrease with older age (60+); possibly due to decreased mobility and health, hence a reduced exposure to nature and experience. These results reaffirm the urgent necessity to instill a love for nature in children and teens right at the onset. An analysis of correlations with educational achievement also indicates that CNT is improved the higher the

education level of the respondent (statistically significant), both in terms of NR_Overall, and similarly across the sub-scales.

The GIS projection indicates that CNT hotspot clusters indicate intensely appreciated areas which are spread across the islands. It also suggest that there is a limited attachment from the North towards places in the South, whereas the South indicates a preference for the Northern areas. CNT places were also noted on the island of Gozo and vice versa, suggesting that the interaction of the CNT construct goes beyond the neighbourhood level and is not as rooted as PA, and hence more mobile. The bulk of special places of high CNT lie mostly in or close to NATURA 2000 sites, but are hardly present in UCAs. Results also indicate that respondents living in localities with high connectedness to NATURA 2000 sites tend to score higher than those living in control sites, even across the NRS sub-scales. This ties in with the biophilia hypothesis (Wilson, 1993)[909] which claims that connectedness to nature develops stronger with more time and exposure to nature. However, it was noted that certain places, especially in Gozo, report a lower CNT than localities in the mainland, which suggests that Gozitans' interaction with natural elements is more inherent in their way of life than that of the mainland, and is perhaps taken for granted since they are more sheltered from anthropogenic loss or threat of loss to their personal or psychosocial environmental resources. This reaffirms arguments which imply that people can establish better or more meaningful CNT when living in proximity of natural settings. However, it also indicates that CNT still occurs in numerous smaller other sites, irrespective of the environment they choose to live in - places which are not necessarily protected or rural areas.

Clearly, there is a growing need and demand to reconnect people with nature while leveraging links to pro-environmental behaviour and benefits to human health or well-being. Given the acknowledged benefits and interest, simple interventions to increase people's connectedness to nature in a sustained manner are needed (Richardson et al., 2017).[910] From the above, emphasis needs to be taken with lower educational levels, the increasing older generation 60+ and the 20-29 cohorts, to maintain simple connections to nature. Improving CNT and its associated benefits has finally started to receive pointed and practical prominence in work by Richardson, Hallam, & Lumber (2015)[911] and Lumber, Richardson, & Sheffield (2016),[912] and the Nature Connectedness Research Group (2013).[913] Findings by Miles and Jenny (2013)[914] reaffirm that repeated engagement with local and familiar semi-rural countryside, akin to the Maltese Islands, can still lead to a mindful approach and psychological rewards that do not require travel into the wilderness, highlighting the positive effect of nature and nature connectedness. Consequently, it is fair to conclude that there is a strong community need for local green spaces situated very close to where people live and spend their day, and that provide formal recreational facilities (such as playing fields) and opportunities to interact with nature.

7.7.2 PA results

The composite mean score for place attachment intensity specified by the participants suggests a moderately positive attachment to place overall. Respondents indicated higher levels of agreement with 'Place Identity' effect items, and average mean scores for place dependence scoring items, and even lower scores for place bonding items. This suggests that Maltese tend to build average bonds and dependence to their locality and is not the leading contributor to PA intensity. An analysis of correlations with age indicates that there are relatively significant differences amongst the six age cohort means, and that older people are often found to be more attached than younger people since people tend to internalise their home place over time, and eventually the place becomes an extension of the self. Contrary to the CNT findings, PA is stronger the lower the education level of the respondent, both in terms of PA Overall, and consistently across the three sub-scales (statistically significant). However, even though PA increases with educational achievement, age still remains a stronger determinant for increased PA.

A ranking of the 13 locality PA means indicates that respondents had a relatively high place attachment to the areas where they live in, however localities with high connectedness to NATURA 2000 sites also show significantly improved PA intensity as against the control sites. These results suggest that people who live in proximity to NATURA 2000 sites are more attached to their homes and local areas than people who live in localities which are not. Again, certain localities in Gozo, despite their high environmental quality and attributes, still scored lower than the Maltese localities which suggests that increased PA does not necessarily depend upon pristine physical qualities but may be derived from other negative or positive environmental features such as economic or social aspects. The hotspot cluster analysis also indicates intensely appreciated areas close to home, and that places of PA are spread along the islands. It also suggests that respondents living in Malta did not indicate places of attachment on the island of Gozo, and similarly vice versa, probably since PA is deemed to be more localised and does not extend beyond the neighbourhood level. The bulk of special places of attachment lie equally either in NATURA 2000 (41%) or Urban Conservation Areas (41%).

7.7.3 EB results

The composite mean score for EB intensity specified by the participants suggests a relatively low environmental behaviour mean below the median. However, it is also evident that cluster respondents living in areas close to NATURA 2000 sites also scored higher than those living in control sites. It was also noted that certain localities in Gozo scored lowest in EB means. This suggests that pro-environmental behaviour does not necessarily depend on natural environments, but may be derived from other negative environmental features

such as economic or social aspects, and that despite improved pro-environmental norms over the years these are not necessarily being expressed in individual action.

Again, an analysis of correlations with age indicates indicates that EB tends to increase with age until the 50 to 59 cohort and then drops again for the 60 to 69 cohort (statistically significant). The assumption is that as people grow older they internalise environmental values and responsibilities better. However, it seems that the relationship between age and environmental behaviour also depends on the specific behaviour under study. Similarly, the study indicates that the higher a respondent's educational achievement, the more increased his or her environmental behaviour ranking (statistically significant). This is attributed to socioeconomic differences which exist between high and low academic achievers. The GIS analysis also suggests that localities in proximity of NATURA 2000 sites indicate an increase in EB means. However, Gozo means remain low overall, and can also be considered a consequence of socio-economic inequalities concentrated in particular districts, irrespective of NATURA 2000 proximity. A stepwise linear regression indicates that PA was not a strong predictor for EB, but there was a moderately strong and positive correlation between NR_Overall and EB_Overall, even across all three sub-scales. This confirms that indeed emotions like CNT play a role in people's motivation to protect the natural environment, and thus provides a further argument for trying to build CNT.

7.7.4 The relationship between CNT, PA and EB

Figure 52 indicates the strength of relationships between PA and CNT, and their subscales, with EB,. While it cannot be claimed that increased connectedness to nature and place causes individuals to engage in pro-environmental behaviours, a relationship between these cognitive factors certainly appears to exist. However, CNT does seem to be a moderate predictor for pro-environmental behaviour and results concur with the literature which suggest that individuals who care about nature and feel connected to it are more likely to take action to protect it (Dutcher et al., 2007).[915] On the other hand, the model below also indicates that place attachment does not appear to be an important factor in the prediction of pro-environmental behaviour, but still has a moderate effect size. This analysis has also exposed a number of notable exceptions to this prediction, especially in Gozo, and was mostly attributed to numerous factors that influence how Gozitans use and interpret their surroundings and natural areas.

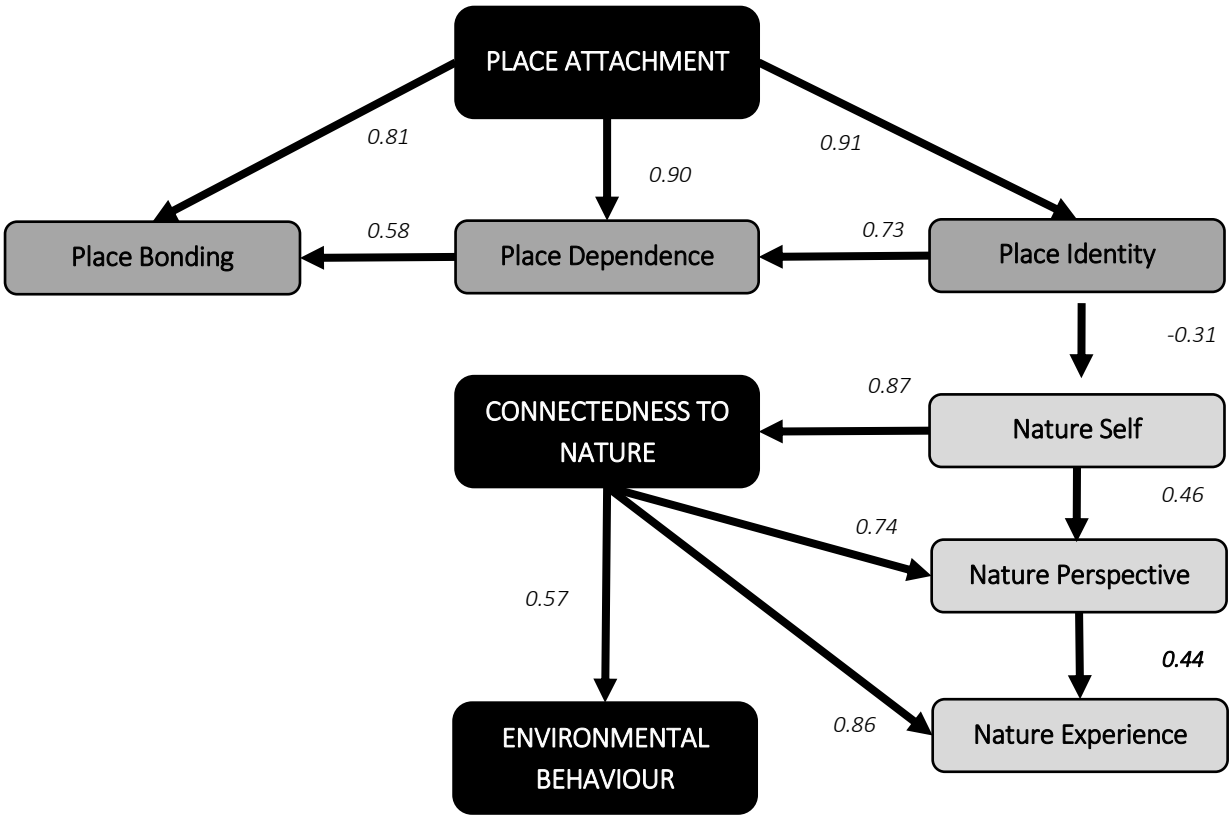


Figure 52 - Predictive relationships between the social constructs of CNT, PA and EB and their sub-factors for a Maltese sample population (n=401).

These findings, combined with the results arising from the examination of the effect of a number of other variables such as educational achievement and age, provide an important contribution to our understanding of an individual's relationship with place and nature, and how these variables may contribute to pro-environmental behaviour. In conclusion, the statistical analysis of CNT and PA constructs is in fact a good tool for expressing socio-cultural values in planning.

7.7.5 CNT, PA and EB in relation to locality

The main implications of these findings is that overall communities living with NATURA 2000 areas within or around their locality have increased means for CNT, PA and EB in comparison to the four control sites, but this difference is only statistically significant with locality for PA. A comparison of CNT and PA special places lying within NATURA 2000 and UCA polygons is presented in Table 102 below. The results also suggest that while places of CNT identified are in fact mostly within or close to natural areas, a lot of participants indicated that places of attachment lie equally between natural areas, as well as locations near home and within protected urban neighbourhoods (UCAs) in their localities. However, it is also evident that location does have an effect on all three constructs, and that Sliema is not an ideal control site since it skews control results significantly for CNT and EB. This also suggests that PA can be fostered even by environments that are not

ostensibly 'natural', and should serve as a cue to planners to provide or improve the fragmented green enclaves within urban areas and the quality of the urban fabric in general. This is necessary not only because of their value to biodiversity and their ability to promote sustainable communities, but also due to their potential contribution to increased PA and CNT, and their direct impact on pro-EB. The maintenance and promotion of protected areas and development of urban parks remains crucial to provide important benefits like improved mental health, social benefits, economic returns and sustainability. The results also suggest that PA and CNT are in fact quite different social and spatial constructs, with clearly diverse, but also common, physical locations of attachment or connectedness.

Table 102 - Comparison of CNT and PA points lying within NATURA 2000 and UCA polygons

	CNT			PA		
	Points	%	Localities	Points	%	Localities
n	*739*			*818*		
NATURA 2000	467	61%	18/34	332	41%	16/34
UCA	114	15%	19/60	334	41%	17/60
Elsewhere	*158*	*24%*		*152*	*18%*	

The spatial representation and online GIS tool has potential implications for land managers and the NATURA 2000 site management. Any aspirations towards environmental management/conservation in specific sites of high CNT or PA could lead to conflict with affected users due to imposition of constraints, and issues of significance are typically quickly contested by local stakeholders and politicised. As pointed out, the sites with highest frequency of CNT are in fact some of our most visited and threatened NATURA 2000 sites in need of improved access and visitor control (Dwejra, Ramla Bay). Clearly more can be done to spread awareness about other NATURA 2000 sites, especially sites which are soon becoming more accessible (Salini, Simar, Maghluq Tal-Bahar, Marsaskala). However, ultimately increased human activity in these already impoverished sites could also be a threat to biodiversity if unmanaged. Making this GIS available online can facilitate community participation as a means of extending knowledge networks and enabling a more informed debate. This is especially useful in an environment where there are numerous public concerns about the inclusivity of planning frameworks, and huge suspicion that development planning and the development control process are simply a political process which might be serving certain vested interests and not others (Harrison & Mordechai, 2002).[916] Lack of awareness, scepticism and suspicion about the efficacy of participation, as well as lack of trust in local government, all influence public attitudes towards active engagement with the planning system. This bleak background, and increased pressure to ensure public participation, requires adaptation in order to critically collect and examine public attitudes and values. Socio-spatial approaches and GIS tools as presented in this study provide a fresh and effective method of engaging with affected communities more surreptitiously in order to identify numerous underlying factors that can be

leveraged towards protecting and managing special places, both in the natural and urban environment, better.

7.8 Practitioner validation and reflections

As an additional assessment component, the methodology developed in this study and the results obtained were discussed with four key planners and policy-makers to obtain their views on the value added of the proposed socio-spatial approach to protected area management. Interviews where held with a senior policy officer at the Planning Authority, two academics involved in the Faculty for the Built Environment but who also regularly serve as planning consultants to the PA, and an academic from the Faculty of Economics, Management & Accountancy specialised in Environmental Economics. Attempts to solicit feedback from top-management at ERA were unsuccessful; I was given the opportunity to meet two officials, but unfortunately the study results were deemed to be beyond their remit, which was more focused on EIAs and enforcement. Names have been withheld to safeguard privacy. A semi-structured interview with open-ended questions was employed for purposes of this validation exercise (Appendix 16 - Policy makers' validation interview). These interviews aimed to discuss the relevance of place attachment and CNT considerations, both conceptually and in terms of their spatial manifestations, and the potential for their consideration in environmental policy making and planning.

The interview structure itself was composed of guide questions, each of which included a brief introductory note explaining the subject in caption. An open-ended approach was undertaken since it can evoke responses that are meaningful and salient to the researcher, "*unanticipated, rich and explanatory in nature*" (Mach, Woodsong, MacQueen, Guest and Namey, 2005, 4). It also allows for an opportunity to receive unconstrained, objective feedback on the strengths, weaknesses, utility or potential limitations of the results and analytical framework developed. Another advantage of qualitative interviews is that they allow the researcher the flexibility to probe initial interviewee replies by following up with the questions why or how (Mach et al., 2005). A formal request to take part in this study was sent via email to the selected key experts, and a written informed consent document in accordance with procedures specified for the study was given by hand to each expert. After being presented with an outline of the methodology and of the results derived, respondents were asked to consider the potential utility of the method developed within the context of their professional work.

Planning Authority Interview

The respondent was asked whether the Authority had interest in considering the implications of socio-spatial factors like people's attachment to place and nature when developing policy . The respondent remarked that the Authority was aware about the value of understanding interactons between place and

nature, and the relevance of identifying places of such attachment for planning. In fact, the respondent observed that the recently-issued Strategic Plan for the Environment and Development (SPED) was considered to be a first step forward in addressing spatial policy and issues on the islands, and was based on a complex legacy of prior development and structure plans. Nonetheless, the respondent could appreciate that the plan remains vague in terms of specific socio-spatial considerations. The major purpose of the SPED from his point of view was mostly to resolve the previous mix match of policy directions and focused measures, while reducing the number of strategic policy directions (from 230 down to 160). The intention remains that the proposed revision down to three Local Plans will facilitate technical and operational implementation, and his opinion was that socio-spatial interactions with place and nature could and should be considered within new Local Plans and guidelines. The respondent acknowledged that the human-cognitive point of view is not sufficiently included in current planning overall, and noted that despite the benefits, it seems unlikely that the new Local Plans will look at these social factors in such detail due to numerous limitations. The utility of these results would certainly help inform policy but the interest in making use of such results seems lacking to-date. The respondent noted that this is part of a wider issue, with inadequate resources allocated to social analysis/studies, and with no formal effort undertaken to follow and incorporate academic research findings. The respondent confirmed that no other specific studies of this nature, besides the 2004 landscape study, have been undertaken. Nonetheless, the new Authority is still establishing its internal functions since the MEPA demerger which came into force 4 April 2016.

Asked whether the Authority was effectively engaging with its constituency, the respondent agreed there was no doubt that it was not doing enough and the reality remains that social input in the overall process is not actively sought out, let alone considered at the level proposed in this study. Consultation is limited to the bare legal requirement, typically with simple requests for comments/objections. This in many ways has served the Authority well in view of its limited resources. The sheer volume of applications for development received puts immense pressure on the Authority to react fast and equitably. However, strong and vocal stakeholder groupings in Malta can create huge power struggles and do not go unnoticed by the politician, who is tasked with sustaining economic drive. Consequently, the respondent felt that perhaps the Authority might appear to be apprehensive of public engagement and consultation. It is not an easy rope to walk, but ultimately there is no doubt that under the current framework, stronger voices are bound to drown out weaker ones in public engagement, creating trust barriers.

There was agreement that such socio-spatial studies could offer better insight into public expectations, especially since it is clear that trust in the Authority was in decline. The respondent also argued that it would be relevant to consider the results and recommendations specifically for envisaged green urban spaces and protected area interventions. There is already a strong element of legal protection, and improved

Development Guidelines published in 2016 which emphasise the value of quality places, as well as the NATURA 2000 management plans launched in 2016 which fall under the remit of ERA. Consideration of special places could help inform implementation of these action plans. However, it was noted that certain planning decisions remain out of the Authority's hands, politically speaking and that the Authority is limited in the extent of forward planning capacity. He also remarked that to a major extent, the Authority and Planning Boards can only be guided by development control issues as dictated by existing DC guidelines, Local Plans, legislation and ultimately applicants' goodwill. In conclusion, it was noted that this sort of exploratory background study is interesting and relevant but the Authority does not have any immediate plans to engage with such considerations at an extensive level.

Faculty of Built Environment interviews

Two academics from the Faculty of Built Environment with extensive experience in planning and who have acted as external urban design and planning consultants to the PA were interviewed. Their experience included the drafting of the original Local Plans draft, contributions to numerous EIAs, the '*Planning Policy Guide on the Use and Applicability of the Floor Area Ratio 2014 (FAR)*, the '*Development Control Design Policy, Guidance and Standards 2015 (DC15)*, and the '*Policy, Guidance and Standards for Outdoor Catering Areas on Public Open Spaces 2016*'.

Respondents noted that there is no doubt that it is critical to understand how people relate to place since at the end of the day, a major component of liveability is place-making, which is the ability to relate to meaningful places as opposed to having anonymous spaces that solely function as breathing spaces but do not contribute to wider quality of life objectives. Unfortunately, place attachment/connectedness to nature hardly features prominently and directly in local policy-making. Relevant research efforts were noted, like the undergoing study on the socio-spatial impact of specific V18 projects in Valletta in research commissioned by the V18 Foundation, and the development of a PPGIS framework and GozoMap tool which served as a platform for the evaluation of selected themes from the ecoGozo action plan (Attard, 2014).[917] The inclusion of place attachment and the role it could play in identitying special places is a critical piece of information to enable policymakers and civil society alike in safeguarding protected areas. However, there is no guarantee that these results could find their way into policy-making since there are no policies that deal with the subject of socio-spatial planning.

With regards to public consultation, consultation periods are in place (as with the case of DC15); respondent also noted that these are often extended in order to enable a wide representation of issues to occur, and all feedback received is responded to and used to improve policy (again based on DC15). That said, the process is still top-down to a large extent, and there has been very little attempt at bottom-up initiatives

that would in turn result in new policy. It was argued that engagement from the public remains largely limited to trying to secure a 'no- development' commitment for these areas and often perceived as an attempt to simply not affect their personal amenity and/or property value. Respondents argued that the role of professionals such as urban designers should be as enablers or facilitators to bridge the gap between the policy-maker and the community and to help articulate/consolidate issues, concerns and needs raised by the community into a tangible framework.

The GIS platform developed in this study was deemed to be extremely useful; however the challenge noted was how to make this interface accessible to policy-makers or members of the general public with no prior experience of online GIS. The question of accessibility to technology also remains a critical one, in an age of digital divide. Often multiple channels might be necessary (possibly through a system of layering within this same interface) to enable wider accessibility for different target users. Respondents argued that at present the interface is better suited for the academic and policy-maker, rather than for civil society. They also agreed that there are differences in the level of engagement/interest for different sites. This is very much dependent on who the key stakeholders are and the role/influence that they might have on the planning process. This has certainly been the case in their research with regard to the achievement of design quality in the built environment. These data layers should feed into plans/policies directly, and this information is necessary for upcoming Local Plan revisions and future strategic considerations at the level of the SPED. Key results and observations from the data should be extracted in order to be articulated into effective policy.

They also confirmed the relevance of understanding how socio-spatial learning can inform protect area management and strategy. From their point of view, this could help pre-empting potential consequences on behaviour and relationship with space. However, such a spatial strategy needs to be a part-top-down (in that it is informed by data and research) and part-bottom-up (in that it needs to be also informed by the community's needs, concerns and aspirations) strategy. It starts from an understanding of place in the physical sense, proceeds with the understanding of the main behavioural dynamics that influence, and are influenced by space, i.e., the social implications of space. Importantly one should strive to understand (both qualitatively and quantitatively) the impacts of interventions on key determinants such as perception of space (and identity), accessibility, etc.

When discussing the priority actions needed to bring about changes in the legal and institutional framework, in their view this rests on three key determinants in planning: namely governance structures (both formal and informal institutions), stakeholder influence (who is taking decisions ultimately and why), and negotiations occurring between such stakeholders (and the influence exerted by stakeholders in such negotiations).

Faculty of Economics, Management & Accountancy interview

The FEMA academic was particularly interested in the implications of the study, especially nature deficit issues, and was keen to see a line of research which tries to establish baselines for these three social factors. Environmental behaviour was of particular interest since it ties in with related work being undertaken by the Faculty, mostly related to happiness and well-being. The results of this study could offer an interesting background to their work, since it establishes clear baselines which have utility within Environmental economics studies.

While the academic utility of these results was clear to the respondent, the academic had serious concerns as to whether local planning would in fact consider the implications of CNT and PA on EB, and that in most probability this was just another crucial layer of data that would still be ignored by authorities, unless a radical shift in mindset and internal training to this effect was undertaken in the medium term. From the respondent's point of view, since species do not vote (only people do), then it was hardly likely that there would be political interest and the necessary drive to include this approach in the spatial strategy, and to actually involve the public more in the management of protected areas. Public good concerns were discussed, with study findings confirming disparities between the values people attribute to nature and place. The respondent argued that ultimately the best hope remains in improved awareness and education in order to develop a sense of belonging in nature. The respondent emphasised that communication and education were in fact not the same thing, and should be approached differently. She was also in complete agreement with ensuring improved life experiences with nature as indicated in the findings, and was happy to note that finally baselines of CNT and EB are available for Malta. The identification of these places through this study was deemed to be very important for connecting people to them. Besides obligations of local authorities and Local Councils, schools and parents could also help establish links to these places in nature during childhood. The study overall was considered to provide an important contribution which could certainly be used to establish environmental economic models that examine the predictive potential of PA and CNT on EB and location, and apply other social factors of relevance to environmental economics like happiness, well-being and quality of life for instance.

Conclusion

All the professional practitioners interviewed agreed that the method and results could make a valuable contribution to the policy making process, with several observing that such perspective maps would be particularly useful for consideration at the level of strategic policy formulation. The results provide useful insights for policymakers striving to find methods of including socio-spatial perspectives in environmental management and planning. Further refining of the visual presentation of certain GIS results was recommended, but respondents appreciated the proof of concept value at this stage and limitations of being dependent on a 3rd party webGIS.

Key strengths of the methods and results highlighted by respondents are listed below:

1. Potential to better guide strategic planning initiatives.
2. Potential to increase public input into policy-making, and contribute to bridging a gap.
3. Relatively low resource requirements, while simultaneously offering a robust output.
4. Offers a way of presenting and communicating visual summaries of relatively complex social and spatial dimensions.
5. Presentation of visual summaries with ease, allowing for quick and multi-layered interpretations of places under focus.
6. Results offer the ability to compare the perceptions of different community groups, and can help inform both experts and the public via web-based GIS.

Additionally, respondents also pointed out that in order to increase socio-spatial considerations in planning the following provisos would need to be addressed:

1. The need to build internal commitment and capacity to be able to conduct such work.
2. The need to ensure authorities and politicians are genuinely interested in using such techniques in practice.
3. The need to assess what weighting should be given to such public input in the first place, and how best to find a relative balance between technical and public opinion.

8 Implications for protected area management and socio-spatial planning

Development pressures on Outside Development Zone (ODZ) areas in Malta have been facilitated by development control guidelines like the Rural Policy and Design Guidance, 2014. A revision of local plans is expected to limit ODZ areas even further, as occurred in 2006, in order to accommodate population and economic growth. This is particularly crucial to Malta in view of its intense population density, limited carrying capacity and insularity. Consequently, there is no doubt that place is becoming an important subject in protected area management, and has a growing influence on numerous facets of environmental planning like place-based conservation and community-based collaboration (Brown and Weber, 2013).[918] In fact, there is growing realization that places can no longer be managed as a simple flow of goods and services and that we must also be cognisant of how the public has come to value these places. For this reason, there is an increasing emphasis on identifying 'special places' and growing attempts to include collaborative place-based approaches into the planning processes (Kruger & Jakes, 2003; [919] Stewart, Williams and Kruger, 2013).[920] Understanding how urban ecologies operate and how one can relate to the changes required for social change, entails a deep understanding of the structures that make up that society (Buttigieg et al., 2015).[921]

Biodiversity conservation decisions undoubtedly require an appreciation of the social system within which these actions will be applied. However multi-stakeholder and multi-scale decision making for conservation exposes complex interactions between social and ecological systems. Accounting for social-ecological system interactions in conservation decision making requires we understand how people are attached and connected to their environment in order to make conservation decisions that are more likely to succeed (Budiharta et al., 2013).[922] It follows then that any place and evidence-based adaptive management recommendations must integrate socio-political factors. Furthermore, active participation and understanding of place meanings within planning frameworks can help identify points of agreement that provide a foundation for community solidarity and collective action, as well as for addressing contested issues (Fresque-Baxter and Armitage, 2012[923]; Chapin and Knapp, 2015).[924]

This work is of relevance to protected area management and socio-spatial planning theory worldwide, but is focused on the Maltese Islands as its study area in view of its population density and stakeholder conflict due to intense land use change on a small island state. As noted, this research sought to leverage CNT, PA and EB concepts to acquire a better understanding of constraints and opportunities in relation to protected area management. Based on the results presented in Chapter 7, this chapter seeks to answer a number of key questions and to focus more explicitly on the implications for protected area management: How can these

results help protected area management? What practical recommendations can be drawn from CNT and PA research for pro-EB and protected area planning? How can planners and pracitioners use these results for protected area management and socio-spatial planning? How can the research methods be improved? The first section discusses the potential opportunities of leveraging attachments to place and nature for protected area management. The second section provides recommendations to include community values for place in protected area management in order to help increase CNT and PA. It also explores how these places of attachment can be considerd in policy and existing green spaces. In the third and final section, a number of reflections are made on the method and results can have on management of protected areas, and highlights potential research opportunities arising from this study.

8.1 Implications of attachments to place and nature for protected area management

This study argues that there is an urgent need for tools to locate rural and urban spaces that have important social or ecological values, and to in some way quantify their relative importance (Mahboubi 2015).[925] Therefore location-based evidence of socio-spatial interactions becomes essential to offer contextual solutions planning strategies and planning which take account of experiential and behavioural consequences of people being attached to a place. Furthermore, cognitive constructs and local values of place shows a distinct spatiality which has clear relevance for spatial planning and protected area management. This 'intangible' information remains as important as more physical and objective data typically used in planning (Jordaan, 2015).[926] Social appraisals in search of this hidden human landscape can be quite effective to understand normative views of people-place relations and could act as an entry point to appreciate the wider ideological picture of how places are used and how the community can participate in their conservation (Fleury-Bahi et al., 2017).[927]

Moreover, strong values have been shown to inspire behavioural responses which either protect or exploit a place or landscape when the conditions are right (Brown and Weber, 2012).[928] These two divergent behavioural inclinations to protect or exploit are very apparent in Malta - between those who pursue land use change in order to leverage its social or natural value and those who wish to preserve the status quo of ongoing development. Unfortunately, this conflict leads to a situation in which planners or developers tend to frame any new proposals for development or change only in economic terms and vague community gain simply to minimise conflict (e.g. potential no. of shops and jobs created), or to confound objectors. This typically results in little meaningful consideration of 'intangible' but strong values of the community to those places, nor their long term improvement. Even within political discourse, the environment seems to be simply understood in relation to human activity and valued as a commodity. This is a dangerous path to take if planners are expecting the involvement of a highly motivated community willing to play its part.

In view of the above concerns and opportunites, environmental management should not only depend on efforts by regulatory bodies, but also on leveraging individual choices and behaviour (Bronfman and Cisternas, 2015).[929] Consequently, it remains imperative to appreciate the determinant factors which affect people's behaviours and attitudes in order to foster sustainable development. Despite a healthy body of knowledge justifying the need to understand how humans and nature interact with their environments like place, there seem to have been few attempts to explain these relationships via spatial frameworks in a manner which may contribute to their operationalisation for practical policy purposes. This seems mostly related to the fact that the relationship between cognitive factors like CNT, PA and EB remain hard to determine, and there is no obvious nor predictable pathway to understanding how these values influence human behaviour and protected area management.

An important function of environmental planning is defining the current baseline, which impacts to assess, how to evaluate interventions, and what is a tolerable level of risk. However, when making these complex decisions, policymakers must also decide whether and how to reflect public and expert attitudes or expectations (Solomon and Abelson, 2013).[930] Another challenge is how best to assess socio-economic aspects when assessing places and risks since this requires a complex integration of scientific, social and economic disciplines, along with traditional biological and ecological planning approaches (Melissa et al., 2016).[931] By its very nature, multidisciplinary research brings together different academic institutions that typically have different research approaches, scientific languages, cultures, perspectives, and methods of communication (Bracken and Oughton 2006;[932] Evely et al., 2008;[933] Miller et al., 2008);[934] which still manifests itself in a gap between natural and social scientists and limits the effectiveness of conservation action (Fox et al., 2006).[935]

Even though the methodology developed cannot be considered to be fully participatory in the traditional sense, it still pushes the boundaries of public involvement especially in the local context, where proper participation remains lacking. It should also provide policy makers with an opportunity to evaluate the extent to which the method can inform protected area planning and management in a way that reflects public affinities or attachments to special places. It further provides insight into how special places can contribute towards increased pro-environmental behaviour, and improved protected area management. Furthermore, the spatial outputs generated can readily feed a new social perspective when assessing place designations or management interventions. Furthermore, most planning authorities have finite resources (human, financial, time) to engage in community consultation and public participation processes to their fullest extent. This study proposes a relatively quick and novel methodological framework for socio-spatial assessment, based on a structured procedure using simple analytical methods and GIS models.

The practicality of deeper meanings towards place in protected area management comes to the fore in a recent work by Newman et al. (2017),[936] who drew on the literature and their own research results to recommend ways how environmental management can leverage the power of place and become more relevant to decision making. They grouped their recommendations as follows (adapted in brief below):

1) Explicitly incorporate attachment to place and nature into project design and implementation.
    a. Use power of place to co-identify issues, goals, and objectives;
    b. Tie conservation science to identified social priority stressors, attachment phenomena, and baseline needs;
    c. Make decisions regarding changes based on initial data;
    d. Bring in citizen inputs to evaluate impacts of interventions and progress towards goals;
    e. Promote identification with place and nature as a motivator for increased environmental behaviour, volunteer recruitment and retention.

2) Consider attachment to place and nature in project and platform design, especially related to baseline data.
    a. Include ecological interconnections of place;
    b. Document protocols and data following metadata standards;
    c. Ensure data are geo-located and use geospatial analysis and GIS;
    d. Make data open and promote open science.

3) Increase place-based collaboration in protected area management.
    a. Create place-based networks for collective impact;
    b. Pool citizen socio-spatial information & resources;
    c. Connect with decision-makers;
    d. Collaborate with small-scale projects.

The CNT, PA and EB baselines and analysis obtained through this study offer another crucial perspective beyond that offered by the natural, social, cultural, political and economic sciences, which are especially relevant for local environmental planning debates, or to foster behavioural change. The results show significant differences among the respondents' orientations towards place and how they connect with it and nature, suggesting that people who live in proximity to NATURA 2000 sites are more attached and connected to their local areas than people who live in other localities, albeit with exceptions. In fact, demographic variables like age and educational achievement were also noted to be strong predictors for CNT and EB, whereas only educational achievement was deemed to be a predictor for PA. This is in line with the literature which also found no effect of place attachment on conservation behaviour despite an increased concern for

environmental and human concerns (Gosling et al., 2010),[937] but contrary to findings by others who found that attachment to specific places not only increases pro-environmental behaviours in place but more broadly as well (Vaske et al., 2001;[938] Halpenny, 2010).[939] The results of this study recognise that there is no one-size-fits-all approach to public engagement and that more context dependent strategies are needed to engage with people of different age groups or levels of education in protected area management since they seem to value nature and place differently across time.

It is also important to point out that that past and present time spent in nature consistently predicts connection to a greater degree than other factors (E. Kals et al., 1999),[940] and childhood nature contact and outdoor experiences seems to be a critical component for fostering adult pro-environmental behaviour (Cheng et al., 2010).[941] Consequently, any environmental school education which hopes to foster a greater connection between youth and nature must communicate positive environmental values in the home, involve parents in environmental education and nature exploration within protected areas or green spaces, foster relational thinking and mindfulness, and encourage children to empathize and engage in perspective-taking with nature (Tam, 2012).[942]

Furthermore, ecosystem management should stand to gain from the mapping of social or personal meanings people attribute to nature, how we view human-environment relationships and the extent to which people agree or disagree on these meanings (Brown et al., 2013).[943] Socio-spatial mapping could also provide insights into potential conflicts that are expected to ensue over capacity thresholds vis a vis environmental constraints and priorities at different spatial scales. The underlying premise for this work remains that an understanding of the human experience and value to place deserves its consideration in environmental planning and development control practice. This implies a shift towards linking spatial patterns to social dynamics/dimensions at the neighbourhood level in order to inform strategic planning frameworks which improve urban quality of life and protected area management. Brown, Raymond and Corcoran (2015)[944] suggest that the mapping of PA enables policy makers to identify those personal connections to place which could lead to tangible place protection (Devine-Wright, 2009).[945] They also argue that the ability to appreciate the value people attach to places across a grander spatial scale beyond the boundaries of one's home, could help them appreciate the overall importance to the region even if they personally do not value these places. Similarly, the potential to analyse social constructs at the spatial level, and against relevant environmental geo-data, could help prioritise and target place-protective actions to areas of concern (Devine-Wright, 2009), and help predict areas of community support or land use conflict (Brown and Raymond, 2014).[946]

The added dimension of mapping these social constructs facilitates overlaying of different data layers,

allowing for a combined analysis of the values that members of a community attribute to nature and place. This socio-spatial projection is also expected to provide a useful perspective for resource managers to be aware of and take into consideration the public's values in place-based protected area management; and build an argument for socio-spatial analysis of these social constructs for environmental planning. The online GIS tool provides for the overlay of data layers for points of PA and CNT, and their assessment against scientifically based conservation priorities within and adjacent to Natura2000 sites. The final aim was to explore ways of managing areas for people and with people instead of just managing resources, and to understand the relevance of those attachments to key management issues. It also provides an insight into the conflicting social constructs which come into play when attempting to protect places from people for people and with people.

These results also suggest that attention must not only be placed on 'natural' protected areas, but also on urban areas where the processes of social and bio-physical changes impact directly on the same kinds of spaces which are created and destroyed. These appropriations of nature can have implications not only on people's health and well-being, but also on pro-environmental behaviour therefore it remains critical that planners provide for meaningful and greener places within the urban landscape (Heynan et al.; 2005).[947]

8.2 Recommendations for increasing CNT and PA

This study argues that protected area management needs a better understanding of the 'community' in protected area management, and how our attachment to nature and place has value for increasing pro-environmental behaviour. Despite the numerous constraints and logistical challenges in assessing complex relationships between human activities and place within formal planning frameworks, it remains critical to persist since the reluctance to internalise planning as a social and political process has led to many failures (Brechin et al. 2002).[948] The proposed methodological framework provides a way to layer social constructs in GIS and environmental decision making, in a way which lends itself towards 'deeper' levels of engagement and interaction for 'co-design' with the community.

From a planning and development control point of view, it is recommended that the social-cultural-ecological concepts of place and nature should be at least considered, and ideally integrated in current planning frameworks related to environmental management. This requires a major shift towards environmental management which recognises human perception and action within environmental settings (Raymond et al. 2017)[949]. Raymond further suggests that this approach could help overcome the "*implicit separateness or duality between ecology, psychological processes and culture, and moves discussions towards a truly relational view that sees biophysical and social components not only as interrelated, but as co-*

constituted" (Muhar et al.; 2017).[950] presents a model (**Figure 53**) designed to function as an "*add-on module*" to planning frameworks, rather than proposing to replace them. The model operationalises the current relationship between the different understandings of the human-nature relationship and the situational factors which together influence certain behaviour, both individually and collectively. It also displays the structure of existing frameworks (dashed lines) and proposed (solid lines) new connections or extensions between these determining factors and their interactions.

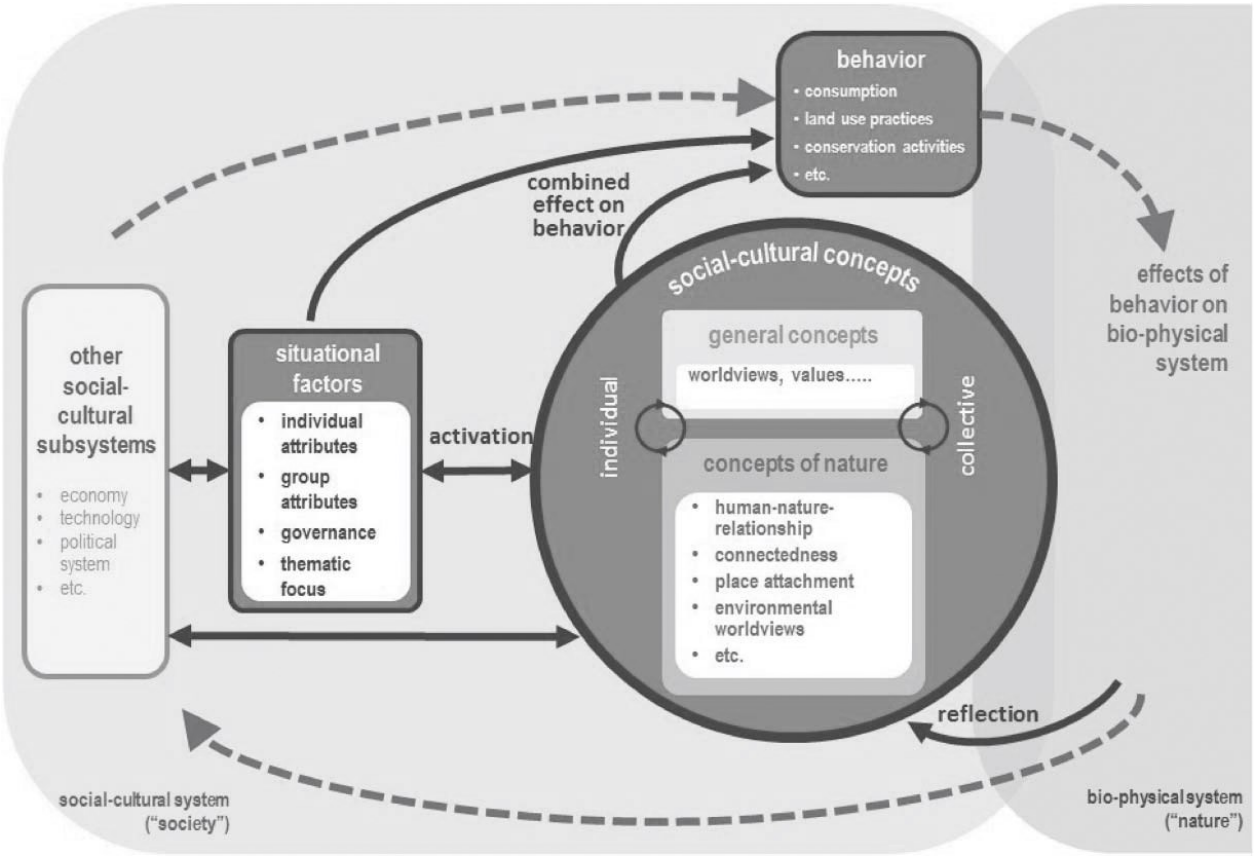


Figure 53 - A model for integrating social-cultural concepts into frameworks of interaction between social and natural systems: dashed lines refer to the structure of existing frameworks and solid lines indicate the proposed extension. Muhar et al. (2017).

EIA frameworks would also benefit from the inclusion of this approach for social impact assessments undertaken as part of Strategic Assement and EIA methodology. This would help include the public further, in the process improving credibility, while ensuring that EIA and SIA management tools are taken seriously within development control and planning frameworks. Such credibility is an important consideration for Malta where land use is often at the core of politically charged controversies and public outcry.

Furthermore, results of this study suggest that the lower mean scores for NR_experience imply that much more needs to be done to provide improved opportunities to engage with and value physical

experiences in the natural world. These opportunities must be context dependent, and able to cater for different target demographic groups, especially in terms of age and educational achievement. This requires the maintenance of an acceptable level of green spaces and an improved urban quality that can stimulates a sense of identity or experience with place or deeper nature. Green spaces can also help improve resilience to extreme environmental events such as heat waves (by mitigating the urban heat island effect) and extreme rainfall (by reducing surface run-off). Communities with green spaces are likely to have healthier citizens and therefore reduced demands on health services, contributing to a stronger economy (WHO, 2016).[951]

Similar arguments are relevant for increasing attachment to both place and nature in the Central area and Gozo regions, within which results indicate lower attachment and connectedness means. This is also relevant if authorities wish to improve pro-environmental behaviour. Consequently, investing in ecological or green infrastructure in both natural protected areas , and the restoration of ecosystems occurring in proximity of urban conservation areas, is not only socially desirable but also quite often economically advantageous (Elmqvist et al. 2015).[952] Green spaces also help to improve resilience to extreme environmental events such as heat waves (by mitigating the urban heat island effect) and extreme rainfall (by reducing surface run-off). Communities with green spaces are likely to have healthier citizens and therefore reduced demands on health services, contributing to a stronger economy (WHO, 2016).[953]

Nonetheless, despite the importance of green spaces, Frendo (2016)[954] notes that when compared with contexts elsewhere, the availability of green spaces within conurbations in Malta is significantly low - the total area of UGS typologies within the Conurbation averages out at 6.95 sqm per capita value, lower than other cities like Berlin and Edinburgh, with 16.35 and 31.39 sqm per capita respectively. Frendo provides an appreciation and inventory of existing open green spaces which was lacking in the local planning system. He identifies eight typologies of urban green infrastructure (UGI) or urban green spaces (UGS) presently available within the Grand Harbour and Central Region conurbation (Table 103) as a study area, and that could be valorised as green open spaces. He also gathered information relating to these available spaces mainly in terms of their spatial characteristics, typology, location, ownership, planning designation and values, and mapped them for policy use. One of the key outcomes of Frendo's study was that the most tangible approach to increasing natural and open spaces in these areas should be aimed first towards appreciating the existing green spaces present, in addition to increasing them. The typologies identified include numerous protected areas, and could work in tandem with results noted in this research effort which also identified numerous other special places. Places within the urban fabric, and which are appreciated as places of attachment (playgrounds, churches, views, village squares) or of connectedness to nature (ex. Protected areas, public gardens, peri-urban fringes, open spaces, coastal views, promenades, farmhouse, etc). The focus on the central conurbation provides an interesting number of sites which could help develop CNT and PA in Malta;

especially since space is so contested and the distinction between rural protected areas and urban or built areas is somewhat blurred due to the huge anthropogenic pressures. The GIS map is reproduced with permission in '**Appendix 15 - Potential urban green spaces within the Grand Harbour conurbation which could be valorised to help increase CNT and PA (Frendo 2016)**'.

Table 103 - Typology of urban green infrastructure (UGI) and urban green spaces (UGS) presently available within the Grand Harbour and Central Region conurbation

Category A	Green Sport Facilities	This typology includes sport areas with hard landscaping which are surrounded by a degree of soft landscaping.
	Public Gardens, parks and recreational Areas	Public gardens and parks are green areas within urban areas intended for formal recreational use.
	POPS - Private Owned Public Spaces	This typology is mostly present in hotel areas within the conurbation.
Category B	Informal Urban Greenspace	informal urban greenspaces include abandoned areas and brownfields with sporadic or ruderal vegetation.
	UGS connected grey infrastructure	This typology is composed of formal green patches found in road infrastructure.
	Natural and semi-natural areas	These consist of natural or planted areas of dense tree vegetation or shrub-land.
	Cemetries	This typology consists of burial ground often covered with green patches, trees and other ornamental plants.
Category C	Vacant lots	Some of these spaces are left open and people can freely venture in them.
	Agricultural areas and urban agriculture	Agricultural areas have been divided further into two types, those designated as 'outside development zone' and those which are within the development zones.

The above GIS data layers in combination with the online GIS tool can help identify priority areas for action and identifying hotspots of increased attachment and connectedness. It could help inform the implementation of the NATURA 2000 management plans (2016), and provide opportunities for the authorities to engage with the general public for their views and help with special places. Attention should also be placed on emerging Privately Owned Public Spaces (POPS), which refers to publicly accessible spaces provided and maintained by private developers, offices or residential building owners (GiGL).[955] These '*pseudo-public spaces*' tend to provide functional amenities for the public, are free to enjoy but have certain restraints to use and access. Such places have also been mentioned by some respondents as being places of attachment or connectedness for them personally (ex. Tigne - Midi in Sliema, Palazzo Parisio in Naxxar, or San Anton Gardens in Attard). A more focused approach using would provide a better oversight of how attachment or connectedness to nature and place develops, and allows for policy protection for fair use also in the interest of the general public, especially when the commodification of public land is concerned.

It is also relevant to point out that more needs to be done within the built environment since a quality urban and built environment also has a motivating effect on society, and ultimately sustains its attachment to place and its own identity (Anton and Lawrence, 2014).[956] The psychological benefits of being surrounded by aesthetically pleasing buildings and public spaces remain critical for the well-being of a balanced society. Unfortunately, most public spaces in Malta are usually the remnant space between roads and buildings, and the public realm is on the whole a medley of badly constructed pavements, randomly placed street furniture with hardly any landscaping or tree planting to offer sensory interest or respite from the elements (Kamra tal-Periti 2007).[957] The end result is that the quality of our urban open and built spaces is often poor, often failing to appreciate the value of quality in design and planning; and could have implications with how people connect or attach with those places.

These results and the GIS data layers created also have a broader applicability for action at the local council level that intends to valorise community values and creating bonding opportunities to places in their communities. Ensuring quality places and landscapes requires that we not only preserve topographic and natural elements at the landscape or protected area level, but also promote visual character at the neighbourhood level. Results suggest that other factors and interventions beyond the physical features can help create attachment to place and nature by also promoting social networking and bonding opportunities. This implies planning and investing towards:

- Promoting and conserving the aesthetic quality of the built environment, especially within UCAs.
- Providing a combination of open and closed spaces which use public art and symbolic architecture in order to stimulate the senses, create meaning and highlight the area’s history and society's identity.
- Considering various activities that help create connectedness with place and nature for different age-or education groups.
- Providing instructive public spaces like interpretations centres for the locality.
- Increasing social participation formal and informal participation by local communities in village activities like national celebrations and tailored regular event like a weekly market.
- Maintaining cultural and religious sites and ceremonies in the neighborhood.
- Empowering local councils to engage with the public via focus groups, workshops and online feedback tools.
- Creating signposted pedestrian village paths, rural trails and cycle lanes in the both the both the urban and peri-urban neighbourhood which are safe to users, and accessible to all at different times of the day.
- Improving existing sporting and cultural public places which multipurpose use (village hall, play areas, swings etc.

- Providing public conveniences and security services in public open spaces.
- Creating reliable community action groups or volunteering inititatives which involve the public like embellishment works, competitions, litter cleaning or tree planting.

Nonetheless, instilling quality and social networking opportunities in our occupied environments ultimately requires a strategic long-term vision which resists the temptation to be derailed by short-term gain or the concerns of specific interest groups. Gozo in particular must be safeguarded persistently in order to preserve the remaining rural farbric before it suffers the same fate as Malta, and to address the marked lower attachments to nature or place, and increase pro-environmental behaviour.

8.3 Reflections on method and future research directions

The method developed and used in this work successfully measures and captures public views on place attachment and connectedness to nature constructs in relation to pro-environmental behaviour within a spatial framework, using a bottom-up approach. This method highlights a systematic approach to engage with dimensions and meanings of attachment to place and nature which can in turn help policymakers assess how relation to place can help influence collaboration and priorities for protected area management. The study provides a framework that attempts to measure these 'intangible' constructs without neglecting the subjective, qualitative nature of place (Masterson 2014)[958].

Moreover, the spatial social data collected through this place-based and participatory mapping approach also provides an opportunity to assess specific social dimensions for land use planning and management, and brings attention to the psychological, biophysical and social processes that affect pro-environmental behaviour (Raymond et al 2017).[959] The generation of mapped results can assist in the prioritisation and allocation of environmental planning resources to places with high attachment or connectedness, or at specific locations. Results indicate that place-based spatial data can offer a reliable approach to identify values people attach to places and nature, and possibly leverage these values towards improved pro-environmental behaviour and protected area management, while also avoiding potential conflict with the community. However, limitations in the quantity of spatial data can limit the inferential quality of conclusions about these three social constructs and it would be prudent to gather more information about public preferences by focusing the participatory mapping adopted on a smaller area. The use of focused web-based surveys and volunteered geographic information tools could facilitate the process for participants. A further key logistical advantage of this method lies in its flexibility and potential adaptability to a range of circumstances.

To better understand the relationship between these three constructs, a number of steps could be taken by future researchers. First, the sample should be more representative of the general population within the study area. Identifying potential attachments to nature and place requires sufficient spatial data to make valid inferences. The larger the study area, the greater the quantity of spatial data required to make place-specific social inferences. In this study, the number of points available in spatial locations for some reference sites was limited. A larger sample size would not only increase the power of analysis but would permit more sophisticated multivariate techniques to take account of multiple potential covarying predictors. As a result, it is hoped that a future application of this study's protocol would produce a much larger dataset. This would not only allow re-testing of the associations found by this study, but could also help improve reporting on social baselines for monitoring of protected area management efforts., and finding an appropriate balance between professional and public input in planning. Secondly, it is important to keep in mind that the Maltese baseline sample may differ from other countries and cultures since these social contructs seem to be context dependent and cannot be simply transferred to other places elsewhere. Thirdly, a more defining role of connectedness and people's values towards nature and place, and their influence on environmental behaviour, may be better served by measuring intentions to engage or act in pro-environmental behaviours rather than past engagement. Also a more suitable alternative would be to observe participants' actual engagement in pro-environmental behaviours using widespread mobile tracking technology since interpreting the results of an observational study would be more reliable than self-reported or volunteered data. A fourth potential research direction for Malta should focus more on the social-cognitive theory influencing individual and collective pro-environmental behaviours since this literature seems lacking. Research could also help identify other social determinants which can provide shared environmental values and benefits, and promising potential lies in assessing the interplay between factors like CNT and PA in combination with other social factors like quality of life and happiness, and their potential influence on our well-being and improved commitment towards moe participatory protected area management. Other potential key areas where further research is needed could be an improved understanding of the influence these factors can have specifically on public participation and environmental economics, and how to build social and natural capital in a community by exploring links between education and increased connectedness or attachment.

While this study highlighted the importance of relationships between people, nature, friends/family and place, the information processing approaches used may not fully account for relational dynamics. This is a key point raised in Raymond et al.'s (2017)[960] embodied ecosystems paper. Further work towards exploring new methods of human-environment relationships could be developed to better understand the dynamic relations between people, nature and place over temporal scales.

9 Concluding remarks

This thesis explored the relationship between connectedness to nature, place attachment and pro-environmental behaviour, using the Maltese Islands as a case study. This thesis is based on the recognition that the public has a key role to play in making decisions about place and protected areas; and that understanding people's attachment or connectedness to special places may be the most pragmatic strategy for finding long-term solutions to planning decisions related to protected area managemen and sustainability.

Both CNT and PA (the functional, cognitive and emotional bond with a place or nature) play a role in increasing environmentally responsible behaviours. An exploration of these relationships was undertaken, first by measuring the intensity of CNT, PA and pro-environment behavioural expressed by a sample of household owners across the islands (n=401). This was followed by an examination of the correlations between these three constructs using regression analysis and structural equation modelling. The relationship between CNT, PA and pro-EB was explored further through the measurement of several related demographic factors, namely gender, age and educational achievement, in order to ascertain whether these may affect CNT, PA and EB intentions, and identify relationships between these three constructs and protected areas.

This effort enabled a more systematic understanding of the sub-dimensions of connectedness to nature (Self, Perspective, Experience) and place attachment (Identity, Dependence, Bonding), and how these relate to protected areas. For instance, NR_Experience was found to be low in comparison with the other NR Subscales, implying that more needs to be done in order to provide more opportunities to experience nature. Study results found that social demographics like age and educational achievement were moderate predictors of pro-EB. Results suggest that CNT is improved the higher the education level of the respondent, whereas PA intensity seems to manifest itself less strongly with increased education. Similarly, correlations with age indicates that there are relatively significant differences amongst the six age cohort means, and that older people are often found to be more attached than younger people to both place and nature. Results also suggest positive associations between CNT, PA and EB, but support the proposition that PA has a weak positive association with overall pro-EB intentions. There was a moderately strong and positive correlation between CNT and EB means, which confirms that CNT plays a tangible role in people's motivation to protect the natural environment, providing further evidence of the need to create opportunities for connectedness to nature. These findings correspond with much of the literature published on CNT and PA as determinants of pro-environmental behaviours.

A notable contribution of this study is its spatial insights into the effect home location and proximity

to protected areas (both natural and urban) have on these three social constructs, and how these variables relate to each other. Results indicate that existing protected areas (whether protected for nature, landscapes, or urban qualities) are evidently loci of community attachments with nature and place. The results also suggest that PA and CNT are in fact quite different social and spatial constructs, with clearly diverse, but also common, physical locations of attachment or connectedness. The GIS mapping and spatial results provide a measure of empirical justification for considering public input on social constructs, and this effort builds a case for CNT and PA to be considered as a necessary component of policy-making and protected area management, or to increase pro-EB. Statistical and spatial results indicate a clear spatial coincidence between PA, CNT, EB and protected areas. Localities with high connectedness to NATURA 2000 sites also show significantly improved CNT, PA and EB mean intensity as against the four control sites. This implies that people who live in proximity of NATURA 2000 sites are more attached to their homes and neighbourhood, more connected to nature, and act more responsibly towards the environment than people who live in localities which are not. It was also noted that special places of PA are equally present within both NATURA 2000 sites and Urban Conservation Areas, hence driving an interest in not only developing increased attachment to natural protected areas, but also to urban ones.

The actual application of CNT and PA theory beyond the academic realm has been limited, and these concepts have perhaps not yet had significant planning and decision making impact to-date; this is certainly the case within the study-area context of Malta, where such considerations have been completely absent from planning. A relational view of place is slowly becoming more common place in environmental management but this requires multi-dimensional approaches which combine ways of exposing underlying values and meanings of place to the public at the onset (Corburn, 2009).[961] However, as Peter Marris (1996; 24)[962] noted, the "*conflict between incompatible meanings cannot be resolved simply by producing evidence, not because evidence is irrelevant, but because its relevance can only be determined by the meanings themselves*."

A validation exercise of the main results with local planners and academics confirmed that the results do provide added value to existing planning and environmental processes, providing a complementary and robust layer of data for policy makers to work with. This complementary social perspective is especially important in view of known limits of practioner-based policy making, which is often influenced by personal (Duelli et al., 2009;[963] Veatch, 1991)[964] and geographical biases (Trimble and van Aarde, 2012),[965] or potential conflicts of interest. There thus appears to be merit in recognising not only the practitioner's input, but also the validity of the lay public's deeper views towards place and protected areas. This proposed approach however involves major shifts in protected area management analysis and frameworks. This study concludes that we need to move away from typical management of place resources as commodities to the consideration of social-ecological dynamics, and transition away from top-down, expert-driven decision-making frameworks

to a more decentralised governance approach aimed at inclusiveness and community. The major shift however needs to be towards ensuring a proper consideration of the historical, cultural, and symbolic significance of places, acknowledging community meaning and identity, obtained from local knowledge.

Environmental management today seems to be best served by a combined understanding of both ecological and human prerogatives. There is no doubt that the most effective conservation measures needed are to ensure better compliance and enforcement of protected areas, as well as the provision of funds to enable appropriate implementation of the management plans. These results have implications that go beyond just 'nature-protected' areas. They also provide insights for wider spatial and urban planning practice, and also highlight attachments to sites or features in Urban Conservation Areas. This perspective and related GIS data layers have a broader applicability also for local council action intent on valorising community values for special places, and creating bonding opportunities to places in their locality. The consideration of special sites which hold strong emotive attachments or provide well-being to the constituency of localities can assist management efforts when prioritising site maintenance, EU funded restoration or conservation projects, and environmental behaviour campaigns. The ease of use of the GIS interface and relatively intuitive online interface allows for wider uptake of this reference tool by practioners and the public sector.

This paper has some limitations despite its theoretical and practical contributions to the field. Readers are cautioned that the results are meaningful across the studied CNT, PA and EB behavioural categories but would not necessarily apply across different pro-environmental behavioural categories and cultures. Future researchers should also integrate other factors likely to influence the pro-environmental behavioural intentions of the general public and at the indivudal level, such as quality of life and happiness, which could provide further insights and enhance the predictive power of these social constructs. It is also noted that an integrated approach has both strengths and weaknesses, and that ecological or planning practitioners might not necessarily possess the necessary expertise in social sciences required to tackle complex environmental management challenges (Heberlein, 2012; Lowe et al., 2009). Researchers are therefore encouraged to come together and engage collaboratively in transdisciplinary science and practice, to address the threats facing human-ecosystems in the Anthropocene (Raymond et al. 2017).[966] This is critical especially in view of the serious threats to protected areas and humanity now that we are on a path to 3 or 4°C global warming.

In conclusion, this work is intended to make a contribution towards establishing a practical framework for socio-spatial knowledge to inform protected area management, based on public input and a collaborative policy making approach. It recognises that the socio-cultural dimension and diversity of mankind is an integral component of many ecosystems and their management, particularly those of the Mediterranean, and that it remains critical to find a sustainable balance between human activity and conservation. This requires a major

effort to understand and enhance the social, aesthetic and cultural fabric both of the landscape, natural areas and the built environment. The present study helps contribute towards a better understanding of human relationships with nature and place. The application of geographic visualisation techniques to visualise social constructs like CNT, PA and EB can help document an alternative hidden 'landscape' which could inform policy makers with multiple and exploratory perspectives for protected area management and environmental behaviour.

REFERENCES

[1] Kolbert, E. (2014). *The sixth extinction : an unnatural history*. New York.Henry Holt and Company.

[2] Huntingford, J. G., Borg Grech J., Spiteri, J.M. (1966). *Advisory outline development plan for North West Malta. Survey report and analysis*. Government of Malta.

[3] Padmanabhan, G., Leipnik, R. M. and Yoon J. (undated). *A glossary of GIS terminology*. Retrieved online 11 June 2013. http://www.ncgia.ucsb.edu/publications/tech_reports/92/92-13.pdf

[4] World Health Organization (2012). *Our Planet, Our Health, Our Future Human health and the Rio Conventions: biological diversity, climate change and desertification*. Retrieved online 11.06.2013 http://www.who.int/globalchange/publications/reports/health_rioconventions.pdf

[5] Jasper O. Kenter, R., Bryce, Michael C., N., Hockley N., Irvine, K. N., Fazey, I., O'Brien L., Orchard-Webb J., Ravenscroft N., Raymond C. M., Reed M. S., Tett P., Watson V. (2016). Shared values and deliberative valuation: Future directions. *Ecosystem Services* 21, Part B, October, 358-371, ISSN 2212-0416. http://dx.doi.org/10.1016/j.ecoser.2016.10.006.

[6] Dudley N., Mansourian S., Stolton S. and Suksuwan S. (2008). *WWF. Safety Net - Protected areas and poverty reduction. Arguments for Protection*. Retrieved online 11.06.2013 http://assets.panda.org/downloads/safety_net_final.pdf

[7] Armitage, D., de Loë, R. and Plummer, R. (2012), Environmental governance and its implications for conservation practice. *Conservation Letters* 5, 245-255. doi:10.1111/j.1755-263X.2012.00238.x

[8] R.M. Wise, I. Fazey, M. Stafford Smith, S.E. Park, H.C. Eakin, E.R.M. Archer Van Garderen, B. Campbell (2014). Reconceptualising adaptation to climate change as part of pathways of change and response. *Global Environmental Change* 28, September, 325-336, ISSN 0959-3780, http://dx.doi.org/10.1016/j.gloenvcha.2013.12.002.

[9] Mahboubi Pouyan, Parkes Margot, Stephen Craig, Man Chan Hing (2015). Using expert informed GIS to locate important marine social-ecological hotspots. *Journal of Environmental Management* 160 342e352

[10] Stern, P. C., Dietz, T., Kalof, L., & Guagnano, G. A. (1995). Values, beliefs, and proenvironmental action: Attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology* 25(18), 1611e1636.

[11] Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior*. Reading, MA: Addison-Wesley

[12] Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

[13] Raymond C. M., Brown G., Robinson G. M.(2011). The influence of place attachment, and moral and normative concerns on the conservation of native vegetation: A test of two behavioural models. *Journal of Environmental Psychology* 31.

[14] Anton, C. E., & Lawrence, C. (2016). The relationship between place attachment, the theory of planned behaviour and residents' response to place change. *Journal of Environmental Psychology* 47, 145-154. DOI:10.1016/j.jenvp.2016.05.010

[15] Schultz, P. W. (2002). "Inclusion with nature: The psychology of human-nature relations". In P. W. Schmuck & W. P. Schultz (Eds.), *Psychology of sustainable development*. (pp. 62-78). Norwell, MA: Kluwer Academic.

[16] Prohansky, H. M., A. K. Fabian, and R. Kaminoff (1983). Place-identity. *Journal of Environmental Psychology* 3, 57-83.

[17] Williams R. David, Stewart S.L. (1998). Sense of place: An elusive concept that is finding a home in ecosystem management. *Journal of Forestry* 96 (5), 18 - 23.

[18] Lee, T. H., Jan, F.-H., & Yang, C.-C. (2013). Conceptualizing and measuring environmentally responsible behaviours from the perspective of community-based tourists. *Tourism Management* 36, 454e468.

[19] Stern P. (2000). Psychology and the science of human-environment interactions. *American Psychologist* 55, 523–530. 10.1037/0003-066X.55.5.523.

[20] Miller, B. W., Caplow, S. C., & Leslie, P. W. (2012). Feedbacks between conservation and social-ecological systems. *Conservation Biology 26*(2), 218–227. http://doi.org/10.1111/j.1523-1739.2012.01823.x

[21] Brown Greg, Kelly de Bieb, Weber Delene (2015). Identifying public land stakeholder perspectives for implementing place-based land management. *Landscape and Urban Planning* 139, 1–15.

[22] Smith, B.L. 2003. *Public policy and public participation: Engaging citizens and community in the development of public policy*. Atlanta: Health Canada.

[23] Le Roux Jan-Hendrik, Cilliers Juaneé Elizelle (2013). *The participatory planning paradigm shift: Comparing disciplines and methods*. 49 th ISOCARP Congress 2013.

[24] Gosling Elizabeth, Williams J.H. Kathryn (2010). Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. *Journal of Environmental Psychology* 30 (2010) 298–304.

[25] Brown, G., and Raymond, C. (2007). The relationship between place attachment and landscape values: Toward mapping place attachment. *Applied Geography* 27(2):89-111.

[26] Brown Greg, Raymond M. Christopher, Corcoran Jonathan (2015). Mapping and measuring place attachment. *Applied Geography* 57, 42e53.

[27] Caquard Sebastian (2014). Cartography III. A post-representational perspective on cognitive cartography. *Progress in Human Geography* 39 (2) April, 225-235. Sage Journals.

[28] Colchester, M. (1998) Who will Garrison the Fortresses? A Reply to Spinage. *Oryx* 32, 3, 11- 13.

[29] Hays R. Allen and Kogl M. Alexandra (2007). Neighborhood attachment, social capital building, and political participation: A case study of low- and moderate-income residents of waterloo, iowa. *Journal of Urban Affairs* 29(2), 181–205.

[30] Jorgensen S. Bradley (2008). *Subjective mapping methodologies for incorporating spatial variation in research on social capital and sense of place*. Paper presented at the Tinbergen Institute, Vrije University, Amsterdam, The Netherlands. June 30th & July 1st.

[31] Moore Eli and Garzón Catalina (2010). *Social Cartography: The Art of Using Maps to Build Community Power. Race, Poverty & the Environment*. Fall. http://reimaginerpe.org/files/Moore.Garzon.17-2.pdf

[32] Secretariat of the Convention on Biological Diversity (2008). *Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet*. Montreal, Technical Series no. 36, i-vii + 96 pages. Retrieved online 14 Aug 2014. https://www.cbd.int/doc/publications/cbd-ts-36-en.pdf

[33] Dudley, N. 2008. *Guidelines for applying protected area management categories*. IUCN, Gland, Switzerland.

[34] Borrini-Feyerabend G., Dudley N., Jaeger T., Lassen B., Pathak Broome N., Phillips A., and Sandwith T. (2013). *Governance of protected areas: from understanding to action. Best practice protected area guidelines*. Series no. 20. IUCN, Gland, Switzerland. Retrieved online 15.08.14. https://www.iucn.org/about/work/ programmes/gpap_home/gpap_capacity2/gpap_bpg/?13678/Governanceof-Protected-Areas-From-understanding-to-action

[35] Milliennium Ecosystem Assessment. http://www.millenniumassessment.org/en/index.aspx

[36] Convention on Biological Diversity. *Aichi Biodiversity Targets*. https://www.cbd.int/sp/targets/

[37] United Nations Environment Programme's World Conservation Monitoring Centre. (2017). Protected Planet. Update on global statistics from Protected Planet Report 2016. Retrieved online 15 Aug 2014. https://protectedplanet.net/c/protected-planet-report-2016/december-2016--global-update

[38] New Zealand Ministry of Foreign Affaris & Trade. *Ross Sea region Marine Protected Area*. Retrieved online 24 May 2014 https://www.mfat.govt.nz/en/environment/antarctica/ross-sea-region-marine-protected-area

[39] Dudley, N. (Editor) (2008). *Guidelines for Applying Protected Area Management Categories*. Gland, Switzerland. Retrieved online 15 Aug 14. http://www.iucn.org/about/union/commissions/wcpa/wcpa_puball/wcpa_pubsubject/wcpa_categoriespub/?1662/ Guidelines-for-applying-protected-area-managementcategories

[40] Convention on Biological Diversity (CBD, 1992). *Article 2*. Retrieved online January 2015 - https://www.cbd.int/protected-old/background.shtml

[41] Agius, C. (2014). *Policy Context of the Endemic Flora of the Maltese Islands in a Changing Taxonomic Landscape*. Masters Theses. 11. http://commons.lib.jmu.edu/master201019/11

[42] IUCN, International Union for Conservation of Nature (2008). *IUCN Guidelines for Applying Protected Area Management Categories*. World Conservation Congress

[43] Dudley, N. and Stolton, S. (Eds.) (2008). Dudley, N (ed.) *Guidelines for Applying Protected Area Management Categories*, IUCN, Gland, Switzerland.

[44] European Commission (2008). NATURA 2000 http://ec.europa.eu/environment/nature/natura2000/index_en.htm

[45] European Commission. *Natura 2000 Barometer*. Retrieved online 14 July 2017. http://ec.europa.eu/environment/nature/natura2000/barometer/index_en.htm

[46] International Union for Conservation of Nature (IUCN). https://www.iucn.org/about

[47] Tsiafouli A. M., Apostolopoulou E., Mazaris D. A., Kallimanis S. A., Drakou G. E., Pantis D. J. (2013). Human Activities in Natura 2000 Sites: A Highly Diversified Conservation Network. *Environmental Management*, Volume 51, Issue 5, pp 1025-1033.

[48] European Commission (2015). *Report on the status of and trends for habitat types and species covered by the Birds and Habitats Directives for the 2007-2012 period as required under Article 17 of the Habitats Directive and Article 12 of the Birds Directive*. Report from the Commission to the Council and the European Parliament. The State of Nature in the European Union. Retrieved online 14 September 2016 http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015DC0219&from=EN

[49] Stolten S. & Dudley N. (1999). *Partnerships for Protection*. Earthscan, London.

[50] Buta N., Holland M. S., Kaplanidou K. (2014). Local communities and protected areas: The mediating role of place attachment for pro-environmental civic engagement. *Journal of Outdoor Recreation and Tourism* 5/6, April, 1–10

[51] West P. C. & Brechin S. R. (eds) (1991). *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*, The University of Arizona Pess, Tucson.

[52] Wells M., Brandon K., & Hannah L. (1992). *People and parks : linking protected area management with local communities*. World Bank.

[53] Ghimire K. B. & Pimbert M. P. (1997). in eds Ghimire K. B., & Pimbert M. P., *Social Change and Conservation: Environmental Politics and impacts of National Parks and protected Areas*, Earthscan Publications, London, pp. 1-45.

[54] Coad, L., Campbell, A., Miles, L., Humphries, K. (2008). *The Costs and Benefits of Protected Areas for Local Livelihoods: a review of the current literature*. Working Paper. UNEP World Conservation Monitoring Centre, Cambridge, U.K.

[55] Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC. http://www.millenniumassessment.org/documents/document.356.aspx.pdf

[56] World Health Organisation (2017). Ecosystem goods and services for health http://www.who.int/globalchange/ecosystems/en/

[57] ten Brink P., Mutafoglu K., Schweitzer J-P., Kettunen M., Twigger-Ross C., Baker J., Kuipers Y., Emonts M., Tyrväinen L., Hujala T., and Ojala A. (2016) *The Health and Social Benefits of Nature and Biodiversity Protection. A report for the European Commission.* (ENV.B.3/ETU/2014/0039), Institute for European Environmental Policy, London/Brussels. http://ec.europa.eu/environment/nature/biodiversity/intro/docs/Health%20and%20Social%20Benefits%20of%20Nature%20-%20Final%20Report%20Executive%20Summary%20sent.pdf

[58] Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC. http://www.millenniumassessment.org/documents/document.356.aspx.pdf

[59] Schops I. (2011) *TEEBcase: Developing the first national park in Belgium together with stakeholders*. Retrieved online 14 July 2017. http://www.teebweb.org/wp-content/uploads/2013/01/TEEBcase-Developing-the-first-national-park-inBelgium-together-with-stakeholders.pdf.

[60] Popescu VD, Rozylowicz L, Niculae IM, Cucu AL, Hartel T (2014). Species, Habitats, Society: An Evaluation of Research Supporting EU's Natura 2000 Network. *PLoS ONE* 9(11): e113648. doi:10.1371/journal.pone.0113648

[61] Milieu Ltd, the Institute for European Environmental Policy (IEEP), ICF International and Ecosystems Ltd. (2016). Evaluation Study to support the Fitness Check of the Birds and Habitats Directives Draft Final Report 4 January 2016. Report prepared for the European Commission's Directorate General Environment under Service Contract number: ENV.B.3/ETU/2014/0014. http://www.euractiv.com/wp-content/uploads/sites/2/2016/06/draft-FC-study-copy-2.pdf

[62] European Topic Centre on Biological Diversity (2014). *The ecological effectiveness of the Natura 2000 Network*. Technical paper N° 5.

[63] European Environment Agency (2015). *Mid-term review of the EU Biodiversity Strategy to 2020 (COM/2015/0478 final)*.

Retrieved online 7th February 2016. http://europa.eu/rapid/press-release_IP-15-5746_en.htm

[64] European Environment Agency (2010). EU 2010 Biodiversity Baseline http://www.eea.europa.eu/publications/eu-2010-biodiversity-baseline

[65] European Environment Agency (2015). *SOER 2015 - The European environment - state and outlook 2015*. http://www.eea.europa.eu/soer

[66] EU Court of Auditors (2017). *Special Report No 1/2017: More efforts needed to implement the Natura 2000 network to its full potential*. http://www.eca.europa.eu/en/Pages/DocItem.aspx?did=40768

[67] Milieu, IEEP and ICF (2016). *Evaluation Study to support the Fitness Check of the Birds and Habitats Directives Final Report*. March 2016. Retrieved online 14 July 2017 http://awsassets.panda.org/downloads/study_evaluation_to_support_fitness_check_of_nature_directives__final.pdf

[68] European Commission (2016). *My statement on orientation debate on the next steps of the Fitness Check of the Birds and Habitats Directives*. Juncker Jean-Claude, President of the European Commission. (released 7 December 2016). https://ec.europa.eu/commission/commissioners/2014-2019/vella/announcements/my-statement-orientation-debate-next-steps-fitness-check-birds-and-habitats-directives_en

[69] Kellert, S. R. & Wilson, E. O. (1993, Eds.). *The biophilia hypothesis*. Washington, DC: Island Press

[70] Stratford E., Davidson J (2002) Capital assets and intercultural borderlands: socio-cultural challenges for natural resource management. *Journal of Environmental Management* 66(4), 429-440. Retrieved online in August 2015 http://eprints.utas.edu.au/2158/1/stratford_and_davidson.pdf

[71] Blicharska Malgorzata, Orlikowska H.Ewa, Roberge Jean-Michel, Malgorzata Grodzinska-Jurczak (2016). Contribution of social science to large scale biodiversity conservation: A review of research about the Natura 2000 network. *Biological Conservation* 199, 110–122.

[72] Kibert C. J., Monroe M. C., Peterson A. L., Plate R. R., Thiele L. P. (2011). *Working Toward Sustainability: Ethical Decision-Making in a Technological World*. Wiley. ISBN: 978-0-470-53972-9

[73] International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) and Food and Agriculture Organization of the United Nations (FAO) (2016). *Mediterra 2016. Zero Waste in the Mediterranean*. Natural Resources, Food and Knowledge. – Paris: Presses de Sciences Po. http://www.fao.org/3/a-bq976e.pdf

[74] Inglehart, Ronald (1977). *The Silent Revolution*. Princeton, NJ: Princeton University Press.

[75] Mutsaers J. (2015). *Environmental concern in global perspective: Exploring relations between core-periphery, vulnerability, environmental problems, post-materialism and environmental concern*. Unpublished dissertation towards a Degree of Master of Science in Human Ecology: Culture, Power and Sustainability. Department of Human Geography, Lund University. Retrieved online 14 July 2017 https://www.researchgate.net/publication/279537532_Environmental_concern_in_global_perspective_Exploring_relations_between_core-periphery_vulnerability_environmental_problems_post-materialism_and_environmental_concern

[76] Hardin, G. (1968). 'The Tragedy of the Commons', *Science* 162, 1243-8.

[77] Dawes, R.M. (1980). Social dilemmas. *Annual Review of Psychology* 31, 169-193.

[78] Vlek, C. (1996a). Collective risk generation and risk management; the unexploited potential of the social dilemmas paradigm. In W.B.G. Liebrand & D.M. Messick (Eds.), *Frontiers in social dilemmas research* (11-38). Berlin: Springer Verlag. Vlek, C.

(1996b). A multi-level, multi-stage and multi-attribute perspective on risk assessment, decision-making and risk control. Risk, *Decision and Policy* 1, 9-31. 167

[79] Dawes M. Robyn; Messick M. David (2000). Social dilemmas. *International Journal of Psychology* 2000, 35 (2), 111-116

[80] Osbaldiston R., Sheldon M. Kennon (2002). Social Dilemmas and Sustainability: Promoting Peoples' Motivation to "Cooperate with the Future". *Psychology of Sustainable Development,* 37-57

[81] Schmuck P., Vlek C. (2003) Psychologists Can Do Much to Support Sustainable Development. *European Psychologist* 8(2), June, 66–76

[82] Albrecht G., Sartore G.M., Connor L., Higginbotham N., Freeman S., Kelly B., Stain H., Tonna A., Pollard G. (2007). Solastalgia: the distress caused by environmental change. *Australasian Psychiatry* 15 Suppl 1:S95-8.

[83] Hornback, K. & Eagles, P. (1999). *Guidelines for Public Use Measurement and Reporting at Parks and Protected Areas*. Cambridge, UK, Gland, Switzerland

[84] Roberts, J.A. & Bacon, D.R. (1997). Exploring the Subtle Relationships between Environmental Concern and Ecologically Conscious Consumer Behaviour, *Journal of Business Research* 40 (1), 79-89.

[85] Greene, T. (1996). 'Cognition and the Management of Place', in B. Driver, D. Distin, T. Baltic, G. Elsner & G. Peterson (eds), Nature and the Human Spirit: Towards an Expanded Land Management Ethic, Venture Publishing, State College: PA, pp. 301-10.

[86] Brandenburg, A.M., and Carroll, M.S. (1995), Your place or mine?: the effect of place creation on environmental values and landscape meanings, *Society and Natural Resources* 8, 381-398.

[87] Mitchell, M.Y., Force, J.E., Carroll, M.S. & McLaughlan, W.J. (1993). Forest Places of the Heart: Incorporating Special Spaces into Public Management. *Journal of Forestry* 91 (4), 32-7.

[88] Williams, D. & Stewart, S.I. (1998). 'Sense of Place: An Elusive Concept that is Finding a Home in Ecosystem Management', *Journal of Forestry* 96 (5), 18-23.

[89] Hobbs, R. J., Higgs, E., Hall, C. M., Bridgewater, P., Chapin, F. S., Ellis, E. C., Ewel, J. J., Hallett, L. M., Harris, J., Hulvey, K. B., Jackson, S. T., Kennedy, P. L., Kueffer, C., Lach, L., Lantz, T. C., Lugo, A. E., Mascaro, J., Murphy, S. D., Nelson, C. R., Perring, M. P., Richardson, D. M., Seastedt, T. R., Standish, R. J., Starzomski, B. M., Suding, K. N., Tognetti, P. M., Yakob, L. and Yung, L. (2014). Managing the whole landscape: historical, hybrid, and novel ecosystems. *Frontiers in Ecology and the Environment* 12, 557–564. doi:10.1890/130300

[90] Sayer J., Sunderland T., Ghazoul J., et al. (2013). Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences* 110, 8349–56.

[91] Louv R. (2005). *Last child in the woods : Saving our children from nature-deficit disorder*. Atlantic books reprinted in 2010. 388 p.. Identifier: ISBN 9781848870833.

[92] Soga, M., Gaston, K.J., Koyanagi, T.F., Kurisu, K. & Hanaki, K. (2016). Urban residents' perceptions of neighbourhood nature: does the extinction of experience matter? *Biological Conservation* 203, 143-150.

[93] Beck, A. and Katcher, A. (1996). *Between Pets and People: The Importance of Animal Companionship*. Purdue University Press, West Lafayette, Indiana.

[94] Axelrod, L.J. and Suedfeld, P. (1995). Technology, Capitalism, and Christianity: Are They Really The Three Horsemen of the Eco-Collapse? *Journal of Environmental Psychology* 15, 183-195

[95] Katcher, A. and Beck, A. (1987). Health and Caring for Living Things. *Anthrozoos* 1, 175-183.

[96] Dickinson E. (2013). The Misdiagnosis: Rethinking "Nature-deficit Disorder. *Environmental communication* 7 (3), 315 - 335

[97] Stilgoe, J. R. (2001). Gone Barefoot Lately? *American Journal of Preventative Medicine* 20: 243-244.

[98] Kahn H. Peter Jr., Severson L. Rachel., and Ruckert H. Jolina (2010). The Human Relation With Nature and Technological Nature. *Current directions in psychological science* 18 (1)

[99] Bekoff Marc, Bexell Sarah(2010). Ignoring Nature: Why We Do It, the Dire Consequences, and the Need for a Paradigm Shift to Save Animals, Habitats, and Ourselves. *Human Ecology Review* 17 (1)

[100] Purdy Jedediah (2015). *After Nature: A Politics for the Anthropocene*. Harvard University Press

[101] Silva Franco Denis(2017). From Human to Person: Detaching Personhood from Human Nature. In *Legal Personhood: Animals, Artificial Intelligence and the Unborn*, 113-125

[102] Katcher, A. and Beck, A. (1987). Health and Caring for Living Things. *Anthrozoos* 1: 175-183.

[103] Lewis, C. A. (1992). Effects of Plants and Gardening in Creating Interpersonal and Community Well-Being. In: *Role of Horticulture in Human Well-being and Social Development: A National Symposium* (Ed. by Relf, D.), pp. 55-65. Timber Press, Arlington, Virginia.

[104] Wilson, E. O. (1993). Biophilia and the Conservation Ethic. In: The Biophilia Hypothesis (Ed. by Kellert, S. R. and Wilson, E. O.), pp. 31-41. Shearwater Books/Island Press, Washington, D.C.

[105] Bustad, L. K. (1996). *Recent Discoveries about our Relationships with the Natural World*. In: Compassion: Our Last Great Hope - Selected Speeches of Leo K. Bustad, DVM, PhD. Delta Society, Renton, WA.

[106] Kellert, S. R. (1997). *Kinship to Mastery: Biophilia in Human Evolution and Development*. Washington, D.C.: Island Press, Washington, D.C.

[107] Livingston Mark, Bailey Nick and Kearns Ade (2008). *People's attachment to place – the influence of neighbourhood deprivation*. Chartered Institute of Housing for the Joseph Rowntree Foundation http://www.jrf.org.uk/sites/default/files/jrf/migrated/files/2200-neighbourhoods-attachment-deprivation.pdf

[108] Bergoglio Mario Jorge (Pope Francis – 2015). *Encyclical letter Laudato si' of the Holy Father Francis on care for our common home*. June 18, 2015. Retrieved online 14 July 2017. http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

[109] Maller, Cecily et al. (2008). *Healthy parks, healthy people. The health benefits of contact with nature in a park context - A review of relevant literature*. Retrieved online 20 March 201. http://www.parkweb.vic.gov.au/resources/mhphp/pv1.pdf

[110] Kaplan, R. and Kaplan, S. (1989). *The Experience of Nature: A Psychological Perspective.* Cambridge University Press, Cambridge, New York.

[111] Hartig, T., Mang, M. and Evans, G. W. (1991). Restorative Effects of Natural Environment Experiences. *Environment and Behaviour*, 23: 3-26.

[112] Kaplan, S. (1995). The Restorative Benefits of Nature: Toward an Integrative Framework. *Journal of Environmental Psychology* 15, 169-182.

[113] Kaplan, S. (1992b). The Restorative Environment: Nature and Human Experience. In: *Role of Horticulture in Human Well-being and Social Development: A National Symposium* (Ed. by Relf, D.), pp. 134-142. Timber Press, Arlington, Virginia

[114] Lachowycz, K., Jones A.P. 2011. Greenspace and obesity: A systematic review of the evidence. *Obesity Reviews* 12, 183-189.

[115] Hartig, T, Mitchell R, de Vries S, Frumkin H. 2014. Nature and health. *Annual Review of Public Health* 35, 207-228.

[116] Lee K.E., Williams K. J.H., Sargent L. D., Williams N. S.G., Johnson K. A. (2015). 40-second green roof views sustain attention: The role of micro-breaks in attention restoration, *Journal of Environmental Psychology* 42, June, 182-189, ISSN 0272-4944. http://doi.org/10.1016/j.jenvp.2015.04.003.

[117] James P, Banay RF, Hart JE, Laden F. (2015a). A review of the health benefits of greenness. *Curr Epidemiol Rep* 2, 131-142.

[118] Bratman G. N., Hamilton P. J., Kevin S. H., Gretchen D. C., and James G. J. (2015). Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the National Academy of Sciences* 112 (28), July.

[119] Wilson, E. O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.

[120] Wilson, E.O. (2001). The ecological footprint. *Vital Speeches* 67, 274–281.

[121] Katcher, A. and Beck, A. (1987). Health and Caring for Living Things. *Anthrozoos* 1, 175-183.

[122] Roszak, T. (1995). Where Psyche Meets Gaia. In: *Ecopsychology: Restoring the Earth, Healing the Mind* (Ed. by Roszak, T., Gomes, M. E. and Kanner, A. D.), pp. 1-17. Sierra Club Books, San Francisco.

[123] Friedmann, E. and Thomas, S. A. (1995). Pet Ownership, Social Support, and One-year Survival After Acute Myocardial Infarction in the Cardiac Arrhythmia Suppression Trial (CAST). *American Journal of Cardiology* 76, 1213-1217.

[124] Frumkin, H. (2001). Beyond Toxicity Human Health and the Natural Environment. *American Journal of Preventative Medicine* 20, 234-240.

[125] Yang, W., T. Dietz, D. B. Kramer, Z. Ouyang, and J. Liu. 2015. An integrated approach to understanding the linkages between ecosystem services and human well-being. *Ecosystem Health and Sustainability* 1(5),19. http://dx.doi.org/10.1890/EHS15-0001.1

[126] Richardson, M., McEwan, K., Maratos, F. A. , Sheffield, D. (2016). Joy and Calm: How an Evolutionary Functional Model of Affect Regulation Informs Positive Emotions in Nature. *Evolutionary Psychological Science*. DOI: 10.1007/s40806-016-0065-5.

[127] Health Council of the Netherlands (2004). Nature and Health. *The influence of nature on social, psychological and physical well-being*. Netherlands, The Hague: Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning, Nature and the Environment.

[128] Birley, M., (2002). A review of trends in health impact assessment and the nature of the evidence used. *J. Environ. Manag. Health* 13, 21e39.

[129] Noble, B.F., Bronson, J.E., (2005). Integrating human health into environmental impact assessment: case studies of Canada's northern mining resource sector. *Arctic* 58, 395e405.

[130] Braveman, P., Egerter, S., Williams, D.R., (2011). The social determinants of health: coming of age. *Annu. Rev. Public Health* 32.

[131] Tuan, Y.F., (1974). Topophilia: a Study of Environmental Perception, Attitudes, and Values. Prentice Hall, Englewood Cliffs, NJ.

[132] Tuan, Y.F., (1977). *Space and Place*. Edward Arnold, London.

[133] Bechtel, R.B., Churchman, A. (2002). *Handbook of Environmental Phychology*. John Wiley & Sons, New York.

[134] Berghöfer A., Dudley N. et al. (2010). *The TEEB for Local and Regional Policy Makers*. Chapter 7 - Ecosystem services and protected areas. The Economics of Ecosystems and Biodiversity (TEEB). Retrieved online 24 March 2015. http://www.teebweb.org/Portals/25/Documents/TEEB%20for%20Local%20and%20Regional%20Policy/TEEB%20Loc%20Pol%20QG%20English.pdf

[135] Brown Greg and Weber Delene (2012). A place-based approach to conservation management using public participation GIS (PPGIS). *Journal of Environmental Planning and Management* 1–19.

[136] Creighton L. James (2005). What is public participation. In: *The Public Participation Handbook: Making Better Decisions Through Citizen Involvement*. Wiley

[137] Hales D. (1989). in eds M C Pearl & D Western, *Conservation for the Twenty-first Century*, Oxford University Press, New York, pp. 139-144.

[138] Palo M., Uusivuori J. (2012). *World Forests, Society and Environment*. Springer Science & Business Media

[139] Dovers, S., Feary, S., Martin, A., McMillan, L., Morgan, D. and Tollefson, M. (2015). *'Engagement and participation in protected area management: who, why, how and when?*', in G. L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds) Protected Area Governance and Management, pp. 413–440, ANU Press, Canberra

[140] Williams, D.R., and S.I. Stewart (1998). Sense of place: an elusive concept that is finding a home in ecosystem management. *Journal of Forestry* 96 (5):18-23.

[141] Borrini-Feyerabend G. (2002). *Parks: The International Journal for Protected Area Managers* 12, 5-16.

[142] International Union for Conservation of Nature and Natural Resources (2016). *Wilderness Protected Areas: Management guidelines for IUCN Category 1b protected areas*. IUCN WCPA Wilderness Specialist Group Sarah A. Casson, Vance G. Martin, Alan Watson, Angie Stringer, and Cyril F. Kormos, Volume Editors. Updated March 2017

[143] Burroughs, R. (1999). When stakeholders choose: process, knowledge, and motivation in water quality decisions. *Society and Natural Resources* 12, 797-809. http://dx.doi.org/10.1080/089419- 299279326

[144] Prell, C., K. Hubacek, and M. Reed. (2009). Stakeholder analysis and social network analysis in natural resource management. *Society and Natural Resources* 22, 501-518. http://dx.doi. org/10.1080/08941920802199202

[145] Alterman R. (2001). *National-Level Planning in Democratic Countries. An International Comparison of City and Regional Policy-Making*. Liverpool University Press

[146] Alterman R. (1982). 'Implementation Analysis in Urban and Regional Planning: Toward a Research Agenda' in Patsy

Healey, Glen McDougall and Michael Thomas (eds), *Planning Theory: Prospects for the 1980s*, Planning Series, Vol. 23, 225–45, Oxford, Pergamon.

[147] Reed, M. S., Vella, S., Challies, E., de Vente, J., Frewer, L., Hohenwallner-Ries, D., Huber, T., Neumann, R. K., Oughton, E. A., Sidoli del Ceno, J. and van Delden, H. (2017). A theory of participation: what makes stakeholder and public engagement in environmental management work? *Restor Ecol.* doi:10.1111/rec.12541

[148] Healey, P. (1997). *Collaborative Planning: Shaping Places in Fragmented Societies*, London, Macmillan.

[149] Innes, J. E. (1996). 'Planning through Consensus Building: A New View of the Comprehensive Planning Ideal', *Journal of the American Planning Association* 62.

[150] Forester , J. (1999). *The Deliberative Practitioner: Encouraging Participatory Planning Processes*, Cambridge, MA, MIT Press.

[151] Freeman, R. E. (1984). *Strategic management. A stakeholder approach*. Basic Books, New York, New York, USA http://dx.doi. org/10.1017/cbo9781139192675

[152] Reed, M. S., Graves A., Dandy N., Posthumus H., Hubacek K., Morris J., Prell C., Quinn C. H., and Stringer L. C.. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management* 90:1933-1949. http://dx.doi.org/10.1016/j. jenvman.2009.01.001

[153] OECD (2015). *Building more effective, accountable, and inclusive institutions for all*. Post-2015 Reflections Paper. Element 6, Paper 1.

[154] Calvet-Mir, L., Maestre-Andrés S., Molina J.. and van den Bergh J. (2015). Participation in protected areas: a social network case study in Catalonia, Spain. *Ecology and Society* 20(4):45. http://dx.doi.org/10.5751/ES-07989-200445

[155] The Aarhus Convention . http://ec.europa.eu/environment/aarhus/

[156] United Nations Economic Commission for Europe (2001). *AARHUS Convention: Convention on Access to Information, Public Participation in Decision-making and Access to to Justice in Environmental Matters*.

[157] US EPA (2014). *International Public Participation Guide*. Retrieved online 09 April 2013. https://www.epa.gov/sites/production/files/2014-05/documents/ppg_english_full-2.pdf

[158] United Nations (2005). *Millennium Ecosystem Assessment*. Island Press, Washington

[159] Sandbrook, C., Nelson, F., Adams, W.M. & Agrawal, A. (2010). Carbon, forests and the REDD paradox. *Oryx*, 44, 330–334

[160] Shmueli, D., Elliott M. and Kaufman S. (2006). Frame Changes and the Management of Intractable Conflicts. *Conflict Resolution Quarterly* 24(2), 207 – 218, December. DOI: 10.1002/crq.169

[161] Esau, N. (1996). Privatization and Parks - The Future of Park Management in Australia. *Chain Reaction* 76, 18-9.

[162] Figgis, P. (1999). Protected Areas of the 21st Century. *Habitat Australia*, October, 24.

[163] International Association of public participation. Available: http://www.iap2.org/displaycommon.cfm?an=4 Last accessed 20th March 2011.

[164] Worah, S. (2002). "The challenge of community-based protected area management". *Parks* 12(2), 80–90.

[165] Jeanrenaud, P. (1999). People oriented conservation - progress to date. In: Stolton, S. and Dudley, N. (eds). *Partnership for Protection – new strategies for planning and management for protected areas*. Earthscan Publications, London

[166] Jones Michael. (October 2007). The European Landscape Convention and the Question of Public Participation Department of Geography, Norwegian University of Science and Technology. *Landscape Research* 32 (5), 613 – 633.

[167] Jonsson, A. & Lundqvist, L. J. (2006). Engagera sig i vattenfra°gorvarfor, hurmycket och var?, in: A. Joborn, I. Danielsson & H. Oscarsson (Eds) Pa° tal om vatten. Om vagen mot en hallbar vattenforvaltning, *Vastra rapport* 6, 93 – 122 (Goteborg: Vastra).

[168] Zachrisson, A. (2004). *Co-management of Natural Resources. Paradigm Shifts, Key Concepts and Cases*. Mountain Mistra Programme report, Report no. 1 (Umea: Mountian Mistra Programme).

[169] Zachrisson, A. (2004). Ibid.

[170] Laasonen S. (February 2008). Environmental Conflict Mediation and Social Impact Assessment: approaches for Enhanced Environmental Governance? *Environmental Impact Assessment Review*, Volume 30, Issue 5, Pages 289-338.

[171] Bergmann, S. (2006). Atmospheres of synergy: towards an eco-theological aesth/ethics of space, *Ecotheology* 11(3), 326 – 356.

[172] Brown J., Mitchell N., Beresfor M. (2005). The Protected Landscape Approach: Linking Nature, Culture and Community. IUCN. In '*Sustainable use of biological diversity in socio-ecological production landscapes*'. (2010). http://www.cbd.int/doc/publications/cbd-ts-52-en.pdf . Last accessed 20th March 2011.

[173] Zachrisson Anna (2010). Deliberative democracy and co-management of natural resources: snowmobile regulation in western Sweden. *International Journal of the Commons* 4 (1). Available: http://www.thecommonsjournal.org/index.php/ijc/article/view/116/91 Last accessed 20th March 2011.

[174] Barrett, C. B., Lee D. R., and McPeak J. G. (2005). Institutional arrangements for rural poverty reduction and resource conservation. *World Development* 33, 193–197.

[175] Haklay, M. (2016). Why is participation inequality important?. In: Capineri, C, Haklay, M, Huang, H, Antoniou, V, Kettunen, J, Ostermann, F and Purves, R. (eds.) *European Handbook of Crowdsourced Geographic Information*, Pp. 35–44. London: Ubiquity Press. DOI: http://dx.doi.org/10.5334/bax.c.

[176] Selman Paul (2004). Community participation in the planning and management of cultural landscapes. *Journal of Environmental Planning and Management*47(3), 365-392

[177] Rao, M., Nagendra, H., Shahabuddin, G. and Carrasco, L. R. (2016) Integrating Community-Managed Areas into Protected Area Systems, in *Protected Areas: Are They Safeguarding Biodiversity?* (eds L. N. Joppa, J. E. M. Baillie and J. G. Robinson), John Wiley & Sons, Ltd, Chichester, UK. doi: 10.1002/9781118338117.ch10

[178] Axford, J. and Hockings, M. T. (2005). *Sense of place: A tool to assist the meaningful engagement of communities in protected area management*. In: Dave Gardiner and Katie Scott, Proceedings of International Conference on Engaging Communities. International Conference on Engaging Communities, Brisbane, QLD, Australia, (1-17). 14-17 August 2005.

[179] Orlove, B. and Brush, S. (1996). Anthropology and the conservation of biodiversity. *Annual Review of Anthropology* 25,329-352

[180] Axford, J. and Hockings, M. T. (2005). Sense of place: A tool to assist the meaningful engagement of communities in protected area management. In: Dave Gardiner and Katie Scott, *Proceedings of International Conference on Engaging Communities.* International Conference on Engaging Communities*,* Brisbane, QLD, Australia, (1-17). 14-17 August.

[181] European Environment Agency European Topic Centre on Biological Diversity (2014). *The ecological effectiveness of the Natura 2000 Network*. McKenna Davis, Sandra Naumann, Keighley McFarland, Andreas Graf and Doug Evans. Technical paper N° 5. http://bd.eionet.europa.eu/Reports/ETCBDTechnicalWorkingpapers/PDF/Ecologic_Effectiveness_of_Natura2000_LitReview_Report.pdf

[182] Coffey J. D.l, Joseph Hallam P. (2012). A Polarized Environment. The Effect of Partisanship and Ideological Values on Individual Recycling and Conservation Behavior. *American Behavioral Scientist* 57 (1), 116 - 139

[183] Miller J. W. (2012). The Polarized America. *American Behavioral Scientist* 57 (1), 3 - 7

[184] Briguglio M. (2014). Household cooperation in waste management : preferences, incentives and promotion. Unpublished PhD dissertation at the University of Stirling, Uk. *Journal of Economic Surveys*30 (3), 497-525. Available at SSRN: https://ssrn.com/abstract=2791817 or http://dx.doi.org/10.1111/joes.12156

[185] Borg, C. (2005). *Political polarisation and its impact on decision-making in local councils*. Unpublished Dissertation Degree: M.A.Public Policy.

[186] Davison K. (2016). *The Effect of Political Preferences on Willingness to Pay for Landscape Protection: The Case of Zonqor Point, Malta*. Unpublished dissertation for a Degree of Bachelor of Commerce (Honours) in Economics, University of Malta

[187] Kahan, Dan M. (2015) The Politically Motivated Reasoning Paradigm. *Emerging Trends in Social & Behavioral Sciences*,. Available at SSRN: http://sci-hub.cc/https://ssrn.com/abstract=2703011

[188] Conrad E. (2008). Planning for conservation in a cultural context – an island perspective. The case of the Maltese Islands. *International Journal of Environmental Consumerism*.

[189] Natarajan L. (2015). Socio-spatial learning: A case study of community knowledge in participatory spatial planning. *Progress in Planning*, http://dx.doi.org/10.1016/j.progress.2015.06.002

[190] Kahn, P.H., Friedman B. (1995). Environmental views and values of children in an inner-city black community. *Child Dev* 66, 1403–1417.

[191] Pauly, D. (1995). Anecdotes and the shifting baseline syndrome of fisheries. *Trends in Ecology and Evolution* 10 (10), 430.

[192] Papworth S. K., Rist J., Coad L., Milner-Gulland E.J. (2009). Evidence for shifting baseline syndrome in conservation. *Conservation Letters* 2 (2). http://onlinelibrary.wiley.com/doi/10.1111/j.1755-263X.2009.00049.x/pdf

[193] Leenhardt P., Teneva L., Kininmonth S.T, Darling E., Cooley S., Claudet J. (2015). Challenges, insights and perspectives associated with using social-ecological science for marine conservation, In *Ocean & Coastal Management* 115, 49-60, ISSN 0964-5691, https://doi.org/10.1016/j.ocecoaman.2015.04.018.

[194] Olsen, E., Kleiven, A.R. Skjoldal, H.R., von Quillfeldt C. H. (2010). Place-based management at different spatial scales. *Journal of Coastal Conservation* 15 (2), 257–269. https://doi.org/10.1007/s11852-010-0108-1

[195] Cresswell, T. (2014). *Place: An Introduction*, 2nd Edition. Wiley-Blackwell.

[196] Agnew, J. A. and James S. D. (1989). "Introduction," in John A. Agnew and James S. Duncan (eds.), *The Power of Place*. Boston: Unwin Hyman.

[197] Gould, P., and White, R. (1974). *Mental Maps.* New York: Penguin Books. Boston: Allen & Unwin.

[198] Relph, E. (1976). *Place and Placelessness.* London: Pion Limited.

[199] Gieryn, F. T. (2000). A Space for Place in Sociology. *Annual Review of Sociology*. Vol. 26: 463-496

[200] Tuan Yi-Fu (1977). *Space and Place The Perspective of Experience*. University of Minnesota Press, Minneapolis.

[201] Bourdieu, P. (1979). *Outline of a Theory of Practice*. London: Cambridge University Press (translated by R. Nice).

[202] Harvey, D. (1996). *Justice, Nature and the Geography of Difference*. Massachusetts: Blackwell Publishers, pp. 210–247.

[203] Casey, E. S. (2001). "Body, Self and Landscape: A Geophilosophical Inquiry into the Place-World", in P. C. Adams, S. Hoelscher and K. E. Till (eds). *Textures of Place: Exploring Humanist Geographies*. Minneapolis: University of Minnesota Press, pp. 403–425.

[204] Tuan Yi-Fu. (1974*). Topophilia: A Study of Environmental Perception, Attitudes and Values.* Prentice-Hall, New Jersey.

[205] Relph, E. (1976). *Place and Placelessness*. London: Pion.

[206] Bott S. (2008). *The Use of Psychometric Scales to Measure Spirit of Place Relevance to Heritage Conservation Efforts from Ninewa Province, Iraq*. ICOMOS General Assembly.

[207] Steele, F. (1981). *The sense of place*. Boston: CBI Publishing

[208] Bonnes, M. and Bonaiuto, M. (2002). Environmental psychology: From spatialphysical environment to sustainable development. In: R. Bechtel and A. Churchman (Editors.), *Handbook of environmental psychology*. Wiley, New York, pp. 28-54.

[209] Cresswell, T. (2004). *Place. A Short Introduction*. Oxford: Blackwell

[210] Bott, S. (2000). *Development of psychometric scales to measure sense of place*. Unpublished dissertation. Colorado State University.

[211] Swanwick, C. (2002). *Landscape Character Assessment: A guidance for England and Scotland. On behalf of The Countryside Agency and Scottish Natural Heritage*, UK. Retrieved online 12 June 2015. http://www.naturalengland.org.uk/Images/lcaguidance_tcm6-7460.pdf

[212] Sack, R. D. (1992). *Place, modernity, and the consumer's world: a relational framework for geographical analysis*. Baltimore and London: John Hopkins University Press.

[213] Smaldone, D., Harris, C.C., Sanyal, N., & Lind, D. (2005). Place attachment and management of critical park issues in Grand Teton National Park. *Journal of Park and Recreation Administration* 23 (1), 90-114.

[214] Schroeder, H. W. 1992. The spiritual aspect of nature: A perspective from depth psychology. In *Proceedings of the 1991*

Northeastern Recreation Research Symposium (United States Department of Agriculture, Forest Service, General Technical Report NE-160). ed. G. Vander Stoep, pp. 25-30. Radnor, PA: Northeastern Forest Experiment Station.

[215] Williams R. Daniel, Patterson E.Michael (1996). Environmental Meaning and Ecosystem Management: Perspectives from Environmental Psychology and Human Geography. Department of Leisure Studies University of Illinois Champaign, Illinois, USA. *Society &. Natural Resources* 9, 507-521.

[216] Williams D. R. (2014a). ""Beyond the commodity metaphor," revisited: some methodological reflections on place attachment research," in *Place Attachment: Advances in Theory, Methods and Applications*, eds Manzo L., Wright P. D., editors. (New York, NY: Routledge;), pp. 89–99.

[217] Williams D. R. (2014b). Making sense of "place": Reflections on pluralism and positionality in place research. *Landsc. Urban Plan.* 131 74–82. 10.1016/j.landurbplan.2014.08.002

[218] Williams D. R. (2014b). ibid.

[219] Patterson, M.E. & Williams, D.R. (2005). Maintaining research traditions on place: Diversity of thought and scientific progress. *Journal of Environmental Psychology* 3, 57-83.

[220] Raymond, C., Kytta, M. & Stedman, R. (2017). Sense of place - fast and slow: The potential contributions of affordance theory to sense of place. *Front. Psychol.* https://doi.org/10.3389/fpsyg.2017.01674

[221] Miller, B. W., Caplow, S. C., & Leslie, P. W. (2012). Feedbacks between conservation and social-ecological systems. *Conservation Biology*, *26*(2), 218–227. http://doi.org/10.1111/j.1523-1739.2012.01823.x

[222] Brunckhorst J. David (2010). Using context in novel community-based natural resource management: landscapes of property, policy and place. *Institute for Rural Futures, and UNESCO Centre for Bioregional Resource Management, Australia.*

[223] Brown G., Kelly de B., Weber D. (2015). Identifying public land stakeholder perspectives for implementing place-based land management.*Landscape and Urban Planning* 139, 1–15.

[224] The Future of Conservation. http://www.futureconservation.org/about-the-debate

[225] The Breaktrhough (2015). *"Conservation in the Anthropocene -- Beyond Solitude and Fragility*." Retrieved online 24 February 2015. http://thebreakthrough.org/index.php/journal/past-issues/issue-2/conservation-in-the-anthropocene.

[226] Kareiva, P., and Michelle M. (2012). What Is Conservation Science?. *BioScience* 62 (11), November, 962–69. doi:10.1525/bio.2012.62.11.5.

[227] Levin, P. S. (2014). New Conservation for the Anthropocene Ocean. *Conservation Letters* 7(4), July , 339–40. doi:10.1111/conl.12108

[228] Marris, E.. (2014). 'New Conservation' Is an Expansion of Approaches, Not an Ethical Orientation. *Animal Conservation* 17 (6), December, 516–17. doi:10.1111/acv.12129.

[229] Marvier, M., and Peter K. (2014). The Evidence and Values Underlying 'New Conservation'. *Trends in Ecology & Evolution* 29 (3), January, 131–32. doi:10.1016/j.tree.2014.01.005

[230] Soulé, M. (1985) What is conservation biology? *Bioscience* 35(11), December, 727-734. Doi: 10.1111/cobi.12147

[231] Greenwald, Noah, Dominick A. Dellasala, and John W. Terborgh. "Nothing New in Kareiva and Marvier." *BioScience* 63, (4), April, 241–241. Doi:10.1525/bio.2013.63.4.18.

[232] Noss, R., Nash, R., Paquet, P., and Michael S. (2013). Humanity's Domination of Nature is Part of the Problem: A Response to Kareiva and Marvier. *BioScience* 63(4), April, 241–42. Doi:10.1525/bio.2013.63.4.19.

[233] Miller, B., M.E. Soulé, and J. Terborgh (2014). 'New Conservation' or Surrender to Development? *Animal Conservation* 17 (6), December, 509-15. Doi: 10.1111/acv.12127

[234] Wilson, E.O. (2016). *Half-Earth: Our Planet's Fight for Life*. New York: Liveright Publishing Corporation, 2016.

[235] Bockington, Dan and Rosaleen Duffy (eds.) (2011). *Capitalism and Conservation*. Chichester: Wiley-Blackwell, 2011.

[236] Büscher, B., Sullivan, S., Neves, K., Igoe, Ji. and Dan B. (2012). Towards a Synthesized Critique of Neoliberal Biodiversity Conservation. *Capitalism Nature Socialism* 23 (2), June, 4-30. Doi: 10.1080/10455752.2012.674149

[237] Spash, C.L. (2015). Bulldozing biodiversity: The economics of offsets and trading in nature. Biological Conservation 192.

[238] Ostrom, E., Diez, T., Dolsak, N., Stern, C., Stonich, S. & Weber, E., eds (2002). *The Drama of the Commons*. Washington DC, USA: National Academy Press.

[239] Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences* 104(39): 15181–15187.

[240] Olson, E., et al., (2011). Place-based management at different spatial scales. *Journal of coastal conservation*, 15, 257–269.

[241] Lefebvre, H. (1991). *The Production of Space*. Oxford: Basil Blackwell.

[242] National improvement service for local government in Scotland (2016). *Place-based Approaches to Joint Planning, Resourcing and Delivery. An overview of current practice in Scotland*. Retrieved online September 2016: http://www.improvementservice.org.uk/documents/research/place-based-approaches-report.pdf

[243] Conrad E. and Cassar L. F. (2012). *Landscape Approaches for Ecosystem Management in Mediterranean Islands*. Institute of Earth Systems, University of Malta.

[244] Hunziker M., Buchecker M., Hartig T. (2007). *Space and Place – Two Aspects of the Human-landscape Relationship. Chapter in A Changing World*. Volume 8 of the Landscape Series pp 47-62.

[245] Korn H., Bockmühl K., Schliep R. (2011). *Report of the European expert meeting in preparation of SBSTTA-15*, 26-28 September, Bundesamt für Naturschutz, Bonn, Germany.

[246] Adhikari B. (2009). *Market-Based Approaches to Environmental Management: A Review of Lessons from Payment for Environmental Services in Asia.* ADBI Working Paper Series No. 134.

[247] National Oceanic and Atmospheric Administration (2004). *NOAA Strategic Plan 2004*.

[248] Barnes C., Bozzi L., McFadden K. (2005). *Exploring an ecosystem approach to management a review of the pertinent literature*. NOAA (National Oceanic and Atmospheric Administration) Ecosystem Goal.Team. http://www.nmfs.noaa.gov/pr/sars/improvement/pdfs/eam_lit_review.pdf

[249] Sayera J., Sunderlandb T., Ghazoulc J., Pfundd J.L., Sheilb D. Meijaardb E., Ventera M., Klintuni Boedhihartonoa A., Dayb M., Garciab C., van Oostenj C., and Buckk L. E. (2013). Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences of the United States of America* 110 (21)

[250] Conrad, L ., Christie, M. & Fazey, I. (2009). Incorporating people's perception into landscape planning: ethical challenges in dealing with diversity of opinion within a community. in Weber E. L. (ed.) *Environmental Ethics: Sustainability and Education*. Inter-disciplinary.net . https://www.inter-disciplinary.net/wp-content/uploads/2009/06/Conrad-paper.pdf

[251] Conrad E, Christie M., Fazey I. (2011). Understanding public perceptions of landscape: A case study from Gozo, Malta. *Applied Geography* 31 (1), January, 159–170 Hazards

[252] Daniel, T.C., Muhar, A., Arnberger, A., Aznar, O., Boyd, J.W., Chan, K.M.A., Costanza, R., Elmqvist, T., Flint, C.G., Gobster, P.H., Grêt-regamey, A., Lave, R., Muhar, S., Penker, M., Ribe, R.G., Schauppenlehner, T., Sikor, T., Soloviy, I., Spierenburg, M., Taczanowska, K., Tam, J., von der Dunk, A., Gret-Regamey, A., Lave, R., Muhar, S., Penker, M., Ribe, R.G., Schauppenlehner, T., Sikor, T., Soloviy, I., Spierenburg, M., Taczanowska, K., Tam, J., von der Dunk, A. & Grêt-regamey, A. (2012). Contributions of cultural services to the ecosystem services agenda. *Proc. Natl. Acad. Sci.* U. S. A. 109, 8812–8819.

[253] Kaltenborn, B.P., Linnell, J.D.C., Baggethun, E.G., Lindhjem, H., Thomassen, J. & Chan, K.M. (2017). Ecosystem Services and Cultural Values as Building Blocks for "The Good life". A Case Study in the Community of Røst, Lofoten Islands, Norway. *Ecol. Econ.*, 140.

[254] Kati, V. & Jari, N. (2016). Bottom-up thinking-Identifying socio-cultural values of ecosystem services in local blue-green infrastructure planning in Helsinki, Finland. *Land use policy* 50.

[255] Muhar, A., Raymond, C. M., van den Born, R. J. G., Bauer, N., Böck, K., Braito, M., Buijs, A., Flint, C., de Groot, W.T., Ives, C.D., Mitrofanenko, T., Plieninger, T., Tucker, C. & van Riper, C.J. (2017). A model integrating social-cultural concepts of nature into frameworks of interaction between social and natural systems. *J. Environ. Plan. Manag*. 1–22.

[256] Norgaard, R.B. (2010). Ecosystem services: From eye-opening metaphor to complexity blinder. *Ecol. Econ.* 69, 1219–1227.

[257] Raymond, C.M., Singh, G.G., Benessaiah, K., Bernhardt, J.R., Levine, J., Nelson, H., Turner, N.J., Norton, B., Tam, J. & Chan, K.M.A. (2013). Ecosystem Services and Beyond: Using Multiple Metaphors to Understand Human-Environment Relationships. *Bioscience* 63, 536–546.

[258] Satterfield, T., Gregory, R., Klain, S., Roberts, M. & Chan, K.M. (2013). Culture, Intangibles and metrics in environmental management. *J. Environ. Manage.* 117, 103–114.

[259] Setten, G., Stenseke, M. & Moen, J. (2012). Ecosystem services and landscape management: three challenges and one plea. *Int. J. Biodivers. Sci. Ecosyst. Serv. Manag*. 8, 305–312.

[260] Williams D. R., Stewart P. W., and Kruger L. E. (eds.) (2013). Place-based conservation: Advancing social theory and practice . In *Place-Based Conservation: Perspectives from the Social Sciences*, DOI 10.1007/978-94-007 -5802-5_1, http://www.parklab.uiuc.edu/place_final_draft_5-22-11.pdf

[261] Entrikin, J. N. (1991). *The betweenness of place: Towards a geography of modernity*. Baltimore, MD: Johns Hopkins.

[262] Gunderson, L. H. (2000). Ecological resilience - In theory and application. *Annual Review of Ecology and Systematics* 31, 425-439.

[263] Wessells, A. T. (2010). Place-based conservation and urban waterways: Watershed activism in the bottom of the basin. *Natural Resources Journal* 50, 539-557.

[264] Young, 0. R., Osherenko, G., Ekstrom, J., Crowder, L. B., Ogden, J., Wilson, J. A., et al. (2007). Solving the crisis in ocean governance: Place-based management of marine ecosystems. *Environment* 49(4), 20-32.

[265] Brandenburg, A.M., & Carroll, M.S. (1995). Your place or mine?: The effect of place creation on environmental values and landscape meanings. *Society and Natural Resources* 8, 381-398.

[266] Adger, W. N., Barnett, J., Chapin, F. S., III, & Ellemor, H. (2011). This must be the place: Underrepresentation of identity and meaning in climate change decision-making. *Global Environmental Politics* 11(2), 1-25.

[267] Fischer, F. (2000). *Citizens, experts, and the environment: The politics of local knowledge.* Durham, NC: Duke University Press.

[268] Goodchild M. F. and Janelle D. G. (2010). Toward critical spatial thinking in the social sciences and humanities. *GeoJournal*. 75(1), February, 3–13.

[269] Shields, R. (1992). *Places on the Margin. Alternative Geographies of Modernity,* London: Routledge.

[270] Shields, R. (1992). A Truant Proximity: Presence and Absence in the Space of Modernity. *Environment & Planning D: Society and Space* 10: 181-198.

[271] Hernandez B., Hidalgo C. M. and Ruiz C. (2013). Theoretical and methodological aspects of research on place attachment. In *Place Attachment: Advances in Theory, Methods and Applications*. Manzo C. Lynne C., Devine-Wrigh Patrick.

[272] Sieber, R. (2006). Public Participation Geographic Information Systems: A Literature Review and Framework. *Annals of the Association of American Geographers* 96(3), pp. 491–507.

[273] Przybylski A. K., Murayama K., DeHaan R. C., Gladwell V. (2013). Motivational, emotional, and behavioural correlates of fear of missing out. *Computers in Human Behaviour* 29,1841–1848

[274] Herlihy, P.H. and Knapp, G. (2003). Maps of, by, and for the Peoples of Latin America. *Human Organization* 62(4), 303-314.

[275] McLain, R., Poe, M., Biedenweg, K., Cerveny, L., Besser, D., and Blahna, D. (2013). Making Sense of Human Ecology Mapping: An Overview of Approaches to Integrating Socio-Spatial Data into Environmental Planning. *Human Ecology* 1-15.

[276] Brown G., Ramirez-Gomez S. (2013). Participatory mapping with indigenous communities for conservation: challenges and lessons from Suriname. *The Electronic Journal on Information Systems in Developing Countries*. EJISDC (2013) 58, 2, 1-22

[277] Marston S. A. (2000). The social construction of scale. *Progress in Human Geography* 24 (2), 219-242

[278] Colchester, M. (1998). Who will Garrison the Fortresses? A Reply to Spinage. *Oryx* 32 (3), 11-13.

[279] Hays A. R. and Kogl A. M. (2007). Neighborhood attachment, social capital building, and political participation: A case study of low- and moderate-income residents of waterloo, iowa. *Journal of Urban Affairs* 29 (2), 181–205.

[280] Jorgensen B. S. (2008). *Subjective mapping methodologies for incorporating spatial variation in research on social capital and sense of place* . Paper presented at the Tinbergen Institute, Vrije University, Amsterdam, The Netherlands. June 30th & July 1st.

[281] Moore E. and Garzón C. (2010). *Social Cartography: The Art of Using Maps to Build Community Power. Race, Poverty & the Environment*. Fall. http://reimaginerpe.org/files/Moore.Garzon.17-2.pdf

[282] Peng, Z. R. and Tsou, M., (2003). *Internet GIS: Distributed Geographic Information Services for the Internet and Wireless Networks* John Wiles and Sons Inc. Hoboken, NJ, USA.

[283] Attard J. (2014). *Assessing Participatory Geographic Information Systems for the ecoGozo Initiative.* Dissertation submitted to the University of Malta in fulfilment of the requirement for the degree of Master of Science (Research) in the area of Sustainable Development University of Malta.

[284] Kingston, R., Carver, S., Evans, A. and Turton, I. (1999). Virtual Decision Making in Spatial Planning: Web-based Geographical Information Systems for Public Participation. *International Conference on Public Participation and Information Technology*, Lisbon.

[285] Goodchild M. F. (1992). a Geographical information science Int. *J. Geogr. Info. Syst.* 6 31 45 doi:10.1080/02693799208901893 (doi:10.1080/02693799208901893)

[286] The Royal Society (2011). Challenges in geographical information science. *Proceedings of The Royal Society* Academy 467, 2431-2443. http://rspa.royalsocietypublishing.org/content/royprsa/467/2133/2431.full.pdf

[287] Irwin Alan (1995). *Citizen Science: A Study of People, Expertise and Sustainable Development*. Routledge. 216 pp.

[288] Bonney R., Ballard H., Jordan R.C., McCallie E., Phillips T., Shirk J., Wilderman C.C. (2009a). *Public Participation in Scientific Research: Defining the Field and Assessing Its Potential for Informal Science Education*. Center for Advancement of Informal Education

[289] Jordan R.C., Ballard H.L., Phillips T.B. (2012a). Key issues and new approaches for evaluating citizen-science learning outcomes. *Frontiers in Ecology and the Environment* 10: 307–309.

[290] Dickinson J.L., Shirk J., Bonter D., Bonney R., Crain R.L., Martin J., Phillips T., Purcell K. (2012). The current state of citizen science as a tool for ecological research and public engagement. *Frontiers in Ecology and the Environment* 10: 291–297.

[291] Bonney R., Cooper C.B., Dickinson J., Kelling S., Phillips T., Rosenberg K.V., Shirk J. (2009b). Citizen science: A developing tool for expanding science knowledge and scientific literacy. *BioScience* 59: 977–984.

[292] Wiggins, A., & Crowston, K.. (2011). From Conservation to Crowdsourcing: A Typology of Citizen Science. In *Proceedings of the Forty-fourth Hawaii International Conference on System Science* (HICSS-44). Koloa, HI.

[293] Jordan R., Crall Alycia, Gray S., Phillips T., and Mellor D. (2015). Citizen Science as a Distinct Field of Inquiry. *BioScience*, Vol. 65 (2), February, 208–211.

[294] IEEE Computer Society (2017) VisWeek: InfoVis Welcome. http://vis.computer.org/VisWeek2010/infovis/index.html ,

[295] Snyder J. P.(1987). *Map Projections: A Working Manual Edition.* USGS Professional Paper. US Geological Survey.

[296] Moore E. and Garzón C. (2010). Social Cartography: The Art of Using Maps to Build Community Power. *Race, Poverty & the Environment.* Fall. http://reimaginerpe.org/files/Moore.Garzon.17-2.pdf

[297] Natarajan L. (2015). Socio-spatial learning: A case study of community knowledge in participatory spatial planning. *Progress in Planning*, http://dx.doi.org/10.1016/j.progress.2015.06.002

[298] Mare Nostrum (2015). *'Safeguarding and Sharing our Open Spaces' with the local communities and local councils of Malta's Grand Harbour area*.' http://www.grandharbourcharter.net/

[299] Goodchild, M.F. (2007). "Citizens as sensors: the world of volunteered geography". *GeoJournal* 69 (4): 211–221. doi:10.1007/s10708-007-9111-y.

[300] Brown G., Montag M. Jessica & Lyon Katie (2012). Public Participation GIS: A Method for Identifying Ecosystem Services. *Society & Natural Resources* 25 (7).

[301] Pocewicz A., Nielsen-Pincus M., Brown G., Schnitzer R. (2012). An Evaluation of Internet Versus Paper-based Methods for Public Participation Geographic Information Systems (PPGIS). *Transactions in GIS*, 16(1): 39–53

[302] Khan et al. (2003). Five steps to conducting a systematic review. J*ournal of the Royal Society of Medicine* 96,118-121. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC539417/

[303] Higgins, J.P.T. and Green S. (eds) (2011). *Cochrane Handbook for Systematic Reviews of Interventions*. John Wiley & Sons, Ltd, Chichester, UK.

[304] Pullin, A., and Knight T. (2001). Effectiveness in conservation practice: pointers from medicine and public health. *Conservation Biology* 15, 50-54.

[305] Pullin, A., Knight, T., Stone D., and Charman K. (2004). Do conservation managers use scientific evidence to support their decision-making? *Biological Conservation* 119, 245-252

[306] Fazey, I., Salisbury J.G., Lindenmayer, D.B. Maindonald J., and Douglas R.. (2004). Can methods applied in medicine be used to summarize and disseminate conservation research? *Environmental Conservation* 31, 190-198.

[307] Sutherland, W., Pullin A., Dolman P., and Knight T. (2004). The need for evidence based conservation. *Trends in Ecology and Evolution* 19, 305-308.

[308] Sackett, D.L., Strauss, S.E., Richardson, W.S., Rosenberg, W., Haynes, B. (2000). *Evidence-based Medicine: How to Practice and Teach EBM*, second ed. Churchill Livingstone, London.

[309] Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the bioshpere. *Journal of Environmental Psychology* 21, 327-339.

[310] Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In P. Schmuck & W. P. Schultz (Eds.), *Psychology of sustainable development* (pp. 62-78). Norwell, MA: Kluwer Academic.

[311] Degenhardt, L. (2002). Why do people act in sustainable ways? Results of an empirical survey of lifestyle pioneers. In P. Schmuck and P.W. Schultz (Eds.), *Psychology of sustainable development* (pp. 123-147). Boston, MA: Kluwer Academic Publishers.

[312] Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology* 24, 503-515.

[313] Orr, D. W. (2004). *Earth in mind: on education, environment, and the human prospect*. Washington, DC: Island Press.

[314] Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behaviour. *Environment and Behaviour* 41(5), 715-740.

[315] Wilson, E. O. (1984). *Biophilia: The human bond with other species*. Cambridge, MA: Harvard University Press.

[316] Naess, Arne (1973). The shallow and the deep, long-range ecology movement. A summary, *Inquiry* 16: 1, 95-100

[317] Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology* 24, 503-515

[318] Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology* 24(1), 31–42.

[319] Perkins, H. E. (2010). Measuring love and care for nature. *Journal of Environmental Psychology* 30 (4): 455-463

[320] Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behaviour. *Environment and Behaviour* 41(5), 715-740.

[321] Brown G., Weber D. (2012). Measuring change in place values using public participation GIS (PPGIS). *Applied Geography* 3, 316-324.

[322] Klassen M. J. (2010). *Connectedness to nature: Comparing rural and urban youths' relationships with nature. Unpublished thesis for an MA in Environmental Education and Communication*. University of Manitoba. Retrieved online 20 March 2014. http://dspace.royalroads.ca/docs/bitstream/handle/10170/150/Klassen,%20Mike.pdf?sequence=1

[323] Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In P. W. Schmuck & W. P. Schultz (Eds.), *Psychology of sustainable development*. (pp. 62-78). Norwell, MA: Kluwer Academic.

[324] Crystal L., Harris C. (1987). The SOS-A Spiritual Opportunity Spectrum: Theory and Implications of Spirit of Place for Ecosystem Management. In *Integrating Social Science and Ecosystem Management: A National Challenge.*

[325] Melson, G.F. (2001). *Why the Wild Things Are: Animals in the Lives of Children*. Cambridge, MA: Harvard University Press.

[326] Shepard, P. (1993). On animal friends. In S.R. Kellert and E.O. Wilson (eds.), *The Biophilia Hypothesis*, 275-300. Washington D.C.: Island Press.

[327] Shepard, P. (1996). *The Others: How Animals Made Us Human*. Washington D.C.: Island Press.

[328] Axelrod, L. J. and Suedfeld, P. (1995). Technology, capitalism, and Christianity: are they really the three horsemen of the eco-collapse? *Journal of Environmental Psychology* 15, 183–195.

[329] Katcher, A. and Beck, A. (1987) Health and caring for living things. *Anthrozoos* 1, 175–183.

[330] Beck, A. and Katcher, A. (1996). *Between Pets and People: The Importance of Animal Companionship*. Purdue University Press, West Lafayette, Indiana.

[331] Stilgoe, J. R. (2001). Gone barefoot lately? *American Journal of Preventative Medicine* 20, 243–244.

[332] Louv Richard (2008). *Last Child in the Woods: Saving our Children from Nature Deficit Disorder.* Algonquin Books. And The Nature Principle: Reconnecting with Life in a Virtual Age.

[333] Kellert S. R. (1997). *Kinship to Mastery: Biophilia in Human Evolution and Development*. Washington, DC: Island Press.

[334] Conn S. (1998). Living in the earth: ecopsychology, health and psychotherapy. Humanist. Psychol. 26, 179

[335] Kahn H.Peter, Severson L Rachel., and Ruckert H.Jolina (2009). The Human Relation With Nature and Technological Nature. *Current Directions in Psychological Science*. Volume 18, Number 1. Retrieved online November 2014- http://depts.washington.edu/hints/publications/Human_Relation_Technological_Nature.pdf

[336] Monbiot G. (2013). Pricing the Priceless. September 18, 2013 http://www.monbiot.com/2013/09/18/pricing-the-priceless/

[337] Howard G. S. (1997). *Ecological Psychology: Creating a More Earth-friendly Human Nature*. Notre Dame, in: University of Notre Dame Press

[338] Schultz P. W. (2000). Empathizing with nature: the effects of perspective taking on concern for environmental issues. *J. Soc. Issues* 56, 391–406.

[339] Relph, E. (1976) *Place and Placelessness*, London: Pion.

[340] Casey, E. S. (2009) *Getting back into place*, Bloomington: Indiana University Press.

[341] Mazumdar S., Mazumdar S. (2004). Religion and place attachment: A study of sacred places. *Journal of Environmental Psychology*, 24,) 385-397.

[342] Kamitsis I., Francis J.P. Andrew (2013). Spirituality mediates the relationship between engagement with nature and psychological wellbeing. *Journal of Environmental Psychology* 36 (2013) 136e143

[343] Schroeder, H.W. 1990. The Spiritual aspect of nature: a perspective from depth psychology. In: More. T.A.; Donnelly, M.P.; Graefe, A.R.; Vaske, J.J . eds *Proceedings of the 1990 Northeastern Recreation Research Symposium*. Gen. Tech. Rep. NE-145. Radnor, PA: U.S. Department of Agriculture. Forest Service, Northeastern Forest Experiment Station.

[344] Schroeder. H.W. (1991). *Psyche, nature, and mystery: a psychological perspective on the values of natural environments*. Chicago, IL: U.S Department of Agriculture, Forest Service, North Central Forest Experment Station.

[345] Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology* 24(1), 31–42.

[346] Ashmore, R. D., Deaux, K., & Mclaughlin-Volpe, T. (2004). An organizing framework for collective identity: Articulation and significance of multidimensionality. *Psychological Bulletin* 130, 80–114.

[347] Clayton, S., & Opotow, S. , Eds. (2003). *Identity and the natural environment*. Cambridge, MA: MIT Press.

[348] Tajfel, H. E. (1978). *Differentiation between social groups: Studies in the social psychology of intergroup relations*.

Oxford, UK: Academic Press.

[349] Perkins. D. D., Long D. A. (2002). Neighborhood Sense of Community and Social Capital Psychological Sense of Community. *The Plenum Series in Social/Clinical Psychology*, 291-318

[350] Kawachi, I., Kennedy, B. and Lochner, K. (1997). Long Live Community: Social Capital as Public Health. *The American Prospect*, 35: 56-59

[351] Mogues, T. (2006). *Shocks, Livestock Asset Dynamics and Social Capital In Ethiopia.* IFPRI Discussion Paper No.38.

[352] Bezabih M., Beyene Abe D., Gebreegziabher Z., Borga L. (2013). *Social Capital, climate change and soil conservation investment: panel data evidence from the Highlands of Ethiopia*. Centre for Climate Change Economics and Policy Working Paper No. 135. Grantham Research Institute on Climate Change and the Environment Working Paper No. 115. http://www.cccep.ac.uk/Publications/Working-papers/Papers/130-139/WP135-social-capital-climate-change-soil-conservation-ethiopia.pdf

[353] Nelson, D. R., Adger W. N., and Brown K. (2007). Adaptation to environmental change: contributions of a resilience framework. *Annual Review of Environmental Resources.* 32:395-419. http://dx.doi.org/10.1146/annurev.energy.32.051807.090348

[354] Ruiz-Mallén, I. and E. Corbera (2013). Community-based conservation and traditional ecological knowledge: implications for social-ecological resilience. *Ecology and Society* 18(4), 12. http://dx.doi.org/10.5751/ES-05867-180412

[355] Howard G. S. (1997). *Ecological Psychology: Creating a More Earth-friendly Human Nature*. Notre Dame, in: University of Notre Dame Press

[356] Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology* 24(1), 31–42.

[357] Festinger, L. (1957). *A theory of cognitive dissonance.* Stanford, CA: Stanford University Press.

[358] Elliot A. J., Devine P.G. (1994). On the Motivational Nature of Cognitive Dissonance: Dissonance as Psychological Discomfort. *Journal of Personality and Social Psychology* 67 (3), 382-394

[359] Festinger, L., S. Schachter, and Reicken, H. (1956). *When Prophecy Fails*. Minneapolis, MN: University of Minneapolis Press.

[360] Vining J., Merrick Melinda S., Price Emily (2008). The Distinction between Humans and Nature: Human Perceptions of Connectedness to Nature and Elements of the Natural and Unnatural Natural Resources and Environmental Sciences University of Illinois Urbana, IL. *Human Ecology Review* 15 (1)

[361] Vining, J., Merrick Melinda, S., Price, Emily, 2008. The distinction between humans and nature: human perceptions of connectedness to nature and elements of the natural and unnatural natural resources and environmental sciences university of Illinois Urbana, IL. *Hum. Ecol. Rev*. 15 (1).

[362] Roszak, T. (1992). *The voice of the earth*. Grand Rapids, MI: Phanes Press.

[363] Bragg, E. A. (1996). Towards ecological self: Deep ecology meets constructionist self-theory. *Journal of Environmental Psychology* 16, 93-108.

[364] Kals Elisabeth, Schumacher Daniel, Montada Leo (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behaviour* 31(2), 178–202.

[365] Vaske, J. J., & Kobrin, K. C. (2001). Place attachment and environmentally responsible behaviour. *Journal of Environmental Education* 32(4), 16–21.

[366] Dutcher, D., Finley, J., Luloff, A., & Johnson, J. (2007). Connectivity with nature as a measure of environmental values. *Environment and Behaviour*39, 474-493.

[367] Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology* 24, 503-515

[368] Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York: Cambridge University Press.

[369] Rolston, H. I. (1993). Biophilia, selfish genes, shared values. In S. R. Kellert, & E. O. Wilson (Eds.). *The biophilia hypothesis* (pp. 381e414). Washington, DC: Island Press.

[370] Schultz P. W. (2000). Empathizing with nature: the effects of perspective taking on concern for environmental issues. *J. Soc. Issues* 56, 391–406.

[371] Natural England (2016). *Access to Evidence Information Note EIN015 Connection to Nature: evidence briefing*. http://publications.naturalengland.org.uk/publication/4792791243161600

[372] Miles Richardson, Marta Maspero, David Golightly, David Sheffield, Vicki Staples & Ryan Lumber (2016): Nature: A New Paradigm for Well-being and Ergonomics, *Ergonomics*, DOI: 10.1080/00140139.2016.1157213

[373] Donahue, B., (1999). *Reclaiming the Commons: Community Farms & Forests in a New England town*. Yale University Press, New Haven.

[374] Sample, V.A., (1994). Building partnerships for ecosystem management on mixed ownership landscapes. *Journal of Forestry* 92 (8), 41–44.

[375] Cornwall A., Jewkes R.(1995). What is participatory research? *Social Science & Medicine* 41 (12), 1667-1676. http://www.civitas.edu.pl/pub/nasza_uczelnia/projekty_badawcze/Taylor/what_is_participatory_research.pdf

[376] Ernst Julie, Stefan Theimer (2011). Evaluating the effects of environmental education programming on connectedness to nature. *Environmental Education Research* 17 (5), 577–598

[377] Bruni, Schultz and Saunders (2013). *CONPSYCHMeasures - Measurement Tools for Environmental Practioners*. Retrieved online 01 July 2013. http://www.conpsychmeasures.com/CONPSYCHMeasures/areas.html

[378] Hefler & Cervinka (2009). *Connectedness with nature scales*. Institute of Environmental Health. http://www.meduniwien.ac.at/umwelthygiene/p018_measures.pdf Retrieved online 01 July 2013.

[379] Tam Kim-Pong (2013). Concepts and measures related to connection to nature: Similarities and Differences. *Journal of Environmental Psychology* 34 (2013) 64e78

[380] Tam Kim-Pong (2013). Dispositional empathy with nature. *Journal of Environmental Psychology* 35 (2013) 92e104v

[381] Tam Kim-Pong (2013). Concepts and measures related to connection to nature: Similarities and differences. *Journal of Environmental Psychology* 34 (2013).

[382] Thompson, S. C. G. & Barton, M. A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, 14, 149-157.

[383] Stern, P. C., Dietz, T., & Guagnano, G. A. (1998). A brief inventory of values. *Educational and Psychological Measurement*, 58(6), 984-1001.

[384] Ellis RJ, Thompson M (eds) (1997) *Culture Matters: Essays in Honor of Aaron Wildavsky*. Boulder, Colo. : Westview Press,

[385] Hartig, T., Korpela, K., Evans, G.W., & Gärling, T. (1997). A measure of restorative quality in environments. *Scandinavian Housing and Planning Research* 14, 175-194.

[386] Kals Elisabeth, Schumacher Daniel, Montada Leo (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behaviour* 31(2), 178–202.

[387] Dunlap, R. E., & VanLiere, K. D. (1978). The new environmental paradigm: A proposed measuring instrument and preliminary results. *The Journal of Environmental Education* 9, 10-19.

[388] Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In P. W. Schmuck & W. P. Schultz (Eds.), *Psychology of sustainable development*. (pp. 62-78). Norwell, MA: Kluwer Academic.

[389] Clayton, S. (2003). Environmental identity: A conceptual and an operational definition. In S. Clayton & S. Opotow (Eds.), *Identity and the Natural Environment* (pp. 45-65). Cambridge, MA: MIT PRESS.

[390] Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology* 24, 503-515

[391] Becker Sieto (2005). *Measuring People's Connection with Nature. Exploring the relations between people's implicit connection with nature, their explicit conservation behaviour, and their affiliation with technology.* http://alexandria.tue.nl/extra1/afstversl/tm/beckers2005.pdf

[392] Dutcher, D., Finley, J., Luloff, A., & Johnson, J. (2007). Connectivity with nature as a measure of environmental values. *Environment and Behaviour* 39, 474-493.

[393] Leary, M. R., Tipsord, J. M., & Tate, E. B. (2008). Allo-inclusive identity: Incorporating the social and natural worlds into one's sense of self. In H. Wayment, & J. Bauer (Eds.), *Transcending self-interest: Psychological explorations of the quiet ego* (pp.137e147). Washington, D.C.: American Psychological Association.

[394] Davis, J. L., Green, J. D., & Reed, A. (2009). Interdependence with the environment: Commitment, interconnectedness, and environmental behaviour. *Journal of Environmental Psychology*, 29, 173e180.

[395] Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behaviour. *Environment and Behaviour*, 41(5), 715-740.

[396] Perkins, H. E. (2010). Measuring love and care for nature. *Journal of Environmental Psychology*, 30 (4): 455-463

[397] Brügger, A., Kaiser, F. G., & Roczen, N. (2011). One for All? Connectedness to Nature, Inclusion of Nature, Environmental Identity, and Implicit Association with Nature. *European Psychologist* 16(4), 324-333.

[398] Silvas Villalobos D. (2013). *Measuring an emotional connection to nature among children*. Colorado State University. Unpublished doctoral dissertation. http://digitool.library.colostate.edu///exlibris/dtl/d3_1/apache_media/L2V4bGlicmlzL2R0bC9kM18xL2FwYWNoZV9tZWRpYS8yMDc2Mzc=.pdf

[399] Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behaviour. *Environment and Behaviour* 41(5), 715-740.

[400] Davis, J. L., Le, B., & Coy, A. E. (2011). Building a model of commitment to the natural environment to predict ecological behaviour and willingness to sacrifice. *Journal of Environmental Psychology* 31, 257e265.

[401] Costa, P. T., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences* 13, 653-665.

[402] Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin* 125, 276-302.

[403] Tam Kim-Pong (2013). Concepts and measures related to connection to nature: Similarities and differences. *Journal of Environmental Psychology* 34.

[404] Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behaviour. *Environment and Behaviour* 41(5), 715-740.

[405] Perkins, H. E. (2010). Measuring love and care for nature. *Journal of Environmental Psychology* 30 (4): 455-463

[406] Goodchild M. F. and Janelle D. G. (2010). Toward critical spatial thinking in the social sciences and humanities. *GeoJournal* 75(1), 3–13.

[407] Sieber, R. (2006). Public Participation Geographic Information Systems: A Literature Review and Framework . *Annals of the Association of American Geographers* 96(3), 491–507.

[408] Herlihy, P.H. and Knapp, G. (2003). Maps of, by, and for the Peoples of Latin America. *Human Organization* 62, 4, 303-314.

[409] Brown, G., and Raymond, C. (2007). The relationship between place attachment and landscape values: Toward mapping place attachment. *Applied Geography* 27(2):89-111.

[410] Brown G., Raymond C. M., Corcoran J. (2015). Mapping and measuring place attachment. *Applied Geography* 42e53.

[411] Crampton W. Jeremy (2001). Maps as Social Constructions: Power, Communication and Visualization. *Progress in Human Geography* 25, 235-52.1. http://www.praxis-epress.org/CGR/35-Crampton.pdf

[412] Colchester, M. (1998). Who will Garrison the Fortresses? A Reply to Spinage. *Oryx* 32, 3, 11- 13.

[413] Scannell, L., & Gifford, R. (2010a). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology*, 30, 1e10.

[414] Lewicka Maria (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology* 31 207e230

[415] Speller, G. (2000). *A community in transition: A longitudinal study of place attachment and identity process in the context of an enforced relocation*. Unpublished PhD thesis, University of Surrey, Guildford, England.

[416] Cantrill J. G., Senecah S. L. (2001). Using the 'sense of self-in-place' construct in the context of environmental policy-

making and landscape planning. *Environmental Science & Policy* 4 (4-5), 185-203.

[417] Williams D. R., Stewart S.L. (1998). Sense of place: An elusive concept that is finding a home in ecosystem management. *Journal of forestry* 96(5), 18 - 23.

[418] Prohansky, H. M., Fabian A. K. , and Kaminoff R. (1983). Place-identity. In *Journal of Environmental Psychology* 3: 57-83.

[419] Hull, R.B. IV and Vigo G. (1990). *Urban nature, place attachment, health, and well-being. In D. Relph (ed.). The Role of Horticulture in Human Well-Being and Social Development*, 149-152. Portland, OR: Timber Press

[420] Hull, R.B. (1992). Image congruity, place attachment and community design. *Journal of Architectural and Planning Research* 9, 3, 181-92.

[421] Bott S E. (2008). *The Use of Psychometric Scales to Measure Spirit of Place*. 16th General Assembly and Scientific Symposium of ICOMOS.

[422] Giuliani, V. (2002). Theory of attachment and place attachment. In M. Bonnes, T. Lee, & M. Bonaiuto (Eds.), *Psychological theories for environmental issues*. Aldershot: Ashgate.

[423] Manzo, L. C. (2003). Beyond house and haven: Toward a revisioning of emotional relationships with places. *Journal of Environmental Psychology* 23, 47–61.

[424] Manzo, L. (2005). For better or for worse: Exploring multiple dimensions of place meaning. *Journal of Environmental Psychology* 25, 67–86.

[425] Manzo, L., & Perkins, D. (2006). Finding Common Ground: The importance of place attachment to community participation in planning. *Journal of Planning Literature* 20, 335–350.

[426] Raymond, C. M., Brown, G., & Weber, D. (2010). The measurement of place attachment: Personal, community and environmental connections. *J. Environ. Psychol.* 30(2010): 422-434.

[427] Raymond, C. M., Brown, G., & Weber, D. (2010). The measurement of place attachment: Personal, community and environmental connections. *J. Environ. Psychol.* 30(2010): 422-434.

[428] Jackson, J. B. (1984). *Discovering the Vernacular Landscape.* New Haven: Yale University Press.

[429] Scannell L., Gifford R (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology* 30 (2010) 1–10.

[430] Norberg-Schulz, C. (1979). *Genius Loci. Towards a Phenomenology of Architecture* (New York: Rizzoli).

[431] Breakwell, G. M. (1992). Processes of self-evaluation: Efficacy and estrangement. In G. M. Breakwell (Ed.), *Social psychology of identity and self-concept*. Surrey: Surrey University Press.

[432] Devine-Wright P, Lyons E, 1997, ``Remembering pasts and representing places: The construction of national identities in Ireland'' *Journal of Environmental Psychology* 17 (33-45)

[433] Knez, I. (2005). Attachment and Identity as Related to a Place and It's Perceived Climate. *Journal of Environmental Psychology* 25, 207-218.

[434] Twigger-Ross, C., & Uzzell, D. (1996). Place and Identity Processes. *Journal of Environmental Psychology* 16, 205-220.

[435] Farrugia S., (2010). *Identifying landscape quality objectives for Gozo*. MSc. Unpublished thesis. Institute of Earth Systems. University of Malta.

[436] Hauge, L. Åshild (2005). Identity and Place. PhD student in Environmental Psychology. Faculty of Architecture and Fine Art, University of Trondheim, Norway. Retrieved online 20th March 2011. http://www.tudelft.nl/live/ServeBinary?id=2e2a5b07-3f77-4d71-b1d1-33a897e794aa&binary=/doc/Conference%20paper%20Lappegard%20Hauge.pdf .

[437] Prohansky, H. M., Fabian A. K. , and Kaminoff R. (1983). Place-identity. In *Journal of Environmental Psychology* 3: 57-83.

[438] Bonaiuto, M., & Bonnes, M. (2000). Social-psychological approaches in environment-behaviour studies: Identity theories and the discursive approach. In S. Wapner et al. *Theoretical Perspectives in Environment-Behavior Research Underlying Assumptions, Research Problems, and Methodologies.* Springer.

[439] Brown, B. B., Perkins, D. D., & Brown, G. (2003). Place attachment in a revitalizing neighborhood: Individual and block

levels of analysis. *Journal of Environmental Psychology* 23, 259–271

[440] Manzo, L., & Perkins, D. (2006). Finding Common Ground: The importance of place attachment to community participation in planning. *Journal of Planning Literature* 20, 335–350.

[441] Canter, D. (1977). *The psychology of place*. London: Architectural Press.

[442] Massey, D. (1995). The conceptualisation of place. In D. Massey, & P. Jess (Eds.), *A Place in the World? Places, cultures and globalisation* (pp. 87–132). Oxford: Open University Press.

[443] Manzo, L. (2005). For better or for worse: Exploring multiple dimensions of place meaning. *Journal of Environmental Psychology*, 25, 67–86.

[444] Williams, D. R., Anderson, B. S., McDonald , C. D., & Patterson , M. E. (1995, October). *Measuring place attachment: More preliminary results*. Paper presented at the Leisure Research Symposium, San Antonio, TX.

[445] Deutsch, K & Goulias, K (2010), Exploring Sense-of-Place Attitudes as Indicators of Travel Behaviour, *Transportation Research Record: Journal of the Transportation Research Board* 2157, (1), 95-102.

[446] Jorgensen, B. S. and R. C. Stedman (2001). Sense of Place as an Attitude: Lakeshore owners' attitudes toward their properties. *Journal of Environmental Psychology* 21(3), 233-248.

[447] Kyle, G. T., Mowen A. J. and Tarrant M. (2004). Linking place preferences with place meaning: An examination of the relationship between place motivation and place attachment. *Journal of Environmental Psychology* 24(4), 439-454.

[448] Vaske, J. J., & Kobrin, K. C. (2001). Place attachment and environmentally responsible behaviour. *Journal of Environmental Education*, 32(4), 16–21.

[449] Halpenny, E. A. (2006). *Environmental behaviour, place attachment and park visitation: A case study of visitors to point pelee national park*. PhD thesis, Ontario, Canada: University of Waterloo.

[450] Brown, G., Raymond M. Christopher, Corcoran J. (2015). Mapping and measuring place attachment. *Applied Geography* 57, 42e53.

[451] Daams, M., van Hinsberg A., Sijtsma F., Davis N. (2016). How deep is your love for nature? A psychological and spatial analysis of the depth of feelings towards Dutch nature areas. *Applied Geography* 77, 38e48. http://dx.doi.org/10.1016/j.apgeog.2016.09.012

[452] Safiullin, M.R., Ermolaeva P.O., Yermolaev, O.P., Selivanov R.N. (2015). Current Perspectives on Social Mapping of Urban Territories. *Asian Social Science* 11(6). February. https://www.researchgate.net/publication/276385031_Current_Perspectives_on_Social_Mapping_of_Urban_Territories

[453] Smith, D. A. (2016). Online interactive thematic mapping: Applications and techniques for socio-economic research. *Computers, Environment and Urban Systems* 57, , 106–117. http://www.sciencedirect.com/science/article/pii/S0198971516300023

[454] Blaschke, T. (2006). The role of the spatial dimension within the framework of sustainable landscapes and natural capital. Landscape and Urban Planning 75 (2006) 198–226. In: *Landscapes and sustainability*. Edited By Marion B. Potschin and Roy H. Haines-Younga.

[455] Bricker, K. S., & Kerstetter, D. L. (2000). Level of specialization and place attachment: An exploratory study of whitewater recreationists. *Leisure Sciences* 22, 233-257.

[456] Moore, R. L., & Graefe, A. R. (1994). Attachments to recreation settings: The case of rail-trail users. *Leisure Sciences 16,* 17-31.

[457] Williams, D. R. & Roggenbuck, J. W (1989). Measuring place attachment: Some preliminary results. In L. H. McAvoy & D. Howard (Eds.), *Abstracts-1989 Leisure &search Symposium* (p. 32). Arlington, VA: National Recreation and Park Association.

[458] Bonaiuto, M., Aiello, A., Perugini, M., Bonnes, M., & Ercolani, A. P. (1999). Multidimentional perception of residential environment quality and neighbourhood attachment in the urban environment. *Journal of Environmental Psychology* 19, 331–352.

[459] Felonneau, M. L. (2004). Love and loathing of the city: Urbanophilia and urbanophobia, topological identity and

perceived incivilities. *Journal of Environmental Psychology* 24, 43-52.

[460] Kyle, G. T., Mowen, A. J., & Tarrant, M. (2004). Linking place preferences with place meaning: An examination of the relationship between place motivation and place attachment. *Journal of Environmental Psychology* 24, 439-454.

[461] Shamai, S., & Ilatov, Z. (2005). Measuring sense of place: Methodological aspects. *Tijdschrift voor Economische en Sociale Geografie* 96, 467-476.

[462] Stedman, R. C. (2002). Toward social psychology of place. Predicting behaviour from place-based cognitions, attitude, and identity. *Environment and Behaviour* 34, 561–581.

[463] Williams, D. R., & Roggenbuck, J. W. (1989). *Measuring place attachment: Some preliminary results*. Paper presented at the session on outdoor planning and management. NRPA symposium on Leisure Research, October 20–22, San Antonio, Texas.

[464] Raymond M. Christopher, Brown Gregory, Weber Delene (2010). The measurement of place attachment: Personal, community, and environmental connections. *Journal of Environmental Psychology* 30, 422e434

[465] Giuliani, M. V. (2003). Theory of attachment and place attachment. In M. Bonnes, T. Lee, & M. Bonaiuto (Eds.), *Psychological theories for environmental issues* (pp. 137–170). Hants: Ashgate.

[466] Shamai, S. (1991). Sense of place: An empirical measurement. *Geoforum* 22, 347 – 358.

[467] Young, M. (1999). The social construction of tourist places. *Australian Geographer 30,* 373-389.

[468] Warzecha, C., & Lime, D. W. (2000). Place attachment on the Colorado and Green Rivers in Conyonlands National Park: Examining the relationship between place andencounter norms. In *Book of abstracts: Eighth International Symposium on Society and Resource Management* (pp. 332–333). Bellingham, WA: Western Washington University.

[469] Williams, D.R .. & Roggenbuck, J. W. (1989). *Measuring place attachment: Some preliminary results*. In L. H. McAvoy & D. Howard (Eds.)

[470] Williams Daniel R. and Vaske J. Jerry (2002). *The Measurement of Place Attachment: Validity and Generalizability of a Psychometric Approach*. Department of Natural Resource Recreation and Tourism, Colorado State University.

[471] Raymond M. Christopher, Brown Gregory, Weber Delene (2010). The measurement of place attachment: Personal, community, and environmental connections. *Journal of Environmental Psychology* 30, 422e434

[472] Williams Daniel R. and Vaske Jerry J.(2002). *The Measurement of Place Attachment: Validity and Generalizability of a Psychometric Approach.* Department of Natural Resource Recreation and Tourism, Colorado State University.

[473] Stokols, D., & Shumaker, S. A. (1981). People in places: A transactional view of settings. In J. H. Harvey (Ed.), *Cognition, social behaviour, and the environment* (pp. 441- 488). Hillsdale, NJ: L. Erlbaum.

[474] Proshansky, H. M. (1978). The city and self-identity. *Environment and Behaviour 10,* 147-169.

[475] Proshansky, H. M., Fabian, A. K., & Kaminoff, R. (1983). Place-identity: Physical world socialization of the self. *Journal of Environmental Psychology 3,* 57-83.

[476] Korpela, K. M. (1989). Place-identity as a product of environmental self-regulation. *Journal of Environmental Psychology 9,* 241-256.

[477] Lewicka, M. (2005). Ways to make people active: Role of place attachment, cultural capital and neighborhood ties. *Journal of Environmental Psychology* 4, 381–395.

[478] Cacciapaglia MA, Yung L, Patterson ME (2012). Place mapping and the role of spatial scale in understanding landowner view of fire and fuels management. *Society and Natural Resources* 0:1–15

[479] Brown, G. (2006). Mapping landscape values and development preferences: A method for tourism and residential planning. *Int. J. Tourism Res.* 8, 101–113.

[480] Carver, S. (2003). The future of participatory approaches using geographic information: Developing a research agenda for the 21st Century. *URISA* J. 15(1):61–71.

[481] Evans, A. J., Kingston R., and Carver S.. (2004). Democratic input into the nuclear waste disposal problem: The influence of geographical data. *Journal of Geographical Systems* 6(2), 117–132.

[482] Kingston, R., Carver S., Evans A., and Turton I. (2000). Web-based public participation geographical information systems: An aid to local environmental decision-making. *Computers Environ. Urban Systems* 24, 109–125.

[483] Watson, A., R. Matt, T. Waters, K. Gunderson, S. Carver, and B. Davis. (2008). *Mapping trade-offs in values at risk in the interface between wilderness and non-wilderness lands*. USDA Forest Service, PSW-GTR-19x. Portland, OR.

[484] Raymond, C., and Brown G. (2007). A spatial method for assessing resident and visitor attitudes towards tourism growth and development. *J. Sustain. Tourism* 5, 1-22.

[485] Raymond, C. M., Bryan B. A., MacDonald D. H., Cast A., Starthearn S., Grandgirard A., and Kavilas T. (2009). Mapping community values for natural capital and ecosystem services. *Ecol. Econ.* 68, 1301-1315.

[486] Brown, G. (2003). A method for assessing highway qualities to integrate values in highway planning. J. *Transport Geogr.* 11(4),271-283

[487] Brown, G., and Raymond, C. (2007). The relationship between place attachment and landscape values: Toward mapping place attachment. *Applied Geography* 27(2), 89-111.

[488] Brown, Greg, Raymond, Christopher M. and Corcoran, Jonathan (2015). Mapping and measuring place attachment. *Applied Geography* 57 42-53. doi:10.1016/j.apgeog.2014.12.011

[489] Lee, T. H., Jan, F.-H., & Yang, C.-C. (2013). Conceptualizing and measuring environmentally responsible behaviours from the perspective of community-based tourists. *Tourism Management* 36, 454e468.

[490] Lee, T. H., Jan, F.-H., & Yang, C.-C. (2013). ibid.

[491] Yuling Zhang a, Hong-Lei Zhang a, *, Jie Zhang a, Shaowen Cheng (2014). Predicting residents' pro-environmental behaviours at tourist sites: The role of awareness of disaster's consequences, values, and place attachment. *Journal of Environmental Psychology* 40, 131e146

[492] Bernath, K., & Roschewitz, A. (2008). Recreational benefits of urban forests: Explaining visitors' willingness to pay in the context of the theory of planned behaviour. *Journal of Environmental Management* 89(3), 155e166.

[493] Johnson, C. Y., Bowker, J. M., & Cordell, H. K. (2004). Ethnic variation in environmental belief and behaviour: An examination of the new ecological paradigm in a social psychological context. E*nvironment and Behaviour* 36(2), 157e186.

[494] Schultz, P. W., & Zelezny, L. C. (1998). Values and proenvironmental behaviour: A five-country survey. *Journal of Cross-Cultural Psychology* 29(4), 540e558.

[495] Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behaviour* 25(5), 322e348.

[496] Karp, D. G. (1996). Values and their effect on pro-environmental behaviour. *Environment and Behaviour*, 28(1), 111e133.

[497] Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Fran_ek, M. (2005). Values and their relationship to environmental concern and conservation behaviour. *Journal of Cross-Cultural Psychology,* 36(4), 457e475.

[498] Groot, J. I. M. D., & Steg, L. (2009). Morality and prosocial behaviour: The role of awareness, responsibility, and norms in the norm activation model. *The Journal of Social Psychology*, 149(4), 425e449.

[499] Stern, P. C. (2000). Toward a coherent theory of environmentally significant behaviour. *Journal of Social Issues,* 56(3), 407e424.

[500] Vaske, J. J., & Kobrin, K. C. (2001). Place attachment and environmentally responsible behaviour. *The Journal of Environmental Education* 32(4), 16e21.

[501] Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology* 29(3), 309e317.

[502] Stern, P. C. (2000). Toward a coherent theory of environmentally significant behaviour. *Journal of Social Issues* 56(3), 407e424.

[503] Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues* 50(3), 65e84.

[504] Schultz, P. W., & Zelezny, L. C. (1998). Values and proenvironmental behaviour: A five-country survey. *Journal of Cross-*

Cultural Psychology 29(4), 540e558.

[505] Steg, L., Dreijerink, L., & Abrahamse,W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology* 25(4), 415e425.

[506] Dolnicar, S., & Leisch, F. (2008). Selective marketing for environmentally sustainable tourism. *Tourism Management* 29(4), 672e680.

[507] Imran, S., Alam, K., & Beaumont, N. (2014). Environmental orientations and environmental behaviour: Perceptions of protected area tourism stakeholders.T*ourism Management* 40, 290e299.

[508] Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (pp. 221e279). New York, NY: Academic.

[509] Kollmuss Anja & Agyeman Julian (2002). Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research* 8(3) 257 http://psychsustain.voices.wooster.edu/files/2014/01/Mind-Gap.pdf

[510] Fliegenschnee , M. & Schelakovsky, M. (1998) Umweltpsychologie und Umweltbildung: eine Einfu¨hrung aus humano¨kologischer Sicht (Wien, Facultas Universita¨ts Verlag).

[511] Fietkau, H.-J. & Kessel, H. (1981) ibid.

[512] Ramkissoon H., Weiler B.and Graham Smith L.D. (2012). Place attachment and pro-environmental behaviour in national parks: the development of a conceptual framework. *Journal of Sustainable Tourism* 20(2) 257–276.

[513] Stedman, R. (2002). Toward a social psychology of place. *Environment and Behaviour 34*, 561–581.

[514] Thogersen, J., & Olander, F. (2003). Spill-over of environment-friendly consumer behaviour. *Journal of Environmental Psychology 23*, 225–236.

[515] Vaske, J.J., & Kobrin, K.C. (2001). Place attachment and environmentally responsible behaviour. *Journal of Environmental Education 32*(4), 16–21.

[516] Gatersleben, B., Steg L., Vlek, C. (2002). Measurement and determinants of environmentally significant consumer behaviour. *Environment and Behaviour* 34(3) 335(28).

[517] Uusitalo Liisa (1990). Are Environmental Attitudes and Behaviour Inconsistent? Findings from a Finnish Study. *Scandinavian Political Studies*, Bind 13 (New Series).

[518] Chatzidakis, A., Hibbert, S. & Smith, A.P. (2007). Why People Don't Take their Concerns about Fair Trade to the Supermarket: The Role of Neutralisation, *Journals of Business Ethic*s 74 (1), 89-100.

[519] Kollmuss Anja & Agyeman Julian (2002). Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research* 8 (3).

[520] Gupta S. & Ogden D. T. (2006). The attitude - behaviour gap in environmental consumerism. *APUBEF Proceedings* - Fall 2006.

[521] Ostrom E., Burger J., Field C. B., Norgaard R. B., Policansky, D. (1999). Revisiting the Commons: Local Lessons, Global Challenges. *Science* 284 (5412), 278-282 DOI: 10.1126/science.284.5412.278

[522] Kliemt, H. (1986). The Veil of Insignificance. *European Journal of Political Economy* 2, 333-344.

[523] Taylor C. (2007) *A Secular Age*. Cambridge, MA: Belknap Press.

[524] McDougall W. (1920). *The Group Mind: A Sketch of the Principles of Collective Psychology with some Attempts to Apply Them to the Interpretation of National Life and Character*. New York: G.P. Putnam's Sons.

[525] Baldacchino J.P. (2011). The eidetic of belonging: Towards a phenomenological psychology of affect and ethno-national identity. *Ethnicities* 11(1), 80–106. Sage.

[526] Markle L. G. (2013). Pro-Environmental Behavior: Does it matter how it's measured? Development and Validation of the Pro-Environmental Behavior Scale (PEBS). *Human Ecology* 41, 905–914

[527] Herrera M. (1992). Environmental and political participation: Toward a new system of social beliefs and value. *Journal of Applied Social Psychology* 22(8), 252-276.

[528] Kaiser F. (1998). A general measure of ecological behaviour. Journal of *Applied Social Psychology*, 28(5), 395-422.

[529] Schultz, P. W. & Zelezny, L. C. (1998). Values and proenvironmental behaviours: A five-country survey. *Journal of Cross-Cultural Psychology*, 29(4), 540-558.

[530] Marušić B. G. (2011). Analysis of patterns of spatial occupancy in urban open space using behaviour maps and GIS. *Urban design International*, 16 1 Spring, 3650 , 1357-5317.

[531] Goličnik Marušić B., Marušic D. (2012). *Behavioural Maps and GIS in Place Evaluation and Design. Application of Geographic Information Systems*, eds. Bhuiyan Monwar Alam, ISBN 978-953-51-0824-5. http://www.intechopen.com/books/application-of-geographic-information-systems/behavioural-maps-and-gis-in-place-evaluation-and-design#B4

[532] Cosco, N., Moore, R., & Islam, M. (2010). Behaviour mapping: a method for linking preschool physical activity and outdoor design. *Medicine & Science in Sports & Exercise* 42 (3), 513-9. DOI: 10.1249/MSS.0b013e3181cea27a.

[533] Moore R., & Cosco N. (2010). Using behaviour mapping to investigate healthy outdoor environments for children and families: conceptual framework, procedures and application. In Thompson, C. W., Aspinall, P., & Bell, S. (Eds). *Innovative approaches to researching landscape and health*. London: Routledge. Retrieved online 3 April 16. http://www.naturalearning.org/sites/default/files/OpenSpace2_Moore_Cosco2010Full.pdf

[534] European Commission. Environment Directorate (2009). *Natura 2000 in the Mediterranean Region*. http://ec.europa.eu/environment/nature/info/pubs/docs/biogeos/Mediterranean.pdf

[535] Grove T. A. and Rackham O. T. (2001). *The nature of Mediterranean Europe: An ecological history*. Yale University Press, New Haven, 384. ISBN 0 300 08443 9

[536] Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A.B. and Kent, J. (2000). Biodiversity hotspots for conservation priorities. *Nature* 403, 853-858.

[537] Cassar L. F. and Conrad E. (2014). *An outline strategy for implementation of a national restoration and afforestation project in the Maltese islands*. Report prepared for the Ministry for Sustainable Development, the Environment and Climate change. https://socialdialogue.gov.mt/en/Public_Consultations/MSDEC/Pages/Consultations/AfforestationandRestorationEcologyintheMalteseislands.aspx

[538] Thompson J. D., Lavergne S., Affre L., Gaudeul M. & Debussche M. (2005). Ecological differentiation of Mediterranean endemic plants. *TAXON* 54 (4), 967–976.

[539] Medail F. and Quezel P. (1999). Biodiversity Hotspots in the Mediterranean Basin: Setting Global Conservation Priorities. *Conservation Biology* 13 (6), 1510–1513.

[540] Allen, H.D. (2001). *Mediterranean ecogeography*. Prentice Hall

[541] Blondel Jacques (2006). The 'Design' of Mediterranean Landscapes: A Millennial Story of Humans and Ecological Systems during the Historic Period. *Human Ecology* 34 (5), 713–729.

[542] Naveh, Z. (1994). The role of fire and its management in the conservation of Mediterranean ecosystems and landscapes. In Moreno, J. M., and Oechel, W. C, *The Role of Fire in Mediterranean-Type Ecosystems*, Springer, Berlin Heidelberg New York, 163-186.

[543] Butzer, K. W (1961). Climatic change in arid regions since the Pliocene. 31–56. In: *A history of land use in arid regions* (Stamp, D., Ed.) Paris: Unesco 1961.

[544] Whyte, R. O. (1961). Evolution of land use in South-Western Asia. 57–118. In: *A history of land use in arid regions* (Stamp, D., Ed). Paris: Unesco 1961.

[545] Woodward, Jamie (2009). *The Physical Geography of the Mediterranean*. Oxford, 07 May

[546] Butzer, K. W. (2005). Environmental history in the Mediterranean world: cross-disciplinary investigation of cause-and-effect for degradation and soil erosion, *Journal of Archaeological Science* 32 (12), 1773-1800, ISSN 0305-4403, http://dx.doi.org/10.1016/j.jas.2005.06.001.

[547] Blondel, J. s. (2006). The 'Design' of Mediterranean Landscapes: A Millennial Story of Humans and Ecological Systems during the Historic Period. *Human Ecology* 34 (5), 713–729.

[548] Marchand, H. (1990). *Les Forets Mediterraneennes. Enjeux et Perspectives.* Economica, Paris.

[549] Quezel, P. (1976). Le dynamisme de la vegetation en region Mediterraneenne. *Collana Verde* 39: 375-391.

[550] Quezel, P., and Medail, F. (2003). *Ecologie et Biogeographie des Forets du Bassin Mediterraneen*. Elsevier, Paris.

[551] Data SIO Imagery (2016). NOAA, U.S. Navy, NGA, Landsat. *Map data Google, Indicating the Maltese islands*.

[552] Climate Change. http://mra.org.mt/climate-change/climate-change-introduction/

[553] Cassar L. F. , Conrad E., and Schembri P.J. (2008). The Maltese Archipelago. Chapter 13 in I.N. Vogiatzakis et al. (eds.), *Mediterranean Island Landscapes.* Springer Science + Business Media B.V.

[554] Schembri P.J. (1993). Physical geography and ecology of the Maltese Islands: A brief overview. In Busuttil S. (ed.), Lerin F. (ed.), Mizzi L. (ed.). *Malta: Food, agriculture, fisheries and the environment*.

[555] Cassar L. F. & Conrad E. (2014). An outline strategy for implementation of a national restoration and afforestation project in the maltese islands. Ministry for Sustainable Development, the Environment and Climate.

[556] Schembri, P.J., Baldacchino, A.E., Mallia, A., Schembri, T., Sant, M.J., Stevens, D.T. and Vella, S.J. (2002). State of the environment report for Malta 2002: Living resources, fisheries and agriculture. Pp. 162-346. In: *State of the Environment Report for Malta, 2002.* Santa Venera, Malta: Ministry for Home Affairs and the Environment; iv + 581pp.

[557] Malta Environment and Planning Authority (2003). Current state of knowledge of the Maltese non-marine fauna. *Annual report and account,* 33-65; Floriana, Malta: Malta Environment and Planning Authority; 92pp.

[558] Haslam, S. M. (1969). Malta's Plant Life. The influence of climate and man on the watercourses of Malta. *Toxic. Env. Chem*. 20-21:85-92.

[559] Lanfranco, E. (1989a). Il-Pjanti Vaskulari Endemici tal-Gzejjer Maltin [The endemic vascular plants of the Maltese islands]. In L-Identita Kulturali ta' Malta [The cultural identity of Malta], ed.T. Cortis, 141-164. Valletta: Department of Information. &
(1989b). The Flora. In Red Data Book for the Maltese Islands, eds. P. J. Schembri and J. Sultana, 5-70, Valletta: Department of Information.

[560] Thake M. A. (1985). The biogeography of the Maltese islands, illustrated by the Clausiliidae. *Journal of Biogeography* 12, 269-287.

[561] Lanfranco, E., and Schembri P. J. (1986). Maltese wetlands and wetland biota. *Potamon* 15:122-125.

[562] Anderson, E. W., and Schembri P. J. (1989). *Coastal zone survey of the Maltese Islands report.* Planning Services Division, Works Department, Floriana.

[563] Schembri, P. J. (1988). Conservation of the Maltese fauna. In State of the Environment Report 1985: A comparative aid to the state of the environment today, ed. A . E. Baldacchino. *Valletta: Din l-Art Helwa. Men of the Trees.* The Ornithological Society/Society of the Study and Conservation of Nature.

[564] Schembri P.J. (1991). Ekologija tal-Gzejjer Maltin: Harsa Generali [Ecology of the Maltese Islands: A general overview]. In *Oqsma tal-kultura Maltija [Aspects of the Maltese culture]*, ed. T. Cortis, pp. 5-37, Floriana: Ministry of Education and the Interior.

[565] Schembri P.J. (1992). *Report of survey: Natural resources In Malta.* Structure Plan Technical Report. Floriana: Planning Services Division.

[566] Schembri P.J. (1993). Physical geography and ecology of the Maltese Islands: A brief overview. In Busuttil S. (ed.), Lerin F. (ed.), Mizzi L. (ed.). *Malta: Food, agriculture, fisheries and the environment*.

[567] Ellul M.A. (2014). *An annotated checklist of the vascular flora of the Maltese Islands*. A dissertation submitted to the Faculty of Science, University of Malta in part fulfilment of the degree of Masters of Science.

[568] Lanfranco S., Lanfranco E., Westermeier R., Zammit M.A., Mifsud M.A. and Xiberras J. (2013). The vascular flora of the Maltese Islands. In *Islands and plants: preservation and understanding of flora on Mediterranean islands.* 2nd Botanical Conference in Menorca. Proceedings and abstracts.

[569] Thake M. A. (1985). The biogeography of the Maltese Islands, Illustrated by the Clausiliidae. *Journal of Biogeography* 12, (3).

[570] Schembri, P.J. (1994) Natural heritage. In: Frendo, H. & Friggieri, O. (eds) *Malta culture and identity*. 105-124; Valletta,

Malta: Ministry of Youth and the Arts; ix + 272pp.

[571] Hunt, C.O. & Schembri, P.J. (1999) Quaternary environments and biogeography of the Maltese Islands. In: Mifsud, A. & Savona Ventura, C. [eds] *Facets of Maltese prehistory*. 41-75; Malta: The Prehistoric Society of Malta; vii + 243pp.

[572] Cassar, L.F., Conrad, E., and Schembri, P.J., (2007). The Maltese archipelago. In I.N., Vogiatzakis, G. Pungetti and A. M. Manion [eds.] Mediterranean Island Landscapes. Springer, *Landscape Serie*s, No.9, 297-322.

[573] Cassar, L. F., Conrad, E., Schembri P. J. (2008). *Mediterranean Island Landscapes*. Volume 9 of the series Landscape Series pp 297-322 The Maltese Archipelago.

[574] Conrad, E. and Cassar, L.F. (eds.) (2010). *Perspectives on Landscape*. Msida: Institute of Earth Systems, University of Malta.

[575] Cassar.L. F. (2010). *A Landscape Approach to Conservation: Integrating Ecological Sciences & Participatory Methods*. xxxi + 210 pages. International Environment Institute.

[576] Conrad, E. and Cassar, L.F. (eds.) (2012). *Landscape Approaches for Ecosystem Management in Mediterranean Islands*. Malta: Progress Press.

[577] National Statistics Office (2016). *World Population Day*: 11 July. News Release. https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_C3/Population_and_Tourism_Statistics/Documents/2016/News2016_108.pdf

[578] Malta Tourism Authority (2016). *Tourism in Malta - Edition 2016*. https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_C3/Population_and_Tourism_Statistics/Documents/2016/News2016_108.pdf

[579] EUROSTAT (2016). *Statistics explained. The EU in the world - population*. Data extracted in March 2016. http://ec.europa.eu/eurostat/statistics-explained/index.php/The_EU_in_the_world_-_population

[580] National Statistics Office (2014). *Census of population and housing 2011.* http://www.nso.gov.mt/site/page.aspx?pageid=588

[581] Stoddart, S. (1997-1998). Contrasting political strategies in the islands of the southern Central Mediterranean. *Accordia research paper* 7, 59-73. https://www.um.edu.mt/library/oar//handle/123456789/9984

[582] Stratford, E. (2003). Editorial: Flows and Boundaries: Small Island Discourses and Challenges of Sustainability, Community, and Local Environments, *Local Environment* 8, 2003, pp. 495– 9, p. 495.

[583] Ingold, T. (2000). *The Perception of the Environment: Essays in Livelihood, Dwelling, and Skill.* London: Routledge.

[584] Vannin,i P., Taggart, J. (2012). Doing islandness: a nonrepresentational approach to an island's sense of place. *Cultural geographies* 20(2) 225–242

[585] Baldacchino, G. (2012). Journal of Marine and Island Cultures Volume 1, Issue 2, December 2012, Pages 55–62. The Lure of the island: A spatial analysis of power relations. http://doi.org/10.1016/j.imic.2012.11.003

[586] Matulis, B. S. and Moyer, J. R. (2016). Beyond Inclusive Conservation: The Value of Pluralism, the Need for Agonism, and the Case for Social Instrumentalism. *Conservation Letters*. doi:10.1111/conl.12281

[587] Briguglio, L. (1995). Small island developing states and their economic vulnerabilities. *World Development* 23(9), pp.1615-1632.

[588] Government of Malta (2002). *Malta National Report - Submitted by the Government of Malta to the World Summit on Sustainable Development* - Johannesburg. Malta: Government of Malta.

[589] Moncada, S., Camilleri M., Formosa, S., & Galea, R. (2010). From Incremental to Comprehensive: Towards Island-Friendly European Union Policy Making. In *Island Studies Journal* 5(1), 61-88.

[590] Zammit, A. (2009). Sociology and the Environment. In Cutajar, J. & Cassar, G. (Eds.). *Social Transitions in Maltese Society* (pp. 303-328). Malta: Agenda.

[591] Baldacchino, G. & Bertram, G., (2009). The beak of the finch: insights into the economic development of small, often island, economies. The Round Table: C*ommonwealth Journal of International Affairs*, 98(401),pp. 141-160.

[592] Baldacchino, G. (2012). Chapter 4 - 'Development strategies for smaller island States and Territories: an ecological approach'. In *Landscape Approaches for Ecosystem Management in Mediterranean Islands*. Eds. Elisabeth Conrad and Louis F. Cassar.

[593] Boissevain, J. (1993). *Saints and Fireworks - Religion and Politics in Rural Malta.* Malta: Progress Press.

[594] Boissevain J. (2012). Chapter 14.- Some notes on the destruction of Malta's landscape. In *Landscape Approaches for Ecosystem Management in Mediterranean Islands*. Eds. Elisabeth Conrad and Louis F. Cassar.

[595] Briguglio, M. (2012a). ENGOs, EU accession and empowerment: the case of land rationalisation in Malta. In *International Journal of Green Economics* 6(3), 279-297.

[596] Arcidiacono, C. & Legewie, H. (2004). Nirranġaw - A Basic Social Psychological Process in an Island Community. Learning communities and sustainable social-economic city development. *Proceedings of the 5th European Conference for Community Psychology*. Berlin, Sept. 16 – 19, 2004

[597] Azzopardi, J. and Mann P. (2007). Nirranġaw : A Social Psychological Process in an Island Community. *The Gozo Observer* (No.16) - June.

[598] Azzopardi, G. J. (2015). Solving problems, the island way: human resourcefulness in action among the islanders of Gozo. *Island Studies Journal* 10, (1), 71-90.

[599] Boissevain, J. (1974). Friends of Friends. Networks, Manipulators and Coalitions. Oxford BasiL Blackwell

[600] Banfield, C. E. (1958). *The Moral Basis of a Backward Society*. The Free Press. https://coromandal.files.wordpress.com/2011/02/edward-c-banfield-the-moral-basis-of-a-backward-society.pdf

[601] Argyris, C. (1991) *Teaching Smart People to Learn*. Harvard Business Review: May/June

[602] Apap, A. M. (2013). *Environmental issues in political discourse. A case study of selected printed media prior to the 2013 general election in Malta*. Submitted in partial fulfilment of a BA in Sociology.

[603] Boissevain, J. & Theuma, N. (1998). Contested Space: planners, tourists, developers and environmentalists in Malta. In S. Abram & *J.* Waldren (Eds.), *Anthropological Perspectives on Local Development: Knowledge and sentiments in conflict* (96-119). London: Routledge.

[604] European Commission (2017). *Public opinion in the European Union (Autumn 2016). National Report - Malta*. First results - Fieldwork November 2016. December. Standard Eurobarometer 86 – Wave EB86.2 – TNS opinion & social. http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/ResultDoc/download/DocumentKy/77186

[605] European Commission (2015). *Attitudes of Europeans towards biodiversity*. Special Eurobarometer 436. Directorate-General for Communication. http://ec.europa.eu/environment/eurobarometers_en.htm

[606] Habitats Directive Reporting. http://ec.europa.eu/environment/nature/knowledge/rep_habitats/index_en.htm

[607] Cassar G. and Cutajar J. Eds. (2004). *Sociological Aspects of the Maltese Islands*. Indigobooks..

[608] Briguglio M. and Brown M. eds. (2016). *Sociology of the Maltese Islands*. Miller Publishing.

[609] MEPA (2010). *Fourth National Report to the Convention on Biological Diversity – Malt*a. Retrieved online August 2015 - https://www.cbd.int/doc/world/mt/mt-nr-04-en.pdf

[610] Ministry for Sustainable Development, the Environment and Climate Change (2012). *National Environment Policy*. February. http://msdec.gov.mt/en/decc/documents/environment/national%20environment%20policy.pdf

[611] Environment and Resources Authority (2012). *The Environment Report Indicators 2010-2011*.

[612] Deidun A. (2010). Challenges to the Conservation of Biodiversity on Small Islands: The Case of the Maltese Islands. International. *Journal of Arts and Sciences* 3(8): 175 – 187. http://www.openaccesslibrary.org/images/XEW277_Alan_Deidun.pdf

[613]. Allan R. James, Venter O., Maxwell S., Bertzky B., Jones K., Shi Y., Watson E.M.J. (2017) Recent increases in human pressure and forest loss threaten many Natural World Heritage Sites, *Biological Conservation* 206, February, 47-55, ISSN 0006-3207, http://dx.doi.org/10.1016/j.biocon.2016.12.011.

[614] Cassar, L. (1997). Settlement patterns in the Maltese Islands: From Early Colonisation to Pre-Independence. *GeoJournal* 41(2): 137-144.

[615] Bertelsmann Stiftung (2015). *Sustainable Governance Indicators SGI.* Malta Report. Godfrey A. Pirotta, Isabelle Calleja, César Colino. http://www.sgi-network.org/docs/2015/country/SGI2015_Malta.pdf

[616] Malta Environment and Planning Agency (2008). *State of the environment indicators 2007. L3 Land cover by type 2007*. https://www.mepa.org.mt/file.aspx?f=2081

[617] http://www.pa.org.mt/mepa-mapserver

[618] Eurostat(2013). *Land cover statistics*. http://ec.europa.eu/eurostat/statistics-explained/index.php/Land_cover_statistics ; http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Land_cover,_2012_LUCAS2012.png ; http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Countries_by_share_of_artifical_land_cover_and_population_density,_2012_LUCAS2012.png

[619] European Environment Agency (2016). *Urban sprawl in Europe*. Joint EEA-FOEN report. Report No 11/2016. http://www.eea.europa.eu/publications/urban-sprawl-in-europe

[620] National Statistics Office (2017). *Motor Vehicles: Q4/2016.* 19 January 2017. Press release NR011/2017. Retrieved online March 2017. https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_B3/Environment_Energy_Transport_and_Agriculture_Statistics/Pages/Motor-Vehicles.aspx

[621] EUROSTAT (2016). *Passenger cars in the EU*. Data extracted in August 2015. http://ec.europa.eu/eurostat/statistics-explained/index.php/Passenger_cars_in_the_EU

[622] Times of Malta (27 Oct 2016). *Cars outpacing population growth*. https://www.timesofmalta.com/articles/view/20161027/local/cars-outpacing-population-growth.629178

[623] Malta Tourism Authority (2017). *Inbound Tourism: December 2016*. 1 February 2017 - 020/2017. Retrieved online in March 2017. https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_C3/Population_and_Tourism_Statistics/Documents/2017/News2017_020.pdf

[624] National Statistics Office (2017). *Trends in Malta 2016*.

[625] Government of Malta (2017). *European Medicines Agency Malta Bid.* http://www.consilium.europa.eu/en/policies/relocation-uk-based-agencies/malta-ema-offer_pdf/

[626] EEA (2014). *Noise in Europe*. Report No 10/2014 http://www.eea.europa.eu/publications/noise-in-europe-2014

[627] Cuschieri S., Vassallo J., Calleja N., Camilleri R., Borg A., Bonnici G., Zhang Y., Pace N. and Mamo J. (2016). Prevalence of obesity in Malta. *Obesity Science & Practice*. doi: 10.1002/osp4.77

[628] Superintendence of Public Health Ministry for Health, the Elderly and Community Care (2012). *A Healthy Weight for Life: A National Strategy for Malta 2012-2020*. https://health.gov.mt/en/Documents/National-Health-Strategies/hwl_en.pdf

[629] Grech V. (2007). Childhood obesity: a critical Maltese health issue. *Journal of the Malta College of Pharmacy Practice*. Issue 12 Winter 2007 http://www.mcppnet.org/publications/issue12-6.pdf

[630] Grech, V. E.; Aquilina S.; Camilleri E. (2015). Depicting the analyses of the first National Maltese Childhood BMI study. *Paediatr Cardiol* 2015;17(4),4-13. https://www.um.edu.mt/library/oar/handle/123456789/8255

[631] European Union (2015). *The External Costs of Passenger and Commercial Vehicles Use in Malta.* Contract Reference Number PN/2014-003-ESCONST/MT. Authors: Attard Maria, Von Brockdorff Philip, Bezzina Frank https://ec.europa.eu/malta/sites/malta/files/docs/body/study_on_traffic_online.pdf

[632] The Today Public Policy Institute (2015). *The Environmental Dimension of Malta's ill-Health and action to prevent Obesity, Diabetes, Cardiovascular Disease and Dementia*. http://www.tppi.org.mt/dir/wp/wp-content/uploads/2016/06/supplement-vi-health-aspects-of-transport-and-the-urban-environment.pdf

[633] Forum for the Future (2014). *The five capitals,* accessed 20 April 2015. http://www.forumforthefuture.org/project/five-capitals/overview

[634] Morris J., Camilleri M., Moncada S. (2008). Key sustainability issues in European sensitive areas – a participatory approach. In: Helming K, Tabbush P, Perez- Soba M (eds). *Sustainability impact assessment of land use changes*. Springer, 451-470.

[635] Laws of Malta. Act VII (2016). *Development Planning Ac*t, 2016. Published 26th January, 2016 https://www.mepa.org.mt/LpDocumentDetails?syskey=1782

[636] Laws of Malta. Act I (2016). *Environment Protection Act.* http://justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=27255&l=1

[637] Rural Development Department. Ministry for Resources and Rural Affairs https://secure2.gov.mt/mrra-ma/file.aspx?f=15

[638] Malta Environment and Planning Authority (2012). *National Biodiversity Strategy & Action Plan*. https://era.org.mt/en/Pages/NBSAP.aspx

[639]National Commission for Sustainable Development (2006). *A sustainable development strategy for the Maltese Islands 2007-2016*. http://www.um.edu.mt/__data/assets/pdf_file/0003/64812/SD_Strategy_2006.pdf

[640] The Council of the European Union (2003). *Council Regulation (EC) No 1782/2003 of 29 September 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers and amending Regulations*. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003R1782

[641] The Bern Convention. http://www.coe.int/t/dg4/cultureheritage/nature/bern/default_en.asp

[642] The Convention on Wetlands (Ramsar Convention). http://www.ramsar.org/

[643] Protocol concerning specially protected areas and biological diversity in the Mediterranean (1999). http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1999:322:0003:0017:EN:PDF

[644] MEPA (2007). *State of the Environment Indicators 2006*. https://www.mepa.org.mt/soe2006-intro

[645] MEPA (2008). *The Environment Report 2008*. https://www.mepa.org.mt/ter

[646] Environment and Resources Authority (2017). *Authority Important Natural Areas.* https://era.org.mt/en/Pages/Important-Natural-Areas.aspx

[647] Environment Resources Authority (2017) *Natura 2000*. Retrieved online 25.05.17. https://era.org.mt/en/Pages/Natura-2000-Malta.aspx

[648] Protected Planet (2017). *Protected areas in Malta.* March. https://www.protectedplanet.net/country/MT

[649] Caruana Dingli P. and Galea M. (2016). *The future of nature parks in Malta: Innovation and Management.* The Today Public Policy Institute. https://www.um.edu.mt/library/oar/bitstream/handle/123456789/8044/The%20Future%20of%20Nature%20Parks.pdf?sequence=2&isAllowed=y6he

[650] European Commission (2013). *Commission implementing decision of 7 November 2013 adopting a seventh updated list of sites of Community importance for the Mediterranean biogeographical region* (notified under document C(2013) 7356) (2013/739/EU) http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D0739&from=EN

[651] European Environment Agency (2010). *Land use (Malta). The European environment – state and outlook 2010. Country assessments - Malta.* http://www.eea.europa.eu/soer/countries/mt/soertopic_view?topic=land

[652] BFN (2010). *Protected Area Management Effectiveness Assessments in Europe - A review of application, methods and results*. https://www.bfn.de/fileadmin/MDB/documents/service/Skript_271a.pdf

[653] Cassar L.F., Conrad E., Griffiths G.H. & Morse S. (2007). Limits of stakeholder participation in sustainable development: "Where facts are few, experts are many. In *The Mediterranean coastal areas from watershed to the sea: interactions and changes* (F. Scapini ed.).

[654] Schembri, P. J. (1993) Physical geography and ecology of the Maltese Islands: a brief overview. In.: Busuttil, S; Lerin, F & Mizzi, L (eds) Malta: Food, agriculture, fisheries and the environment. *Options Mediterraneennes* ser. B: Etudes et. Recherches No 7. pp. 27-39; Paris, France: CIHEAM; 192pp.

[655] Agius C. (2014). *Policy Context of the Endemic Flora of the Maltese Islands in a Changing Taxonomic Landscape*. Unpublished *Masters Thesis*. 11. http://commons.lib.jmu.edu/master201019/11

[656] Joint Research Centre (2013). *Connectivity of Natura 2000 Forest Sites. Institute for Environment and Sustainability.* Retrieved online June 2015 http://forest.jrc.ec.europa.eu/media/cms_page_media/56/2013-NATURA 2000%20connectivity_executive%20rep.pdf

[657] Araújo M. B., Alagador D., Cabeza M., Nogués-Bravo D., and Thuiller W. (2011). Climate change threatens European conservation areas. *Ecol Lett.* May 2011; 14(5): 484–492. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3116148/

[658] Intergovernmental Panel on Climate Change (2014) Climate Change 2014: Impacts, Adaptation, and Vulnerability. Working Group II contribution to the IPCC Fifth Assessment Report http://www.ipcc.ch/report/ar5/wg2/

[659] Giorgia, F., Lionello P. (2008). Climate change projections for the Mediterranean region. *Global and Planetary Change* 63(2–3), September, 90–104

[660] Micallef, A., Sammut C.V. (2010). Future climate scenarios in: the second national communication of Malta to the United Nations framework convention on climate change. In: Micallef A, Sammut CV, editors. *Malta: Ministry for Resources and Rural Affairs*, Government of Malta.

[661] Council of Europe (2012). *Reports and contributions by governments – Malta. Bern Convention Group of Experts on Biodiversity and Climate Change.* Convention on the conservation of european wildlife and natural habitats. Compilation prepared by the Directorate of Democratic Governance, Culture and Diversity.

[662] Barredo, I. J., Caudullo G., Dosio A. (2016). Mediterranean habitat loss under future climate conditions: Assessing impacts on the Natura 2000 protected area network. *Applied Geography* 75 (2016) 83e92.

[663] Akerlof K., DeBono R., Berry P., Leiserowitz A., Roser-Renouf C., Clarke K.L., Rogaeva A., Nisbet M.C., Weathers M.R., and Maibach E.W., (2010). Public perceptions of climate change as a human health risk: surveys of the United States, Canada and Malta. International *Journal of Environmental Research and Public Health* 7(6), 2559-2606.

[664] European Environment Agency (2015). *State of the Environment Report 2015 - The European environment — state and outlook 2015.* http://www.eea.europa.eu/soer

[665] Schmuck ,P., Vlek C. (2003). Psychologists Can Do Much to Support Sustainable development. *European Psychologist,* 8 (2), June, 66–76. Hogrefe & Huber Publishers.

[666] National Wildlife Federation (2102). *The Psychological Effects of Global Warming on the United States: And Why the U.S. Mental Health Care System Is Not Adequately Prepared*. http://www.climateaccess.org/sites/default/files/NWF_Psychological%20Effects.pdf

[667] http://natura2000malta.com/

[668] Transport Malta (2016). *Environmental Report. Development of a National Transport Model.* Supporting Strategy Development in Malta Strategic Environmental Assessment on Malta's National Transport Strategy and Master Plan Environmental Report. Version 1.0. August. Contractors. Ineco-Systematica Consortium. Subcontractor: Adi Associates Environmental Consultants Ltd.

[669] http://natura2000malta.com/

[670] MEPA (2015). *Information brief on the management planning & implementation of communication measures for terrestrial Natura 2000 sites in the Maltese islands.* https://socialdialogue.gov.mt/en/Public_Consultations/OPM/Pages/Consultations/Natura2000MaltaManagementPlan.aspx Retrieved online October 2016.

[671] The Environment and Resources Authority (2017). *Natura 2000 Management Planning for Terrestrial Sites in Malta & Gozo*. Press Release (March 6) http://era.org.mt/en/Pages/Natura-2000-Management-Planning.aspx

[672] The Today Public Policy Institute (2016). *The Future of Nature Parks in Malta: Innovation and Management.*

[673] Popescu, V.D., Rozylowicz, L., Niculae, I.M., Cucu A.L., Hartel T. (2014). Species, Habitats, Society: An Evaluation of Research Supporting EU's Natura 2000 Network. *PLoS ONE* 9(11): e113648. doi:10.1371/journal.pone.0113648

[674] Bradshaw, C.J.A., Giam X., Sodhi N.S. (2010) Evaluating the Relative Environmental Impact of Countries. *PLoS ONE* 5(5): e10440. doi:10.1371/ journal.pone.0010440

[675] Malli,a D. (2014). Chapter 9 - Sustainability and Urban Conservation in Malta. In: *Future Preparedness: Thematic and Spatial Issues for the Environment and Sustainability*. Eds Saviour Formosa. Department of Criminology, Faculty for Social Wellbeing, University of Malta, Msida, Malta.

[676] Malta Environment and Planning Authority (1995). *Development Control within Urban Conservation Areas Design Guidance.* (July)

[677] https://www.mepa.org.mt/lpg-uca-street

[678] Butler, A. (2014). *Developing Theory of Public Involvement in Landscape Planning - Democratising Landscape*. Faculty of Landscape Architecture, Horticulture and Crop Production Science. Department of Urban and Rural Development. Uppsala Doctoral Thesis. Swedish University of Agricultural Sciences. Uppsala.

[679] Council of Europe (2000). *European Landscape Convention*. http://www.coe.int/en/web/conventions/full-list/-/conventions/rms/0900001680080621

[680] European Parliament (2003). *Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC - Statement by the Commission*. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32003L0035

[681] European Parliament (2006). *Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies*. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006R1367

[682] EU Secretariat, Office of the Prime Minister (2010). *Malta's report on the experience gained in the application of Directive 2003/4/EC on public access to environmental information.* 19 January.

[683] Laws of Malta (1855). *Chapter 12. Code of organization and civil procedure.* http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=8577

[684] Environment and Resources Authority (2017). *AARHUS Convention implementation report certification sheet.* https://era.org.mt/en/PublishingImages/Pages/Active-Public-Consultations/Aarhus%20National%20Implementation%20Report%202017.pdf

[685] The National Assembly for Wales (2000). *Environmental Impact Assessment: A Guide to Procedures,* DETR and Thomas Telford Ltd. Downloaded from the Internet: http://www.communities.gov.uk/documents/planningandbuilding/pdf/157989.pdf

[686] Sciberras, R. (2013). *Effectiveness of Environmental Impact Assessment Process in the Maltese Islands*. *Masters Theses.* Paper 319.

[687] Vella S., Borg M. (2010). 'Integrate Plurality of Landscapes and Public involvements into Maltese environmental Policy' in S. Keorner and I. Russel (eds.) *Unquiet Pasts - Risk Society, Lived Cultural Heritage, Re-designing Reflexivity* (Ashgate Publishing).

[688] Vella S., Reed M., Sidoli del Ceno J., Attlee A. (2015). *SIA, Participation and Mediation on the ground.* IAIA15 Conference Proceedings. Impact Assessment in the Digital Era. 35th Annual Conference of the International Association for Impact Assessment, 20 - 23 April. http://conferences.iaia.org/2015/Final-Papers/Vella,%20Steven%20-%20SIA,%20Participation%20and%20Mediation%20on%20the%20ground.pdf

[689] Vella S., Reed M., Attlee A. (2015). Ibid..

[690] Burdge R. J. (2002) Why is social impact assessment the orphan of the assessment process? *Impact Assessment and Project Appraisal* 20:1, 3-9, DOI: 10.3152/147154602781766799

[691] Sublet H. V., Covello V.T., Tinker L. Tim (2013). Scientific Uncertainty and Its Influence on the Public Communication Process. Springer *Science & Business Media*, 09 Mar.

[692] US EPA (2014). *International Public Participation Guide.* https://www.epa.gov/sites/production/files/2014-05/documents/ppg_english_full-2.pdf

[693] Holmes B. (2011). *Citizens' engagement in policymaking and the design of public services.* Research Paper No. 1, 2011–12. Parliament of Australia. Department of Parliamentary Services

[694] Nisbet E. K. L., Zelenski J. M., & Murphy S. A. (2009). The Nature Relatedness Scale: Linking individuals' connection with nature to environmental concern and behaviour. *Environment and Behaviour* 41, 715-740. http://naturerelatedness.ca/Naturerelatedness/Nature_Relatedness_files/Nature%20Relatedness%20Scale%20and%20scoring-Nisbet%20et%20al.pdf

[695] Williams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: validity and generalizability of a psychometric approach. *Forest Science* 49, 830-840.

[696] Raymond C. M., Brown G., Weber D. (2010). The measurement of place attachment: Personal, community, and environmental connections. *Journal of Environmental Psychology* 30 (2010) 422e434

[697] Kyle, G., Graefe, A., & Manning, R. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment and Behaviour* 37(2), 153e177.

[698] Dutcher D., Finley C. J., Luloff A.E. and Buttolph Johnson J. (2007). Connectivity with nature as a measure of Environmental Values. *Environment and Behaviour* 39: 474.

[699] Luloff A.E., Wilkinson K.P., Schwartz, M.R., Finley J.C., Jones S.B, & Humphrey C.R. (1993). *Pennsylvania 's Forest Stewardship Program's media campaign: Forest landowners' and the general public's opinions and attitudes: Final report.* The Pennsylvania State University . University Park , PA.

[700] Creative Research Systems (2017). *Sample Size Calculator.* http://www.surveysystem.com/sscalc.htm

[701] National Statistics Office (2014). *Census of Population and Housing 2011 Final Report.* https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/01_Methodology_and_Research/Census2011_FinalReport.pdf

[702] National Statistics Office (2014). *Census of population and housing 2011*. http://www.nso.gov.mt/site/page.aspx?pageid=588

[703] Department of Local Councils. *(2014). Map of localities across Malta. April.*

[704] Environment & Resources Authority (2017). Natura 2000 Management Planning for Terrestrial Sites in Malta & Gozo. https://era.org.mt/en/Pages/Natura-2000-Management-Planning.aspx

[705] National Statistics Office (2012). Census of population and housing. 2011 Preliminary Report. https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/01_Methodology_and_Research/Census2011_PreliminaryReport.pdf

[706] http://natura2000.eea.europa.eu/#

[707] Tabachnick, B. C., & Fidell, L. S. (Eds.). (2001). *Using Multivariate Statistics* (4th ed.).New York: Harper Collins.

[708] Nisbet, E. K. L., Zelenski, J. M., & Murphy, S. A. (2009) The Nature Relatedness Scale: Linking individuals' connection with nature to environmental concern and behaviour. *Environment and Behaviour* 41, 715-740.

[709] Schultz, P. W. (2002). Inclusion with nature: The psychology of human-nature relations. In P. W. Schmuck & W. P. Schultz (Eds.), *Psychology of sustainable development.* (62-78). Norwell, MA: Kluwer Academic.

[710] Vaske, J.J., and Kobrin K.. (2001). Place attachment and environmentally responsible behaviour. *J. Environ. Educ*. 32(4): 116-121.

[711] Jorgensen, B.S., AND Stedman R.C.. (2001). Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *J. Environ. Psych.* 21:233-248.

[712] Stedman, R.C., (2002). Toward a social psychology of place: predicting behaviour from place-based cognitions, attitude, and identity. *Environment & Behaviour* 34, 405–425.

[713] Halpenny A. E. (2006). *Environmental Behaviour, Place Attachment and Park Visitation: A case study of visitors to Point Pelee National Park*. Unpublished doctorate dissertation. Waterloo, Ontario, Canada

[714] Semken S., Freeman B. C., Watts N. B., Neakrase J. J., Dial E. R., Baker R. D. (2009). Factors That Influence Sense of Place as a Learning Outcome and Assessment Measure of Place-Based Geoscience Teaching. *Electronic Journal of Science Education* 13(2).

[715] Raymond C.M., Brown G., Weber D. (2010). The measurement of place attachment: Personal, community, and environmental connections. *Journal of Environmental Psychology* 30, 422e434

[716] Kyle, G., Graefe, A., & Manning, R. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment and Behaviour*, 37(2), 153e177.

[717] Raymond C.M., Brown G., Weber D. (2010). The measurement of place attachment: Personal, community, and environmental connections. *Journal of Environmental Psychology* 30, 422e434.

[718] Raymond C.M., Brown G., Weber D. (2010). Ibid.

[719] Semken S., Freeman B. C., Watts N. B., Neakrase J. J., Dial E. R., Baker R. D. (2009). Factors That Influence Sense of Place as a Learning Outcome and Assessment Measure of Place-Based Geoscience Teaching. *Electronic Journal of Science Education* 13 (2).

[720] Cerny, C.A., & Kaiser, H.F. (1977). A study of a measure of sampling adequacy for factor-analytic correlation matrices. *Multivariate Behavioural Researc*h 12(1), 43-47.

[721] Dutcher D. D., Finley C. J., Luloff A.E. and Buttolph Johnson J. (2007). Connectivity With Nature as a Measure of Environmental Values. *Environment and Behaviour* 39: 474.

[722] Luloff A. E., Wilkinson K. P., Schwartz M. R., Finley J.C., Jones S. B., & Humphrey C.R. (1993). *Pennsylvania's forest stewardship program's media campaign; Forest landowners and the general public's opinions and attitudes.* Unpublished report submitted to the state forester, Commonwealth of Pennsylvania and the USDA Forest Service. University Pork: Pennsylvania State University.

[723] Dutcher D., Finley C. J., Luloff A.E. and Buttolph Johnson J. (2007). Connectivity with nature as a measure of Environmental Values. *Environment and Behaviour* 39: 474.

[724] Budiharta, S, Meijaard E, Wells J.A, Abram N.K, and Wilson, K.A. (2016). Enhancing feasibility: incorporating a socio-ecological systems framework into restoration planning. *Environmental Science & Policy* 64: 83-92. http://dx.doi.org/10.1016/j.envsci.2016.06.014

[725] Kaiser, H. F. (1958). The varimax criterion for analytic rotation in factor analysis. *Psychometrika* 23, 187-200.

[726] Jorgensen B. S. (2010). Spatial variation in social capital and sense of place. *Tijdschrift voor Economische en Sociale Geografie* 101 (5), 554–567. DOI:10.1111/j.1467-9663.2010.00633.x,

[727] Government of Malta (2001). *Data Protection Act.* http://www.idpc.gov.mt/dbfile.aspx/DPA_amended2012.pdf

[728] Shaozhong S. (2016). Cartographical visualisation for communicating geoscientific findings: a modern computational approach. E*arth Sci Inform* 9, 263–269.

[729] Wettinger G. (2000). *Place-names of the Maltese Islands ca. 1300 – 1800.* PEG.

[730] Formosa S., Magri V. , Neuschmid J. and Schrenk M. (2011). Sharing Integrated Spatial and Thematic Data: The CRISOLA Case for Malta and the European Project Plan4all Process. *Future Internet* 3, 344-361; doi:10.3390/fi3040344

[731] Pollino A. M., La Porta L., Caiaffa E.. (2015) Marine Waves Energy: A spatio-temporal DSS-WebGIS to support the wave-energy potential assessment in the Mediterranean Sea. *Energia Ambiente e Innovazione. Anno 2015. Speciale Ocean energy: Ongoing reseach in Italy.* DOI: 10.12910/EAI2015-048. http://editors.enea.it/it/pubblicazioni/EAI/anno-2015/speciale-ocean-energy-ongoing-reseach-in-italy/marine-waves-energy-a-spatio-temporal-dss-webgis-to-support-the-wave-energy-potential-assessment-in-the-mediterranean-sea

[732] Sommer R., and Sommer B. (2001). *A practical guide to behavioural research*. New York: Oxford University Press.

[733] Cacciapaglia M.A., Yung L., Patterson M.E. (2012). Place mapping and the role of spatial scale in understanding landowner view of fire and fuels management. *Society and Natural Resources* 0:1–15

[734] Gosen S. (2014). *Social desirability in survey research: Can the list experiment provide the truth?* Dissertation submitted to the Philipps-Universität Marburg, Fachbereich Psychologie. Retrieved online on the 3rd February 2016. http://archiv.ub.uni-marburg.de/diss/z2014/0228/pdf/dsg.pdf

[735] Food and Agriculture Organization of the United Nations (1997). *Marketing Research and Information Systems.* Marketing and Agribusiness Texts - 4. http://www.fao.org/docrep/w3241e/w3241e00.htm#Contents

[736] Statistics New Zealand (Undated). *Non-Sampling Error in Economic Surveys at Statistics New Zealand*.

http://m.stats.govt.nz/methods/survey-design-data-collection/non-sampling-error.aspx

[737] European Commission (2014). *Special Eurobarometer 416 Attitudes of European citizens towards the environment.* European Commission, Directorate-General for Environment (DG ENV) and co-ordinated by the Directorate-General for Communication. http://ec.europa.eu/public_opinion/archives/ebs/ebs_416_sum_en.pdf &.http://ec.europa.eu/public_opinion/archives/ebs/ebs_416_en.pdf

[738] Kaplan, R., Kaplan, S. (1989). *The experience of nature: A psychological perspective.* Cambridge University Press. ISBN 0-521-34939-7.

[739] Kaplan, S. and R. De Young (2002). Toward a better understanding of pro-social behavior: The role of evolution and directed attention. *Behavioral & Brain Sciences* 25, 263-264. http://hdl.handle.net/2027.42/83666

[740] De Young, R. (2010). Restoring mental vitality in an endangered world. *EcoPsychology* 2, 13-22. http://hdl.handle.net/2027.42/83484

[741] Kaplan, S. (2001). Meditation, restoration, and the management of mental fatigue. *Environment and Behaviour*, 33(4), 480–506.

[742] Nordhaus, T., Shellenberger M. (2009). *Apocalypse Fatigue: Losing the Public on Climate Change.* Yale Environment 360. http://e360.yale.edu/authors/ted-nordhaus-and-michael-shellenberger

[743] Baddeley, M. (2011). *Energy, the Environment and Behaviour Change: A survey of insights from behavioural economics.* Cambridge Working Paper. https://doi.org/10.17863/CAM.5245

[744] Hayward F. S. (2011). 2011 Almanac of Environmental Trends. Pacific Research Institute

[745] Calvet-Mir, L., Maestre-Andrés S., Molina J. and van den Bergh J. (2015). Participation in protected areas: a social network case study in Catalonia, Spain. *Ecology and Society* 20(4):45. http://dx.doi.org/10.5751/ES-07989-200445

[746] Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

[747] Nisbet E. K. (2015). *Answering Nature's Call. Results of the 2015 David Suzuki Foundation's 30x30 Nature Challenge*. http://www.davidsuzuki.org/publications/30x30report_2015.pdf

[748] Ombudsman. Commissioner for Environment and Planning (2016). *Access to Countryside - The right to ramble.* http://www.ombudsman.org.mt/access-to-the-country-side-the-right-to-ramble/

[749] Cuschieri, S., Vassallo, J., Calleja, N., Camilleri, R., Borg, A., Bonnici, G., Zhang, Y., Pace, N., and Mamo, J. (2016) Prevalence of obesity in Malta. *Obesity Science & Practic*, 2: 466–470. doi: 10.1002/osp4.77.

[750] Desira, D. (2014). *Exploring biophilia: the influence of childhood experiences on connectedness to nature in adulthood*. Unpublished dissertation at the University of Malta for the degree of Bachelor of Science (Hons) in Earth Systems.

[751] Baldacchino, F. (2011). *Attitudes of primary school children towards environmental responsibility*. Published B.Ed. (Hons.) dissertation, University of Malta

[752] Barthelmess, P., Schuz, M., Fuchs, R., Kucera, D., Prandini, M. (2013). Different Shades of Green: Comparative Study on Nature Relatedness and Ecologic Consciousness among South Korean, Swiss, and Czech Students. *Central European Business Review*, North America, 2, Jul. Retrieved online 27 May. 2017. https://cebr.vse.cz/index.php/cebr/article/view/63

[753] Madden C. (2005). Cross-Country Comparisons of Cultural Statistics: Issues and Good Practice. *Cultural Trends* 14 (4) December, 299-316. www.informaworld.com/openurl?genre=article&issn=0954-8963&volume=14&issue=4&spage=299

[754] European Commission (2014). *Special Eurobarometer 416. Opinion & Social. Attitudes of european citizens towards the environment report*. Fieldwork: April - May 2014 / Wave EB81.3 – TNS Publication: September. http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_416_en.pdf

[755] Grønhøj, A., and Thøgersen, J. (2009). Like father, like son? Intergenerational transmission of values, attitudes, and behaviours in the environmental domain. *J. Environ. Behav*. 29, 414–421. doi: 10.1016/j.jenvp.2009.05.002

[756] Scannell, L., and Gifford, R. (2013). The role of place attachment in receptivity to local and global climate change messages. *Environ. Behav*. 45, 60–85. doi: 10.1177/0013916511421196

[757] Mifsud, D., Attard M., Isonc, S. (2017). To drive or to use the bus? An exploratory study of older people in Malta. *Journal of Transport Geography* 64, October, 23–32.

[758] Cumming E.; Earl Henry W. (1961). *Growing Old*. New York: Basic. p. 227.

[759] Toepoel Vera (2013). Ageing, Leisure, and Social Connectedness: How could Leisure Help Reduce Social Isolation of Older People? *Social Indicators Research*. 113(1): 355–372. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3696179/

[760] Cumming E, Henri WE. Growing old: *The process of disengagement*. New York: Basic Books; 1961.

[761] Heine C, Browning C. (2004). The communication and psychosocial perceptions of older adults with sensory loss: a qualitative study. *Ageing Soc.* 24(1):113–30.

[762] National Centre for Freedom from Addictions (2015). *Problematic internet use in malta amongst young people aged between 18-30 years. A quantitative study.* The President's Foundation for the Wellbeing of Society. San Anton Palace 2015.

[763] OFCOM (2014). *Adults' media use and attitudes report 2016.* https://www.ofcom.org.uk/research-and-data/media-literacy-research/adults-media-use-and-attitudes

[764] Wilson, E. O. (1984). *Biophilia*. Cambridge: Harvard University Press. ISBN 0-674-07442-4.

[765] Zaradic, P. A., Pergams, O. R. W., (2007). Videophilia: Implications for childhood development and conservation. The *Journal of Developmental Processes*, 2(1), 130-147.

[766] Pergams O. R. W, and Zaradic P. A. (2008). Evidence for a fundamental and pervasive shift away from nature-based recreation. *Proceedings of the National Academy of Sciences*. 105 (7), 2295–2300, doi: 10.1073/pnas.0709893105

[767] Keeso A. (2016). *Attention Economics, The Digital Age, and Nature Connectedness: Introducing Environmental Education to Disruption.* Nature Connections Conference (#NCx2016) hosted at the University of Derby. https://medium.com/@AlanKeeso/attention-economics-the-digital-age-and-nature-connectedness-introducing-environmental-education-365c5de67955#.qg3pe9g5b http://tedxtalks.ted.com/video/The-rescue-mission-Alan-Keeso-T

[768] Florian, A., Jörg, M. (2014). Nature Documentaries, Connectedness to Nature, and Pro-environmental Behavior, *Environmental Communication* 10 (4). DOI: 10.1080/17524032.2014.993415

[769] Buttel, F.H. 1979. Age and Environmental Concern: A Multivariate Analysis. *Youth and Society* 10 (3): 237–56.

[770] Liefländera K. A., Fröhlicha G. , Bognera X. F., Schultz P. Wesley (2013). Promoting Connectedness with Nature Through Environmental Education. *Environmental Education Research* 19 (3).

[771] Hirsh, J.B. (2010). "Personality and environmental concern." *Journal of Environmental Psychology* 30 (2), 245–48.

[772] Kantomaa, M.T., Tammelin T.H., Näyhä S., and Taanila A.M. (2007). "Adolescents' physical activity in relation to family income and parents' education." *Preventive Medicine* 44 (5), 410–15.

[773] Bruni, C.M., and P.W. Schultz. 2010. "Implicit beliefs about self and nature: Evidence from an IAT game." *Journal of Environmental Psychology* 30 (1): 95–102.

[774] Bruni, C.M., and P.W. Schultz. 2010. "Implicit beliefs about self and nature: Evidence from an IAT game." *Journal of Environmental Psychology* 30 (1): 95–102.

[775] Directorate-General of Education and Culture (2015). *The Education and Training Monitor.* SWD 199. November.

[776] Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* Routledge. ISBN 1-134-74270-3.

[777] Spiteri B. (2011). Towards sustainable management of land and sea uses within the Marsaxlokk Bay area. *Journal of Coastal Research* Winter, 61, p.242(6)

[778] Cumbo, S. (2013) *Fishing villages and changing identities: the case of Marsaxlokk, Malta.* URI: https://www.um.edu.mt/library/oar//handle/123456789/8051. M. Maltese Stud. University of Malta . Institute of Maltese Studies.

[779] Takahashi T. (2003). *Cultural analysis of the Karakuwa fishing community in Japan and Fishermen's reforestation movement.* A thesis submitted to Oregon State University in partial fuilfilment of the requirement for the degree of Master of Art in Applied Anthropology.

https://ir.library.oregonstate.edu/xmlui/handle/1957/28464

[780] Hussain, M.A.; Yunos, M. Y. M. ; Ismail, S. ; Utaberta, Nangkula ; Ismail, N. A. ; Arifin, N. F. M. ; Intan, R.; Daud, M. Lutfi (2015). The role of urban form at historical waterfront: case of Marsaxlokk waterfront.(Report) *Advances in Environmental Biology* 9(24), 142(5)

[781] Portelli R. (2017). Assessing the experiences of Sliema residents and environmental non-governmental organizations of public participation processes in development projects in Sliema. Institute of Earth Systems, University of Malta Department of Integrated Science and Technology, James Madison University. Unpublished dissertation submitted In partial fulfilment of the requirements of The Master of Science in Environmental Management and Sustainability.

[782] https://www.graphpad.com/quickcalcs/ttest1.cfm

[783] Evelpidou, N., de Figueiredo, T., Mauro, F., Tecim, V., & Vassilopoulos, A. (2010). *Natural Heritage from East to West – Case studies from 6 EU countries*. Springer.

[784] Russell R., Guerry D. ., Balvanera P., Gould K. R., Basurto X., Chan M.A. K., Klain S., Levine J., and Tam J. (2013). Humans and Nature: How Knowing and Experiencing Nature Affect Well-Being. *Annual Review of Environment and Resources* 38:473–502

[785] NSO (2015). *Malta in Figures 2014*. Valletta: National Statistics Office, 2014.

[786] Cassar F. L. (2006). *A landscape approach to conservation: integrating ecological sciences & participatory methods.* Thesis submitted in fulfilment of the requirements of the degree of PhD Department of Geography School of Human and Environmental Sciences The University of Reading

[787] Cassar F.L. (2006). Ibid.

[788] Dramstad, W. E., Fjellstad, W. J., Strand, G. H., Mathiesen, H. F., Engan, G., & Stokland, J. N. (2002). Development and implementation of the Norwegian monitoring programme for agricultural landscapes. *Journal of Environmental Management* 64(1), 49e6

[789] Vizzari, M. (2011). Spatial modelling of potential landscape quality. *Applied Geography* 31(1), 108e118

[790]Colchester, M. (1998a). Conservation politics: the Upper Orinoco-Casiquiare Biosphere Reserve. in A. Gray, A. Parellada, and H. Newing, editors. *From principles to practice: indigenous peoples and biodiversity conservation in Latin America.* (131–154). Forest Peoples Programme and International Work Group for Indigenous Affairs, Copenhagen.

[791] AFROMAISON (2014). *Tools and Approaches for Integrated Natural Resource Management. Africa at a meso-scale: adaptive and integrated tools and strategies for natural resource management*. http://inr.org.za/wp-content/uploads/2014/09/economic-tools-and-incetives_afromaison_tools-for-inrm.pdf

[792] Dorninger C., Abson J. D., Fischer J., von Wehrden H. (2017). Assessing sustainable biophysical human–nature connectedness at regional scales. Environ. Res. Lett. 12, 055001 https://doi.org/10.1088/1748-9326/aa68a5

[793] Davis N., Daams M., van Hinsberg A., Sijtsma F.. (2016). How deep is your love of nature? A psychological and spatial analysis of the depth of feelings towards Dutch nature areas. *Applied Geography* 77 (2016) 38e48

[794] http://www.timesofmalta.com/articles/view/20130719/local/The-Azure-Window-is-still-safe-for-now.478580

[795] Pleil J.D., Stiegel M.A., Madden M.C., Sobus J.R. (2011). Heat map visualization of complex environmental and biomarker measurements. Chemosphere. 2011 84(5) Jul, 716-23. https://www.ncbi.nlm.nih.gov/pubmed/21492901

[796] Steele, J. (1974). *The Structure of Marine Ecosystems*. Harvard University Press, Cambridge MA.

[797] Wynveen, Christopher J; Kyle, Gerard T. (2015). A Place Meaning Scale for Tropical Marine Settings. *Environmental Management*; 55 (1), Jan, 128-142. New York

[798] Mayer, F. S., & Frantz, C. M. P. (2004). The connectedness to nature scale: a measure of individuals' feeling in community with nature. *Journal of Environmental Psychology* 24(4), 503–515.

[799] European Commission (2003). NATURA 2000 Standard Data form: Explanatory Notes 1. http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/standarddataforms/notes_en.pdf

[800] NATURA 2000 *Standard Data form: Explanatory Notes*. Retrieved November 2015: Natura 2000 - Standard Data Form. http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=MT0000013

[801] Nash, R. (1982). *Wilderness and the American Mind.* New Haven, CT: Yale University Press, 425 pp.

[802] Easthope Hazel (2004). A place called home Housing, *Theory and Society* 21 (3).

[803] Ahlbrandt, R.S. (1984). *Neighborhoods, People, and Community.* New York: Plenum.

[804] Brown, B., Perkins D.D., and Brown G. (2003). Place Attachment in Revitalizing Neighborhoods: Individual and Block Level Analysis. *Journal of Environmental Psychology* 23 (3), 259-271.

[805] Lalli, M. (1992). Urban-Related Identity: Theory, Measurement, and Empirical Findings. *Journal of Environmental Psychology* 12, 285-303.

[806] Adevi, A.A., and Grahn P. (2011). Attachment to Certain Natural Environments: A Basis for Choice of Recreational Settings, Activities and Restoration from Stress? *Environment and Natural Resources Research* 1 (1), 36-52.

[807] Raymond M. Christopher, Brown G., Weber D. (2010). The measurement of place attachment: Personal, community, and environmental connections. *Journal of Environmental Psychology* 30 (2010) 422e434

[808] Kyle, G., Graefe, A., & Manning, R. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment and Behaviour* 37(2), 153e177.

[809] Kyle, G., Graefe, A., & Manning, R. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment and Behaviour* 37(2), 153e177.

[810] Devine-Wright, P. (2009). Rethinking NIMBYism. *Journal of Community and Applied Social Psychology* 19, 426–441.

[811] Vorkinn, M., & Riese, H. (2001). Environmental Concern in a Local Context The Significance of Place Attachment. *Environment and Behaviour* 33(2), 249–263.

[812] Jorgensen, B.S., & Stedman, R.C. (2001). Sense of place as an attitude: Lakeshore owners' attitudes toward their properties. *Journal of Environmental Psychology* 21, 233–248.

[813] Hidalgo, M. C., & Hernandez, B. (2001). Place attachment: Conceptual and empirical questions. *Journal of Environmental Psychology* 21, 273e281.

[814] Rollero, C., & De Piccoli, N. (2010b). Place attachment, identification and environment perception: An empirical study. *Journal of Environmental Psychology* 30, 198e205.

[815] National Statistics Office (2016). *Trends in Malta*. https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/D2_Dissemination_Unit/Trends%20in%20Malta%202016.pdf

[816] Bonaiuto, M., Aiello, A., Perugini, M., Bonnes, M., & Ercolani, A. P. (1999). Multidimensional perception of residential environment quality and neighbourhood attachment in the urban environment. *Journal of Environmental Psychology* 19, 331e352.

[817] Hidalgo, M. C., & Hernandez, B. (2001). Place attachment: Conceptual and empirical questions. *Journal of Environmental Psychology* 21, 273e281.

[818] Lewicka, M. (2010). What makes neighbourhood different from home and city? Effects of place scale on place attachment. *Journal of Environmental Psychology* 30, 35e51.

[819] Riger, S., & Lavrakas, P. J. (1981). Community ties: Patterns of attachment and social interaction in urban neighbourhoods. *American Journal of Community Psycholog* 9(1), 55e66.

[820] Sampson, R. J. (1988). Local friendship ties and community attachment in mass society: A multilevel systemic model. *American Sociological Review* 53, 766e779.

[821] Rowles, G. D. (1983). Place and personal identity in old age: Observations from Appalachia. *Journal of Environmental Psychology* 3, 299e313.

[822] Rollero, C., & De Piccoli, N. (2010a). Does place attachment affect social well-being? *Revue europeenne de psychologie appliquee*, 60, 233e238.

[823] Hay, R. (1998). Sense of place in developmental context. *Journal of Environmental Psychology*, 18, 5e29.

[824] Charis A.E., Carmen L. (2014). Home is where the heart is: The effect of place of residence on place attachment and community participation. *Journal of Environmental Psychology* 40, 451e461. http://www.sciencedirect.com/science/article/pii/S0272494414000954

[825] LAERD Statistics (2015). Three-way ANOVA in SPSS Statistics. https://statistics.laerd.com/spss-tutorials/three-way-anova-using-spss-statistics.php

[826] Uzzell, D., Pol, E., & Badenas, D. (2002). Place identification, social cohesion, and environmental sustainability. *Environment and Behaviour* 34, 26-53.

[827] Mesch, G. S., & Manor, O. (1998). Social ties, environmental perception, and local attachment. *Environment and Behaviour* 30, 227-245.

[828] Russell R., Guerry D. A.; Balvanera P.; Gould K. R.; Basurto X.; Chan M.A. Kai; Klain S., Levine J., and Tam J. (2013). Humans and Nature: How Knowing and Experiencing Nature Affect Well-Being. *Annu. Rev. Environ. Resour*. 38, 473–502. http://fds.duke.edu/db/attachment/2449

[829] Scannell L. (2003). *Natural and Civic Place Attachment and the Relation to Pro-Environmental Behaviours in Trail and Nelson, British Columbia*. Unpublished thesis submitted in partial fulfillment of the requirements for the Degree of Master of Science in the Department of Psychology. University of British Columbia, 2003

[830] Azzopardi R. M. (2012). Recent International and Domestic Migration in the Maltese Archipelago: An Economic Review. *Island Studies Journal* 7 (1), 49-68.

[831] Stokols, D., and Shumaker S.A. (1981). People in Places: A Transactional View of Settings. P. 441–448 in Harvey, D. (Ed.). *Cognition, Social Behavior, and the Environment.* Hillsdale, NJ: Erlbaum, 608 pp.

[832] Low, S. M. & Altman, I. (1992) Place attachment: a conceptual inquiry, in: Altman, I. & Low, S. M. (Eds) *Place Attachment* pp. 1–12 (New York: Plenum).

[833] Henriet, Marie-Odile (1972). Habitat et communaute villageoise a Gozo." Proc. of Congrès D'études Des Cultures Méditerranéennes D'influence Arabo-berbère, Malta. Ed. Micheline Galley and David R. Marshall. Alger: Société Nationale D'édition Et De Diffusion, 1972. p. 528-531

[834] Schroeder, H. W. (2002). Experiencing nature in special places: Surveys in the North-Central Region. *Journal of Forestry* 100 (5):8–14.

[835] Jorgensen S. B. (2010). Spatial variation in social capital and sense of place. *Tijdschrift voor Economische en Sociale Geografie* – 2010, DOI:10.1111/j.1467-9663.2010.00633.x, Vol. 101, No. 5, pp. 554–567.

[836] Tuan, Yi-Fu (1977). *Space and Place: The Perspectives of Experience.* Minneapolis: University of Minnesota Press, 235 pp.

[837] Jackson J.B. (1994). *A Sense of Place, a Sense of Time.* New Haven, CT: Yale University Press, 212 pp.

[838] Farnum, J., Hall T., and Kruger L.E. (2005). *Sense of Place in Natural Resource Recreation and Tourism: An Evaluation and Assessment of Research Findings. General Technical Report PNW-GTR-660.* Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

[839] Ryan, R.L. (2005). Exploring the Effects of Environmental Experience on Attachment to Urban Natural Areas. *Environment and Behavior* 37:3-42.

[840] Ujang N. (2012). Social and Behavioral Sciences Place Attachment and Continuity of Urban Place Identity. *Procedia - Social and Behavioral Sciences* 49, 156-167. https://doi.org/10.1016/j.sbspro.2012.07.014

[841] Madgin, R., Bradley, L. & Hastings, A. (2016). Connecting physical and social dimensions of place attachment: What can we learn from attachment to urban recreational spaces? *Journal of Housing and the Built Environment* 31: 677. https://doi.org/10.1007/s10901-016-9495-4.

[842] USDA Forest Service (2014). *Green cities, Good Health.Place Attachment & Meaning***.** Flora Katrina, University of Washington; Rozance Mary Ann, University of Washington; Riffe Mark, METI, Inc./USDA Forest Service. https://depts.washington.edu/hhwb/Thm_Place.html

[843] Heynen, N., Kaika, M. and Swyngedouw, E. (2006). *In the nature of cities: Urban political ecology and the politics of urban metabolism*. New York: Routledge.

[844] Adams J.; Greenwood D.; Thomashow M.; Russ A. *Sense of Place.* https://www.thenatureofcities.com/2016/05/26/sense-of-place/

[845] McCracken, G. (1988), The Long Interview, Newbury Park, CA: Sage. (1989), 'Homeyness,' a Cultural Account of One Constellation of Consumer Goods and Meanings, in *Interpretive Consumer Research*, ed. Elisabeth C. Hirschman,

Provo, UT: Association for Consumer Research, 168–83.

[846] Mazumdar Shampa and Mazumdar Sanjoy (2004). Religion and Place Attachment: A Study of Sacred Places Article in *Journal of Environmental Psychology* 24(3):385-397 . September DOI: 10.1016/j.jenvp.2004.08.005

[847] Debenedetti A., Oppewal H., and Arsel Z. (2014). Place Attachment in Commercial Settings: A Gift Economy Perspective. *Journal of Consumer Research* Vol 41(1). February DOI: 10.1086/673469

[848] Maclaran, P., and Brown S. (2005). The Center Cannot Hold: Consuming the Utopian Marketplace. *Journal of Consumer Research* 32 (September), 311–23.

[849] Milligan, M. J. (1998). Interactional Past and Potential: The Social Construction of Place Attachment. *Symbolic Interaction* 21 (1), 1–33.

[850] Charleston, S. (2009). The English Football Ground as a Representation of Home. *Journal of Environmental Psychology* 29 (1), 144–50.

[851] O'Guinn, T. C., and Russell W. B. (1989). Heaven on Earth: Consumption at Heritage Village, USA. *Journal of Consumer Research* 16 (September), 227–38.

[852] Rosenbaum, M. S., Ward J., Walker B. A., and Ostrom A. L. (2007), A Cup of Coffee with a Dash of Love: An Investigation of Commercial Social Support and Third-Place Attachment. *Journal of Service Research* 10 (1), 43–59.

[853] Seamon D. (2013). Place attachment and phenomenology. The synergistic dynamism of place In: *Place Attachment Advances in Theory, Methods and Applications* Edited by Lynne Manzo and Patrick Devine-Wright. http://www.arch.ksu.edu/seamon/Seamon%20Nov%201%202012%20final%20draft%20place%20attachment%20chapter%20for%20PDF.pdf

[854] Kianicka, S., Buchecker, M., Hunziker, M. & Muller-Boker, U. (2006) Locals' and tourists' sense of place', *Mountain Research and Development* 26 (1): 55-63.

[855] Sowers, J. (2010). *A phenomenology of place identity for Wonder Valley, California*. Doctoral dissertation, Department of Geography, Kansas State University, Manhattan, KS.

[856] Seamon, D. (2013). Phenomenology and uncanny homecoming, in D. Boscaljon (ed.), *Resisting the place of belonging*. Burlington, Vermont: Ashgate (forthcoming).

[857] Cremona V. A. (ed.) (2016). *On Culture: Mapping Valletta 2018*. MidSea Books. http://valletta2018.org/cultural-programme/cultural-mapping/

[858] Friedmann J. (2010) Place and Place-Making in Cities: A Global Perspective, *Planning Theory & Practice* 11:2, 149-165, DOI: 10.1080/14649351003759573

[859] Kollmuss, A.; Agyeman J. (2002). "Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior?". *Environmental Education Research* 8 (3): 239–260. doi:10.1080/13504620220145401.

[860] Godin, G.; Conner, M.; Sheeran, P. (2005). Bridging the intention–behaviour gap: The role of moral norm. *British Journal of Social Psychology* 44 (4): 497–512. ISSN 2044-8309. doi:10.1348/014466604X17452.

[861] Champniss G., VilaFernando R. (2011). *Brand Valued: How socially valued brands hold the key to a sustainable future and business success*. Wiley. ISBN: 978-1-119-97667-7

[862] Zelezny, L. C., Poh-Pheng Chua, and Aldrich C. 2000. Elaborating on Gender Differences in Environmentalism. *Journal of Social Issues* 56:443–57.

[863] Plavsic, S., *An Investigation of Gender Differences in Pro-environmental Attitudes and Behaviours* (2013). Honors Scholar Theses. 404. http://digitalcommons.uconn.edu/srhonors_theses/404

[864] Stevenson K. T., Peterson M. N., Carrier . J., Strnad R. L., Bondell H. D., Kirby-Hathaway T. & Moore S. E. (2014). Role of Significant Life Experiences in Building Environmental Knowledge and Behavior Among Middle School Students, *The Journal of Environmental Education* 45:3, 163-177, DOI: 10.1080/00958964.2014.901935

[865] Ajaps S., McLellan R. & Gritter K. (2015). "We don't know enough": Environmental education and pro-environmental behaviour perceptions. *Cogent Education* 2 (1).

[866] Lynn P. (2014). *Distinguishing Dimensions of Pro-environmental Behaviour.* Institute for Social & Economic Research. https://www.iser.essex.ac.uk/research/publications/working-papers/iser/2014-19.pdf

[867] Wiernik M.Brenton, Ones S. Deniz, Dilchert S. (2013). "Age and environmental sustainability: a meta-analysis", *Journal of Managerial Psychology* 28 (7/8), 826 – 856.

[868] Diekmann, A.; Preisendörfer, P. (1998). Environmental behavior discrepancies between aspirations and reality. *Ration. Soc. 10*, 79–102.

[869] Engel, U., and Pötschke, M.. (1998). Willingness to Pay for the Environment: Social Structure, Value Orientations and Environmental Behaviour in a Multilevel Perspective. *Innovation* 11(3):315-331.

[870] Klineberg, S. L., McKeever, M., and Rothenbach, B. (1998). Demographic Predictors of Environmental Concern: It Does Make a Difference How It's Measured. *Social Science Quarterly* 79(4):734- 754.

[871] Marquart-Pyatt, S. T. (2007). Concern for the Environment Among General Publics: A Cross-National Study. Society & Natural Resources 20(10):883-898.

[872] Gelissen, J. (2007). Explaining Popular Support for Environmental Protection: A Multilevel Analysis of 50 Nations. *Environment and Behaviour* 39(3):392-415.

[873] Franzen, A. and Meyer, R. (2010). Environmental attitudes in cross-national perspective: a multilevel analysis of the ISSP 1993 and 2000. *European Sociological Review* 26, 219–234.

[874] Gelissen, J. (2007). Explaining popular support for environmental protection: a multilevel analysis of 50 nations. *Environment and Behavior* 39, 392–415

[875] Dunlap, R. E. and York, R. (2008). The globalization of environmental concern and the limits of the postmaterialist values explanation: evidence from four multinational surveys. *Sociological Quarterly* 49, 529–563.

[876] Fairbrother M. (2010). Rich People, Poor People, and Environmental Concern: Evidence across Nations and Time. *European Sociological Review* 29(5), 910–922 910 DOI:10.1093/esr/jcs068

[877] Shen J, Saijo T. (2008). Reexamining the relations between socio-demographic characteristics and individual environmental concern: Evidence from Shanghai data. *J Environ Psychol*. 28, 42–50. doi: 10.1016/j.jenvp.2007.10.003.

[878] Casey, P. J., & Scott, K. (2006). Environmental Concern and Behaviour in an Australian Sample within an Ecocentric-Anthropocentric Framework. *Australian Journal of Psychology* 58, 57-67. http://dx.doi.org/10.1080/00049530600730419

[879] Klineberg, S. L., McKeever, M., and Rothenbach, B. (1998). Demographic Predictors of Environmental Concern: It Does Make a Difference How It's Measured. *Social Science Quarterly* 79(4):734- 754.

[880] Gelissen, J. (2007). "Explaining Popular Support for Environmental Protection: A Multilevel Analysis of 50 Nations." *Environment and Behavior* 39(3):392-415.

[881] Mifsud M. C. (2011). An Investigation on the Environmental Knowledge, Attitudes and Behaviour of Maltese Youth. *US-China Education Review* 3, 413-422. ISSN 1548-6613

[882] Sirivongs, K., & Tsuchiya, T. (2012). Relationship between local residents' perceptions, attitudes and participation towards national protected areas: a case study of Phou Khao Khouay National Protected Area, Central Lao PDR. *Forest Policy and Economics* 21, 92e100.

[883] Kortenkamp, K. V., & Moore, C. F. (2001). Ecocentrism and anthropocentrism: Moral reasoning about ecological commons dilemmas. *Journal of Environmental Psychology 4*, 47-60.

[884] Félonneau M-L., Becker M. (2008). Pro-environmental attitudes and behaviour: Revealing perceived social desirability, *Revue internationale de psychologie sociale* 4 (Tome 21), 25-53.

[885] Py J. and Ginet A. (2003). Knowledge of general social norms. Normative clearsightedness. In *A sociocognitive approach to social norms*. Ed. By Dubois Nicole. Routledge Research International Series in Social Psychology.

[886] Kollmuss, A.; Agyeman J. (2002). "Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior?". *Environmental Education Research* 8 (3): 239–260. doi:10.1080/13504620220145401

[887] Rees W. (2010). What's blocking sustainability? Human nature, cognition, and denial Sustainability. *Science, Practice, & Policy* 6(2), Fall. http://d20nn6mxpbiih2.cloudfront.net/sspp-journal/SSPP-v6.2.1001-012.rees.pdf

[888] Nir, L. (2011). "Motivated Reasoning and Public Opinion Perception". Public Opinion Quarterly 75 (3): 504. doi:10.1093/poq/nfq076

[889] Satariano, B. (2016). *Places, People and Health: A socio-geographical perspective on wellbeing of mothers and their children in deprived neighbourhoods of Malta*. Doctoral thesis, Durham University.

[890] Cosco N. G., Moore R. C., and Islam M. Z. (2010). Behaviour mapping: A method for linking preschool physical activity and outdoor design. *Medicine & Science in Sports & Exercise* 42 (3), 513–19.

[891] Moore, R. C. and Cosco N. G. (2010). Using behaviour mapping to investigate healthy outdoor environments for children and families: Conceptual framework, procedures and applications. In *innovative approaches to research excellence in landscape and health*, ed. Catharine Ward Thompson, Peter Aspinall, and Simon Bell. London: Taylor and Francis

[892] Rigolon A. (2013). *Geomethodology review: Behavioural mapping*. GEOG 5161, February 18, 2013. http://www.colorado.edu/geography/foote/geog5161/presentations/2013/GEOG_5161_Alessandro_Behavioural%20mapping.docx

[893] Gibson, J. J. (1977). The theory of affordances. In *Perceiving, acting, and knowing: Toward an ecological psychology*, ed. Robert Shaw and John Bransford. Hillsdale NJ: Lawrence Erlbaum Associates.

[894] Barker, R. G. (1968). *Ecological psychology: Concepts and methods for studying the environment of human behaviour*. Palo Alto, CA: Stanford University Press.

[895] Golicnik, B. (2007). GIS behaviour mapping for provision of interactive empirical knowledge, vital monitoring and better experience design. In Urban Sustainability Through Environmental Design: Approaches to Time-People-Place Responsive Urban Spaces. London: Routledge. Retrieved from: http://books.google.ca/books?id=TwvNk-s8F1YC

[896] Bell, P., Greene, T., & Mace, B. (2011). Teaching environmental psychology: demonstrations and exercise. In, Balcetis, E., Burns, S. R., Daniel, D. B., Saville, B. K., & Woody, W. D. (Eds.), *Promoting Student Engagement* (Section 1, 44). Retrieved from http://teachpsych.com/Resources/Documents/ebooks/pse2011vol2.pdf#page=48

[897] Office of the Prime Minister (2013). *National Strategic Reference Framework 2007-2013.* https://eufunds.gov.mt/en/Operational%20Programmes/Structural%20Funds%20and%20Cohesion%20Fund%202007%202013/Documents/1NSRF.pdf

[898] Stepwise linear regression http://www.geog.leeds.ac.uk/courses/other/statistics/spss/stepwise/

[899] Davis, J. L., Green J. D.and Reed A. (2009), 'Interdependence with the environment: Commitment, interconnectedness, and environmental behavior', *Journal of Environmental Psychology* 29 (2), 173–80.

[900] Dutcher, D. D., Finley J. C., Luloff A. E.and Johnson J. B. (2007). Connectivity with nature as a measure of environmental values, *Environment and Behavior* 39 (4), 474–93.

[901] Gosling, E. and Williams K. J. H. (2010), 'Connectedness to nature, place attachment and conservation behavior: Testing connectedness theory among farmers', *Journal of Environmental Psychology* 30 (3), 298–304.

[902] Mayer, F. S. and Frantz C. M. (2004), 'The connectedness to nature scale: A measure of individuals' feeling in community with nature', *Journal of Environmental Psychology* 24 (4), 503–15

[903] Pereira, M. and Forster, P (2015). The Relationship between Connectedness to Nature, Environmental Values, and Pro-environmental Behaviours. *Reinvention: an International Journal of Undergraduate Research* 8 (2). http://www.warwick.ac.uk/reinventionjournal/issues/volume8issue2/pereira Date accessed 12/06/17.

[904] Stedman, R. (2002). Toward a social psychology of place. *Environment and Behavior* 34, 561-581.

[905] Walker, A. J., & Ryan, R. (2008). Place attachment and landscape preservation in rural New England: a Maine case study. *Landscape and Urban Planning* 86(2), 141-152

[906] Ramkissoon, H, Weiler, B & Smith, LDG 2012, 'Place attachment and pro-environmental behaviour in national parks: the development of a conceptual framework', *Journal of Sustainable Tourism* 20(2), 257-276. The publisher's version of article available at http://dx.doi.org/10.1080/09669582.2011.602194

[907] Pourret, O. (2008) *Bayesian networks: a practical guide to applications*. Chichester, Wiley.

[908] Camilleri M. (2004). Environmental Capacity of a Small Island State: Planning for Sustainable Development in Malta Author(s): Source: *The Town Planning Review* 75 (1), 67-94. Published by: Liverpool University Press

[909] Kellert, S. R., & Wilson, E. O. (1993). *The Biophilia hypothesis*. Washington, D.C: Island Press.

[910] Richardson, M., Maspero, M., Golightly, D., Sheffield, D., Staples, V. & Lumber, R. (2017). Nature: A new paradigm for

well-being and ergonomics. *New Paradigms in Ergonomics* 60 (2).

[911] Richardson, M., Hallam, J. & Lumber, R. (2015). One thousand good things in nature: Aspects of nearby nature associated with improved connection to nature. *Environmental Values 24*(5), 603-619. doi: 10.3197/096327115X14384223590131

[912] Lumber, R., Richardson, M. & Sheffield, D. (i2017). The seven pathways to nature connectedness: A focus group study. *European Journal of Ecopsychology.*

[913] http://www.derby.ac.uk/science/research/centres-groups/psychological/groups/nature-connectedness/

[914] Richardson Miles, Hallam Jenny (2013). Exploring the Psychological Rewards of a Familiar Semi-Rural Landscape: Connecting to Local Nature through a Mindful Approach. *The Humanistic Psychologist* 41(1), 35-53, February DOI: 10.1080/08873267.2012.732156

[915] Dutcher D., James, Finley C., Luloff, A.E., Johnson J., Buttolph (2007). Connectivity with nature as a measure of environmental values. *Environ. Behav.* 39, 474e493.

[916] Harrison C. & Mordechai (Muki) H. (2002). The Potential of Public Participation Geographic Information Systems in UK Environmental Planning: Appraisals by Active Publics. *Journal of Environmental Planning and Management* 45 (6)

[917] Attard J. (2014). *Assessing Participatory Geographic Information Systems for the ecoGozo Initiative*. Dissertation submitted to the University of Malta in fulfilment of the requirement for the degree of Master of Science (Research) in the area of Sustainable Development

[918] Brown G. & Weber D. (2013). A place-based approach to conservation management using public participation GIS (PPGIS) *Journal of Environmental Planning and Management* 56 (4)

[919] Kruger, L. E., & Jakes, P. J. (2003). The importance of place: Advances in science and application. *Forest Science,* 49(6), 819-821.

[920] Stewart, W. P., Williams, D. R., Kruger, L.(2013). *Place-Based Conservation Perspectives from the Social Sciences.* Springer.

[921] Buttigieg J., Formosa S., Sladden V. (2015). Maltese technological steps towards integrative cities. In: *E-Governance Spatial Planning Decision-Making*. ECTP-CEU Young Planners Workshop 2015 11th Biennial of European Towns & Town Planners Dublín.

[922] Budiharta, S, Meijaard E, Wells J.A, Abram N.K, and Wilson, K.A. (2016). Enhancing feasibility: incorporating a socio-ecological systems framework into restoration planning. *Environmental Science & Policy*. 64: 83-92. http://dx.doi.org/10.1016/j.envsci.2016.06.014

[923] Fresque-Baxter, J.A., Armitage, D., (2012). Place identity and climate change adaptation: a synthesis and framework for understanding. Wiley *Interdiscip. Rev. Clim. Change* 3 (3) 251–266.

[924] Chapin S. F., Knapp C. N. (2015). Sense of place: A process for identifying and negotiating potentially contested visions of sustainability. *Environmental science & policy* 53 (2015) 38 - 46. https://pdfs.semanticscholar.org/2935/565331551ca3fdfea2840d55dde2153dff4f.pdf

[925] Mahboubi P., Parkes M., Stephen C., Man Chan H. (2015). Using expert informed GIS to locate important marine social-ecological hotspots. *Journal of Environmental Management* 160. 342e352

[926] Jordaan T. (2015). *Planning the intangible: place attachment and public participation in South African town planning.* Thesis submitted for the degree Philosophiae Doctor in Urban and Regional Planning at the Potchefstroom Campus of the North-West University. https://dspace.nwu.ac.za/bitstream/handle/10394/15314/Jordaan_T.pdf?sequence=1

[927]Fleury-Bahi G. et al. (eds. (2016). *Handbook of Environmental Psychology and Quality of Life Research*, International Handbooks of Quality-of-Life, DOI 10.1007/978-3-319-31416-7_14

[928] Brown G., Weber D. (2012). Measuring change in place values using public participation GIS (PPGIS). *Applied Geography* 34, 316e324. DOI: 10.1016/j.apgeog.2011.12.007

[929] Bronfman C. N., Cisternas C. P. (2015). Understanding Attitudes and Pro-Environmental Behaviors in a Chilean Community. *Sustainability* 7(10), 14133-14152; doi:10.3390/su71014133. http://www.mdpi.com/2071-1050/7/10/14133/htm

[930] Solomon, S., & Abelson, J. (2012). Why and When Should We Use Public Deliberation? *The Hastings Center Report 42*(2), 17–20. http://doi.org/10.1002/hast.27

[931] Dick M., Rous A.M. , Nguyen, V. M. , Cooke, Steven J. (2016). Necessary but challenging: Multiple disciplinary approaches to solving conservation problems. *Facets Journal* 22 June. http://facetsjournal.com/doi/abs/10.1139/facets-2016-0003 . DOI https://doi.org/10.1139/facets-2016-0003

[932] Fox H.E., Christian C, Nordby J.C., Pergams ORW, Peterson G.D., and Pyke C.R. (2006). Perceived barriers to integrating social science and conservation. *Conservation Biology* 20(6): 1817–1820. DOI: 10.1111/j.1523-1739.2006.00598.x

[933] Evely A.C., Fazey I., Pinard M., and Lambin X. (2008). The influence of philosophical perspectives in integrative research: a conservation case study in the Cairngorms National Park. *Ecology and Society* 13(2): 52 Available from http://www.ecologyandsociety.org/vol13/iss2/art52/

[934] Miller T.R., Baird T.D., Littlefield C.M., Kofinas G., Chapin F.S., and Redman C.L. (2008). Epistemological pluralism: reorganizing interdisciplinary research. Ecology and Society 13(2): 46.

[935] Fox H.E., Christian C., Nordby J.C., Pergams O.R.W., Peterson G.D., and Pyke C.R. (2006). Perceived barriers to integrating social science and conservation. Conservation Biology 20(6), 1817–1820. DOI: 10.1111/j.1523-1739.2006.00598.x

[936] Newman G., Chandler M., Clyde M., McGreavy B., Haklay M., Ballard H., Gray S., Scarpino R., Hauptfeld R., Mellor, D. Gallo J. (2017). Leveraging the power of place in citizen science for effective conservation decision making. *Biological Conservation* 208, 55-64, ISSN 0006-3207, http://dx.doi.org/10.1016/j.biocon.2016.07.019.

[937] Gosling, E. Williams K. J. H. (2010). Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. *Journal of Environmental Psychology* 30, 298.

[938] Vaske, J. J., Kobrin, K. C. (2001). Place Attachment and Environmentally Responsible Behavior. *Journal of Environmental Education* 32, 16.

[939] Halpenny E. A. (2010). Pro-environmental behaviours and park visitors: The effect of place attachment. *Journal of Environmental Psychology* 30, 409.

[940] Kals E., Schumacher, D. Montada L. (1999). Emotional Affinity toward Nature as a Motivational Basis to Protect Nature. *Environment and Behavior* 31, 178.

[941] Cheng J. C.-H., Monroe M. C. (2010). Connection to Nature : Children's Affective Attitude Toward Nature. *Environment and Behavior* 44 (1), 31 - 49

[942] Tam J. (2012). *Fostering connections between youth and the environment in British Columbia*. Canadian Parks and Wilderness Society. http://cpawsbc.org/upload/CPAWS_Fostering_Connections_Report.pdf

[943] Brown G., Ramirez-Gomez S. (2013) Participatory mapping with indigenous communities for conservation: challenges and lessons from Suriname. *Electronic Journal on Information Systems in Developing Countries* 58 (2), 1-22

[944] Brown G., Raymond C.M., Corcoran J. (2015). Mapping and measuring place attachment. *Applied Geography* 57, 42e53

[945] Devine-Wright, P. (2009). Rethinking NIMBYism: the role of place attachment and place identity in explaining place-protective action. *Journal of Community & Applied Social Psychology* 19 (6), 426e441.

[946] Brown, G., & Raymond, C. (2014). Methods for identifying land use conflict potential using participatory mapping. *Landscape and Urban Planning*, 122, 196e208.

[947] Heynen N., Kaika M.and Swyngedouw E.. Eds. (2005) *In the Nature of Cities. Urban political ecology and the politics of urban metabolism*. Routledge.

[948] Brechin, S. R., P. R. Wilshusen, C. L. Fortwangler, and P. C. West. 2002. Beyond the square wheel: Toward a more comprehensive understanding of biodiversity conservation as social and political process. *Society & Natural Resources* 15,41- 64.

[949] Raymond C. M., Giusti M. and Barthel S. (2017). An embodied perspective on the co-production of cultural ecosystem services: toward embodied ecosystems. *Journal of Environmental Planning and Management.* https://doi.org/10.1080/09640568.2017.1312300

[950] Muhar A., Raymond C.M., van den Born R. J.G., Bauer N., Böck K. , Braito M. , Buijs A. , Flint C., de Groot W. T., D. Ives C.,

Mitrofanenko T., Plieninger T. , Tucker C. & van Riper C. J. (2017) A model integrating social-cultural concepts of nature into frameworks of interaction between social and natural systems, *Journal of Environmental Planning and Management*, DOI: 10.1080/09640568.2017.1327424

[951] WHO Regional Office for Europe, Copenhagen (2016). *Urban green spaces and health: A review of evidence.* http://www.euro.who.int/__data/assets/pdf_file/0005/321971/Urban-green-spaces-and-health-review-evidence.pdf

[952] Elmqvist T., Setälä H., Handel S.N., van der Ploeg S., Aronson J., Blignaut J.N., Gómez-Baggethun E., Nowak D.J., Kronenberg, R de Groot J. (2015). Benefits of restoring ecosystem services in urban areas, *Current Opinion in Environmental Sustainability* 14, 101-108, ISSN 1877-3435, http://dx.doi.org/10.1016/j.cosust.2015.05.001.

[953] WHO Regional Office for Europe, Copenhagen (2016). *Ibid.*

[954] Frendo M.(2016). *Towards a green spatial strategy for the Maltese conurbation*. Unpublished dissertation at the Faculty for the Built Environment.

[955] Greenspace Information for Greater London (GIGL). www.gigl.org.uk/

[956] Charis A. E.; Lawrence C. (2014). Home is where the heart is: The effect of place of residence on place attachment and community participation Author links open overlay panel. *Journal of Environmental Psychology* 40, December, 451-461.

[957] Kamra tal-Periti (2007). The urban challenge. Our quality of life and the built environment. Gutenberg Press.

[958] Masterson, V. A., Stedman R. C., Enqvist J., Tengö M., Giusti M., Wah D. l, and Svedin U. (2017). The contribution of sense of place to social-ecological systems research: a review and research agenda. *Ecology and Society* 22(1):49. https://doi.org/10.5751/ES-08872-220149

[959] Raymond C. M., Giusti M. and Barthel S. (2017). An embodied perspective on the co-production of cultural ecosystem services: toward embodied ecosystems. *Journal of Environmental Planning and Management.* https://doi.org/10.1080/09640568.2017.1312300

[960] Raymond C. M., Giusti M. and Barthel S. (2017). An embodied perspective on the co-production of cultural ecosystem services: toward embodied ecosystems. *Journal of Environmental Planning and Management*. https://doi.org/10.1080/09640568.2017.1312300

[961] Corburn Jason (2009). Integrate relational place-based approaches into planning. In: *Toward the Healthy City: People, Places, and the Politics of Urban Planning*. MIT Press

[962] Marris, P. (1996). *The Politics of Uncertainty: Attachment in Private and Public Life*. New York: Routledge.

[963] Duelli, P., Baur, P., Buchecer, M., Gugerli, F., Holderegger, R. & Wolgemuth, T. (2009). The role of value systems in biodiversity research. In: KIENAST, F., Wildi, O. & Ghosh, S. (eds.) *A changing world: challenges for landscape research.* Dordrecht: Springer, 27-34.

[964] Veatch, R. M. (1991). Consensus of expertise: the role of consensus of experts in formulating public policy and estimating facts. *Journal of Medicine and Philosophy* 16, 427-445.

[965] Trimble, M. J., and van Aarde R. J. (2012). Geographical and taxonomic biases in research on biodiversity in human-modified landscapes. *Ecosphere* 3(12):119. http://dx.doi.org/10.1890/ES12-00299.1

[966] Raymond C. M., Giusti M. and Barthel S. (2017). An embodied perspective on the co-production of cultural ecosystem services: Toward embodied ecosystems. *Journal of Environmental Planning and Management*. May. http://dx.doi.org/10.1080/09640568.2017.1312300

APPENDICES

Appendix 01 - NATURA 2000 sites in the Maltese Islands (Transport Malta, 2016)

*Refer to '**Appendix 02 - List of Annex I Habitats in the Maltese Islands** for further details*

Site Code	Name	Designation	Qualifying features of conservation interest *
MT0000001	Ghajn Barrani Area	SAC (international importance); Area of Ecological Importance (AEI); Area of High Landscape Value (AHLV); Tree Protection Areas	Annex I habitats – 1240, 1510, 5330, 8210, 92D0
MT0000002	Pembroke Area	SAC; AEI; SSI	Annex I habitats – 1240, 1410, 3140, 3170, 5330, 5410, 5420, 6220
MT0000003	Il-Ballut tal-Wardija (l/o San Pawl il- Bahar)	SAC; AEI; Tree Protected Area; AHLV	Annex I habitats – 3170, 5330, 9320, 9340, 9540
			Annex II plants - Anacamptis urvilleana, Elatine gussonei
			Annex IV / Red Data Book (RDB) - plant species and invertebrate animal species
MT0000004	Il-Maqluba (l/o Qrendi)	SAC; AEI; Tree Protection Area; Tree Reserve	Annex I habitats – 5230, 8210, 9570*
MT0000005	Ir-Ramla Area	SAC; AEI	Annex I habitats – 1210, 1240, 2110, 2210, 2220, 8210, 92D0
			Annex II plants – *Orobanche densiflora*, *Brachytrupes megacephalus*, *Pseudoseriscius cameroni*
MT0000006	Is-Simar (l/o San Pawl il-Bahar)	SAC; SPA; AEI; SSI; Bird	Annex I habitats – 1150*, 3170, 5410
		Sanctuary; Wetland of International Importance; AAI	Annex II plant species – *Anacamptis urvilleana*, *Elatine gussonei, Ophrys melitensis*
			Annex II fauna – *Zamenis situla, Rhinolophus hipposideros, Aphanius fasciatus*
			RDB species – plants, reptiles, mammals, amphibian (only one species in the Maltese Islands) and invertebrates
			Birds – *Himantopus himantopus* (Annex I), breeding wetland species, wintering wetland species, migratory waterfowl and waders including Annex I migratory herons, migratory wetland passerines, and migratory woodland passerines
MT0000007	Is-Salini	SAC; Transitional Water Body; Bird Sanctuary; AEI; SSI; AAI	Annex I habitats – 1150*, 1160, 1310, 1410, 1420, 92D0, 5330
			Annex II fauna –*Aphanius fasciatus*
			Annex IV / RDB species – molluscs, arthropods, moths, and other invetebrates
			Birds – *Acrocephalus scirpaceus*

MT0000008	L-Ghadira s-Safra	SAC; AEI	Annex I habitats –1420, 3170*
			Annex IV / RDB species – invertebrates
MT0000009	Ramla tat-Torri / Rdum tal-Madonna Area	SAC; SPA; AEI; IBA; AHLV (Important Bird Area)	Annex I habitats –1210, 1240, 2110, 2210, 2220, 5330, 5430, 5410, 8210
			Annex II plants – *Anacamptis urvilleana, Orobanche densiflora*
			Annex II fauna – *Brachytrupes megacephalus, Pseudoseriscius cameroni, Zamenis situla*
			Annex IV / RDB species – plants, invertebrates, reptiles, mammals
			Birds – *Puffinus yelkouan* (Annex I)*, Calandrella brachydactyla* (Annex I)*, Calonectris diomedea* (Annex I), *Monticola solitarius*, *Sylvia conspicilliata*, *Sylvia melancocephala*, raptors, passerines
MT0000010	Ix-Xaghra tal-Kortin	SAC; Transitional Water Body, AEI, SSI, AHLV	Annex I habitats –1240, 5330, 5410, 8210, 9320, 9540
			Annex II fauna – *Brachytrupes megacephalus, Pseudoseriscius cameroni, Zamenis situla*
			Annex IV / RDB species – plants, invertebrates, and reptiles
MT0000011	Ghar Dalam	SAC; Site of Archaeological Importance; Area of Archaeological Importance (AAI)	Annex I habitats – 8310
			Annex II fauna – *Armadilidium ghardalamensis, Rhinolophus hipposideros*
			Annex IV / RDB species - Mammal
MT0000012	Wied il-Mizieb	SAC; AEI / SSI; Tree Protected Area, AHLV	Annex I habitats –5330, 9320, 9570
			Annex II plants – *Anacamptis urvilleana, Ophrys melitensis*
			Annex II fauna – Brachytrupes megacephalus, Pseudoseriscius cameroni, Zamenis situla, Pseudoseriscius cameroni*, Zamenis situla*
			Annex IV / RDB species –invertebrates, mammals
MT0000013	Ic-Cittadella	SAC; AAI; AHLV	Annex I habitats –1210, 1240, 2110, 2210, 2220, 5330, 5430, 5410, 8210
			Annex II plants – *Linaria pseudolaxiflora*
			Annex II fauna – *Rhinolophus hipposideros, Myotis punicus*
			Annex IV / RDB species – plants, reptiles invertebrates, mammals
MT0000014	Il-Ballut (l/o Marsaxlokk)	SAC; Bird Sanctuary; AEI / SSI	Annex I habitats –1310, 1410, 1420
			Annex II plants – *Anacamptis urvilleana, Orobanche densiflora*
			Annex II fauna – *Brachytrupes megacephalus, Pseudoseriscius cameroni, Zamenis situla*
			Annex IV / RDB species –invertebrates
MT0000015	L-Ghadira Area	SAC; SPA; AEI; SSI; Bird	Annex I habitats –1150,1310, 1410, 1420, 2220, 5330, 5410, 6220
		Sanctuary; Wetland of	Annex II plants – *Anacamptis urvilleana, Ophrys melitensis, Orobanche densiflora*

		International Importance; AHLV	Annex II fauna – *Rhinolophus hipposideros, Myotis punicus, Zamenis situla, Aphanius fasciatus, Brachytrupes megacephalus, Pseudoseriscius cameroni*
			Annex IV / RDB species – plants, mammals
			Birds – *Himantopus himantopus* (Annex I)*, Calandrella brachydactyla* (Annex I)*,* non-Annex I breeding species, wintering wetland species, migratory waterfowl and waders including Annex I migratory herons, migratory raptors, wintering and staging Passeriformes
MT0000016	Filfla	SAC; SPA; AEI; SSI; Filfla Nature Reserve; Bird Sanctuary	Annex I habitats – 1240, 1420, 8210
			Annex II fauna – *Lampedusa imitatrix*
			Annex IV / RDB species – plants, invertebrates, reptiles
			Birds –*Hydrobates pelagicus* (Annex I)*, Calonectris diomedea* (Annex I)
MT0000017	Kemmuna, Kemmunett, Il-Hagriet ta' Bejn il-Kmiemen u l-Iskoll ta' Taht il-Mazz	SAC; SPA; AEI; SSI; Tree	Annex I habitats –1240, 1420, 2210, 3140, 5330, 5410,6220, 8210,92D0, 9320, 9540
		Protection Area; Bird Sanctuary; Nature Reserve	Annex II plants – *Anacamptis urvilleana, Linaria pseudolaxiflora, Ophrys melitensis, Orobanche densiflora*
			Annex II fauna – *Brachytrupes megacephalus, Pseudoseriscius cameroni, Zamenis situla*
			Annex IV / RDB species – plants, invertebrates, reptiles, mammals
			Birds – *Puffinus yelkouan* (Annex I)*, Calandrella brachydactyla* (Annex I)*, Calonectris diomedea* (Annex I), *Monticola solitarius*, *Sylvia conspicilliata*, *Sylvia melancocephala*, *Sturnus vulgaris, Passer hispaniolensis, raptors, passerines hispaniolensis, raptors, passerines*
MT0000018	Buskett – Girgenti Area	SAC; SPA; Tree Protection Area; AEI / SSI; Bird Sanctuary; AHLV; AAI	Annex I habitats –3170, 5230, 5330, 8310, 92A0, 9320, 9340, 9540
			Annex II plants – *Elatine gussonei, Petalophyllum ralfsii*
			Annex II fauna – *Myrmecophilus baronii*, *Zamenis situla*, *Rhinolophus hipposideros, Myotis punicus*
			Annex IV / RDB species – plants, fungi, invertebrates, amphibian, reptiles, mammals
			Birds –Raptors, breeding and wintering passerines
MT0000019; MT0000029;	Dwejra – Qawra Area, inkluz Hagret il-General	SAC; SPA; AEI; SSI; Nature Reserve; Bird Sanctuary; AHLV; Tree Protection Area	Annex I habitats –1240, 1420, 3140, 5330, 5430, 8210, 92D0
MT0000030	Rdumijiet ta' Ghawdex: Il-Ponta ta' Harrux sa il-Bajja		Annex II plants – *Cremnophyton lanfrancoi, Helichrysum melitense, Hyoseris frutescens, Linaria pseudolaxiflora, Anacamptis urvilleana, Palaeocyanus crassifolius*
			Annex IV / RDB species – plants, invertebrates, reptiles, amphibian, mammals

	tax-Xlendi Rdumijiet ta' Ghawdex: Il-Ponta ta' San Dimitri sa il-Ponta ta' Harrux		Birds – *Puffinus yelkouan* (Annex I)*, Calandrella brachydactyla* (Annex I)*, Calonectris diomedea* (Annex I), *Monticola solitarius*, *Cisticola juncidis*, *Sylvia conspicilliata*, *Sylvia melancocephala*, *Miliaria calandra*, waders and related species, birds of prey, passerines
MT0000020;	Xlendi-Wied tal-Kantra Area	SAC; SPA; AEI; SSI; AHLV; Site of	Annex I habitats –1240, 3140, 3170, 5330, 5430, 8210, 9320
MT0000028	Rdumijiet ta' Ghawdex: Id-Dawra tas-Sanap sa Tal-Hajt	Archaeological Importance	Annex II plants – *Anacamptis urvilleana*, Palaeocyanus crassifolius, Cremnophyton lanfrancoi, Elatine gussonei, Hyoseris frutescens,lanfrancoi, Elatine gussonei, Hyoseris frutescens, Linaria pseudolaxiflora
MT0000029	Rdumijiet ta' Ghawdex: Il-Ponta ta' Harrux sa il-Bajja tax-Xlendi		Annex II fauna – *Rhinolophus hipposideros, Myotis punicus*
			Annex IV / RDB species – plants, invertebrates,
			Birds – *Puffinus yelkouan* (Annex I)*, Calandrella brachydactyla (Annex I), Calonectris diomedea*
			(Annex I), *Monticola solitarius*, waders and aquatic birds, raptors, passerines
MT0000021	L-Imgiebah / Tal-Mignuna Area	SAC; AEI; Tree Protected Area; AHLV	Annex I habitats –1240, 1510, 5330, 8210, 92D0, 9320, 9340, 9540
			Annex II plants – *Anacamptis urvilleana, Linaria pseudolaxiflora*
			Annex II fauna –*Zamenis situla*
			Annex IV / RDB species – plants, amphibian, invertebrates
MT0000022	Il-Gzejjer ta' San Pawl /Selmunett	SAC; AEI; SSI; Bird Sanctuary; Nature Reserve	Annex I habitats –1170, 1240
			Annex II plants – *Linaria pseudolaxiflora*
			Annex II fauna – *Brachytrupes megacephalus, Pseudoseriscius cameroni, Zamenis situla*
			Annex IV / RDB species – plants, invertebrates
MT0000023	Il-Maghluq tal-Bahar (l/o Marsascala)	SAC; Transitional Water Body; AEI / SSI	Annex I habitats –1150*; 1210; 1240; 1410; 1420; 1510; 2110; 3140; 5330; 5410; 5430; 6220; 8210; 92D0
			Annex II plants – *Hyoseris frutescens, Anacamptis urvilleana*
			Annex II fauna – *Zamenis situla*
			Birds – *Puffinus yelkouan, Calandrella brachydactyla*
MT0000024;	Rdumijiet ta' Malta: Ir-Ramla tac-Cirkewwa sa il-Ponta ta' Benghisa	SAC; SPA; AEI; SSI; Protected Beach; AHLV; Tree Protected Area; Bird Sanctuary; AAI; Sites of	Annex I habitats –1240; 1410; 1510; 2110; 3140; 3170; 5330; 5410; 5430; 6220; 8210; 8330; 92A0; 9320; 9340

MT0000031	Rdumijiet ta' Malta: Ix-Xaqqa sa' Wied Moqbol	Archaeological Importance	Annex II plants – *Palaeocyanus crassifolius, Anacamptis urvilleana, Crepis pusilla, Cremnophyton lanfrancoi, Elatine gussonei, Ophrys melitensis, Hyoseris frutescens, Petalophyllum ralfsii, Linaria pseudolaxiflora*
			Annex II fauna – *Myotis punicus, Rhinolophus hipposideros, Lampedusa melitensis, Lampedusa imitatrix, Zamenis situla*
MT0000032	Rdumijiet ta' Malta: Ras il-Pellegrin sax-Xaqqa		Annex IV / RDB species – plants, invertebrates, reptiles, mammals
			Birds – *Puffinus yelkouan* (Annex I), *Calonectris diomedea (Annex I), Calandrella brachydactyla*
			(Annex I), *Cisticola juncidis*, *Sylvia comspillata*, Monticola solitarius, Larus michahellis
MT0000025	L-Ghar ta' l-Iburdan	SAC; AEI; SSI	Annex I habitats –5330; 8310; 8330; 92A0; 9320
			Annex II fauna – Myotis punicus, Rhinolophus hipposideros
MT0000026	Il-Qortin tal-Magun u l-Qortin il-Kbir	SAC; AEI; SSI;	Annex I habitats –1240; 1510; 5330; 5410; 9320
			Annex II plants –*Ophrys melitensis*
			Annex IV / RDB species – plants, reptiles
MT0000034 MT0000027	L-Inhawi ta' Cenc Rdumijiet ta' Ghawdex: Ta' Cenc	SAC; SPA; AEI; SSI; Bird Sanctuary	Annex I habitats –1240; 1510; 3140; 3170; 5330; 5410; 5430; 6220; 8210
			Annex II plants – *Palaeocyanus crassifolius, Cremnophyton lanfrancoi, Elatine gussonei, Hyoseris frutescens, Linaria pseudolaxiflora*
			Annex IV / RDB species – plants, invertebrates, reptiles, mammals, amphibian
			Birds – *Puffinus yelkouan* (Annex I), *Calonectris diomedea* (Annex I), *Hydrobates pelagicus (Annex I) Calandrella brachydactyla* (Annex I), *Cisticola juncidis*, *Sylvia comspillata*, *Sylvia melancocephala*, *Monticola solitarius, Miliaria calandra, Passer hispaniolensis,* aquatic and marine birds, birds of prey, passerines
MT0000101	Il-Bahar bejn Rdum Majjiesa u Ras ir-Raheb	SAC	Annex I habitats -1110, 1120, 1170, 8330
			Annex IV / RDB species – plants, invertebrates
MT0000102	Il-Bahar fl-Inhawi ta' Ghar Lapsi u ta' Filfla	SAC	Annex I habitats - 1120, 1170
			Annex IV / RDB species – plants, invertebrates
MT0000103	Il-Bahar fl-Inhawi tad-Dwejra (Ghawdex)	SAC	Annex I habitats - 1120, 1170, 8330
			Annex IV / RDB species – plants, invertebrates, fish
MT0000104	Il-Bahar fl-Inhawi ta' Mgarr ix-Xini	SAC	Annex I habitats: 1110, 1120, 1170, 8330
			Annex IV / RDB species – plants, invertebrates

	(Ghawdex)		
MT0000105	Il-Bahar fil-Grigal ta' Malta	SAC	Annex I habitats - 1110, 1120, 1170, 8330
			Annex II fauna – *Gibbula nivosa*
			Annex IV / RDB species – plants, invertebrates
MT0000106	Il-Bahar tat-Tramuntana	SAC; SPA	Annex IV / RDB species – reptiles, mammals
			Birds – *Calonectris diomedea*
MT0000107	Il-Bahar tal-Grigal	SPA	Birds – *Hydrobates pelagicus*, *Puffinus yelkouan*
MT0000108	Il-Bahar tal-Lvant	SPA	Birds – *Hydrobates pelagicus*, *Calonectris diomedea*

Appendix 02 - List of Annex I Habitats in the Maltese Islands [967]

1110 Sandbanks which are slightly covered by sea water all the time
1120 * Posidonia beds (*Posidonion oceanicae*)
1150 * Coastal lagoons
1160 Large shallow inlets and bays
1170 Reefs
1210 Annual vegetation of drift lines
1240 Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium sp.*
1310 *Salicornia* and other annuals colonising mud and sand
1410 Mediterranean salt meadows (*Juncetalia maritimi*)
1420 Mediterranean and themo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi)*
1510 * Mediterranean salt steppes (*Limonietalia*)
2110 Embryonic shifting dunes
2210 *Crucianellion maritimae* fixed beach dunes
2220 Dunes with *Euphorbia terracina*
3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
3170 * Mediterranean temporary ponds
5230 * Arborescent matorral with Laurus nobilis
5330 Thermo-Mediterranean and pre-desert scrub
5410 West Mediterranean clifftop phryganas (*Astralo-Plantaginetum subulatae)*
5420 *Sarcopoterium spinosum* phryganas
5430 Endemic phryganas of the *Euphorbio-Verbascion*
6220 * Pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*
8210 Calcareous rocky slopes with chasmophytic vegetation
8310 Caves not open to the public
8330 Submerged or partially submerged sea caves
92A0 *Salix alba* and *Populus alba* galleries
92D0 Southern riparian galleries and thickets (*Nerio-Tamaricetea Securinegion tinctoriae*)
9320 *Olea* and *Ceratonia* forests
9340 *Quercus ilex* and *Quercus rotundifolia* forests
9540 Mediterranean pine forests with endemic Mesogean pines
9570 * *Tetraclinis articulata* forests

Appendix 03 - A literature review of connectedness to nature and its potential for environmental management

ARTICLE IN PRESS

Journal of Environmental Management xxx (2015) 1–15

Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman

Review

A literature review of connectedness to nature and its potential for environmental management

Brian Restall*, Elisabeth Conrad

Institute of Earth Systems, University of Malta, Msida, Malta

ARTICLE INFO

Article history:
Received 31 July 2014
Received in revised form
22 April 2015
Accepted 17 May 2015
Available online xxx

Keywords:
Literature review
Connectedness to nature
Nature relatedness
Environmental management
Spatial mapping

ABSTRACT

Understanding how people's relationships with nature form, how they influence personal values and attitudes, and what behavioural implications they may have could provide more insight into how connectedness to nature (CNT) can effectively contribute to environmental management goals. This paper undertakes a review of literature published over the past decade (2002–2011) on SCOPUS; and describes the current state of knowledge regarding CNT, assesses any efforts towards the spatial mapping of CNT for environmental management, and identifies measures of CNT defined in the broader literature. This review suggests that there is quite some overlap in the literature on CNT concepts, and that more effort needs to be made towards multi-disciplinary research which explores how CNT can be useful to environmental planning and conservation research on the field. It also further corroborates the need and relevance of applying more social and affective strategies to promote conservation behaviour. The main progress in CNT theory seems to have been made in the development of measurement tools, and it is clear that there is a strong convergent validity amongst the different measures due to their similarity, and functional associations. Further efforts towards the exploration of multi-dimensional measures is recommended since they consistently stand out as showing better results. The geographic visualisation of CNT constructs is another area of research that deserves attention since it can provide a unique point of view towards guiding participatory protected area planning and management.

A substantial body of literature has been published in the social and behavioural sciences over the last three decades examining the human–nature relationship (e.g. Degenhardt, 2002; Schultz, 2001a,b, 2002; Mayer and Frantz, 2004; Orr, 2004; Nisbet et al., 2009). The study of connectedness to nature (CNT) is primarily concerned with understanding how people identify themselves with the natural environment and the relationships they form with nature. The literature devoted to people–nature relationships has made valuable contributions to environmental psychology; however the breadth and variety of CNT literature can also present challenges to a comprehensive understanding of the field. This is exemplified by the multiplicity of terms used for this construct, with CNT also referred to in the literature as nature connectedness (Schultz, 2002), nature relatedness (Nisbet et al., 2009), love and care for nature (Perkins, 2010), connectivity with nature (Dutcher et al., 2007), emotional affinity toward nature (Kals et al., 1999), dispositional empathy with nature (Tam, 2013a,b,c) or inclusion of nature in the self (Schultz, 2001a,b). Given this breadth of terms, there is substantial scope for literature reviews of existing academic research in the subject area, in order to highlight key elements and trends in the field.

CNT theory suggests that a relationship with the natural world directly affects people's physical, mental, and overall wellbeing due to benefits gained by increased exposure to nature and positive experiences in the natural world (Tauber, 2012). Direct experiences with natural settings seem to have very profound emotional effects on people (Louv, 2008), and a stronger commitment to nature could lead to higher human interest in environmental protection (Perkins, 2010). Consequently, understanding how people's relationships with nature form, how they influence personal values

* Corresponding author.
E-mail address: brian.restall@pim.com.mt (B. Restall).

http://dx.doi.org/10.1016/j.jenvman.2015.05.022
0301-4797/

and attitudes, how they can be measured and what behavioural implications they may have, could provide more insight into how CNT has the potential to effectively help meet conservation goals. Better insight into people and their relationships with nature has the potential to enhance our ability to effectively meet conservation goals. Understanding how these relationships form, how they influence personal values and attitudes, and what behavioural implications they may have remains critical. The ability to link CNT concepts to geographically defined spaces could also potentially be useful for purposes of environmental management, and for conservation planning in particular.

Given the above, this paper provides a literature review of CNT academic literature over the past decade (2001–2011), with three main objectives: a) to describe the current state of knowledge regarding CNT; b) to assess any efforts towards the spatial mapping of CNT for environmental management and c) to identify measures of CNT defined in the literature.

1. Connectedness to nature and its relevance to environmental management

Various authors have suggested that humans were in the past more physically and psychologically connected to nature than people living in industrialised nations today (Melson, 2001; Shepard, 1993, 1996). This implies a potential disconnect from the natural environment (Axelrod and Suedfeld, 1995; Beck and Katcher, 1996, Katcher and Beck, 1987) primarily due to the displacement of people into cities which seems to insulate us from outdoor natural environmental stimuli (Stilgoe, 2001). Clearly human pressures in modern society, coupled with technological improvements and increased urbanisation, could also be affecting people's ability to connect with nature in their daily lives, potentially creating a nature-disconnect which is thought to have an impact on our empathy for other species and our desire to help conservation efforts (Louv, 2008; Kellert, 1997; Conn, 1998). This could also be leading to a decline in people's connectedness across generations and diminishing our experience in and with the natural world (Kahn et al., 2009). Some even argue that the relationship between people and the natural world is in fact broken, and that this is leading to a failure to value the very same systems that keep us alive (Monbiot, 2013). Consequently understanding how a sense of connection with nature can impact upon people's decisions to protect nature is important if we wish to protect biodiversity, and ultimately this same sense of connectedness to nature (Howard, 1997; Schultz, 2000).

Wilson (1984) claims that humans have an innate kinship for nature which he terms biophilia. This understanding of our sense of inclusion in nature is referred to as our '*ecological identity or self*' (Naess, 1973); and attachment to nature and place are thought to affect human identity or self-definition (Clayton and Opotow, 2003; Mayer and Frantz, 2004; Schultz et al., 2004). Perkins (2010) defines the construct of love and care for nature as "a deep love and caring for nature which includes a clear recognition of nature's intrinsic value as well as a personal sense of responsibility to protect it from harm". Similarly Nisbet et al. (2009) proposed the term 'nature relatedness' (NR) to explain our connectedness with other living things in the natural world - even those that are not appealing to humans.

Klassen (2010) suggests a strong interrelatedness between ecological identity, sense of place and ecological literacy, and establishes that the degree to which these three concepts influence individuals varies from person to person. He also concludes that an individual's CNT is dependent on a variety of precursors, including 'prior knowledge', 'lived experiences', 'cultural background', as well as 'encountering and conversing with people who display their compassion, caring, and dedication for environmental concerns'. Schultz (2002) also suggests that '*values*' act as a bond between all these concepts and precursors mentioned by Klassens since they underpin the relationship with the natural world, and their affective psychological and physiological responses to natural settings (Crystal and Chuck, 1987). Wilson (1984) also suggests that another important determinant impinging on our deep and profound relationship with nature is spirituality, and suggests that an ecological self is experienced through '*a sense of belonging or spiritual oneness with nature*'. Similarly Kamitsis and Francis (2013) conclude that exposure to nature and CNT are indeed positively associated with psychological wellbeing and significantly mediated by spirituality. Schroeder (1990, 1991) defines spirituality as the experience of "*being related to or in touch with an 'other' that transcends one's individual sense of self and gives meaning to one's life*" at the deepest level of the human psyche (Crystal and Harris, 1987). Thus, the human values of natural areas can also include the sense of timelessness and feelings of community and connectedness to other people as well as to places and things in nature (e.g. landforms, natural features, other living things) (Daniel et al., 2007).

Schultz (2002, 2004) argues that the construct for CNT is composed of three dimensions of psychological inclusion in nature – i) a cognitive or mental representation of that self that creates an interdependence with nature; ii) an affective representation which refers to an individual's emotional bond with nature that creates a sense of intimacy and care for it; and iii) a behavioural component which refers to an individual's commitment to act in the best interest of the natural environment and protect it. However Ashmore et al. (2004) suggest that there are more dimensions to CNT and propose that '*collective identity*' also has a determinant role since one may interpret nature as a collective community which humans belong to (Clayton, 2003). Collective identity is defined by Tajfel (1978) as "*that part of an individual's self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership*". Collective identity is also related to social capital theory which Perkins et al. (2002) define as "*the norms, networks, and mutual trust of 'civil society' that facilitate cooperative action among citizens and institutions*", and which results in direct benefits for those community members (Kawachi et al., 1997). In fact, social capital theory could also play an important role in the way humans adapt to environmental shocks (Mogues, 2006), or in certain cases even why they hamper adaptation (Bezabih et al., 2013). It would therefore be fair to conclude that the level of resilience of social-ecological systems is not only dependent on social factors such as people's ability to anticipate changes and adapt to future challenges (adaptive capacity), but is also influenced by human intervention, institutional policies and exposure to natural changes over time (Nelson et al., 2007). Consequently ecological resilience and social factors like CNT are intrinsically interconnected through changing forms of natural resource management demands over time (Ruiz-Mallén and Corbera, 2013).

Several authors (e.g. Bragg, 1996; Roszak, 1992) insist that a more connected sense of self to nature is conducive to environmentally responsible behaviour (ERB), and that less tangible social motivations like CNT or place attachment are in fact potential drivers of significant environmental action (Kals et al., 1999; Vaske and Kobrin, 2001; Dutcher et al., 2007). Indeed, as connectedness to nature or place increases so does one's empathy and willingness to

Please cite this article in press as: Restall, B., Conrad, E., A literature review of connectedness to nature and its potential for environmental management, Journal of Environmental Management (2015), http://dx.doi.org/10.1016/j.jenvman.2015.05.022

protect it (Mayer and Frantz, 2004); and direct contact with nature has been shown to increase interconnectedness and love for nature (Kaplan and Kaplan, 1989; Rolston, 1993; Wilson, 1984). Meanwhile Schultz (2000) argues that the value people give to an object depends on the extent to which they include that object within their sense of self, and that pro-environmental behaviour is more likely with increased connectedness to nature or place (Gosling and Williams, 2010; Schultz, 2002).

The above '*eco-psychological*' arguments then suggest that there are significant disparities in the way individuals are attracted to nature, and disconnectedness from nature could indirectly contribute to environmental deterioration (Howard, 1997; Schultz et al., 2004). Schultz (2000) and Howard (1997) argue that if we start to value nature, we will feel a higher concern for it and commit towards its protection. However the relationship between nature and self is in many ways at conflict with people's perceptions of natural and unnatural environments – where most perceive natural areas as independent from human agency, potentially leading to cognitive dissonance (Elliot and Devine, 1994; Festinger, 1957). Cognitive dissonance occurs when people are torn between opposing thoughts or feelings about a particular concept (Vinning, 2008; Festinger et al., 1956). This dissonance typically leads people to rationalise their environmentally damaging behaviour in order to relieve this dissonance, and feel better about their contradictory perceptions and actions. Resolving this conflict in perceptions of CNT and actual behaviour could lead to more environmentally responsible behaviour (Vining et al., 2008).

2. Methods

2.1. Data collection protocol and search strategy

This paper presents two sets of literature reviews – the first dataset based on a review of the literature undertaken using principles of Systematic Literature Review (SLRs) protocols as a guide, and the second dataset based on a less restrictive but wider search for relevant literature related specifically to measures of CNT. The SLR protocol was identified a-priori and detailed the study inclusion criteria, established a series of review questions, identified relevant studies, appraised their quality and summarised the evidence to provide an overall picture of CNT literature. The aim was to synthesize findings from recent literature in order to understand the direction CNT research is taking, while reducing the effect of the reviewers' own bias, identifying gaps, and suggesting directions for further research (Khan, 2003; Higgins and Green 2011). Pullin and Knight (2001), Pullin et al. (2004), Fazey et al. (2004) and Sutherland et al. (2004) agree that SLRs are improved methods for the identification of academic evidence and for its application in environmental conservation and management. The study provides a concise and systematic synopsis of the somewhat fragmented literature on CNT for researchers to draw reliable conclusions on CNT's potential contribution to environmental management (Sackett et al., 2000).

The first step of the literature review involved systematically identifying data sources. The papers which formed our dataset were thus selected from peer reviewed literature on CNT published between January 2002 and December 2014 for the first dataset. Searches of web-based databases hosted by SciVerse (Scopus) were conducted, specifically under the categories for "Life sciences" (7200 journal titles) and "Social sciences and humanities" (5300 titles). Scopus was selected because it offers significant coverage of databases that deal with the environmental social sciences. The search terms used were "*connectedness to nature*" and "*nature relatedness*", with papers selected for further evaluation if they contained this term within the article title, abstract and/or keywords. Other related search terms were excluded since CNT is by now established as the leading term for this construct. The use of the Scopus database inevitably means that other relevant CNT literature may have been overlooked, since it only offers literature written in English, and excludes other works published in books, dissertations, and conference proceedings or online. Nonetheless peer-reviewed research communicated through the medium of established journals remains the most reliable source for a systematic literature review that can withstand academic scrutiny, despite the above limitations. For researchers trying to identify or build a CNT measure ideal for their needs, a more complete list of available measures is needed. Consequently, in order to provide a more comprehensive literature review of measures associated with CNT, the author also undertook a Scopus search beyond the reference years; and furthermore screened the first 100 returns of 'grey literature' from the Google search engine using the same keywords, but focussing specifically on measurement of CNT. This second dataset was used specifically to provide a more comprehensive collation of CNT measures beyond the first dataset. Only English language publications were assessed.

2.2. Study inclusion criteria

Each article returned by the database search had its full text reviewed if the title and/or abstract were deemed to meet any three of the following study inclusion criteria, namely: a) articles specifically dealing with the topic of connectedness to nature; b) articles containing a measure quantifying the connection to the natural world; and c) articles that attempt to map CNT. Publications were scored for the extent to which they discussed each of the three inclusion criteria listed above in the title or abstract, and when necessary in the introduction and discussion sections. Thus, whether a published article was deemed relevant was dependent on the context of the study, and its direct relevance to CNT. Consequently papers that simply mentioned CNT or simply discussed fringe aspects of underlying CNT concepts were deemed to be irrelevant to this review. All papers were assessed by the primary author to ensure consistency, with key findings then reviewed by the second author. After searching the Scopus database, the selection was narrowed down to 260 papers published between 2002 and 2014. Of these 260 sources, 170 were rejected because they did not match the study inclusion criteria mentioned above. Our final sample was comprised of 90 peer reviewed papers from forty different journals and are listed in Annex I.

2.3. Coding protocol

The selected 90 papers were each reviewed carefully to assess their relevance against an a-priori protocol derived following a preliminary review of all papers. We identified the following ten review variables in order to describe the papers' context and methods for measuring CNT, and these variables were subsequently used to score each relevant paper accordingly.

2.4. Limitations

Bibliographic and academic research databases available

Please cite this article in press as: Restall, B., Conrad, E., A literature review of connectedness to nature and its potential for environmental management, Journal of Environmental Management (2015), http://dx.doi.org/10.1016/j.jenvman.2015.05.022

electronically are typically the primary source for systematic reviews; however, the social sciences and humanities literature is more fragmented than the natural sciences and engineering field (Boaz et al., 2002). The social sciences also seem to lack the large scale databases typically found in medicine, chemistry and other scientific disciplines; and are spread across niche journal repositories available via commercial subscription. Similarly undertaking systematic search protocols tends to be more difficult than in scientific disciplines like medicine because of the variability of social science terminology and indexing in established repositories (Fazey, 2005a,b). Since we only assessed literature from Scopus journals, and general Google searches specifically for the measures section, some caution is necessary when deriving conclusions from this work since other relevant CNT literature may have been excluded. This is especially relevant in view of recent open-access repositories like PlosOne and the acceleration of scientific output which is estimated to double every 9 years (Bornmann and Mutz, 2014). In fact, circa 60 of the 90 papers selected here where published in 2013 and 2014 alone.

3. Results and discussion

3.1. CNT papers published and their wider research contexts

Ninety papers were found to be of direct relevance to CNT within the 13 years analysed on the Scopus database. A comparison against the coverage of other similar psychological constructs like place attachment (in the same database and over the same period) suggests that CNT is still somewhat under-represented in the Scopus literature. For instance a similar search for the term "*place attachment*" (PA) revealed 1064 potential sources which are of direct relevance to the PA literature.

Out of the 90 papers reviewed, 76 papers (84%) undertook empirical research which applies CNT within specific contexts, while only 12 published papers (13%) comprised literature reviews, and only two papers were general format papers in the form of essays, reports or discussion papers. While the benefits of widespread empirical research are clear, this result also confirms there is scope for reviews of this nature. The majority of papers were standalone studies (78%) and the remaining 22% of the studies formed part of wider programmes of research – primarily looking at related health issues in connection with CNT, or else exploring the interplay between teaching and CNT. 54% of the studies received no reported funding whatsoever, and only 31% of papers received state funding, with only 4% receiving academic funding and 7% receiving NGO funding.

3.2. Journals publishing about CNT

Between 2002 and 2014, 17 journals published papers specifically dealing with CNT; however, 15 of these journals only published one paper on the subject over this time span. The 'Journal of Environmental Psychology' (JEP) published 30% of all papers (27 papers), followed by Landscape and Urban Planning (LUP) at 56% and Health & Place, Ecological Economics, Journal of Environmental Management, Procedia – Social and Behavioral Sciences, and Environment and Behavior which published 3% of the papers. This result comes as no surprise since the *JEP* is a leading journal for academics who have a specific interest in the interrelationships between people and their physical surroundings. This implies that CNT is somewhat relegated to the psychology literature base and has limited exposure or application in other multi-disciplinary publications or academic literature, which can be a limiting factor towards the potential influence of CNT concepts in environmental policy or management decisions.

3.3. Country interest in CNT

For each paper we noted the institution and country where authors were based in order to give an idea of the spread of CNT research and to identify any cultural biases which may be present. All papers originated only from 25 countries, and the largest numbers of publications (27%) were written from USA institutes, followed by 17% in Australia and 8% in the UK, 7% in the Netherlands, 6% in Canada, while Germany made a modest contribution (4%).

The only lower income country represented, based on the gross national income per capita and a classification of economies by the World Bank (2010–2014), was Iran; however the paper in question was written by academics in India. Overall this suggests that studies in CNT are undertaken in high-income countries, and that low-income countries are poorly represented in CNT literature. Unfortunately this bias towards high-income countries is not specific to CNT literature alone and remains prevalent in most fields of research (Pablos-Mendez and Shademani, 2006). The main probable reason for such a significant discrepancy between high and low-income countries is likely due to the lack of environmental research funding allocated in these countries, and is further compounded by the Environmental Kuznets Curve hypothesis (Kuznet, 1955; Grossman and Krueger's 1991; Stern 2004). Kuznet's hypothesis suggests that there is a relationship between environmental deterioration and a country's development especially during the initial phases of industrialisation. He posits that when certain levels of per-capita income are reached the degradation is reversed since economic growth helps create better regulatory conditions for environmental improvement and more demand for better environmental quality (Yandle et al., 2002). Understanding CNT in low-income countries could expose some interesting comparisons in connectedness between people from different social and economic realities, and the potential effects of technology embeddedness and globalisation on CNT perceptions. Consequently one can assume that such discrepancies are also attributable to a country's capability to invest in research, and the significant differences in the scientific spending of nations (Fazey, 2005a,b; May, 1998; Tilman, 2000). This limitation is indeed significant because ultimately we may be generalizing about the way people connect to nature on the basis of very few cultural frameworks, and limits a true understanding of CNT as a universally-applicable concept.

3.4. Academic domains pursuing CNT, and their spatial focus

As can be expected, the greatest proportion of papers (66%) analysed CNT purely from the psychological point of view, or looked at its application within the environmental and social psychology domain. Only 13% of papers focused on the implications of CNT on conservation, 6% on human geography, 3% on sociology along with a similar 3% on the medical sciences. Other varied disciplines like education only garnered a share of 7%of the literature. This suggests that CNT is somewhat grounded in the psychological sciences but still garners interest from various domains (Oberkircher et al., 2011) including environmental policy and planning, and more needs to be done to ensure more interdisciplinary approaches for its application on the field.

Our review indicates that there is a moderately varied distribution of studies across the identified spatial scales. Papers

Please cite this article in press as: Restall, B., Conrad, E., A literature review of connectedness to nature and its potential for environmental management, Journal of Environmental Management (2015), http://dx.doi.org/10.1016/j.jenvman.2015.05.022

considering the relevance of CNT for '*Nature in general*' dominated the literature (29%); followed by a specific focus on '*Natural areas (not directly modified for human purposes)*' at 13%. '*Urban areas*' (12%) and '*Agricultural areas*' (11%) also were the subject of study; while '*Rural areas*', (7%), '*Outdoor areas or urban parks*' (6%), '*Touristic areas*' (2%), and '*Contaminated/polluted environments*' (1%) garnered modest interest. '*Office environments*' received no direct CNT attention in the period reviewed and 16% of the papers had no particular spatial focus. These results indicate that research is mostly focused on understanding CNT within a generic appreciation of nature, or simply focused on the psychological implications of CNT on people, rather than being framed within specific environments. However, natural and urban areas do seem to be of direct interest in CNT, while fewer studies where applied to agricultural areas, rural areas, outdoor areas or urban parks, and touristic areas. This is possibly the result of people moving out of rural areas and relocating to coastal and urban settlements (Daily, 2001; Fischer et al., 2005), which further decreases our exposure to nature and natural places and creates an implicit demand towards understanding people's affinity to modified urban areas or their peri-urban fringes. As mentioned earlier human contact with nature is important for human well-being, both physically and psychologically, and applies not only within natural environments but also within urban environments (e.g. importance of urban green space). In fact, a recent literature review by Haluza et al. (2014) that investigated physiological outcomes of experiencing nature confirms that natural environments offer a high potential for human well-being, restoration and stress recovery. The benefits of being connected with nature seem to reach beyond helping people to recover from stress or attention fatigue, and Mayer et al. (2009) suggest that a sense of belonging in the natural world can also help people gain purpose and meaning in life. Many (Wilson, 1984; Kellert and Wilson, 1993; Kellert, 1997) argue that people have an inherent need to associate with the broader natural world, and when this need is met they will in turn experience psychological benefits (Roszak, 1995). However it is important to note how Klassen (2010) suggests that while youth in urban centres have less connectedness to nature, rural youth are also showing signs of disconnectedness. Hence a greater understanding of how CNT constructs are shaped within modified environments, and the implications of such changes in modified environments is still lacking (Young, 2000; Luck et al., 2004).

3.5. Stakeholder involvement

There is doubt that successful nature management can be designed or implemented without taking in consideration the relationship with the broader society. For instance, conserving rural landscapes has been shown to require complex coordination with many public and private stakeholders (Donahue, 1999; Sample, 1994). Despite the potential links between peoples' CNT and planning, only 74% of the papers involved stakeholders somewhat in their studies with the vast majority of them (60%) being involved simply for data gathering purposes and to obtain their views (11%). This implies that although there were varying degrees of public involvement, only 3% of the papers attempted to apply the findings through true participatory or consultative research beyond the mere acknowledgement of local people's reflections and attachment to nature. Nonetheless, it is crucial to note that despite the appeal of participatory research, this in itself raises numerous other academic and political challenges that go beyond the mere production of data (Cornwall and Jewkes, 1995). More needs to be done in order to make the case on how CNT research can contribute towards ensuring that the location of power in the participation process remains with the local people involved (Hovik et al., 2010), while fostering and leveraging this connectedness, or lack of it, towards effective participatory conservation efforts and more responsible environmental behaviour (Ernst and Stefan, 2011).

3.6. Spatial mapping of CNT constructs

Spatial mapping and analysis of geographically referenced information is being used extensively in the social sciences to gain spatial perspectives that can solve complex environmental problems which are embedded in space and time (Goodchild and Janelle, 2010). This is especially the case due to the proliferation of location-based personal devices over the last decade. In view of recent efforts towards community involvement in natural resource management, spatial mapping has emerged as a powerful tool to bring communities' knowledge and points of view to the attention of public authorities or decision-makers. In fact, participatory mapping is nowadays being used extensively to create maps that represent community values and perceptions, land use patterns, local knowledge and practices that can empower decision making while empowering stakeholders (Brown and Ramirez-Gomez, 2013). Participatory mapping refers to "*community-based research and development approaches that use local people to map places*", and which facilitate public involvement in policy making (Sieber, 2006) by projecting cognitive spatial knowledge into cartographic and visual descriptive datasets (Herlihy and Knapp, 2003). Despite these benefits, our review did not come across any efforts that tried to map CNT specifically, even though a lot of work has gone towards using mapping approaches for measuring and displaying similar cognitive constructs, for example landscape values and place attachment (Brown and Raymond, 2007; Brown et al., 2015). Applying '*geographic visualisation*' techniques to display social constructs like CNT could provide an alternative cartographic landscape that could provide policy makers with multiple and exploratory perspectives of data to understand spatial and social construct patterns better (Crampton, 2001). Mapping respondents' response to a CNT measure would allow for the spatial projection of CNT expressions of value towards nature and provide a unique point of view to identify social risks associated with potential land use change. Despite the above, only 4% of the CNT papers reviewed attempted to include this perspective in their research.

If we are serious about the view that people are part of an ecosystem, then good ecosystem management should stand to gain from the mapping of social or personal meanings or value people attribute to nature; or how we view human–environment relationships and the extent to which people agree or disagree on these meanings (Brown et al., 2013). McLain et al. (2013) identify three broad potential uses of socio-spatial data in environmental planning, namely to: a) secure land tenure and manage natural resources; b) identify local ecological knowledge; and c) identify peoples' connection to place (Brown et al., 2013). Participatory spatial mapping of intangible assets like CNT and similar nature-place-human specific priorities can be a useful approach to better integrate local knowledge in conservation planning since it can identify areas of common values or disagreement and also act as an educational tool. CNT spatial mapping can allow planners to identify areas of distinctive human connection and relate that

Please cite this article in press as: Restall, B., Conrad, E., A literature review of connectedness to nature and its potential for environmental management, Journal of Environmental Management (2015), http://dx.doi.org/10.1016/j.jenvman.2015.05.022

data layer with relevant land characteristics for areas in need of biodiversity protection (Colchester, 1998) and integrated resource management, while contributing towards participatory decision making and providing a reference point for monitoring or evaluation (Table 1).

3.7. Research methods used for measuring CNT

The aim of this section is to provide an overview of CNT measures mentioned or used in the wider literature to measure, quantify and categorize the human relationship with our natural environment. We review the distinctiveness of these measures as a further contribution to the theoretical understanding of connection to nature, and undertake a critical analysis of their strengths and weaknesses. Out of the papers reviewed for the first dataset, 49% actually use one or more tools to quantify CNT, and some of the studies reviewed have even developed psychometric scales of their own. Although a number of the papers reviewed or assessed numerous instruments that measure CNT, it is clear that other established CNT measurement tools were omitted since they were not published in peer-reviewed journals. Consequently a wider and less restrictive literature review beyond the SCOPUS journal and date parameters was undertaken for this section in order to create a second dataset. Table 2 below builds on previous compilations published by Bruni, Schultz and Saunders (2013), Hefler and Cervinka (2009) and Tam (2013a,b,c) in order to fill the gap in the existing literature by reviewing a compendium of CNT tools. Please note that only measures which are most cited and are intended for an adult target audience were reviewed, and this list is not deemed to be exhaustive. The measures are sorted in chronological order so as to show how measures have evolved over time. It is important to note that the majority of measures reviewed are essentially unidimensional in scope since they tend to identify one specific aspect of the connection between humans and nature; which are typically related to affective affiliation, cognitive representation, or relationship commitment (Tam, 2013a,b,c). On the other hand, other scales like the Environmental Identity scale (EID) tend to expose multiple dimensions of CNT like the interaction with natural elements, importance of nature, importance of affiliation with nature, and emotions toward nature (Tam, 2013a,b,c; Clayton, 2003) or behavioural attitudes.

There is clearly substantial similarity and possible overlap between the various measures and constructs of CNT reviewed above, even though they theoretically focus on different aspects of CNT. These similarities are even acknowledged by the authors themselves in some cases. Mayer and Frantz (2004) suggest that CTN and INS are highly inter-correlated ($r = .55$) and have similar correlations with behaviour (Tam, 2013a,b,c). Nisbet et al. (2009) also noted similarities between the NR and CTN scales, and Howell et al. (2011) confirmed a strong inter-correlation ($r = .61$) between these two scales. Also, Davis et al. (2011) show how COM is strongly correlated with CTN, EID, and INS ($r = .57$ to .68, Tam, 2013a,b,c). More recently Kim-Pong Tam (2013a,b,c) undertook an important cross-border and empirical study to understand better how seven of the various measures discussed above are similar to, or different from, each other. Table 3 below shows the correlation and its respective 95% confidence interval of each possible pair of measures related to CNT against criterion variables for one of the cohort samples. The criterion variables used by Tam included (i) the five traits and values of personality and individual differences (Costa and McCrae, 1992); (ii) contact with nature; (iii) "*subjective wellbeing which includes both a cognitive component (satisfaction with life) and an affective component (pleasantness of emotions)*" (Diener et al., 1999); and finally (iv) environmental behaviour which included attitudinal support for environmental movement/causes and self-reported ecological behaviour. Tam's findings in fact show "*strong convergent validity and little incremental validity among these measures*", which suggests that they can be considered as measures of the same underlying construct. This should instil more confidence in the use of these measures.

Nevertheless, these results also suggest that while the subtle statistical divergences of these measures cannot be ignored, it is evident that NR and EID show a persistent correlation with the criterion variables, and that the NR scale was consistently reliable *"for traits, subjective well-being, and environmental behaviour"* (Tam, 2013a,b,c). Also Tam shows that the multi-dimensional measures consistently showed better results which suggests that CNT is

Table 1
Descriptive variables and answer categories used.

	Variables	Questions	Categories
1.	Study Category:	What type of study is this?	(i) Empirical research (i.e., qualitative and quantitative studies), (ii) Reviews, and (iii) Essays/comments.
2.	Research integration	Is the study stand-alone or part of a wider programme of research?	i) Stand-alone, ii) wider.
3.	Funding	Did the study receive funding?	Yes/No. (i)No funding; (ii)State funding; (iii)NGO funding; (iv)EU funding; (v)Internal funding; (vi)Source not specified.
4.	Journal and country:	Which journals are publishing about CNT, and which countries are papers coming from?	(i) Journal name; (ii) Origin of main author.
5.	Disciplinary focus:	Does the study emanate from a specific disciplinary standpoint?	(i)Psychology, (ii)Human geography, (iii)Biology, (iv)Physical geography, (v)Sociology, (vi) Medical, (vii) Conservation.
6.	Spatial focus:	Is the study focused on a particular type of environment? If yes, what type of environment?	Yes/No. (i) Natural areas (not directly modified for human purpose); (ii) Rural areas; (iii) Urban areas, (iv) Office environments; (v) Outdoor areas or urban parks; (vi) Contaminated/polluted environments; (vii) Other.
7.	Stakeholder Involvement	Does the study involve stakeholders?	(i)No stakeholders involved; (ii)Official agencies; (iii)NGOs; (iv)Locals; (v)Resource users; (vi)Research community; (vii)Minority groups.
8.	CNT mapping	Does the study involve spatial/geographic mapping of CNT or related concepts?	Yes/No.
9.	CNT Measurement	Is the study focused on the measurement of CNT?	Yes/No.
10.	Policy and Management	Does the study have practical implications for policy and environmental management?	Yes/No

Please cite this article in press as: Restall, B., Conrad, E., A literature review of connectedness to nature and its potential for environmental management, Journal of Environmental Management (2015), http://dx.doi.org/10.1016/j.jenvman.2015.05.022

Table 2
Measures of CNT, with a brief description of the dimensions identified and variables measured. (CR = Cognitive representation, Affective affiliation = AA, Relationship commitment = RC).

#	Date/authors	Measurement scale	Abb.	Dimensions of CNT	CNT constructs identified			Factors, attitudes, constructs or variables measured	Measurement tool
					CR	AA	RC		
1	1998/Stern and Dietz De Groot J.I.M. and Steg L (2007)	Environmental Value Orientations Scale	EVO	Uni-dimensional	☒	☒		Measures value orientations towards the environment. ▪ Egoistic values – respondent's interest in environmental issues that affect people personally. ▪ Socio-altruistic values – environmental actions due to moral obligations and that may have consequences on other human beings ▪ Biospheric values – cost and benefits to nature as a whole	23-item measure, scored on a 9-point Likert scale.
2	1994/Thompson and Barton	Ecocentric and Anthropocentric Attitudes Toward the Environment Scale	EAATE	Uni-dimensional	☒	☒	☒	Measures 2 attitudes (Ecocentric & Anthropocentric) across 3 sub-scales: ▪ Ecocentric attitudes – valuing nature and protecting it because of its inherent value. ▪ Anthropocentric attitudes – a belief that nature is only valued for material benefits that it can give to mankind. ▪ Apathy toward environmental issues - a skepticism of environmental issues and a lack of concern in these issues	33-item measure, scored on 5-point Likert scale.
3	1997/Ellis & Thompson	New Ecological Consciousness scale	NEC	Uni-dimensional	☒	☒		Measures general feelings about environmental degradation, limits to economic growth, and potential crises in overpopulation, ▪ Egalitarian biases ▪ Individualistic biases ▪ Hierarchical cultural biases ▪ Environmental attitudes and beliefs.	10 item measure, scored on a 7 point Likert scale.
4	1997a/Hartig, Kaiser & Bowler	Perceived Restorativeness Scale	PRS	Uni-dimensional	☒	☒		Measures qualities of restorative person-environment transactions. ▪ Being away – getting distance from some ordinarily present or routine aspects of one's life; ▪ Fascination – particular contents and events in the processes of exploration; ▪ Coherence – a function of immediately perceived elements or features of the environment to one another and scope; ▪ Compatibility – match between the person's goals and inclinations, the demands made on the person by environmental conditions and the patterns of information available in the environment for support of purposive and required activities	16 item measure, scored on a 7-point Likert scale.
5	1999/Kals, Schumacher, and Montada	Emotional affinity toward nature	EATN	Uni-dimensional	☒	☒		Measures emotional inclinations toward nature as love for nature and feeling of oneness with nature ▪ Love of nature ▪ Feelings of freedom, ▪ Feelings of Safety ▪ Feelings of Oneness with Nature	16-item measure, scored on a 7-point Likert scale.
6	1997/2000/Dunlap, VanLiere, Mertig, & Jones	New Ecological Paradigm	NEP	Multi-dimensional	☒	☒		Measures sentiments and attitudes towards nature and the environment. ▪ Ecological worldviews ('primitive beliefs') ▪ Environmental concerns ▪ Degree to which the respondent views humans as an integral part of the natural environment and their relationship with it.	15-item measure, scored on a 5-point Likert scale.
7	2002/Schultz	Inclusion of Nature in Self Scale	INS	Uni-dimensional	☒			Measures beliefs regarding one's feelings of connection to the natural world	Visual measure of 7 pairs of overlapping circles, scored

(continued on next page)

								▪ Perspective – external, nature-related worldview, a sense of agency concerning individual human actions and their impact on all living things. ▪ Experience – a physical familiarity with the natural world and the level of comfort with and desire to be out in nature.	
16	2010/Perkins	Love and Care for Nature Scale	LCN	Multi-dimensional	☒	☒		Measures an individual's personal and emotional connectedness with nature, and his/her underlying construct of love and deep caring for nature. ▪ Psychological determinants of environmental altruism across a range of contexts	15 item measure, scored on a 7-point Likert type scale.
17	2011/Brügger, A., Kaiser, F. G., & Roczen, N.	Disposition to connect with nature	DCN	Uni-dimensional	☒			Measures personal attitude which can be indirectly derived from inspecting past bonding activities via responses to statements that reflect an appreciation of nature. ▪ Past bonding activities ▪ Evaluative appreciation of nature	Assesses 50 behaviours across a 5-point frequency scale from 1 (never) to 5 (very often) and dichotomous yes/no questions.
18	2013/Silvas V. Daniel	Emotional connection to nature	ECN	Multi-dimensional	☒	☒	☒	Measures emotional connections to nature and relates them to: ▪ Concepts or attitudes attitudes to protect nature (ATPN), and ▪ Willingness to protect nature (WTPN).	Assesses 20 polar emotions across a 5-point semantic scale, and assesses AATPN and WTPN across 5-point Likert scales.

Table 3
Descriptive statistics, inter correlations, and factor loadings of the various measures (incl. Studies 1& 2)[a] – Tam, 2013a,b,c.

	COM	CTN	CWN	EATN	EID	INS	NR	AID	LCN
COM	–	.81	.80	.81	.85	.66	.88	.62	.84
CTN	.78	–	.84	.74	.81	.64	.83	.65	.84
CWN	.67	.72	–	.70	.75	.67	.78	.66	.78
EATN	.78	.71	.66	–e	.76	.59	.77	.53	.82
EID	.85	.77	.66	.79	–	.67	.85	.65	.85
INS	.48	.53	.44	.40	.46	–	.63	.86	.67
NR	.80	.76	.66	.75	.82	.44	–	.63	.82
AID	–	–	–	–	–	–	–	–	.62
LCN	–	–	–	–	–	–	–	–	–
Study 1 mean (SD)	4.66 (.83)	4.47 (.67)	4.70 (.87)	4.59 (.69)	4.55 (.76)	4.01 (1.46)	4.42 (.68)	–	–
Study 1 alpha	.83	.79	.61	.84	.89	–	.83	–	–
Study 1 factor loading	.91	.86	.76	.85	.91	.52	.88	–	–
Study 2 mean (SD)	5.21 (1.15)	4.85 (1.04)	5.01 (1.39)	5.01 (1.05)	4.88 (1.22)	4.53 (1.96)	4.92 (1.00)	3.72 (1.52)	5.26 (1.25)
Study 2 alpha	.93	.89	.86	.93	.96	–	.90	.92	.97
Study 2 factor loading	.93	.90	.86	.85	.91	.73	.92	.71	.92
Based on Fisher's r to z transformation (Fisher, 1915)									

[a] Note. The numbers below the diagonal were findings from Study 1, while the numbers above the diagonal were findings from Study 2. All correlations were significant at the .001 level. Study 1 used undergraduate students only and from a Chinese society (Hong Kong), while Study 2 used participants of more diverse background from the USA.

indeed a multi-dimensional construct (Nisbet et al., 2009, 2011; Perkins, 2010).

3.8. Links between CNT and environmental policy/management?

Out of the 90 studies identified, only 30% (27) of the papers reviewed tried to link the CNT construct with practical implications for environmental policy and planning efforts. The potential detachment between humans and nature can have serious implications for people's future environmental values, attitudes and behaviour (Vining et al., 2008); and can definitely provide critical leads for CNT constructs' application to management and policy. Research suggests clearly that CNT does indeed throw light towards conservation planning and practice, and where or when social preparedness is underdeveloped and necessary (Sloan, 2002). Similarly the values and knowledge held by local communities is acknowledged as being valuable for biodiversity conservation, and there is a clear need to combine social constructs with biological conservation (Pretty and Smith, 2004). Consequently, assessing and evaluating the driving forces of CNT in our society would rationally seem to be a matter of high priority for environmental policy and management. However, most published studies seem to have a purely exploratory approach that only add small incremental findings and new dimensions to the empirical body of knowledge in CNT; and only provide somewhat limited contributions to the development of environmental management theory. More effective and multi-disciplinary research that is relevant and involves environmental practitioners or policy makers active in the field is necessary; and more feedback is required from those same practitioners on how they think CNT can be useful to conservation research. Future research must explore ways how CNT can be applied to environmental planning and management efforts which offer implications for understanding individuals' orientations toward the environment; and which take cognisance of the unpredictable and contested elements of conservation decisions (Whelan et al., 2002). A good start in this direction was offered by Gosling and Williams (2010) who studied the associations between pro-environmental behaviour and two other types of emotional associations, namely place attachment and CNT, in the context of farmers' management of native vegetation on their land. The findings were consistent with current frameworks and suggest that "*emotional association with nature leads to an expanded sense of self and greater valuing of non-human species, and so to pro-environment behaviour*". This further corroborates the relevance of applying more social and affective strategies in environmental management to promote conservation behaviour.

4. Concluding remarks – some suggestions for future research

While many established authors have made significant contributions to the literature over the last decade, the present work highlights new opportunities for future research on CNT especially with regards to spatial representations of CNT, and applications of the concept in environmental management. Researchers interested in understanding, or influencing people's attitudes and behaviours towards the natural world, may benefit from CNT concepts and measures that assess the subjective experience of ecological self and the interconnectedness of humans with nature. The assumption from the literature is that a focus on interconnectedness and dependence with the environment may result in enduring and committed conservation action. However, further research is needed in order to transpose these notions to different populations or cultures, and to consider whether CNT is felt similarly by the older generation, children and students, or people of different cultures since responses can generally be more diverse (Calder et al., 1981).

Despite the dynamic progress of the CNT literature in ad-hoc empirical papers, the authors express their concern about unclear relations between CNT concepts and other similar psychological constructs like place attachment; and the extent to which such constructs combined can be used as predictors of commitment to the environment. Further interest in exploring more holistic theoretical frameworks that clarify the overlaps in fragmented CNT concepts, rather than just concentrating on CNT constructs in isolation, is therefore necessary. Future research could also delve into the various consequences of CNT to understand whether people who are highly connected to the environment have a significant motivational orientation to compromise on their self-interests for the longer term benefits of conserving the natural world. Similarly more needs to be done towards multi-disciplinary research that is relevant and practical to both environmental managers active in the field in order to ensure that CNT can be useful to conservation research.

A case can also be made concerning the absence and application of geographic visualisation techniques to display social constructs like CNT. This point of view could provide an innovative GIS landscape that can provide policy makers with multiple and exploratory perspectives of CNT expressions towards nature; and provide a unique point of view towards guiding participatory protected area planning and management.

The main progress in the literature seems to have been made in the development of CNT measurement tools. Research indicates that there is strong convergent validity amongst the different measures due to their similarity, and functional associations. However, the predictive potential of each measure could depend partially on whether the application of CNT constructs in conservation literature is more focused on the cognitive, affective or behavioural aspects, or a combination of other factors. Further efforts towards the exploration of multi-dimensional measures is recommended since they consistently stand out as showing better results. In conclusion, future research primarily needs to explore answers to the following pressing questions:

i) How can environmental and resource management practitioners operationalise approaches that include deeper psychological values people assign to natural areas for more effective and inclusive environmental management?
ii) How can CNT be applied effectively to environmental management in combination with similar social constructs like environmental or recreational behaviour?
iii) How can social constructs like CNT be represented spatially?
iv) What qualitative methods might be most appropriate and effective for studying CNT in different populations across time?

Answers to the above questions are necessary for environmental management to develop a broader theoretical framework that includes the profound, affective psychological and physiological responses to natural settings which are more socially sensitive and politically responsive towards resource or ecosystem management.

Acknowledgements

This paper was part-funded by the Strategic Educational Pathways Scholarships (STEPS), awarded by the Education Ministry of Malta; and is a deliverable of further research which is working towards applying the spatial intersections between a community's values for nature and place against other spatial attributes of protected area resources.

Please cite this article in press as: Restall, B., Conrad, E., A literature review of connectedness to nature and its potential for environmental management, Journal of Environmental Management (2015), http://dx.doi.org/10.1016/j.jenvman.2015.05.022

ANNEX I. List of articles included in review, sorted in chronological descending order

	Authors	Title	Year	Source title
1	Cynthia McPherson Frantz, F. Stephan Mayer	The importance of connection to nature in assessing environmental education programs	2014	Studies in Educational Evaluation
2	Kim-Pong Tam, Sau-Lai Lee, Melody Manchi Chao	Saving Mr. Nature: Anthropomorphism enhances connectedness to and protectiveness toward nature	2014	Journal of Experimental Social Psychology
3	Jia Wei Zhang, Ryan T. Howell, Ravi Iyer	Engagement with natural beauty moderates the positive relation between connectedness with nature and psychological well-being	2014	Journal of Environmental Psychology
4	Anne Marike Lokhorst, Céline Hoon, Rob le Rutte, Geert de Snoo	There is an I in nature: The crucial role of the self in nature conservation	2014	Land Use Policy
5	Lai Yin Carmen Leong, Ronald Fischer, John McClure	Are nature lovers more innovative? The relationship between connectedness with nature and cognitive styles	2014	Journal of Environmental Psychology
6	Thomas H. Beery, Daniel Wolf-Watz	Nature to place: Rethinking the environmental connectedness perspective	2014	Journal of Environmental Psychology
7	Antal Haans	The natural preference in people's appraisal of light	2014	Journal of Environmental Psychology
8	Stanley T. Asah, Anne D. Guerry, Dale J. Blahna, Joshua J. Lawler	Perception, acquisition and use of ecosystem services: Human behavior, and ecosystem management and policy implications	2014	Ecosystem Services
9	Angel Mario Dzhambov, Donka Dimitrova Dimitrova	Elderly visitors of an urban park, health anxiety and individual awareness of nature experiences	2014	Urban Forestry & Urban Greening
10	Angel M. Dzhambov, Donka D. Dimitrova, Elena D. Dimitrakova	Association between residential greenness and birth weight: Systematic review and meta-analysis	2014	Urban Forestry & Urban Greening
11	Michał Jaśkiewicz, Tomasz Besta	Heart and mind in public transport: Analysis of motives, satisfaction and psychological correlates of public transportation usage in the Gdańsk–Sopot–Gdynia Tricity Agglomeration in Poland	2014	Transportation Research Part F: Traffic Psychology and Behaviour,
12	Sarah L. Bell, Cassandra Phoenix, Rebecca Lovell, Benedict W. Wheeler	Green space, health and wellbeing: making space for individual agency	2014	Health & Place
13	Annick Hedlund-de Witt, Joop de Boer, Jan J. Boersema	Exploring inner and outer worlds: A quantitative study of worldviews, environmental attitudes, and sustainable lifestyles	2014	Journal of Environmental Psychology
14	Alexandra Kibbe, Franz X. Bogner, Florian G. Kaiser	Exploitative versus appreciative use of nature – Two interpretations of utilization and their relevance for environmental education	2014	Studies in Educational Evaluation
15	Jia Wei Zhang, Paul K. Piff, Ravi Iyer, Spassena Koleva, Dacher Keltner	An occasion for unselfing: Beautiful nature leads to prosociality	2014	Journal of Environmental Psychology
16	Marianne E. Krasny, Jesse Delia	Natural area stewardship as part of campus sustainability	2014	Journal of Cleaner Production
17	Kelly L. Haws, Karen Page Winterich, Rebecca Walker Naylor	Seeing the world through GREEN-tinted glasses: Green consumption values and responses to environmentally friendly products	2014	Journal of Consumer Psychology
18	Kate E. Lee, Kathryn J.H. Williams, Leisa D. Sargent, Claire Farrell, Nicholas S. Williams	Living roof preference is influenced by plant characteristics and diversity	2014	Landscape and Urban Planning
19	Angelika Wilhelm-Rechmann, Richard M. Cowling, Mark Difford	Responses of South African land-use planning stakeholders to the New Ecological Paradigm and the Inclusion of Nature in Self scales: Assessment of their potential as components of social assessments for conservation	2014	Biological Conservation
20	Angela Sanguinetti	Transformational practices in cohousing: Enhancing residents' connection to community and nature	2014	Journal of Environmental Psychology
21	F.G. Kaiser, A. Brügger, T. Hartig, F.X. Bogner, H. Gutscher	Appreciation of nature and appreciation of environmental protection: How stable are these attitudes and which comes first?	2014	European Review of Applied Psychology
22	Gesa Sophie Holst, Oliver Musshoff, Till Doerschner	Policy impact analysis of penalty and reward scenarios to promote flowering cover crops using a business simulation game	2014	Biomass and Bioenergy
23	Julian Rode, Erik Gómez-Baggethun, Torsten Krause	Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence	2014	Ecological Economics
24	Yoshihisa Kashima, Angela Paladino, Elise A. Margetts	Environmentalist identity and environmental striving	2014	Journal of Environmental Psychology
25	Jacob B. Hirsh	Environmental sustainability and national personality	2014	Journal of Environmental Psychology
26	Keren Mintz, Tali Tal	Sustainability in higher education courses: Multiple learning outcomes	2014	Studies in Educational Evaluation
27	Angela Loder	'There's a meadow outside my workplace': A phenomenological exploration of aesthetics and green roofs in Chicago and Toronto	2014	Landscape and Urban Planning,
28	Sophia Imran, Khorshed Alam, Narelle Beaumont		2014	Tourism Management,

(*continued on next page*)

(*continued*)

	Authors	Title	Year	Source title
		Environmental orientations and environmental behaviour: Perceptions of protected area tourism stakeholders		
29	Jelle Boeve-de Pauw	Moving environmental education forward through evaluation	2014	Studies in Educational Evaluation
30	Mark Groulx, John Lewis, Christopher Lemieux, Jackie Dawson	Place-based climate change adaptation: A critical case study of climate change messaging and collective action in Churchill, Manitoba	2014	Landscape and Urban Planning
31	Isabelle D. Wolf, Teresa Wohlfart	Walking, hiking and running in parks: A multidisciplinary assessment of health and well-being benefits	2014	Landscape and Urban Planning
32	Annukka Vainio, Riikka Paloniemi	The complex role of attitudes toward science in pro-environmental consumption in the Nordic countries	2014	Ecological Economics
33	Natalia Buta, Stephen M. Holland, Kyriaki Kaplanidou	Local communities and protected areas: The mediating role of place attachment for pro-environmental civic engagement	2014	Journal of Outdoor Recreation and Tourism,
34	Ilias Kamitsis, Andrew J.P. Francis	Spirituality mediates the relationship between engagement with nature and psychological wellbeing	2013	Journal of Environmental Psychology
35	Kim-Pong Tam	Concepts and measures related to connection to nature: Similarities and differences	2013	Journal of Environmental Psychology
36	Kim-Pong Tam	Dispositional empathy with nature	2013	Journal of Environmental Psychology
37	Haywantee Ramkissoon, Liam David Graham Smith, Betty Weiler	Testing the dimensionality of place attachment and its relationships with place satisfaction and pro-environmental behaviours: A structural equation modelling approach	2013	Tourism Management,
38	Eleanor Ratcliffe, Birgitta Gatersleben, Paul T. Sowden	Bird sounds and their contributions to perceived attention restoration and stress recovery	2013	Journal of Environmental Psychology
39	Elizabeth F. Pienaar, Daniel K. Lew, Kristy Wallmo	Are environmental attitudes influenced by survey context? An investigation of the context dependency of the New Ecological Paradigm (NEP) Scale	2013	Social Science Research
40	David R. Jones	'The Biophilic University': a de-familiarizing organizational metaphor for ecological sustainability?	2013	Journal of Cleaner Production,
41	Arjen Buijs, Anna Lawrence	Emotional conflicts in rational forestry: Towards a research agenda for understanding emotions in environmental conflicts	2013	Forest Policy and Economics
42	Silvia Collado, Henk Staats, José A. Corraliza	Experiencing nature in children's summer camps: Affective, cognitive and behavioural consequences	2013	Journal of Environmental Psychology
43	Donald W. Hine, Joseph P. Reser, Wendy J. Phillips, Ray Cooksey, Anthony D.G. Marks, Patrick Nunn, Susan E. Watt, Graham L. Bradley, A. Ian Glendon	Identifying climate change interpretive communities in a large Australian sample	2013	Journal of Environmental Psychology
44	Courtney G. Flint, Iris Kunze, Andreas Muhar, Yuki Yoshida, Marianne Penker	Exploring empirical typologies of human–nature relationships and linkages to the ecosystem services concept	2013	Landscape and Urban Planning
45	Lynda Cheshire, Carla Meurk, Michael Woods	Decoupling farm, farming and place: Recombinant attachments of globally engaged family farmers	2013	Journal of Rural Studies
46	Jacki Schirmer, Helen L. Berry, Léan V. O'Brien	Healthier land, healthier farmers: Considering the potential of natural resource management as a place-focused farmer health intervention	2013	Health & Place
47	Natalia López-Mosquera, Mercedes Sánchez	Direct and indirect effects of received benefits and place attachment in willingness to pay and loyalty in suburban natural areas	2013	Journal of Environmental Psychology
48	Sacha Jellinek, Kirsten M. Parris, Don A. Driscoll, Peter D. Dwyer	Are incentive programs working? Landowner attitudes to ecological restoration of agricultural landscapes	2013	Journal of Environmental Management
49	Mustafa Kahyaoğlu	A Case Study on Primary Science Teacher Candidates' Perceptions towards Alienating from Nature	2013	Procedia – Social and Behavioral Sciences
50	Stephanie Wilkie, Andri Stavridou	Influence of environmental preference and environment type congruence on judgments of restoration potential	2013	Urban Forestry & Urban Greening,
51	Jeou-Shyan Horng, Chih-Hsing Liu, Sheng-Fang Chou, Chang-Yen Tsai	Professional conceptions of creativity in restaurant space planning	2013	International Journal of Hospitality Management,
52	*Birgitta Gatersleben, Matthew Andrews*	When walking in nature is not restorative—The role of prospect and refuge	2013	Health & Place
53	Shawna C. Peckham, Peter N. Duinker, Camilo Ordóñez	Urban forest values in Canada: Views of citizens in Calgary and Halifax	2013	Urban Forestry & Urban Greening
54	Fiona Timmins, Freda Neill	Teaching nursing students about spiritual care – A review of the literature	2013	Nurse Education in Practice
55	Ellen van der Werff, Linda Steg, Kees Keizer	The value of environmental self-identity: The relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour	2013	Journal of Environmental Psychology
56	Lisa M. Smith, Jason L. Case, Heather M. Smith, Linda C. Harwell, J.K. Summers	Relating ecosystem services to domains of human well-being: Foundation for a U.S. index	2013	Ecological Indicators
57	Silvia Collado, Henk Staats, José A. Corraliza	Experiencing nature in children's summer camps: Affective, cognitive and behavioural consequences	2013	Journal of Environmental Psychology,
58	Nik Ramli Nik Abdul Rashid, Naja Mohammad		2012	Procedia – Social and Behavioral Sciences

		A Discussion of Underlying Theories Explaining the Spillover of Environmentally Friendly Behavior Phenomenon		
59	Annick Hedlund-de Witt	Exploring worldviews and their relationships to sustainable lifestyles: Towards a new conceptual and methodological approach	2012	Ecological Economics
60	Mirjam de Groot	Exploring the relationship between public environmental ethics and river flood policies in western Europe	2012	Journal of Environmental Management,
61	Claire Freeman, Katharine J.M. Dickinson, Stefan Porter, Yolanda van Heezik	"My garden is an expression of me": Exploring householders' relationships with their gardens	2012	Journal of Environmental Psychology
62	Marianne Cohen, Raymond Baudoin, Milena Palibrk, Nicolas Persyn, Catherine Rhein	Urban biodiversity and social inequalities in built-up cities: New evidences, next questions. The example of Paris, France	2012	Landscape and Urban Planning
63	Hesam Kamalipour, Armin Jeddi Yeganeh, Mehran Alalhesabi	Predictors of Place Attachment in Urban Residential Environments: A Residential Complex Case Study	2012	Procedia – Social and Behavioral Sciences
64	Taciano L. Milfont, Chris G. Sibley	The big five personality traits and environmental engagement: Associations at the individual and societal level	2012	Journal of Environmental Psychology,
65	Ernst J., Theimer S.	Evaluating the effects of environmental education programming on connectedness to nature	2011	Environmental Education Research
66	Davis J.L., Le B., Coy A.E.	Building a model of commitment to the natural environment to predict ecological behavior and willingness to sacrifice	2011	Journal of Environmental Psychology
67	Howell A.J., Dopko R.L., Passmore H.-A., Buro K.	Nature connectedness: Associations with well-being and mindfulness	2011	Personality and Individual Differences
68	Perkins H.E.	Measuring love and care for nature	2010	Journal of Environmental Psychology
69	Romig K.	Community and social capital in upper-income neighborhoods: An investigation in metropolitan phoenix	2010	Urban Geography
70	Duffy S., Verges M.	Forces of nature affect implicit connections with nature	2010	Environment and Behavior
71	Gosling E., Williams K.J.H.	Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers	2010	Journal of Environmental Psychology
72	Joshanloo M., Afshari S., Rastegar P.	Linking social axioms with indicators of positive interpersonal, social and environmental functioning in Iran: An exploratory study	2010	International Journal of Psychology
73	Bruni C.M., Schultz P.W.	Implicit beliefs about self and nature: Evidence from an IAT game	2010	Journal of Environmental Psychology
74	Perrin J.L., Benassi V.A.	The connectedness to nature scale: A measure of emotional connection to nature?	2009	Journal of Environmental Psychology
75	Lindborg R., Stenseke M., Cousins S.A.O., Bengtsson J., Berg A., Gustafsson T., Sjodin N.E., Eriksson O.	Investigating biodiversity trajectories using scenarios – Lessons from two contrasting agricultural landscapes	2009	Journal of Environmental Management
76	Van Herzele A., Van Gossum P.	Owner-specific factors associated with conversion activity in secondary pine plantations	2009	Forest Policy and Economics
77	Vining J., Merrick M.S., Price E.A.	The distinction between humans and nature: Human perceptions of connectedness to nature and elements of the natural and unnatural	2008	Human Ecology Review
78	Baker S., Morrison R.	Environmental spirituality: Grounding our response to climate change	2008	European Journal of Science and Theology
79	Acevedo M.F., Baird Callicott J., Monticino M., Lyons D., Palomino J., Rosales J., Delgado L., Ablan M., Davila J., Tonella G., Ramirez H., Vilanova E.	Models of natural and human dynamics in forest landscapes: Cross-site and cross-cultural synthesis	2008	Geoforum
80	Malone G.	Ways of belonging: Reconciliation and Adelaide's public space indigenous cultural markers	2007	Geographical Research
81	Townsend M.	Feel blue? Touch green! Participation in forest/woodland management as a treatment for depression	2006	Urban Forestry and Urban Greening
82	Young O.R., Berkhout F., Gallopin G.C., Janssen M.A., Ostrom E., van der Leeuw S.	The globalization of socio-ecological systems: An agenda for scientific research	2006	Global Environmental Change
83	Frantz C., Mayer F.S., Norton C., Rock M.	There is no "I" in nature: The influence of self-awareness on connectedness to nature	2005	Journal of Environmental Psychology
84	Mayer F.S., Frantz C.M.	The connectedness to nature scale: A measure of individuals' feeling in community with nature	2004	Journal of Environmental Psychology
85	Pretty J., Smith D.	Social capital in biodiversity conservation and management	2004	Conservation Biology
86	Grotzer T.A., Bell Basca B.	How does grasping the underlying causal structures of ecosystems impact students' understanding?	2003	Journal of Biological Education
87	Sloan N.A.	History and application of the wilderness concept in marine conservation	2002	Conservation Biology
88	Baum F., Palmer C.	Opportunity structures': Urban landscape, social capital and health promotion in Australia	2002	Health Promotion International
89	Verges M., Duffy S.	Connected to Birds but Not Bees: Valence Moderates Implicit Associations with Nature	2010	Environment and Behavior
90	Mayer F.S., Frantz C.M., Bruehlman-Senecal E., Dolliver K.	Why is nature beneficial?: The role of connectedness to nature	2009	Environment and Behavior

References

Ashmore, R.D., Deaux, K., Mclaughlin-Volpe, T., 2004. An organizing framework for collective identity: articulation and significance of multidimensionality. Psychol. Bull. 130, 80–114.

Axelrod, L.J., Suedfeld, P., 1995. Technology, capitalism, and christianity: are they really the three horsemen of the eco-collapse? J. Environ. Psychol. 15, 183–195.

Beck, A., Katcher, A., 1996. Between Pets and People: the Importance of Animal Companionship. Purdue University Press, West Lafayette, Indiana.

Becker, Sieto, 2005. Measuring People's Connection with Nature. Exploring the Relations between People's Implicit Connection with Nature, Their Explicit Conservation Behavior, and Their Affiliation with Technology. http://alexandria.tue.nl/extra1/afstversl/tm/beckers2005.pdf.

Bezabih, Mintewab, Beyene, Abe Damte, Gebreegziabher, Zenebe, Borga, Livousew, 2013. Social Capital, Climate Change and Soil Conservation Investment: Panel Data Evidence from the Highlands of Ethiopia. Centre for Climate Change Economics and Policy Working Paper No. 135. Grantham Research Institute on Climate Change and the Environment Working Paper No. 115. http://www.cccep.ac.uk/Publications/Working-papers/Papers/130-139/WP135-social-capital-climate-change-soil-conservation-ethiopia.pdf.

Boaz, Annette, Ashby, Deborah, Young, Ken, 2002. Systematic Reviews: What Have They Got to Offer Evidence Based Policy and Practice?. Working Paper 2.ESRC UK Centre for Evidence Based Policy and Practice Queen Mary. http://www.kcl.ac.uk/sspp/departments/politicaleconomy/research/cep/pubs/papers/assets/wp2.pdf.

Bornmann, Lutz, Mutz, Rudiger, 2014. Growth rates of modern science: a bibliometric analysis based on the number of publications and cited references. J. Assoc. Inf. Sci. Technol. Viewed 08 April 2015 http://arxiv.org/ftp/arxiv/papers/1402/1402.4578.pdf.

Bragg, E.A., 1996. Towards ecological self: deep ecology meets constructionist self-theory. J. Environ. Psychol. 16, 93–108.

Brown, Greg, Ramirez-Gomez, Sara, 2013. Participatory mapping with indigenous communities for conservation: challenges and lessons from Suriname. Electron. J. Inf. Syst. Dev. Ctries. EJISDC 58 (2), 1–22.

Brown, G., Raymond, C., 2007. The relationship between place attachment and landscape values: toward mapping place attachment. Appl. Geogr. 27 (2), 89–111.

Brown, Greg, Raymond, M. Christopher, Corcoran, Jonathan, 2015. Mapping and measuring place attachment. Appl. Geogr. 57 (2015), 42–53.

Brügger, A., Kaiser, F.G., Roczen, N., 2011. One for all? Connectedness to nature, inclusion of nature, environmental identity, and implicit association with nature. Eur. Psychol. 16 (4), 324–333.

Bruni, Schultz, Saunders, 2013. CONPSYCHMeasures – Measurement Tools for Environmental Practioners (last accessed in March 2013). http://www.conpsychmeasures.com/CONPSYCHMeasures/areas.html (retrieved online 01 July 2013).

Calder, B.J., Phillips, L.W., Tybout, A.M., 1981. Designing research for application. J. Consum. Res. 8, 197–207.

Clayton, S., 2003. Environmental identity: a conceptual and an operational definition. In: Clayton, S., Opotow, S. (Eds.), Identity and the Natural Environment. MIT PRESS, Cambridge, MA, pp. 45–65.

Clayton, S., Opotow, S., 2003. Identity and the Natural Environment. MIT Press, Cambridge, MA.

Colchester, M., 1998. Who will Garrison the fortresses? A reply to spinage. Oryx 32 (3), 11–13.

Conn, S., 1998. Living in the earth: ecopsychology, health and psychotherapy. Humanist. Psychol. 26, 179.

Cornwall, Andrea, Jewkes, Rachel, 1995. What is participatory research? Soc. Sci. Med. 41 (12), 1667–1676. http://www.civitas.edu.pl/pub/nasza_uczelnia/projekty_badawcze/Taylor/what_is_participatory_research.pdf.

Costa, P.T., McCrae, R.R., 1992. Four ways five factors are basic. Personal. Individ. Differ. 13, 653–665.

Crampton, W. Jeremy, 2001. Maps as social constructions: power, communication and visualization. Prog. Hum. Geogr. 25, 235–252. http://www.praxis-epress.org/CGR/35-Crampton.pdf.

Crystal, L., Chuck, Harris, 1987. The SOS-A spiritual opportunity spectrum: theory and implications of spirit of place for ecosystem management. In: Integrating Social Science and Ecosystem Management: a National Challenge. Proceedings.

Daily, G.C., 2001. Ecological forecasts. Nature 411, 245–245.

Davis, J.L., Green, J.D., Reed, A., 2009. Interdependence with the environment: commitment, interconnectedness, and environmental behaviour. J. Environ. Psychol. 29, 173–180.

Davis, J.L., Le, B., Coy, A.E., 2011. Building a model of commitment to the natural environment to predict ecological behavior and willingness to sacrifice. J. Environ. Psychol. 31, 257–265.

De Groot, J.I.M., Steg, L., 2007. Value orientations and environmental beliefs in five countries: validity of an instrument to measure egoistic, altruistic and biospheric value orientations. J. Cross Cult. Psychol. 38, 318–332.

Degenhardt, L., 2002. Why do people act in sustainable ways? Results of an empirical survey of lifestyle pioneers. In: Schmuck, P., Schultz, P.W. (Eds.), Psychology of Sustainable Development. Kluwer Academic Publishers, Boston, MA, pp. 123–147.

Diener, E., Suh, E.M., Lucas, R.E., Smith, H.L., 1999. Subjective well-being: three decades of progress. Psychol. Bull. 125, 276–302.

Donahue, B., 1999. Reclaiming the Commons: Community Farms & Forests in a New England Town. Yale University Press, New Haven.

Dunlap, R.E., Van Liere, K.D., Mertig, A.G., Jones, R.E., 2000. New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. J. Soc. Issues 56 (3), 425–442.

Daniel, Dutcher D., James, Finley C., Luloff, A.E., Johnson Janet, Buttolph, 2007. Connectivity with nature as a measure of environmental values. Environ. Behav. 39, 474–493.

Elliot, J. Andrew, Devine, G. Patricia, 1994. On the motivational nature of cognitive dissonance: dissonance as psychological discomfort. J. Personal. Soc. Psychol. 67 (3), 382–394.

Ellis, R.J., Thompson, F., 1997. Culture and the environment in the Pacific Northwest. Am. Polit. Sci. Rev. 91, 885–987 doi: 10.2307/2952171.

Ernst, Julie, Stefan, Theimer, 2011. Evaluating the effects of environmental education programming on connectedness to nature. Environ. Educ. Res. 17 (5), 577–598.

Fazey, I., Salisbury, J.G., Lindenmayer, D.B., Maindonald, J., Douglas, R., 2004. Can methods applied in medicine be used to summarize and disseminate conservation research? Environ. Conserv. 31, 190–198.

Fazey, I., Fischer, J., Lindenmayer, D.B., 2005a. Who does all the research in conservation biology? Biodivers. Conserv. 14, 917–934.

Fazey, I., Fischer, J., Lindenmayer, D.B., 2005b. What do conservation biologists publish? Biol. Conserv. 124 (1), 63–73.

Festinger, L., 1957. A Theory of Cognitive Dissonance. Stanford University Press, Stanford, CA.

Festinger, L., Schachter, S., Reicken, H., 1956. When Prophecy Fails. University of Minneapolis Press, Minneapolis, MN.

Fischer, J., Fazey, I., Briese, R., Lindenmayer, D.B., 2005. Making the matrix matter: challenges in Australian grazing landscapes. Biodivers. Conserv. 14, 575–578. Biology and Conservation.

Fisher, R.A., 1915. Frequency distribution of the values of the correlation coefficient in samples of an indefinitely large population. Biom. Biom. Trust 10 (4), 507–521. JSTOR 2331838.

Goodchild, F. Michael, Janelle, G. Donald, 2010. Toward critical spatial thinking in the social sciences and humanities. GeoJournal 75 (1), 3–13. February.

Gosling, Elizabeth, Williams, J.H. Kathryn, 2010. Connectedness to nature, place attachment and conservation behaviour: testing connectedness theory among farmers. J. Environ. Psychol. 30 (2010), 298–304.

Grossman, G.M., Krueger, A.B., 1991. Environmental Impacts of a North American Free Trade Agreement. National Bureau of Economic Research Working Paper 3914. NBER, Cambridge MA.

Haluza, Daniela, Schonbauer, Regina, Cervinka, Renate, 2014. Green perspectives for public health: a narrative review on the physiological effects of experiencing outdoor nature. Int. J. Environ. Res. Public Health 11 (5), 5445–5461. http://dx.doi.org/10.3390/ijerph110505445.

Hartig, T., Kaiser, F.G., Bowler, P.A., 1997a. Further Development of a Measure of Perceived Environmental Restorativeness (Working Paper No. 5). Uppsala University, Institute for Housing Research, Gävle, Sweden.

Hefler, Cervinka, 2009. Connectedness with Nature Scales. Institute of Environmental Health. http://www.meduniwien.ac.at/umwelthygiene/p018_measures.pdf (Retrieved online 01 July 2013).

Herlihy, P.H., Knapp, G., 2003. Maps of, by, and for the peoples of Latin America. Hum. Organ. 62 (4), 303–314.

Higgins, J.P.T., Green, S. (Eds.), 2011. Cochrane Handbook for Systematic Reviews of Interventions 4.2.5. John Wiley & Sons, Ltd, Chichester, UK.

Hovik, S., Sandström, C., Zachrisson, A., 2010. Management of protected areas in Norway and Sweden: challenges in combining central governance and local participation. J. Environ. Policy Plan. 12 (2), 159–177.

Howard, G.S., 1997. Ecological Psychology: Creating a More Earth-friendly Human Nature. University of Notre Dame Press, Notre Dame.

Howell, A.J., Dopko, R.L., Passmore, H.-A., Buro, K., 2011. Nature connectedness: associations with well-being and mindfulness. Personal. Individ. Differ. 51, 166–171.

Kahn Jr., Peter H., Severson, Rachel L., Ruckert, Jolina H., 2009. The Human Relation with Nature and Technological Nature. In: Current Directions in Psychological Science.

Kals, Elisabeth, Schumacher, Daniel, Montada, Leo, 1999. Emotional affinity toward nature as a motivational basis to protect nature. Environ. Behav. 31 (2), 178–202.

Kamitsis, Ilias, Francis, J.P. Andrew, 2013. Spirituality mediates the relationship between engagement with nature and psychological wellbeing. J. Environ. Psychol. 36 (2013), 136–143.

Kaplan, R., Kaplan, S., 1989. The Experience of Nature: a Psychological Perspective. Cambridge University Press, New York.

Katcher, A., Beck, A., 1987. Health and caring for living things. Anthrozoos 1, 175–183.

Kawachi, I., Kennedy, B., Lochner, K., 1997. Long live community: social capital as public health. Am. Prospect 35, 56–59.

Kellert, S.R., 1997. Kinship to Mastery: Biophilia in Human Evolution and Development. Island Press, Washington, DC.

Kellert, S.R., Wilson, E.O., 1993. The Biophilia Hypothesis. Island Press, Washington, DC.

Khan, et al., 2003. J. R. Soc. Med. 96, 118–121. www.cochrane.org.

Klassen, J. Michael, 2010. Connectedness to Nature: Comparing Rural and Urban Youths' Relationships with Nature. Unpublished thesis for a Master of Arts in Environmental Education and Communication. Brandon University. https://

Please cite this article in press as: Restall, B., Conrad, E., A literature review of connectedness to nature and its potential for environmental management, Journal of Environmental Management (2015), http://dx.doi.org/10.1016/j.jenvman.2015.05.022

dspace.royalroads.ca/docs/bitstream/handle/10170/150/Klassen,%20Mike.pdf?sequence=1.
Kuznets, S., 1955. Economic growth and income inequality. Am. Econ. Rev. 49, 1–28.
Leary, M.R., Tipsord, J.M., Tate, E.B., 2008. Allo-inclusive identity: incorporating the social and natural worlds into one's sense of self. In: Wayment, H., Bauer, J. (Eds.), Transcending Self-interest: Psychological Explorations of the Quiet Ego. American Psychological Association, Washington, D.C., pp. 137–147.
Louv, Richard, 2008. Last Child in the Woods: Saving Our Children from Nature Deficit Disorder. In: And the Nature Principle: Reconnecting with Life in a Virtual Age. Algonquin Books.
Luck, G.W., Ricketts, T.H., Daily, G.C., Imhoff, M., 2004. Alleviating spatial conflict between people and biodiversity. Proc. Natl. Acad. Sci. U. S. A. 101, 182–186.
May, R.M., 1998. The scientific investments of nations. Science 281, 49–51.
Mayer, F.S., Frantz, C.M., 2004. The connectedness to nature scale: a measure of individuals' feeling in community with nature. J. Environ. Psychol. 24, 503–515.
Mayer, F. Stephan, McPherson, Frantz Cynthia, Bruehlman-Senecal, Emma, Dolliver, Kyffin, 2009. Why Is Nature Beneficial? The Role of Connectedness to Nature. Environment and Behavior, 41 (5).
McLain, R., Poe, M., Biedenweg, K., Cerveny, L., Besser, D., Blahna, D., 2013. Making sense of human ecology mapping: an overview of approaches to integrating socio-spatial data into environmental planning. Hum. Ecol. 1–15.
Melson, G.F., 2001. Why the Wild Things Are: Animals in the Lives of Children. Harvard University Press, Cambridge, MA.
Mogues, T., 2006. 'Shocks, Livestock Asset Dynamics and Social Capital in Ethiopia. IFPRI Discussion Paper No. 38.
Monbiot, George, 2013. Pricing the Priceless. September 18, 2013. http://www.monbiot.com/2013/09/18/pricing-the-priceless/.
Naess, Arne, 1973. 'The shallow and the deep, long-range ecology movement. A summary'. Inquiry 16 (1), 95–100.
Nelson, D.R., Adger, W.N., Brown, K., 2007. Adaptation to environmental change: contributions of a resilience framework. Annu. Rev. Environ. Resour. 32, 395–419. http://dx.doi.org/10.1146/annurev.energy.32.051807.090348.
Nisbet, E.K., Zelenski, J.M., Murphy, S.A., 2009. The nature relatedness scale: linking individuals' connection with nature to environmental concern and behavior. Environ. Behav. 41 (5), 715–740.
Nisbet, E.K., Zelenski, J.M., Murphy, S.A., 2011. Happiness is in our nature: exploring nature relatedness as a contributor to subjective well-being. J. Happiness Stud. 12, 303–322.
Oberkircher, L., Shanafield, M., Ismailova, B., Saito, L., 2011. Ecosystem and social construction: an interdisciplinary case study of the Shurkul lake landscape in Khorezm, Uzbekistan. Ecol. Soc. 16 (4), 20.
Orr, D.W., 2004. Earth in Mind: on Education, Environment, and the Human Prospect. Island Press, Washington, DC.
Pablos-Mendez, A., Shademani, R., 2006. Knowledge translation in global health. J. Contin. Educ. Health Prof. 26, 81–86.
Perkins, H.E., 2010. Measuring love and care for nature. J. Environ. Psychol. 30 (4), 455–463.
Pretty, J., Smith, D., 2004. Social capital in biodiversity conservation and management. Conserv. Biol. 18, 631–638.
Pullin, A., Knight, T., 2001. Effectiveness in conservation practice: pointers from medicine and public health. Conserv. Biol. 15, 50–54.
Pullin, A., Knight, T., Stone, D., Charman, K., 2004. Do conservation managers use scientific evidence to support their decision-making? Biol. Conserv. 119, 245–252.
Rolston, H.I., 1993. Biophilia, selfish genes, shared values. In: Kellert, S.R., Wilson, E.O. (Eds.), The Biophilia Hypothesis. Island Press, Washington, DC, pp. 381–414.
Roszak, T., 1992. The Voice of the Earth. Phanes Press, Grand Rapids, MI.
Roszak, T., 1995. Where psyche meets Gaia. In: Roszak, T., Gomes, M.E., Kanner, A.D. (Eds.), Ecopsychology: Restoring the Earth, Healing the Mind. Sierra Club Books, San Francisco.
Ruiz-Mallén, I., Corbera, E., 2013. Community-based conservation and traditional ecological knowledge: implications for social-ecological resilience. Ecol. Soc. 18(4) (12). http://dx.doi.org/10.5751/ES-05867-180412.
Sackett, D.L., Strauss, S.E., Richardson, W.S., Rosenberg, W., Haynes, B., 2000. Evidence-based Medicine: How to Practice and Teach EBM, second ed. Churchill Livingstone, London.
Sample, V.A., 1994. Building partnerships for ecosystem management on mixed ownership landscapes. J. For. 92 (8), 41–44.
Schroeder, H.W., 1990. The spiritual aspect of nature: a perspective from depth psychology. In: More, T.A., Donnelly, M.P., Graefe, A.R., Vaske, J.J. (Eds.), Proceedings of the 1990 Northeastern Recreation Research Symposium. Gen. Tech. Rep. NE-145. Department of Agriculture. Forest Service, Northeastern Forest Experiment Station, Radnor, PA: U.S.
Schroeder, H.W., 1991. Psyche, Nature, and Mystery: a Psychological Perspective on the Values of Natural Environments. Department of Agriculture, Forest Service, North Central Forest Experment Station, Chicago, IL: U.S.
Schultz, P.W., 2000. Empathizing with nature: the effects of perspective taking on concern for environmental issues. J. Soc. Issues 56, 391–406.
Schultz, P.W., 2001a. Assessing the structure of environmental concern: concern for the self, other people, and the biosphere. J. Environ. Psychol. 21, 327–339.
Schultz, P.W., 2001b. The structure of environmental concern: concern for self, other people, and the bioshpere. J. Environ. Psychol. 21, 327–339.
Schultz, P.W., 2002. Inclusion in nature: the psychology of human-nature relations. In: Schmuck, P., Schultz, P.W. (Eds.), Psychology of Sustainable Development. Kluwer Academic Publishers, Boston, MA, pp. 61–78.
Schultz, P.W., Shriver, C., Tabanico, J.J., Khazian, A.M., 2004. Implicit connections with nature. J. Environ. Psychol. 24 (1), 31–42.
Shepard, P., 1993. On animal friends. In: Kellert, S.R., Wilson, E.O. (Eds.), The Biophilia Hypothesis. Island Press, Washington D.C, pp. 275–300.
Shepard, P., 1996. The Others: How Animals Made Us Human. Island Press, Washington D.C.
Sieber, Rene, 2006. Public participation geographic information systems: a literature review and framework. Ann. Assoc. Am. Geogr. 96 (3), 491–507.
Silvas, Villalobos Daniel, 2013. Measuring an Emotional Connection to Nature Among Children. Unpublished doctoral dissertation. Colorado State University. http://digitool.library.colostate.edu///exlibris/dtl/d3_1/apache_media/L2V4bGlicmlzL2R0bC9kM18xL2FwYWNoZV9tZWRpYS8yMDc2Mzc=.pdf.
Sloan, N.A., 2002. History and application of the wilderness concept in marine conservation. Conserv. Biol. 16 (2), 294–305. April 2002.
Stern, David, 2004. The rise and fall of the environmental Kuznets curve. World Dev. 32 (8), 1419–1439.
Stern, P.C., Dietz, T., Guagnano, G.A., 1998. A brief inventory of values. Educ. Psychol. Meas. 58 (6), 984–1001.
Stilgoe, J.R., 2001. Gone barefoot lately? Am. J. Prev. Med. 20, 243–244.
Sutherland, W., Pullin, A., Dolman, P., Knight, T., 2004. The need for evidence based conservation. Trends Ecol. Evol. 19, 305–308.
Tajfel, H.E., 1978. Differentiation Between Social Groups: Studies in the Social Psychology of Intergroup Relations. Academic Press, Oxford, UK.
Tam, Kim-Pong, 2013a. Concepts and measures related to connection to nature: similarities and differences. J. Environ. Psychol. 34 (2013).
Tam, Kim-Pong, 2013b. Dispositional empathy with nature. J. Environ. Psychol. 35 (2013), 92–104.
Tam, Kim-Pong, 2013c. Concepts and measures related to connection to nature: similarities and Differences. J. Environ. Psychol. 34 (2013), 64–78.
Tauber, Peter Gelden, 2012. An Exploration of the Relationships Among Connectedness to Nature, Quality of Life, and Mental Health. All Graduate Theses and Dissertations. Paper 1260. http://digitalcommons.usu.edu/etd/1260.
The World Bank, 2014. Low Income Countries. Retrieved online 01st January 2014. http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD. http://data.worldbank.org/income-level/LIC.
Thompson, S.C.G., Barton, M.A., 1994. Ecocentric and anthropocentric attitudes toward the environment. J. Environ. Psychol. 14, 149–157.
Tilman, D., 2000. Causes, consequences and ethics of biodiversity. Nature 405, 208–211.
Vaske, J.J., Kobrin, K.C., 2001. Place attachment and environmentally responsible behavior. J. Environ. Educ. 32 (4), 16–21.
Vining, J., Merrick Melinda, S., Price, Emily, 2008. The distinction between humans and nature: human perceptions of connectedness to nature and elements of the natural and unnatural natural resources and environmental sciences university of Illinois Urbana, IL. Hum. Ecol. Rev. 15 (1).
Whelan, R.J., Rodgerson, L., Dickman, C.R., Sutherland, E.F., 2002. Critical life cycles of plants and animals: developing a process based understanding of population changes in fire-prone landscapes. In: Bradstock, R.A., Williams, J.E., Gill, M.A. (Eds.), Flammable Australia: the Fire Regimes and Biodiversity of a Continent. Cambridge University Press, Cambridge, p. 462.
Wilson, E.O., 1984. Biophilia: the Human Bond with Other Species. Harvard University Press, Cambridge, MA.
Yandle, Bruce, Vijayaraghavan, Maya, Bhattarai, Madhusudan, 2002. The Environmental Kuznets Curve – a Primer. http://www.macalester.edu/~wests/econ231/yandleetal.pdf.
Young, T.P., 2000. Restoration ecology and conservation biology. Biol. Conserv. 92, 73–83.

Further readings

Dunlap, R.E., VanLiere, K.D., 1978. The new environmental paradigm: a proposed measuring instrument and preliminary results. J. Environ. Educ. 9, 10–19.
Hartig, T., Korpela, K., Evans, G.W., Gärling, T., 1997b. A measure of restorative quality in environments. Scand. Hous. Plan. Res. 14, 175–194.
Raymond, C., Brown, G., 2007. A spatial method for assessing resident and visitor attitudes toward tourism growth and development. Anticipated publication J. Sustain. Tour. 15 (4 or 5).

Please cite this article in press as: Restall, B., Conrad, E., A literature review of connectedness to nature and its potential for environmental management, Journal of Environmental Management (2015), http://dx.doi.org/10.1016/j.jenvman.2015.05.022

[967] Transport Malta (2016). Environmental Report. Development of a National Transport Model. Supporting Strategy Development in Malta Strategic Environmental Assessment on Malta's National Transport Strategy and Master Plan Environmental Report. Version 1.0. August 2016. Contractors. Ineco-Systematica Consortium. Subcontractor: Adi Associates Environmental Consultants Ltd.

Appendix 04 - Citations for 'A literature review of connectedness to nature and its potential for environmental management' according to SCOPUS as at 25/09/2017

Count	Title	Author	Year	Journal
1	An urban ecology critique on the "Smart City" model	Colding, J., Barthel, S.	2017	Journal of Cleaner Production
2	Transforming urban gardeners into land stewards	Mumaw, L.	2017	Journal of Environmental Psychology
3	Recreational cultural ecosystem services: How do people describe the value?	Stålhammar, S., Pedersen, E.		Ecosystem Services
4	Human–nature connection: a multidisciplinary review	Ives, C.D., Giusti, M., Fischer, J., (...), Kendal, D., von Wehrden, H.	2017	Current Opinion in Environmental Sustainability
5	Differential environmental psychological factors in determining low carbon behaviour among urban and suburban residents through responsible environmental behaviour model	Neo, S.M., Choong, W.W., Ahamad, R.B.		Sustainable Cities and Society
6	Generation, characterization and reuse of solid wastes from a biodiesel production plant	Oliveira, F.J.S., Santana, D.D.S., Costa, S.S.B., (...), Liduino, V.S., Servulo, E.F.C.	2017	Waste Management
7	Making wild law work-the role of 'connection with nature' and education in developing an ecocentric property law	Howe, H.R.	2017	Journal of Environmental Law
8	Doses of nearby nature simultaneously associated with multiple health benefits	Cox, D.T.C., Shanahan, D.F., Hudson, H.L., (...), Hancock, S., Gaston, K.J.	2017	International Journal of Environmental Research and Public Health
9	Leverage points for sustainability transformation	Abson, D.J., Fischer, J., Leventon, J., (...), Jager, N.W., Lang, D.J.	2017	Ambio
10	Proenvironmental behavior: Critical link between satisfaction and place attachment in Australia and Canada	Ramkissoon, H., Mavondo, F.T.		Tourism Analysis
11	Plant blindness and the implications for plant conservation	Balding, M., Williams, K.J.H.	2016	Conservation Biology
12	School grounds as a resource of green space to increase child-plant contact	Akoumianaki-Ioannidou, A., Paraskevopoulou, A.T., Tachou, V.	2016	Urban Forestry and Urban Greening
13	Prioritising ecosystem services in Chinese rural and urban communities	Pan, Y., Marshall, S., Maltby, L.	2016	Ecosystem Services
14	Ecodesign field of research throughout the world: mapping the territory by using an evolutionary lens	Luiz, J.V.R., Jugend, D., Jabbour, C.J.C., Luiz, O.R., de Souza, F.B.	2016	Scientometrics
15	Linking ecology with social development for tropical aquatic conservation	Irvine, K., Castello, L., Junqueira, A., Moulton, T.	2016	Aquatic Conservation: Marine and Freshwater Ecosystems
16	Urban bird feeding: Connecting people with nature	Cox, D.T.C., Gaston, K.J.	2016	PLoS ONE
17	(Re)thinking the intersection between sustainability and supply chain	Dickel, D.G., Cezar, N., Da Motta, M.K., De Moura, G.L.	2016	Espacios
18	Likeability of garden birds: Importance of species knowledge & richness in connecting people to nature	Cox, D.T.C., Gaston, K.J.	2015	PLoS ONEOpen Access

Appendix 05 - Letter of authenticity - Institute of Earth Systems

L-UNIVERSITÀ TA' MALTA
Msida - Malta
L-ISTITUT TAS-SISTEMI AMBJENTALI

UNIVERSITY OF MALTA
Msida - Malta
INSTITUTE OF EARTH SYSTEMS

To Whom it May Concern:

This letter provides a brief overview of a study being conducted by Brian Restall, a doctoral student of the Institute of Earth Systems of the University of Malta, under the guidance of the undersigned and Professor Louis F. Cassar. The study seeks to explore how connectedness to nature and place attachment can contribute to the management of protected areas of natural importance in Malta. Approximately 400 total participants from amongst the general public are being interviewed as part of this research project. These interview results are crucial to the success of the study.

Procedures

Informa Consultants, and its representatives, have been appointed to undertake door-to-door interviews in various localities across Malta. Participation in this research is entirely voluntary. You may refuse to participate or withdraw at any time without consequence. If you agree to participate in this research study, you will be asked to complete a survey about your views concerning nature, place, and protected areas. You may answer only the questions you feel comfortable answering and are free to withdraw your participation at any time. There is no penalty for withdrawing. You may be withdrawn from this study without your consent by the investigator if it appears that the study is causing you physical, mental, or emotional harm.

Confidentiality

This is an anonymous survey. Research records will be kept confidential, and in line with Maltese legislation, your responses will be deleted after 6 months. **Please do not put your name or any other identifying information on the survey**. The survey should take approximately 20 to 30 minutes to complete. When the survey is complete, please return it to the designated administrator.

Should you have any questions, please feel free to contact the undersigned, or Mr. Brian Restall directly on 2142 0852 or via email on brian.restall@pim.com.mt

I thank you for your time and cooperation on behalf of the Institute, and for your contribution to this research.

Regards,

Elisabeth Conrad, PhD

Institute of Earth Systems
University of Malta
Msida MSD 2080
MALTA

Tel: +356 2340 2873
Email: elisabeth.conrad@um.edu.mt
Website: www.um.edu.mt/ies

Appendix 06 - Letter of informed consent for respondents

Attitudes Toward Nature, Place and Protected Areas

Introduction/ Purpose

Brian Restall, under the guidance of Dr. Elisabeth Conrad and Dr. Saviour Formosa at the Institute of Earth Systems at the University of Malta, is conducting a research study to find out more about how connectedness to nature and place attachment can contribute to protected area management. There will be approximately 1000 total participants in this research.

Procedures

If you agree to participate in this research study, you will be asked to complete the attached survey about your attitudes toward nature, place attachment and participatory protected area management.
You may answer only the questions you feel comfortable answering, and you may stop at any time. There is no penalty for withdrawing.
Please do not put your name or any other identifying information on the survey. The survey should take approximately 20 to 30 minutes to complete. When the survey is complete, please return it to the designated administrator.

Risks

The risks involved in your participation in this research are no greater than what you may experience in everyday life. There may be some discomfort answering some of the survey questions since these surveys ask questions about some demographic characteristics such as age, education, and also questions about your general psychological attitudes related to connectedness to nature and place attachment. If you feel uncomfortable with these questions at any time you may withdraw participation.

Benefits

As a participant, you may derive an immediate benefit from an increased level of self-awareness regarding your own attitudes and well-being. Or, there may be no immediate direct benefit to you. The researcher will benefit from an increased awareness of the relationship between peoples' attitudes and protected areas.
Additionally, this research will serve to contribute towards the researcher's professional goals and may be used directly or indirectly to improve Malta's natural areas.

Explanation & offer to answer questions

This letter of information serves as a brief explanation of this study. However, if you have any questions or research-related problems, you may reach Brian Restall on 2142 0852 or via email on brian.restall@pim.com.mt

Voluntary nature of participation and right to withdraw without consequence

Participation in research is entirely voluntary. You may refuse to participate or withdraw at any time without consequence or loss of benefits. You may be withdrawn from this study without your consent by the investigator if it appears that the study is causing you physical, mental, or emotional harm.

Confidentiality

This is an anonymous survey. Research records will be kept confidential, and in line with Maltese

University Research Ethics Committee (UREC) Approval

The University Research Ethics Committee at the University of Malta has approved this research study. If you have any questions or concerns about your rights or a complaint, and would like to contact someone other than the research team, you may contact UREC at:

University Research Ethics Committee
Room 217
Administation Building
University of Malta
Msida MSD 2080

Tel/Fax: +356 2340 2810
http://home.um.edu.mt/urec/

Copy of Letter of Information

If you would like a copy of this Letter of Information for your records, you may keep this copy.

Investigator Statement

"Through this letter, the research study has been explained to the individual, including the nature and purpose and the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered."

Signature of Researcher(s)

Appendix 07 - Final Questionnaire in English

SURVEY ON THE ROLE OF CONNECTEDNESS TO NATURE & PLACE

Good morning / afternoon / evening, my name is [NAME], from Informa Consultants. We are currently conducting a survey to assess how connected people tend to feel to the natural habitat and place of residence. Would you mind if I take a few minutes of your time to ask you a few questions.

This questionnaire asks you to indicate your feelings about your area of residence and natural areas, and to report a variety of local behaviours that you engage in. Although some of the items may seem similar, please think about and answer each question separately, and as accurately as possible.

Interviewer Code:

Name of Street:

Locality:

- B' Kara [14] ☐
- M' Xlokk [36] ☐
- Mellieha [37] ☐
- Naxxar [44] ☐
- Rabat (Malta) [50] ☐
- Siġġiewi [9] ☐
- Sliema [59] ☐
- Valletta [1] ☐
- Nadur [43] ☐
- Rabat (Gozo) [11] ☐
- St Lawrenz [54] ☐
- Sannat [56] ☐
- Xaghra [63] ☐

Q1 **Is the household's accommodation a:** [ASK OR CODE IF OBVIOUS]

- Terraced house/ Townhouse ☐
- Semi-detached house ☐
- Fully-detached house ☐
- Maisonette/ Ground floor tenement ☐
- Flat / Apartment / Penthouse ☐
- Semi / Fully-detached farmhouse ☐
- Other ☐
- Don't know ☐
- Refused ☐

Q2 **Do you own a garden or field?** [SINGLE CODE ONLY]

- Yes - own garden or field ☐
- Yes - garden shared with others ☐
- No ☐
- Don't know ☐
- Refused ☐

Q3 **How long have you lived in this area?**

- Don't know ☐
- Refused ☐
- *Specify No. of years:* ☐

Q4 **What is the place that you now consider to be your home, irrespective of where you are actually living now?**

- Here ☐
- Elsewhere ☐

If elsewhere please say where:

Q5 **How often, if at all, do you visit public gardens, parks, natural areas, country side or other public spaces (eg public squares, beaches etc) and spend some time there?** [Specify for both summer & winter]

	Summer	Winter
Not at all	☐	☐
Rarely	☐	☐
Everyday	☐	☐
Several times a week	☐	☐
Once a week	☐	☐
Once a month	☐	☐
Several times a month	☐	☐
Don't know	☐	☐
Refused	☐	☐

[IF YES - Summer] *Specify place they visit most in Summer. Be as specific as possible.*

[IF YES - Winter] *Specify place they visit most in Winter. Be as specific as possible.*

Q6 **What are the three most important reasons why you visit natural areas or the countryside?** [MAX 3 CODES ONLY - PROMPT ONLY IF NECESSARY]

- I don't visit ☐
- Enjoy nature (Observe nature, photography, bird watching, studying plants) ☐
- Culture ☐
- Health and physical activity (walking, jogging, hiking) ☐
- Rest and relaxation (walking a dog, picnicking, enjoy the scenery) ☐
- To learn more about the area ☐
- Being together with family/similar people ☐
- Nostalgia/pleasant old memories ☐
- To get away from crowded environments for a while and get some fresh air ☐
- To meet new and varied people ☐
- Hunting/fishing ☐
- Other ☐
- Don't know ☐

Specify Other:

Q7 **And how important, if at all, is it for you to have public gardens, parks, countryside or other public spaces nearby?** [SINGLE CODE ONLY]

- Very important ☐
- Fairly important ☐
- Not very important ☐
- Not at all important ☐
- Don't know ☐
- Refused ☐

Q8 **Are you aware of any Natura 2000 sites in your vicinity?**

- I don't know what Natura 2000 is ☐
- Yes ☐
- No ☐
- I know what Natura 2000 is but I don't know if there are any in the vicinity ☐

PLACE ATTACHEMENT

This section asks you to indicate your feelings specifically about your AREA OF RESIDENCE.

Q9 **Are there ANY places or features about WHERE YOU LIVE that you think are either distinctive or special?**

- No there aren't ☐ Go to Q11
- Yes there are ☐
- Don't know ☐ Go to Q11
- Refused ☐ Go to Q11

Q10 **Can you mention up to three such places?** [IMP. TO PIN DOWN A SPECIFIC PLACE - Can be any physical space - church, village squara, nicca, public square or garden, beach, promenade, etc]

1.
2
3

Q11 For each of the following, please rate the extent to which you agree with each statement, using the scale from 1 to 5, where '1' means you 'Disagree strongly' and '5' means you 'Agree strongly'. **[INDICATE RESPONDENTS' ANSWER BELOW BY SELECTING THE NUMBER THAT BEST REPRESENTS HOW THEY FEEL ABOUT THE AREA WHERE THEY LIVE]**

	Disagree strongly	Disagree	Don't know / Undecided	Agree	Agree strongly
This area is very special to me	☐	☐	☐	☐	☐
I am proud of the natural environment in and around my village	☐	☐	☐	☐	☐
I am very attached to the natural spaces in and around my area	☐	☐	☐	☐	☐
This area reflects the type of person I am	☐	☐	☐	☐	☐
If I had to move away from here I would really miss it	☐	☐	☐	☐	☐
No other place can compare to here for me	☐	☐	☐	☐	☐
As far as I'm concerned there are better places to spend time than in my village	☐	☐	☐	☐	☐
This is the best place for the activities I like to do	☐	☐	☐	☐	☐
I feel a connection to the community in this area	☐	☐	☐	☐	☐
I have an extensive network of family or friends here	☐	☐	☐	☐	☐
I would feel less attached to this area if the natural areas here disappeared	☐	☐	☐	☐	☐

Q12 **Assume that friends are visiting from abroad, and they are hoping that you will show them what it is about Malta and Gozo that you love and are proud of. Please name where you would take them.** [LIST A MAXIMUM OF FIVE SPOTS ONLY BUT IMP. TO PIN DOWN A SPECIFIC PLACE]

Don't know..... ☐ Go to Q13

Refused..... ☐ Go to Q13

1. ☐
2. ☐
3. ☐
4. ☐
5. ☐

NATURE RELATEDNESS SCALE

Q13 **Can you name a few places where you feel a strong connection with nature?**
[IMP. TO PIN DOWN NAME OF PLACE (not necessarily in the same area) eg. GOZO IS NOT A GOOD ANSWER BUT MARSALFORN BAY IS]

Don't know..... ☐ Go to Q14
Refused..... ☐ Go to Q14

1 ☐
2 ☐
3 ☐

Q14 For each of the following, please rate the extent to which you agree with each statement, using the scale from 1 to 5, where '1' means you 'Disagree strongly' and '5' means you 'Agree strongly'. **[PLEASE MAKE SURE THEY RESPOND ON HOW THEY REALLY FEEL, RATHER THAN HOW THEY THINK "MOST PEOPLE" FEEL]**

	Disagree strongly	Disagree	Don't know / Undecided	Agree	Agree strongly
I enjoy being outdoors, even in bad weather	☐	☐	☐	☐	☐
Some species are just meant to die out or become extinct	☐	☐	☐	☐	☐
Humans have the right to use natural resources anyway we want	☐	☐	☐	☐	☐
My ideal vacation spot would be a remote, natural area	☐	☐	☐	☐	☐
I do think about how my actions affect the environment	☐	☐	☐	☐	☐
I enjoy digging in soil and getting my hands dirty	☐	☐	☐	☐	☐
I feel a spiritual connection when in nature	☐	☐	☐	☐	☐
I am very aware of environmental issues	☐	☐	☐	☐	☐
I take notice of plants and animals wherever I am	☐	☐	☐	☐	☐
I don't often go out in nature	☐	☐	☐	☐	☐
Nothing I do will change problems in other places on the planet	☐	☐	☐	☐	☐
I am not separate from nature, but a part of it	☐	☐	☐	☐	☐
The thought of being deep in the woods away from civilisation is frightening	☐	☐	☐	☐	☐
My feelings about nature do not affect how I live my life	☐	☐	☐	☐	☐
Animals and plants should have fewer rights than humans	☐	☐	☐	☐	☐
Even in the middle of the city, I notice nature around me (eg birds, flowers, plants, lizards etc)	☐	☐	☐	☐	☐
My relationship to nature is an important part of who I am	☐	☐	☐	☐	☐
Conservation is not necessary because nature is strong enough to recover from any human impact	☐	☐	☐	☐	☐
The health of plants and animals has an impact on the future of humans	☐	☐	☐	☐	☐
I think about the suffering of animals	☐	☐	☐	☐	☐
I feel very connected to all living things and the earth	☐	☐	☐	☐	☐

ECOLOGICAL BEHAVIOUR SCALE

Q15 Can you tell me whether or not you have ever done any of the following:

	Yes	No
Contributed time or money to an environmental or wildlife conservation group?	☐	☐
Stopped buying a product because it caused environmental problems?	☐	☐
Attended a public hearing or meeting about the environment?	☐	☐
Contacted a government agency to get information or complain about an environmental problem?	☐	☐
Voted for or against a political candidate, in part, because of his or her position on the environment?	☐	☐
Changed your behaviour in any way because of concern for the environment?	☐	☐

CONSULTATION

Q16 Can you give me three reasons why you think natural areas are protected? [THREE CODES ONLY - PROMPT ONLY IF NECESSARY]

- For human use and enjoyment ☐
- To protect endangered animals and plants ☐
- To stop the destruction of valuable areas - land and sea ☐
- Promote nature-friendly land-use ☐
- To stimulate eco-tourism and recreational opportunities ☐
- To provide clean air and water ☐
- Other ☐
- None of these ☐
- Don't Know / Not applicable ☐

Specify Other:

Q17 Have you noticed any decline in countryside or nature over the years?

- Yes ☐ Go to Q18
- No ☐ Go to Q19

Q18 Do you think a decline will have an impact on you personally?

- Yes, I am already affected by the loss of countryside ☐
- Yes, it will have an effect on me, but not now, later on ☐
- No, not on me personally but on my children ☐
- No, it will not have an effect ☐
- Don't Know / Not applicable ☐

Q19 Please tell me what you think are the three biggest threats to natural areas in Malta? [THREE CODES ONLY - PROMPT ONLY IF NECESSARY]

- Intensive farming ☐
- Pollution of air/water (sea, rivers, lakes, etc) ☐
- Man-made disasters (e.g. oil spills, industrial accidents, etc.) ☐
- Plants and animals introduced into our ecosystems (that are not normally found in a region or country) ☐
- Hunting and over-fishing ☐
- Tourism ☐
- Development and land use change (e.g. roads, housing, industry, conversion of natural areas to farmland) ☐
- Climate change ☐
- Other ☐
- Don't Know / Not applicable ☐

Specify other:

Q20 **Sometimes economic development results in damage or destruction of natural areas. Which of the following statements comes closest to your opinion?**
[READ OUT - SINGLE RESPONSE]

- This is acceptable because economic development is more important ☐
- This should be prohibited because natural areas are more important ☐
- This is only acceptable for developments of major public interest and if damage is fully compensated for ☐
- Don't Know / Not applicable ☐

Q21 **Do you feel that you are sufficiently informed and involved by authorities in managing protected areas in or around your locality?**

- Yes ☐
- No ☐
- Don't know ☐

Any comments:

Q22 **Would you like to be involved in decisions on protected natural areas in your vicinity?**

- Yes ☐ Go to Q23
- No ☐ Go to Q24
- Don't know ☐ Go to Q24

Q23 **To what extent do you agree with the following measures to safeguard and protect natural areas further?** [MARK ALL - INDICATE RESPONDENTS' ANSWER BELOW BY SELECTING THE NUMBER THAT BEST REPRESENTS HOW THEY FEEL]

	Disagree strongly	Disagree	Don't know /Undecided	Agree	Agree strongly
Prohibit damaging recreational activities in sensitive areas	☐	☐	☐	☐	☐
Restore damaged areas by not-intervening on the site so that it recuperates alone	☐	☐	☐	☐	☐
Restore damaged areas by intervening on the site	☐	☐	☐	☐	☐
Reintroduce original Maltese species or plants typical of the area, and eradicate invasive ones	☐	☐	☐	☐	☐
Provide educational and interpretation services for visitors	☐	☐	☐	☐	☐
Provide a ranger/warden service for strict protection zones	☐	☐	☐	☐	☐
Expropriate land in particularly sensitive areas, and compensate owners	☐	☐	☐	☐	☐
Stop renewing expired public land leases in particularly sensitive areas	☐	☐	☐	☐	☐
Expand the protected areas where and when possible	☐	☐	☐	☐	☐
Create paths and put up signs with basic information about the area	☐	☐	☐	☐	☐
Ensure controlled access and vehicular access bans in sensitive areas	☐	☐	☐	☐	☐
Creation of hunting ban areas and quiet zones	☐	☐	☐	☐	☐

DEMOGRAPHIC DETAILS

Q24 Gender:

- Male ☐
- Female ☐

Q25 Age:

20-24	☐	65-69	☐
25-29	☐	70-74	☐
30-34	☐	75-79	☐
35-39	☐	80-84	☐
40-44	☐	85-89	☐
45-49	☐	90-94	☐
50-54	☐	95-99	☐
55-59	☐	Refused	☐
60-64	☐	DK	☐

Q26 What is the highest level of education that you attained?

- No schooling ☐
- Primary ☐
- Lower Secondary ☐
- Upper Secondary ☐
- Post secondary / Non-Tertiary (e.g. MCAST, nursing) ☐
- Tertiary ☐
- Don't know ☐
- Refusal ☐

Q27 What is your current occupational status?

- Self employed ☐
- Employed full time ☐
- Employed part time ☐
- Looking after the home or family ☐
- Permanently retired from work ☐
- Unemployed and seeking work ☐
- At school ☐
- In further/higher education ☐
- Government work or training scheme ☐
- Permanently sick or disabled ☐
- Unable to work due to short-term illness or injury ☐
- Other ☐
- Don't know ☐
- Refused ☐

Specify other:

Q28 If respondent would like to receive a brief about the results of this study, please provide an email address:

Q29 Telephone No:

Appendix 08 - Final questionnaire in Maltese

SURVEY ON THE ROLE OF CONNECTEDNESS TO NATURE & PLACE

Bonġu/wara nofs-in-nhar it-tajjeb/il-lejl it-tajjeb, jiena [NAME] mill-Informa Consultants. Qegħdin nagħmlu stħarrig biex naraw kemm in-nies iħossu konnessjoni mal-ambjent naturali u il-post fejn joqogħodu. Nista nieħu ftit mill-ħin tiegħek biex nsaqsik xi mistoqsijiet.

Dan il-kwestjonarju isaqsi fuq kif tħossok dwar il-lokalita` fejn toqogħod u postijiet oħrajn fin-natura; u biex naraw x' tip ta' attivitajiet tagħmel. Għalkemm xi affarijiet jidħru simili, jekk jogħoġbok ħu l-ħin li hemm bżonn biex twieġeb għal mistoqsijiet bl-aħjar mod li tista.

Interviewer Code:

Name of Street:

Locality:

- B' Kara [14] ☐
- M' Xlokk [36] ☐
- Mellieha [37] ☐
- Naxxar [44] ☐
- Rabat (Malta) [50] ☐
- Siġġiewi [9] ☐
- Sliema [59] ☐
- Valletta [1] ☐
- Nadur [43] ☐
- Rabat (Gozo) [11] ☐
- St Lawrenz [54] ☐
- Sannat [56] ☐
- Xaghra [63] ☐

Q1 Din id-dar hija:

- Terraced house/ Townhouse ☐
- Semi-detached house ☐
- Fully-detached house ☐
- Maisonette/ Ground floor tenement ☐
- Flat / Apartment / Penthouse ☐
- Semi / Fully-detached farmhouse ☐
- Other ☐
- Don't know ☐
- Refused ☐

Q2 Għandek ġnien jew għalqa?
[SINGLE CODE ONLY]

- Iva - ġnien jew għalqa ☐
- Iva - ġnien maqsum ma ħaddiehor ☐
- Le ☐
- Ma nafx ☐
- Rifjuta ☐

Q3 Kemm ilek tgħix f' din il-lokalita`?

- Ma nafx ☐
- Rifjuta ☐
- *Speċifika numru ta' snin* ☐

Q4 Liema huwa l-post li tikkunsidra d-dar, irrispettivament ta' fejn qed toqogħod bħalissa?

- Hawnhekk ☐
- X' imkien ieħor ☐

Jekk x' imkien ieħor, għid fejn:

Q5 Kemm il-darba iżżur xi ġnien pubbliku, park, postijiet fin-natura, il-kampanja, jew xi postijiet pubbliċi oħra (ez pjazza, bajja eċċ) u tqatta xi ħin hemmhekk?
[Specify for both summer and winter]

	Sajf	Xitwa
Qatt	☐	☐
Rari	☐	☐
Kuljum	☐	☐
Diversi drabi fil-ġimgħa	☐	☐
Darba fil-ġimgħa	☐	☐
Darba f' xahar	☐	☐
Diversi drabi fix-xahar	☐	☐
Ma nafx	☐	☐
Rifjuta	☐	☐

[IF YES - Summer] *Speċifika il-post fejn tmur l-aktar fis-Sajf. Be as specific as possible.*

[IF YES - Winter] *Speċifika il-post fejn tmur l-aktar fix-Xitwa. Be as specific as possible.*

Q6 **Liema huma t-tlett raġunijiet ewlenin għalfejn iżżur xi postijiet fin-natura jew fil-kampanja?**
[MAX 3 CODES ONLY - PROMPT ONLY IF NECESSARY]

- Qatt ma nżur dawn il-postijiet ☐
- Tapprezza n-natura (Observe nature, photography, bird watching, studying plants) ☐
- Kultura ☐
- Saħħa u attivitajiet fiżici (walking, jogging, hiking) ☐
- Biex tistrieħ u tirrilassa (walking a dog, picnicking, enjoy the scenery) ☐
- Biex issir taf iżjed dwar il-post ☐
- Biex tgħaddi il-ħin flimkien mal-familja / nies oħra simili ☐
- Nostalġija / memorji sbieħ ☐
- Biex taqta ftit min postijiet iffullati u tgawdi ftit arja friska ☐
- Biex tiltaqa ma' nies ġodda u differenti ☐
- Kaċċa / Sajd ☐
- Oħrajn ☐
- Ma nafx ☐

Speċifika oħrajn:

Q7 **U kemm hu importanti għalik li jkollok ġonna pubbliċi, parks, il-kampanja, jew postijiet pubbliċi oħra fil-viċinanzi tiegħek?** [SINGLE CODE ONLY]

- Importanti ħafna ☐
- Importanti ☐
- Ma tantx hu importanti ☐
- Mhu importanti xejn ☐
- Ma nafx ☐
- Rifjuta ☐

Q8 **Taf b' xi siti ta' Natura 2000 fil-viċinanzi tiegħek?**

- Qatt ma smajt b' Natura 2000 ☐
- Iva ☐
- Le ☐
- Naf x'inhu Natura 2000, iżda ma nafx jekk hemmx xi siti fil-viċnanzi ☐

PLACE ATTACHEMENT

F' din is-sezzjoni nsaqsu dwar kif tħossok speċifikament fuq il-LOKALITA FEJN TOQOGĦOD.

Q9 **Hemm xi postijiet jew karatteristiċi fil-lokalita fejn toqogħod, li taħseb huma distintivi jew speċjali**

- Le mhemmx ☐ Go to Q11
- Iva hemm ☐ Go to Q10
- Ma nafx ☐ Go to Q11
- Rifjuta ☐ Go to Q11

Q10 **Tista ssemmi sa tlieta minn dawn il-postijiet distintivi jew speċjali?**
[IMP. TO PIN DOWN A SPECIFIC PLACE - Can be any physical space - church, village squara, nicca, public square or garden, beach, promenade, etc]

1.
2.
3.

Q11 **Minn dawn li ser naqralek, skond kemm taqbel jew ma taqbilx, tista tagħti numru bejn '1' u '5', fejn '1' jindika li 'Ma taqbel xejn' u '5' ifisser li 'Taqbel ħafna'.**
[INDICATE RESPONDENTS' ANSWER BELOW BY SELECTING THE NUMBER THAT BEST REPRESENTS HOW THEY FEEL ABOUT THE AREA WHERE THEY LIVE]

	Ma taqbel xejn	Ma taqbilx	Ma nafx / Mhux deciz	Taqbel	Taqbel ħafna
Din il-lokalita hija speċjali ħafna għalija	☐	☐	☐	☐	☐
Jiena kburi tal-ambjent naturali li hemm fil u madwar il -lokalita tiegħi	☐	☐	☐	☐	☐
Nħoss li għandi rabta qawwija mal-postijiet naturali fil u madwar il-lokalita tiegħi	☐	☐	☐	☐	☐
Din il-lokalita tirrifletti it-tip ta' persuna li jien	☐	☐	☐	☐	☐
Li kieku kelli niċċaqlaq minn hawn, nimmisjah ħafna	☐	☐	☐	☐	☐
Għalija mhemmx post ieħor li jikkompara m' hawn	☐	☐	☐	☐	☐
Hawn postijiet aħjar fejn wieħed jista jqatta l-ħin, milli fil-villaġġ tiegħi	☐	☐	☐	☐	☐
Dan huwa l-aħjar post għall-attivitajiet li nħobb nagħmel	☐	☐	☐	☐	☐
Nħoss konnessjoni mal-kommunita f' dan il-post	☐	☐	☐	☐	☐
Għandi ħafna tal-familja u ħbieb li joqogħodu hawn	☐	☐	☐	☐	☐
Nħoss anqas rabta mal-post li kieku il-postijiet naturali li hawn jisparrixxu	☐	☐	☐	☐	☐

Q12 **Assumi li ġejjin xi ħbieb minn barra, u qed jistennew li turihomdawk il-postijiet li inti tant tħobb u kburi bihom f' Malta u Għawdex. Tista tgħidli f'liema postijiet toħodhom?** [LIST A MAXIMUM OF FIVE SPOTS ONLY BUT IMP. TO PIN DOWN A SPECIFIC PLACE]

Ma nafx..... ☐ Go to Q13

Rifjuta ..... ☐ Go to Q13

1. ☐
2. ☐
3. ☐
4. ☐
5. ☐

NATURE RELATEDNESS SCALE

Q13 **Tista ssemmili xi postijiet fejn tħoss rabta qawwija man-natura?** [IMP. TO PIN DOWN NAME OF PLACE (not necessarily in the same area) eg. GOZO IS NOT A GOOD ANSWER BUT MARSALFORN BAY IS]

Ma nafx..... ☐ Go to Q14

Rifjuta ..... ☐ Go to Q14

1 ☐

2 ☐

3 ☐

Q14 **Minn dawn li ser naqralek, skond kemm taqbel jew ma taqbilx, tista tagħti numru bejn '1' u '5', fejn '1' jindika li 'Ma taqbel xejn' u '5' ifisser li 'Taqbel ħafna'.**
[PLEASE MAKE SURE THEY RESPOND ON HOW THEY REALLY FEEL, RATHER THAN HOW THEY THINK "MOST PEOPLE" FEEL]

	Ma taqbel xejn	Ma taqbilx	Ma nafx / Mhux deciz	Taqbel	Taqbel ħafna
Nieħu gost inkun barra, anke jekk it-temp ikun ħazin	☐	☐	☐	☐	☐
Huwa normali li ċertu speċi jmutu jew isiru estinti	☐	☐	☐	☐	☐
Il-bniedem għandu d-dritt li juża r-riżorsi naturali kif irrid hu	☐	☐	☐	☐	☐
Il-post ideali tiegħi għal-vaganza huwa f'post remot u fin-natura	☐	☐	☐	☐	☐
Naħseb dwar kif l-azzjonijiet tiegħi jaffetwaw l-ambjent	☐	☐	☐	☐	☐
Nieħu gost nħaffer fil-ħamrija u nħammeg idejja	☐	☐	☐	☐	☐
Nħoss konnesjoni spiritwali meta nkun fin-natura	☐	☐	☐	☐	☐
Jiena konxju ħafna ta' kwistjonijiet li għandhom x' jaqsmu mal-ambjent	☐	☐	☐	☐	☐
Jiena nosserva l-pjanti u annimali nkun fejn nkun	☐	☐	☐	☐	☐
Ma nzurx postijiet fin-natura ta' spiss	☐	☐	☐	☐	☐
Xejn minn dak li nagħmel ma jista jbiddel l-problemi li hemm f'partijiet oħra tal-pjaneta	☐	☐	☐	☐	☐
Jiena miniex separat minn natura, iżda parti minnha	☐	☐	☐	☐	☐
Il-ħsieb li nkun fil-qalba ta' foresta il-bogħod miċ-ċivilta huwa tal-biża	☐	☐	☐	☐	☐
Il-mod kif inħossni dwar in-natura ma jaffetwax il-mod kif ngħix	☐	☐	☐	☐	☐
L-annimali u l-pjanti għandhom ikollhom inqas drittijiet mill-bniedem	☐	☐	☐	☐	☐
Anke f'nofs belt ninduna bin-natura madwari (ez għasafar, fjuri, pjanti, gremxul eċċ)	☐	☐	☐	☐	☐
Ir-relazzjoni tiegħi man-natura hija parti importanti ta' min jien	☐	☐	☐	☐	☐
Il-konservazzjoni mhiex importanti għax in-natura hija b' saħħitha biżżejjed biex tirkupra minn kwalunkwe impatt uman	☐	☐	☐	☐	☐
Is-saħħa tal-pjanti u tal-annimali għandu impatt fuq il-futur tal-bniedem	☐	☐	☐	☐	☐
Jiena naħseb dwar it-tbatija tal-annimali	☐	☐	☐	☐	☐
Nħossni konness hafna ma kull ħaġa li tgħix, u mad-dinja	☐	☐	☐	☐	☐

ECOLOGICAL BEHAVIOUR SCALE

Q15 Tista tgħidli jekk qatt għamilt xi wieħed minn dawn:

	Iva	Le
Tajt mill-ħin tiegħek jew tajt xi flus lil xi grupp tal-konservazjoni tal-ambjent jew annimali	☐	☐
Waqaft tixtri prodott għax ikkawża problemi fl-ambjent	☐	☐
Attendejt 'public hearing' / laqgħa għal-pubbliku dwar l-ambjent	☐	☐
Ikkuntajajt xi aġenzija tal-gvern biex tikseb xi informazzjoni jew tagħmel ilment dwar problema fl-ambjent	☐	☐
Ivvutajt għal jew kontra kandidat politiku, in parti, minħabba l-posizzjoni tiegħu/tagħha fuq l-ambjent	☐	☐
Biddilt l-imġieba tiegħek b' xi mod, għaliex kont ikkonċernat dwar l-ambjent	☐	☐

KONSULTAZZJONI

Q16 Tista ittini tlett raġunijiet għalfejn taħseb li żoni naturali huma protetti? [THREE CODES ONLY - PROMPT ONLY IF NECESSARY]

- Ghall-użu u t-tgawdija tal-bniedem ☐
- Biex tipproteġi annimali u pjanti li huma fil-periklu ☐
- Biex iwaqqfu l-qerda ta' postijiet prezzjuzi, kemm l-art u l-bahar ☐
- Biex jippromwovu l-uzu ta' postijiet fin-natura ☐
- Biex jistimulaw l-eku-turizmu u opportunitajiet ta' rikreazzjoni ☐
- Biex jipprovdu ilma u arja nadifa ☐
- Oħrajn ☐
- L-ebda minn dawn ☐
- Ma nafx / Mhux applikabli ☐

Speċifika l-oħrajn:

Q17 Osservajt xi nuqqas ta' kampanja u natura matul is-snin?

- Iva ☐ Go to Q18
- Le ☐ Go to Q19

Q18 Tahseb li nuqqas fil-kampanja u natura jista jkollu impatt fuqek personalment?

- Iva, diġa jien affetwat bin-nuqqas ta' kampanja ☐
- Iva, ħa jkollu impatt fuqi iżda mhux issa, aktar tard ☐
- Le, mhux fuqi personalment imma fuq it-tfal tiegħi ☐
- Le, ma jkollu ebda effett ☐
- Ma nafx / Mhux applikabli ☐

Q19 Tista tgħidli liema taħseb li huma l-akbar tlett affarijiet li huma theddida ghal-żoni naturali f' Malta? [THREE CODES ONLY - PROMPT ONLY IF NECESSARY]

- Agrikoltura/Biedja intensiva ☐
- Tniġġis tal-arja/ilma (sea, rivers, lakes, etc) ☐
- Diżastri li jirrizultaw mil-bniedem (ez. oil spills, inċidenti industrijali eċċ) ☐
- Pjanti jew annimali li jiġu introdotii fl-eko-sistema tagħna (li normalment ma jinstabux f' reġjun jew pajjiz) ☐
- Il-kaċċa u s-sajd eċċessiv ☐
- It-turiżmu ☐
- L-iżvilupp u biddliet fl-użu tal-artijiet (eż toroq, housing, industrija, konverżjoni ta' żoni naturali għal art agrikola) ☐
- Tibdil fil-klima ☐
- Oħrajn ☐
- Ma nafx / Mhux applikabli ☐

Specifika l-ohrajn:

Q20 **Xi kultant, l-iżvilupp ekonomiku jirriżulta fi ħsara jew qerda ta' żoni naturali. Liema minn dawn id-dikjarazzjonijiet jirrifletti l-aktar l-opinjoni tiegħek?**
[READ OUT - SINGLE RESPONSE]

- Dan huwa aċċettabli għax l-iżvilupp ekonomiku huwa aktar importanti ☐
- Dan għandu jiġi pprojbit għax iz-żoni naturali huma aktar importanti ☐
- Dan huwa aċċettabli biss għal-żviluppi kbar li huma fl-interess tal-pubbliku u fejn il-ħsara tiġi kkompensata b'mod sħih ☐
- Ma nafx / Mhux applikabli ☐

Q21 **Tħoss li inti infurmat/a biżżejjed u involut/a mill-awtoritajiet fl-immaniġġjar ta' żoni protetti fil / jew madwar il-lokalita tiegħek?**

- Iva ☐
- Le ☐
- Ma nafx ☐

Kummenti:

Q22 **Tixtieq tkun involuta f' deċiżjonijiet fuq żoni protetti naturali madwar il-lokalita tiegħek?**

- Iva ☐ Go to Q23
- Le ☐ Go to Q24
- Ma nafx ☐ Go to Q24

Q23 **Sa liema punt taqbel b' dawn il-miżuri sabiex aktar nissalvagwardjaw iż-żoni protetti naturali tagħna?** [MARK ALL - INDICATE RESPONDENTS' ANSWER BELOW BY SELECTING THE NUMBER THAT BEST REPRESENTS HOW THEY FEEL]

	Ma taqbel xejn	Ma taqbilx	Ma nafx / Mhux deciz	Taqbel	Taqbel hafna
Jiġu pprojbiti attivitajiet ta' rikreazzjoni li jagħmlu l-ħsara f' żoni sensittivi	☐	☐	☐	☐	☐
Jiġu rrestawrati żoni fejn hemm xi ħsara mingħajr intervent fuq il-post, biex jirkupraw waħedhom	☐	☐	☐	☐	☐
Jiġu rrestawrati zoni fejn hemm xi ħsara permezz ta' intervent fuq il-post	☐	☐	☐	☐	☐
Jerġgħu jiġu introdotti speċi oriġinali Maltin u jinqerdu dawk invażivi (ez sagħtar, widnet il-baħar)	☐	☐	☐	☐	☐
Jiġu pprovduti servizzi edukattivi u ta' interpretazzjoni għal-viżitaturi	☐	☐	☐	☐	☐
Jiġu pprovduti servizzi ta' rangers/wardens għal-żoni li jeħtiegu l-ogħla protezzjoni	☐	☐	☐	☐	☐
Tittieħed l-art mill-gvern, partikolarment f' żoni sensittivi, u jiġu ikkumpensati is-sidien	☐	☐	☐	☐	☐
Ma jibqgħux jiġu mġedda kirjiet skaduti ta' art pubblika, f' ċertu żoni sensittivi	☐	☐	☐	☐	☐
Jespandu ż-żoni protetti kull fejn u meta possibli	☐	☐	☐	☐	☐
Jinħolqu mogħdijiet u sinjali b' informazzjoni dwar il-post	☐	☐	☐	☐	☐
Jizguraw aċċess ikkontrollat u projbizzjoni ta' vetturi f' żoni sensittivi	☐	☐	☐	☐	☐
Jinħolqu żoni għal kwiet u fejn il-kaċċa hija projbit	☐	☐	☐	☐	☐

Appendix 09 - Statistical result summaries for CNT, PA and EB

CNT statistical summary results

The main summary findings for '**Section 7.2 - Statistical and spatial analysis of Connectedness to Nature'** include the following:

- The composite mean score for CNT intensity specified by the participants was 2.572 (*SD = .44, n = 401*). The mean of 2.572 is slightly above the mid-point scale of the scale range, which indicates average and modest CNT across the population sample overall (median=2.5).

- As predicted, localities with to NATURA 2000 sites in their vicinity had higher connectedness means overall e.g., Mellieha (2.84), Rabat (Malta) (2.75), M' Xlokk (2.71) as against sites like Naxxar (2.48), and Rabat-Gozo (2.57). Conversely, control sites like Valletta (M= 2.51, SD=0.55), B'Kara (M=2.34, SD = 0.27) and surprisingly Nadur (M=2.20, SD=0.38) show a significantly reduced CNT in comparison.

- NR-Self rankings suggest that Rabat (M=2.94), Mellieha (M=2.90) and Sliema (M=2.88) ranked higher on this sub-scale and remains in line with the assumption that localities in close proximity to NATURA 2000 sites tend to identify strongly with nature. Sliema is an exception under this sub-scale since it is a coastal site without NATURA 2000 in its confines, but this can possibly be explained by the constant onslaught on the locality by speculative construction and escalating conflict with residents. The NR-Perspective factor indicates that M' Xlokk (M=2.94), Mellieha (2.88) and Rabat (Malta, M= 2.77) rank higher as expected, while Sannat (M=2.47), B' Kara (M= 2.46) and Nadur (M=2.29). The NR-Experience factor results for this scale Mellieha (M=2.72), Siggiewi (M=2.55) and Rabat (Malta, M=2.47) rank higher, while Naxxar (M=2.15), B' Kara (2.08) and Nadur (M=2.01). The latter anomaly may suggest that Gozitans are somewhat more sheltered from anthropogenic loss or threat of loss to their personal or psychosocial environmental resources, which is at a different scale than that of the mainland.

- Respondents indicated higher levels of agreement overall with NR Self affect items such as "*The health of plants and animals has an impact on the future of humans*" (M=3.12, SD=0.574) and NR Perspective items like "*I think a lot about the suffering of animals*" (M=3.07, SD=.541). The exception lies with the lowest scoring item which is indeed a NR Self item: "*My feelings about nature do not affect how I live my life*" (*M* = 1.98, *SD* = 0.998). However, this item was characterised by a low score probably because it was a negatively phrased statement. NR experience items are characterized by the lowest mean scores and higher levels of variance overall. The next lowest scoring items: "*My ideal vacation spot would be a remote, natural area*." (*M* = 1.99, *SD* = 1.122), "*The thought of being deep in the woods away from civilisation is frightening*" (M=2.04,SD=1.122) and "*I enjoy digging in soil and getting my hands dirty*" (M=2.24, SD=1.194) suggest that a functional experiential relationship with nature may not be the leading contributor to respondents' connectedness to nature overall, and that Maltese do not particularly value physical experiences in the natural world. This may also indicate that the NR experience identity items are indeed measuring a different sub-construct.

- An analysis of correlations between CNT_Overall with gender indicates that there is hardly any tangible difference between the means of males (M=2.60) and females (M=2.54). Similar proximity in means has been noted with regards to NR Self and NR Perspective, while a minor discrepancy in favour of a slightly higher NR experience mean score for men is noted.

- An analysis of correlations with age indicates that there are relatively significant difference amongst the six age cohort means. The tendency indicates that for NROverall, the 40 to 49 (2.72) and 50 to 59 (2.72) cohorts have the highest CNT. The 30 to 39 remain close to the median as they build a sense of attachment towards the later years. However, the 60 to 69 (2.52) and the 70+ (2.47) cohort means suggest that CNT tends to decrease with older age. The assumption is that this related to decreased mobility and health, hence a reduced exposure to nature and experience. The youngest cohort 20-29 (2.46) fairs worst as expected, since CNT is probably an 'acquired' cognitive process over time highly dependent on experience, but it could also be a result of the digital age which is heavily influencing how we (but especially the younger generation) use our time.

- An analysis of correlations with educational achievement indicates that CNT improves with higher education levels of respondents, both in terms of NR Overall, and similarly across the sub-scales.

- A multiple regression was run to predict NROverall from gender, age, and education which significantly predicted NROverall, $F(3,397) = 15.064$, $p < .0005$, adj. $R2 = .095$. However, only education ($r^2=0.65$) and age ($r^2=0.95$) where statistically significant to the prediction, $p < .05$, where age is a very strong predictor for CNT. Gender was rejected as a significant predictor of NR Overall.

- Respondents identified 737 special places of connectedness; after grouping related places, 198 places of high CNT place were projected. The hotspot clusters indicate intensely appreciated areas, and that places of CNT are spread along the islands. However, the areas of greatest overlap are near the northern and central parts of the island, and rest in or in the vicinity of NATURA 2000 sites. Further details are provided in the next map. However, the South provides numerous sites that score relatively highly, but there is a limited attachment from the North towards places in the South. The South on the other hand indicates a preference for the Northern areas. It also suggests that respondents indicated that places of connectedness to nature were also noted on the island of Gozo, and vice versa since the interaction of the construct goes beyond the neighbourhood level, and is not as rooted as PA and hence more mobile. The bulk of special places of high CNT lie either in NATURA 2000 (NATURA 2000) or scattered elsewhere, but hardly in Urban Conservation Areas (UCA).

- A point in polygon exercise indicates that 467 of these points indicated by correspondents (61%) indeed lie within NATURA 2000 designated areas, and only involve 18 out of the 34 NATURA 2000 designated areas (53%). It also indicates that only 114 of these points indicated by correspondents indeed lie within UCA designated areas (15%), and only involve 19 out of the 60 UCA designated areas (53%). 28% of the points are scattered elsewhere.

PA statistical summary results

Section 7.3 – 'Statistical and spatial analysis of Place Attachment' provided a baseline assessment of PA, and identifies places where respondents feel attachment to place. The main summary findings include the following:

- The composite mean score for place attachment intensity specified by the participants was 24.4 (SD = 7.3, n = 401) which is slightly below the mid-point of the scale range (>33). This suggests a moderately positive attachment to place overall (since this is an inverted scale) across the population sample.

- A ranking of the 13 locality PA means indicates that respondents had a relatively high place attachment to the areas where they live. Localities with high connectedness to NATURA 2000 sites like Rabat-Malta (M=19.42, SD=5.63), St. Lawrenz (M=19.80, SD=7.20) and Mellieha (M=20.10, SD=5.86) show significantly improved PA intensity. Conversely, control sites like Valletta (M= 26.13, SD=9.94), Naxxar (M=26.35, SD=6.29) and B'Kara (M=32.68, SD=8.98) show a significantly reduced PA in comparison. These results suggest that people who live in proximity to NATURA 2000 sites are more attached to their homes and local areas than people who live in other localities. It is important to note that certain localities in Gozo, despite their high environmental quality and attributes, still scored lower than the Maltese localities. This suggests that increased PA does not necessarily depend upon pristine physical qualities but may be derived from other negative or positive environmental features, such as economic or social aspects, as well as individual characteristics.

- Respondents indicated higher levels of agreement with 'Place Identity' affect items such as "*This area is very special to me*" (M=4.30, SD=0.78) and "*I am proud of the natural environment in and around my village*" (M=3.97, SD=0.93). An exception lies with one of the place dependence scoring items which ranks highly: "*If I had to move away from here I would really miss it*" (*M* = 4.19, *SD* =0.93). Place bonding items like "*I have an extensive network of family or friends here*" (M=3.88, SD=0.97) score close to the median and suggest that Maltese tend to build average bonds to people in their locality. PA dependence items are characterised by the lowest mean scores and higher levels of variance overall. The place dependence dimension reflects a physical familiarity with the natural world, a level of comfort with and desire for nature contact. The next lowest scoring items: "*As far as I'm concerned there are better places to spend time than in my village*" (M=3.32,SD=0.99), "*This is the best place for the activities I like to do*" (M=3.62,SD=1.01) and "*No other place can compare to here for me*" (M=3.63, SD=1.11) suggest that a functional dependence relationship with place may not be the leading contributor to respondents' PA, and that Maltese do not particularly feel dependent on places in their immediate locality.

- An analysis of correlations of PA_Overall with gender indicates that there is hardly any tangible difference between the means of males (M=24.77) and females (M=24.06). Similar proximity in means between men and women was noted with regards to PA_Bonding. However PA_Dependence indicates that men tend to be slightly more dependent on their locality, whereas women tend to grow stronger attachments to the home rather than to the locality per se.

- An analysis of correlations with age indicates that there are relatively significant differences amongst the six age cohort means. The tendency indicates that for PA_Overall, the 60 to 69 (M=21.99) and 70+ (M=22.20) cohorts have the highest attachment intensity. The 40-49 (M=24.28) and 50-59 (M=24.78) groups remain close to the median, building a sense of attachment towards later years. However, the

30-39 (M=25.45) and 20-29 (M=27.03) cohort means suggest that PA tends to be lower during younger ages. This is in line with the literature, in which older people were often found to be more attached than younger people and linked with length of residence in the locality and obviously age. This suggests that older people understandably tend to internalise their home place over time and eventually the place becomes an extension of the self.

- An analysis of correlations with age indicates that there are relative differences between the five educational achievement cohort means. Contrary to CNT findings, PA is stronger the lower the education level of the respondent with the No schooling /Primary (22.41) levels at the lowest means decreasing all the way up to tertiary level respondents (26.31) both in terms of PA Overall, and consistently across the three sub-scales.

- A three-way ANOVA to predict PA_Overall from gender, age, and education in fact suggests that there is a statistically significant three way age*gender*education interaction effect for PA_Overall. However, the multiple regression which marginally predicted PA_Overall, $F(3,397) = 7.713$, $p < .0005$, adj. $R2 = .05$, found that only age $F(p=.015)$ was statistically significant to the prediction, $p < .05$, while education and gender were not. Consequently, even though PA increases with educational achievement, age remains a stronger determinant for increased PA.

- Respondents indicated 818 frequencies or mentions of PA places collectively, and after grouping points by relative proximity, 284 locations were identified and listed. The hotspot clusters indicate intensely appreciated areas and that places of PA are spread along the islands. However, the areas of higher frequencies are near the northern parts of the island, and rest in or in the vicinity of NATURA 2000 sites. Also, most of the identified places of PA seems to be in the central and northern areas for most respondents; however, the South provides numerous sites that score relatively highly. This indicates that most of the activity and connectedness seems to be in the central and northern areas, with limited attachment from the North towards places in the South. The South on the other hand indicates attachment towards places in the Northern areas. It also suggests that respondents living in Malta did not indicate places of attachment nature on the island of Gozo, and similarly vice versa, probably since PA is deemed to be more localised and does not go beyond the neighbourhood level.

- A point in polygon exercise via a spatial join was run in ARCMap in order to identify which of the 818 places identified for high PA actually fall within NATURA 2000 sites or an Urban Conservation Area (UCA). The bulk of special places of attachment lie equally either in NATURA 2000 (NATURA 2000 – 41%) or Urban Conservation Areas (UCA – 41%). The 332 points (41%) indicated by respondents lie within NATURA 2000 designated areas, but only involve 16 out of the 34 NATURA 2000 designated areas (53%). On the other hand, points lying within UCA designated areas only involve 17 out of the 60 UCA designated areas (53%). 18% of the remaining points are scattered elsewhere.

EB statistical summary results

The major results from '**Section 7.4 - 'Statistical and spatial analysis of Environmental Behaviour'** include the following:

- The composite mean score for EB intensity specified by the participants was -1.9601 (SD = 3.367, n = 401) across a range from -6 to +6. This indicates that overall the sample population reports relatively low environmental behaviour below the mean. However, it is also evident that cluster respondents living in areas close to NATURA 2000 sites scored higher ex. Mellieha (-0.3871) and Rabat (Malta) (-0.6452), Sliema (-0.6452) and Xaghra (-1). As expected most of the control sites ranked poorly like B' Kara (-2.3871), Valletta (-2.5806) and Naxxar (-2.9032), with the exception of Sliema, which ranked in 3rd place.

- It is important to note that certain localities in Gozo, despite their high environmental quality and attributes, still scored lowest in EB means. This suggests that pro-environmental behaviour does not necessarily depend on natural environments, but may be derived from other negative environmental features, such as economic or social aspects. The exception in expectations is with the bottom ranking localities of Sannat (-4.2667) and Nadur (-5.0968) which scored at bottom rank despite hosting scenic NATURA 2000 sites. The overall weak averages are of concern since it suggests that despite increased ecological norms and worldviews, these communities' attitudes and behaviour are still not sufficiently expressed in individual action.

- Respondents indicated higher levels of agreement with items such as "*Attended a public hearing or meeting about the environment*" (M=1.85,SD=0.36) and "*Voted for or against a political candidate, in part, because of his or her position on the environment*" (M1.84, SD=0.371). However, items which ranked low were "*Contributed time or money to an environmental or wildlife conservation group*" (M = 1.51, SD =0.501) and "*Changed your behaviour in any way because of concern for the environment*" (M=1.5, SD=0.501).

- An analysis of correlations with gender indicates overall that there is a negligible difference between the means of males (M=-2.1436) and females (M=-1.7864).

- An analysis of correlations with age indicates that there are relatively significant differences amongst the six age cohort means. The highest tendency to pro-environmental behaviour lies with the 50 to 59 cohort (M=-1.0541) followed by the 40 to 49 cohort (M=-1.614), and the 60 to 69 (-2). As expected the 30 to 39 (-2.1493), followed by the 20 to 29 (-2.3377) cohorts indicate lower environmental behaviour rankings . This suggests that EB tends to increase with age until the 50 to 59 cohort and then drops again for the 60 to 69 cohort.

- An analysis of correlations with educational achievement indicates that the higher a respondent's educational progress, the more increased his or her environmental behaviour ranking.

- There is a statistical significant effect between age*gender*education and environmental behaviour $F(3,397) = 7.713$, $p < .0005$, adj. $R2 = .137$. However, only age and education were statistically significant predictors for EB to the prediction, $p < .05$, while gender was rejected.

Appendix 10 - PA and CNT identified by respondents sorted by locality

			Place Attachment			Connectedness to Nature		
Resp. #	Q0b	Q0c	Q10	Q10a	Q10b	Q13a	Q13b	Q13c
	Name of Street:	*Locality:*	*1*	*2*	*3*	*1*	*2*	*3*
1	John Borg Street	B' Kara	basilica st helen	stazzjoni antika	nicec	Buskett	Mdina bastions	San Anton Gardens
2	Bishop Labini Street	B' Kara	il-knisja il-Qadima	Basilica St Elena	Stazzjon	Buskett	Hastings Gardens	Furjana il-Mall
3	John Borg Street	B' Kara	Basilica St helen			Mizieb	Bidnija	Ghadira
4	Triq Kostantinu	B' Kara	Il Wied ta' Bkara	Basilica		Fort Sant Angelo	Valletta Bastions	Mdina
5	Triq Kostantinu	B' Kara	Stazzjon	Basilica	Pjazzez u kappelli	Ghadira	Ghajn Tuffieha	Buskett
6	Triq Kostantinu	B' Kara	Basilika	L-Istazzjon	Pjazza ta Santa Elena	Buskett	Bajja tal mellieha	Xlendi Ghawdex
7	Sqaq Bazzarru	B' Kara	stazzjon	diversi knejjes	nicec	r-ramla l-hamra	zurrieq by boat	area tal fortizza wardija
8	sqaq bazzarru	B' Kara	toroq antiki u sqaqin	basilica	stazzjon	st john's cathedral	dwejra	mdina bastions
9	sqaq bazzarru	B' Kara	bandli	basilica	sqaq	toroq tal-birgu	bormla	valletta barrakka
10	triq il qanpiena	B' Kara				mdina cathedral	tigne point	dwejra
11	triq graffitti navali	B' Kara				dwejra	st johns cathedral	mdina bastions
12	Graffitti Navali Street	B' Kara	Santa Elena B asilica			Mtahleb	Wardija	
13	Triq Grossetto	B' Kara				festa isla	ggantija	barakka valletta
14	Triq Grossetto	B' Kara				hagar qim	tarxien tremples	mdina bastions
15	Triq Grosetto	B' Kara				Buskett	Mosta Dome	Barrakka ta' fuq
16	Farrugia Randon Street	B' Kara	Stazzjon	Church		Mellieha		

17	Farrugia Randon Street	B' Kara				Selmun		
18	Vlontin Street	B' Kara				Zurrieq	Buskett	Had Dingli
19	Vlontin Street	B' Kara				Dwejra		
20	Vlontin street	B' Kara				Sliema	Ghadira	
21	Gori Mancini	B' Kara	stazzjon	Basilika	knisja tal herba	selmun mgiebah	mizieb	gnejna
22	Gori Mancini	B' Kara						
23	Triq Santa Tereza	B' Kara						
24	Triq Santa Tereza	B' Kara						
25	John Borg	B' Kara	Stazzjon			Marsalforn	ta silg m'xlokk	
26	John Borg	B' Kara				selmun		
27	John Borg	B' Kara				wied iz zurrieq		
28	Salib imqaddes	B' Kara	stazzjon tal ferrovija	Il knisja	Il knisja l qadima			
29	salib imqaddes	B' Kara	knisja tal herba					
30	salib imqaddes	B' Kara	knisja l qadima	mithna ta ganu	il knisja l qadima	il wied, B'Kara		
31	Farrugia Randon Street	B' Kara	church			Ta' Qali	Buskett	
32	Triq ic-Cippi	M' Xlokk	Marnisi	Delimara		Triq il-marnisi M'Xlokk		
33	Triq ic-Cippi	M' Xlokk	Delimara	Kalanka		by the sea, M'Xlokk	Delimara Countyside	mtahleb/ **Bahrija**
34	Triq Melqart	M' Xlokk	Delimara	Hofor M'Xlokk	M'Xlokk Promenade	Hofor	Delimara Countyside	Buskett
35	Triq Sta Katerina	M' Xlokk	Delimara	Marnisi Area	St Peter's Pool M'Xlokk	marnisi area	Delimara Countyside	Ghadira
36	Guilino Maniscalco	M' Xlokk	M'Xlokk Promenade	M'Xlokk at sea		sea side, M'Xlokk	Delimara	out at sea
37	Sta Katerina	M' Xlokk	St peters	Delimara		Zonqor	mellieha	Delimara

38	Sta Katerina	M' Xlokk	Bajja Marsaxlokk	Delimara		M'Xlokk Bay		
39	St Antnin	M' Xlokk	Square Marsaxlokk	By the sea		M'Xlokk Bay	M'Xlokk Square	
40	St Antnin	M' Xlokk	Square Marsaxlokk	Delimara		Buskett	Kennedy Grove	Pwales, Xemxija
41	Gulino maniscalco	M' Xlokk	at sea	M'xlokk Square		at sea		
42	triq San Guzepp	M' Xlokk	seafront M'Xlokk			Delimara		
43	triq San Guzepp	M' Xlokk	Bugibba	Delimara		Delimara		
44	triq San Guzepp	M' Xlokk	Knisja ta Pompei					
45	triq Axtart	M' Xlokk	Seafront			Ta Qali		
46	Triq Axtart	M' Xlokk				Salib ta l-gholja	Delimara	Xatt ta M'Xlokk
47	Triq Axtart	M' Xlokk				M'Xlokk		
48	Triq is-Silg	M' Xlokk	Xorb l-ghagin			Delimara	M'Xlokk	
49	Triq is-Silg	M' Xlokk						
50	Triq is-Silg	M' Xlokk	Dwejra			Dwejra	Xlendi	Hondoq ir-Rummien
51	Triq Piju V	M' Xlokk				Zurrieq		
52	Triq Piju V	M' Xlokk	Xatt ta M'Xlokk			Buskett	Delimara	
53	Triq Xerriek	M' Xlokk	Rabat Malta			Rabat		
54	Triq Xerriek	M' Xlokk	Mdina	Birgu		Delimara		
55	Triq Xerriek	M' Xlokk	Knisja ta Pompei			M'Xlokk		
56	Triq L-Ixprunara	M' Xlokk				Delimara		
57	Triq L-Ixprunara	M' Xlokk	Xorb L'Ghagin	Fomm ir-rih	L-ahrax tal Mellieha	Delimara	Xorb L'Ghagin	
58	Triq ix-Xini	M' Xlokk	Gnien taz-Zejtun			Gnien taz-Zejtun		

59	Triq Lepanto	M' Xlokk	Golden Bay	Delimara	Qajanza	Buskett	Ghajn Tuffieha	
60	Triq Lepanto	M' Xlokk	Xatt ta M'Xlokk					
61	Triq Lepanto	M' Xlokk	St Anton gardens	Xatt ta M'Xlokk		St Anton	M'Xlokk	
62	Triq Tonin Attard	M' Xlokk				Mgarr		
63	Triq l-Isqof Pace	Mellieha	santwarju	ghadira	shelters	San Anton Attard	Gnien haz Zejtun Mellieha	Selmun
64	Kappillan Magri	Mellieha	Santwarju	Pjazza tal-Parocca	Ghadira	ghadira	cirkewwa	selmun
65	Tirq l-isqof Pace	Mellieha	Ghaj Zejtuna	Qammieh	Ta'Ciantar (manikata)	dingli	buskett	mellieha
66	triq il-fortizza	Mellieha	santwarju	ghadira	selmun	ghadira	ghajn tuffieha	l-ahrax
67	triq il-wied	Mellieha	ghadira	santwarju	bajja ghajn tuffieha	mellieha kollu	selmun	ghajn tuffieha
68	triq il-wied	Mellieha	santwarju	ghadira	selmun palace	selmun	l-ahrax	majjistral park
69	Triq Ta' Masrija	Mellieha	Id-Dar ta' L-Anzjani fejn hemm hafna attivitajiet	Is-Santwarju Tal-Madonna Tal-Mellieha	Il-Knisja Tal-Madonna Tal-Vittorja	Il-Qammieh L/O Ghadira	Il-Bajja Tal-Mellieha	L-Armier
70	Triq Ta' Masrija	Mellieha	Village Square	Mellieha Bay	Activity Park at Selmun	Selmun	Manikata	Dingli
71	Triq Ta' Masrija	Mellieha	Is-Santwarju Tal-Madonna Tal-Mellieha	Il-Bandli ta' wara il-Knisja fejn hemm Veduta sabieha ta L-Ghadira	Il-Bajja Ta' Lghadira	Ghar Lapsi (Siggiewi)	Il-Bajja tax-Xlendi	Il-Bajja Ta' Marsalforn
72	Triq Iz-Znuber	Mellieha	Is-Santwarju Tal-Madonna Tal-Mellieha	It-Torri L-Ahmar	Il-Madonna Ta' L-Ghar	Dingli Cliffs	L-Ahrax Tal-Mellieha	Is-Salib Ta' L-Gholja (Siggiewi)
73	Triq il-Fortizza	Mellieha						
74	Triq L-Arznell	Mellieha	Is-Santwarju	L-Armier	Il-kosta tal-blat	Dingli Cliffs	Il-Buskett	L-Armier

			Tal-Madonna Tal-Mellieha		taht Santa Marija Estate			
75	Triq L-Arznell	Mellieha	L-Ahrax Tal-Mellieha	L-Ghadira	Ic-Cirkewwa	Dingli Cliffs	Chadwick Lakes	Il-Kuncizzjoni (Rabat)
76	Triq It-Tunnagg	Mellieha	Seaview Cafeteria fejn hemm veduta sabieha tal bajja tal-Mellieha	L-Ghadira	Ic-Cirkewwa	Il-Mistra	Is-Salib Ta' L-Gholja	Chadwick Lakes
77	Gnien Ingraw	Mellieha	santwarju	ghajn tal hasselin mellieha	shelters	selmun	ghajn tuffieha	ghadira u bird park
78	triq il fortizza	Mellieha	santwarju	bahar santa maria estate l-isfel	ghadira	ghadira	ghajn tuffieha	dwejra ghawdex
79	palma Street	Mellieha	l-Ahrax Tal-Mellieha	Widien		Dingli Cliffs	Mellieha	
80	Triq iz-Zebbug	Mellieha	Mellieha Seaside			Mellieha		
81	Palma Street	Mellieha	Santwarju tal-Mellieha	Parks		Mellieha Front		
82	Triq iz Zebbug	Mellieha	Gharukasa	Ahrax Tal-Mellieha	St Marija estate	Ahrax Tal-Mellieha	Mellieha	
83	Triq it-Tgham	Mellieha	Selmun	Ahrax tal-Mellieha		Selmun	Dingli	
84	Triq il-Mithna l-qadima	Mellieha	Santwarju	Gharucasa		Mellieha		
85	Mithna l-Qadima	Mellieha	Selmun	all of Mellieha		Ghadira reserva	Foresta 2000	Buskett
86	Triq il-Mithna Qadima	Mellieha	Gnien	Santwarju		Rabat	Selmun	
87	Triq is sajjieda	Mellieha	selmun	torri l abjad	pillboxes	ghajn tuffieha	l-ahrax tal-Mellieha	
88	triq is sajjieda	Mellieha	santwarju tal madonna	il knisja	fort campbell	ramlet il qortin	selmun	
89	Triq tramuntana	Mellieha	popeye village	selmun		l imgiebah		

90	Triq tramuntana	Mellieha	torri ta selmun	santwarju tal madonna	torri l ahmar	selmun	mistra	L ahrax
91	Triq it tramuntana	Mellieha	anchor bay	dahlet ix xmajjar	ramlet il qortin	l ahrax		
92	Qasam Qortin	Mellieha	selmun	torri l ahmar		mistra	l imgiebah	
93	Triq is sajjieda	Mellieha	knisja tal mellieha	il madonna ta l ghar	shelter			
94	Triq Dahlet Qorrot	Nadur	Torri Kenuna	Torri Ta Isopu	Dahlet Qorrot	Dahlet Qorrot		
95	Triq Dahlet Qorrot	Nadur	Dahlet Qorrot	Church		Dahlet Qorrot		
96	Triq San Blas	Nadur	Torri Kenuna	Belvedere Nadur		Fejn it torri ta kenuna		
97	Triq San Blas	Nadur	Qortin San Filep	Torri T' Isopu	Wied Bingemma	Qortin San Filep		
98	Triq San Blas	Nadur	San Blas	Dahlet Qorrot	Ramla	Dahlet Qorrot		
99	Triq il Qala	Nadur	Ramla	Dahlet Qorrot	San Blas	Ramla		
100	Triq il Qala	Nadur	Ramla	Belvedere Nadur		Ramla		
101	Triq il Qala	Nadur	San Blas	Dahlet Qorrot		Rdum t' Esopu		
102	Triq Dahlet Qorrot	Nadur	Dahlet Qorrot	Ramla		Dahlet Qorrot		
103	Triq San Blas	Nadur	San Blas	Torri Kenuna	Torri Isopu	San Blas		
104	Triq ta Hida	Nadur	Knisja	Ramla		Ramla		
105	Triq ta Hida	Nadur	Ramla	San Blas	Dahlet Qorrot	L ghalqa privata		
106	Triq BIngemma	Nadur	Ramla	San Blas		Ramla		
107	Triq Bingemma	Nadur	Gnien tal Kunsill	Ramla	San Blas	Gnien tal Kunsill		
108	Triq Bingemma	Nadur	Ramla			Ramla		
109	Triq it-torri ta' Kenuna	Nadur	Belvedere	Ramla	Torri Isopu	Ramla		

			Nadur					
110	Triq it-torri ta' Kenuna	Nadur	Belvedere Nadur			Dahlet Qorrot		
111	Triq it-torri ta' Kenuna	Nadur	Ramla	Torri Kenuna	San Blas	Belvedere Nadur		
112	Triq it-torri ta' Kenuna	Nadur	Gnien belvedere nadur			Ramla		
113	Triq ta Hida	Nadur	Ramla			Ramla		
114	Triq San Gakbu	Nadur	Dahlet qorrot	Knisja		Dahlet qorrot		
115	Triq San Gwann	Nadur	Torri ta kenuna	Torri ta sopu				
116	Triq San gwann	Nadur	Piazza San pietru u san pawl	Ramla				
117	Triq Guze bonnici	Nadur	San blas	Dahlet qorrot	Torri ta kenuna	San blas	Dahlet qorrot	Dwejra
118	Mgarr road	Nadur	San blas	Dahlet qorrot	Torri ta Isopu	Wied l ghasri	San blas	Kemuna
119	Triq xjuf ir rih	Nadur	Dahlet qorrot	Ramla	San blas	Dahlet qorrot	Wied San blas	Wileg, qala
120	San gakbu	Nadur	Knisja	Pjazza tar rahal		San blas	Dahlet qorrot	
121	Triq Dun G Vella	Nadur	Knisja	Pjazza	My garden	San blas	Dahlet qorrot	
122	Triq ta' Said	Nadur						
123	Triq San gwann	Nadur						
124	Triq Xandriku	Nadur	San Blas	Dahlet Qorrot	Ramla	San Blas	Wied il- Mielah	Ramla Cave
125	Triq Santa Lucija	Naxxar	kapella ta santa lucija	Palazzo parisio	torri tal kaptan			
126	Triq santa lucija	Naxxar	palazzo parisio	kapella ta san pawl ta targa	cart ruts	salini		
127	Triq santa lucija	Naxxar	Triq santa lucija	palazzo parisio		Qalet Marku	Id dwejra	
128	Vjal il labour	Naxxar	Palazzo Parisio	IL knisja		mizieb	wied il ghasel	

129	Vjal il labour	Naxxar	il kazin tal banda	cart ruts				
130	Vjal il labour	Naxxar	Kapelli	Knisja				
131	Triq Andrea Debono	Naxxar	Torri Gauci	Triq Santa Lucija	Knisja	wied speranza		
132	Triq Andrea Debono	Naxxar	IL Knisja			Selmun		
133	Triq Andrea Debono	Naxxar	Cart Ruts			Buskett		
134	Triq il Kbira	Naxxar	IL Knisja	Kapella Ta Santa Lucija	Cart Ruts	chadwick lakes		
135	Triq il kbira	Naxxar	Palazzo Parisio	San Pawl ta targa				
136	Triq il kbira	Naxxar	Torri tal kaptan	cart ruts		xlendi		
137	Triq san Pawl	Naxxar						
138	Triq san Pawl	Naxxar	Kapella san pawl ta targa	statwa ta san pawl	san pawl milqi			
139	Triq san Pawl	Naxxar	st pauls church					
140	Triq il Habbatta	Naxxar	Torri tal kaptan			IL Mizieb		
141	Triq Jean Houel	Naxxar	Cart ruts					
142	Triq Jean Houel	Naxxar	Parocca	st.lucy chapel		Imgiebah		
143	Triq l-Ghenieq	Naxxar				buskett		
144	Triq L-Ghenieq	Naxxar	palazzo parisio	pillbox	tradefair	barakka		
145	Triq l-Ghenieq	Naxxar				Wied incinta		
146	Triq iL-Qoton	Naxxar	Palazzo Parisio	Tempji Tal Qadi	Tal Wej	Dwejra Gozo		
147	Triq il-Kbira	Naxxar	Chapels in Naxxar	Palazzo Parisio	Village core	XORb l-Ghagin	Mellieha	Mizieb
148	Lell Falzon	Naxxar	Tal Wej	Palazzo Parisio		Dingli Cliffs		
149	Triq il Kbira	Naxxar	Palazzo Parisio					

150	Trieq l-Punent	Naxxar	Tal Wej	Palazzo Pariso	Tempji Tal QAdi	Tal Wej	Hagar Qim
151	Triq San Gwann	Naxxar	Palazzo Pariso			Mistra	
152	Triq San Pawl	Naxxar	Palazzo Parisio				
153	San Gwann	Naxxar				Mgiebah	
154	Triq il Kbira	Naxxar				Dingli Cliffs	Hagar Qim
155	ST Lucy St	Naxxar				Dwejra Gozo	
156	Triq Karlu Galea	Rabat (Gozo)	Citadella	Is-Sur	Pjazza San Gorg	Dwejra	Wied il- Milah
157	Triq 31 ta Marzu 1979	Rabat (Gozo)	Citadella	Villa Rundle	Tokk	Wied il- Ghasri	Dwejra
158	Triq l- Imghallem	Rabat (Gozo)	Citadella	Pjazza San Gorg	Villa Randal	Hondoq	Comino
159	Triq l-Imghallem	Rabat (Gozo)	Citadella	Teatru		Ta Cenc	Dwejra
160	Triq l-Imghallem	Rabat (Gozo)	Bazilica	Citadella		Dwejra	Ta Cenc
161	Triq Enrico Mizzi	Rabat (Gozo)	San Gorg				
162	Triq l-Imghallem	Rabat (Gozo)	Citadella	Villa Rundle	The Lanes Sqaqijiet	Xwejni	Dwejra
163	Triq Enricu Mizzi	Rabat (Gozo)	San Gorg	Citadella		Xlendi	Ggantija
164	Triq San Gwann Bosco	Rabat (Gozo)	Citadella	Tokk		Mgarr ix Xini	
165	San Gwann Bosco	Rabat (Gozo)	Citadella	Villa Rundle		Ta Pinu area	
166	Triq Mattia Preti	Rabat (Gozo)	Cittadella	Pjazza Indipendenza	Villa Rundle	San Lawrenz - Rdum	
167	Triq Mattia Preti	Rabat (Gozo)	Katidral			Villa Rundle	

168	Triq Mattia Preti	Rabat (Gozo)	Cittadella			Wied L-Ghasri	Wied ta Marsalforn	
169	Triq Mattia Preti	Rabat (Gozo)	Katidral	Ministeru	Sta Martha	Dwejra		
170	Triq Putirjal	Rabat (Gozo)	Cittadella	Villa rundle		Dwejra		
171	Triq Putirjal	Rabat (Gozo)	Katidral	Villa rundle	San gorg	Lunzjata		
172	Castle str	Rabat (Gozo)	Katidral			Lunzjata		
173	Castle str	Rabat (Gozo)	Katidral			Dwejra	Xwejni	
174	Guze Ellul Mercer	Rabat (Gozo)	Cittadella			Lunzjata		
175	Triq Guze Ellul Mercer	Rabat (Gozo)	Cittadella	Villa Rundle		Dwejra		
176	Triq Guzepp Labre	Rabat (Gozo)	Lunzjata	Cittadella	Villa Rundle	Ghajn Barrani	Sunset Dwejra	Is Salini Tax Xwejni
177	Triq Guzepp Labre	Rabat (Gozo)	Cittadella	Villa Rundle		Lunzjata	Ghadira Ta San Raflu	Xlendi
178	Triq Guzepp Labre	Rabat (Gozo)	Cittadella	Pjazza	Lunzjata	Fuq is Sur	Dwejra	Marsalforn
179	Triq Karolina Cauchi	Rabat (Gozo)				Xwejni	Dwejra	Xlendi
180	Triq Carolina Cauchi	Rabat (Gozo)	Villa Rundle	Cittadella	Lunzjata	Ta Cenc	Mgarr ix-Xini	
181	Triq Carolina Cauchi	Rabat (Gozo)	Cittadella	Lunzjata	Villa Rundle	Xwejni		
182	Triq Agius De Soldanis	Rabat (Gozo)	Basilika ta San George	Cittadella	Katidral	Marsalforn	Dwejra	Xlendi
183	Triq L-Assunta	Rabat (Gozo)	Cittadella	Pjazza	Lunzjata	Xlendi		

184	Triq L-Assunta	Rabat (Gozo)	Cittadella	Cittadella	Villa Rundle	Fanal Ta Gordan	Villa Rundle	Lunzjata u widien ohra
185	Triq l-Assunta	Rabat (Gozo)	Cittadella	Lunzjata	Villa Rundle	Wied il Ghasri	Xwejni	Qbajjar
186	Triq Carolina Cauchi	Rabat (Gozo)				Xwejni	Dwejra	Xlendi
187	Triq l-isptar	Rabat (Malta)	san Pawl Rabat	Howard Gardens	saqqajja	Mellieha	Dingli	
188	Triq l-isptar sqaq Nru1	Rabat (Malta)	Il-Foss Mdina	Buskett	Dingli	Buskett	Dingli	Landrijiet
189	Triq san Pawl	Rabat (Malta)	Fomm ir-Rih			Fomm ir- Rih	Mtahleb	Bahrija
190	Triq san Pawl	Rabat (Malta)	selmun	Dingli		Selmun	Dingli	Gozo
191	Santu Wistin	Rabat (Malta)	Buskett	Bahrija	Kuncizzjoni	Bahrija	Buskett	Kuncizzjoni
192	Santu Wistin	Rabat (Malta)	Buskett	Mdina	Chadwick Lakes/Mtahleb	Chadwick Lakes	Bahrija	Buskett
193	Santu Wistin	Rabat (Malta)	Howard Gardens	Mdina		Mtahleb	Bahrija	Buskett
194	Santu Wistin	Rabat (Malta)	Buskett	Bahrija	Chadwick Lakes	Bahrija	Chadwick Lakes	Buskett
195	San Pawl	Rabat (Malta)	Bidnija	Mtarfa	Howard Gardens	Bahrija	Chadwick Lakes	Buskett
196	San Pawl	Rabat (Malta)	Gnejna	bahrija	Mdina	Gnejna	Bahrija	Buskett
197	Sqaq Muzew Nru1	Rabat (Malta)	Howard Gardens	bahrija	Mdina	Dingli	Bahrija	Kuncizzjoni
198	L-Isptar	Rabat (Malta)	Howard Gardens	Chadwick Lakes	Mtarfa	Chadwick Lakes	Bahrija	Mtarfa
199	L-Isptar	Rabat (Malta)	Howard Gardens	Mdina	Fuq is-sur	Fawwara	Bidnija	Bahrija

200	L-Isptar	Rabat (Malta)	San Bastjan	Mdina	saqqajja	Buskett		
201	Triq Fidloqqom	Rabat (Malta)	Howard Gardens	Il-Knisja ta' San Pawl	Roman Villa	Howard Gardens (Rabat)	Il-Buskett	Il-Gnejna
202	Triq Fidloqqom	Rabat (Malta)	Howard Gardens	Tal-Virtu hdejn Is-Seminarju	Il-Bahrija	Santa Katerina (Ir-Rabat)	Dingli Cliffs	Il-Lunzjata (Ghawdex)
203	Triq Fidloqqom	Rabat (Malta)	Howard Gardens	Il-Parrocca Ta' San Pawl	Il-Katakombi Ta' San Pawl u Sant' Agatha	Il-Buskett	Had-Dingli	Nature Reserve tal-Mellieha
204	Vjal Il-Haddiem	Rabat (Malta)	L-Imdina	Howard Gardens	Il-Katakombi Ta' San Pawl	Il-Buskett	Il-Gnejna	Wied-Qirda (Zebbug Malta)
205	Vjal Il-Haddiem	Rabat (Malta)	Village Core	Howard Gardens	Il-Grotta ta' San Pawl	IL-Buskett	Ix-Xatt tal-blat taht il-promenade f'Tas-Sliema	Ghar Lapsi
206	Vjal IL-Haddiem	Rabat (Malta)	L-Imdina	Il Pjazza Tar-Rabat	Howard Gardens	IL-Buskett	IL-Kuncizzjoni (Rabat)	IL-Bahrija
207	Triq Pietru Grixti	Rabat (Malta)	Roman Villa	Katakombi Ta' San Pawl	L-Imdina	Il-Buskett	Chadwick Lakes	Selmun
208	Triq Pietru Grixti	Rabat (Malta)	IL-Buskett	Howard Gardens	Chadwick Lakes	Chadwick Lakes	IL-Bahrija	Il-Buskett
209	Triq Pietru Grixti	Rabat (Malta)	Howard Gardens	IL-Knisja Ta' San Pawl	Il Kappella Ta' San Luqa	Il-Wied tal-Qlejja (Chadwick Lakes)	IL-Buskett	Howard Gardens
210	Triq Santa Rita	Rabat (Malta)	Howard Gardens	L-Imtahleb	Il-Knisja Ta' San Pawl	L-Imtahleb	Ic-Chadwick Lakes	IL-Bahrija
211	Triq Santa Rita	Rabat (Malta)	IL-Knisja Ta' San Pawl	Howard Gardens	L-Imtahleb	L-Imtahleb	Chadwick Lakes	Is-Santi (jaghmel parti ma Bingemma)
212	Triq Santa Rita	Rabat (Malta)	L-Imdina	Howard Gardens	Il-Knisja Ta' San Pawl	IL-Buskett	Dingli Cliffs	Chadwick Lakes

213	Triq San Mikiel	Rabat (Malta)	Howard Gardens	IL-Buskett	IL-Grotta Ta' San Pawl	IL-Buskett	Dingli Cliffs	L-Imtahleb
214	Triq Doni Qadima	Rabat (Malta)	Mdina	Catacombs	Roman Villa	Buskett		
215	Triq Doni Qadima	Rabat (Malta)	Buskett	Mdina	IL-Gnien Tar-Rabat	Gnien Tar-Rabat		
216	Triq Doni Qadima	Rabat (Malta)	Il-Gnien	Roman Villa		Il-Gnien		
217	Triq Doni Qadima	Rabat (Malta)	Gnien Tar-Rabat	Mdina		Rabat		
218	Triq il-Blat	Sannat	Ta Cenc			Ta Cenc		
219	Triq il Blat	Sannat	Ta Cenc			Ta Cenc		
220	Triq V Caruana Spiteri	Sannat	Ta Cenc			Ta Cenc	Mgarr ix-Xini	
221	Triq in Newwiela	Sannat	Ta Cenc			Ta Cenc		
222	Triq ta Cenc	Sannat	Ta Cenc					
223	Triq Sannat	Sannat	Playing Field Sannat			Xlendi		
224	Triq Vincenzo Caruana Spiteri	Sannat	Ta Cenc			Ta Cenc		
225	Ta Cenc Street	Sannat	Ta Cenc			Ta cenc		
226	Triq ta Cenc	Sannat	Knisja Sannat	Ta Cenc		F'ghalqa privata		
227	Triq Bebunaq	Sannat	Ta Cenc			Xwejni	Ta Cenc	
228	Triq Bebunaq	Sannat	Saguna Cliffs	Ta Cenc				
229	Ras in Newwiela	Sannat	Ta Cenc			Ta Cenc	Dwejra	Lunzjata
230	Vincenzo Caruana Spiteri str.	Sannat	Ta Cenc			TA Cenc		
231	Sannat Road	Sannat	Ta Cenc	Seguna Cliffs	Church	Dwejra	Ta Cenc	
232	Triq it-Tilliera	Sannat	Ta Cenc			Ta Cenc		
233	Triq in -Newwiela	Sannat	Ta Cenc			Ta Cenc		

234	Triq in-Newwiela	Sannat	Ta Cenc	Saguna Cliffs		Ta Cenc		
235	Triq il-Blat	Sannat	Ta Cenc			Dwejra	Ta Cenc	
236	Sannat Rd	Sannat	Ta Cenc			Ta Cenc		
237	Ta Cenc	Sannat	Ta Cenc			Ta Cenc		
238	Triq ix-Xabbata	Sannat	Ta Cenc	Mgarr ix Xini		Marsalforn	Ta Cenc	
239	Triq Skerla	Sannat	Ta Cenc	Mgarr ix-Xini		Ta Cenc	Dwejra	
240	Triq Falkun	Sannat	Ta Cenc	Xlendi	Mgarr ix-Xini	Ta Cenc	Dwejra	Xlendi
241	Triq Gerxija	Sannat	Mgarr ix-Xini	Ta Cenc		Ghadira Ta San Rafflu	Ta Cenc	Xlendi
242	Triq Xabbata	Sannat	Ta Cenc	Mgarr ix-Xini		Ta Cenc	Mgarr ix- Xini	
243	Triq Xabbata	Sannat	Mgarr ix- Xini	Ta Cenc		Ta Cenc	Mgarr ix-Xini	Saguna Cliffs
244	Triq Skerla	Sannat	Mgarr ix-ini	Ta Cenc sea cliffs	Ta Cenc land cliffs (Sanap)	Ta Cenc	Mgarr ix-Xini	
245	Triq 28 ta'April 1688	Sannat	Ta Cenc	Mgarr ix-Xini	is-Sanap	Ta Cenc	Ramla	
246	Triq Coco Palmieri	Sannat	Ta Cenc	Mgarr ix Xini	Tal Bardan	Is-Sanap	Ta Cenc	Xlendi Cliffs
247	Triq Coco Palmieri	Sannat	Mgarr ix Xini	Ta Cenc	Sanap	Mgarr ix Xini	Ta Cenc	Dwejra
248	Triq il-Kbira	Siġġiewi	toroq antiki	salib ta' l-gholja	pjazza san nikola	blue grotto	fawwara	
249	Triq il-kbira	Siġġiewi	knisja san niklaw	fawwara	lapsi	is-salib tal-gholja	ghar lapsi	ghawdex id-dwejra
250	triq il-kbira	Siġġiewi	is-salib tal-gholja	fawwara	ghar lapsi	hagar qim	kappella tal-fawwara	girgenti
251	TRIQ IL-KBIRA SQAQ NRU.5	Siġġiewi	salib tal-gholja	pjazza san nikol	knisja il-qadima	st johns cathedral valletta	port il kbir u l-barrakka valletta	waterfont
252	TRIQ IL-KBIRA SQAQ NRU.5	Siġġiewi	salib tal-gholja	fawwara (Kappella tal-karmnu)	dar tal-providenza	limestone heritage	zurrieq blue grotto	ghar lapsi
253	st margaret street	Siġġiewi	salib tal-gholja	fawwara	lapsi	salib tal-gholja	hagar qim	mnajdra

254	st margaret street	Siġġiewi	parocca san nikola	nicec fit-toroq	salib tal-gholja	girgenti	lapsi	fawwara
255	St Margaret Street	Siġġiewi	salib tal-gholja	lapsi	girgenti	girgenti	ghar dalam	fawwara
256	Pjazza San Nikola	Siġġiewi	ghar lapsi	salib tal-gholja	girgenti/fawwara	fawwara	hdejn id dar tal-providenza	dwejra gozo
257	borg scicluna street	Siġġiewi	knisja parrokjali	salib tal-gholja	fawwara kwiet u pittoreska	fawwara	is-salib tal-gholja	girgenti
258	triq brandin	Siġġiewi	Fawwara	Salib il Gholja	toroq sbieh u antiki bin nicec	Fawwara		Ta'Qali
259	Triq ta' Brandin	Siġġiewi	Limestone Heritage	Salib-il-Gholja	Ghar Lapsi	Ramla l-Hamra	Ggantija	Fawwara/Girgenti
260	Triq ta' Brandin	Siġġiewi	Salib Tal-Gholja	Lapsi Bahar	Knisja San Nikola	Fawwara	Buskett	Lapsi
261	Pjazza San Nikola	Siġġiewi	Kappella tal-Providenza	Knisja parrokjali	Limestone Heritage	Fawwara	Dingli Cliffs	Dwejra
262	Mons Mikiel Azzopardi	Siġġiewi	Kappelli zghar u nicec	Fawwara	Hal Xluq Kappella	Fawwara	Lapsi bahar	Girgenti
263	Triq Id-Demnuq	Siġġiewi	Limestone Heritage	Il-Knisja il-Qadima	Wied Hesri	IL-Fawwara	Is-Salib Ta' L-Gholja	IL-Buskett
264	Triq Id-Demnuq	Siġġiewi	Ghar Lapsi	Il-Girgenti u Is- Salib Ta' L-gholja	Wied Hesri	Il-Buskett	Ghar-Dalam (B'Bugia)	Ghajn Tuffieha
265	Triq Id-Demnuq	Siġġiewi	Il-Knisja IL-Qadima	Il-Binja Tal-Qorti	Wied Hesri	IL-Buskett	IL-Girgenti	Ghar Lapsi
266	Triq In-Newba	Siġġiewi	IL-Pjazza Ta' San-Nikola	IL-Knisja Ta' San Nikola	IL-Fawwara	IL-Buskett	IL-Fawwara	Hondoq Ir-Rummien (Ghawdex)
267	Triq In-Newba	Siġġiewi	IL-Palazz Ta' L-Inkwizitur	IL-Knisja Tal-Providenza	Is-Salib Ta' L-Gholja	IL-Buskett	IL-Girgenti	IL-Fawwara
268	Triq L-Imdina	Siġġiewi	IL-Pjazza Ta' San Nikola	Limestone Heritage	Is_Salib Ta' L-Gholja	Madwar IL-Kappella Tal-Providenza	Ghar Lapsi	IL-Fawwara
269	Triq L-Imdina	Siġġiewi	Is-Salib Ta' L-gholja	IL-Fawwara	IL-Kappella Ta' Hal-Xluq	Is-Salib Ta' L-Gholja	Wied Hesri	IL-Fawwara

270	Triq Dun Manuel Zammit	Siġġiewi	IL-Pjazza Ta' San Nikola	Wied Hesri	Is-Salib Ta' L'Gholja	IL-Fawwara (Siggiewi)	Ghar Lapsi (Siggiewi)	Wied Hesri (Siggiewi)
271	Triq Hal-Xluq	Siġġiewi	IL-Fawwara	Is-Salib Ta' L'Gholja	Ghar Lapsi	Il-Fawwara (Siggiewi)	Il-Girgenti (Siggiewi)	Is-Salib Ta' L-Gholja (Siggiewi)
272	Triq Hal-Xluq	Siġġiewi	IL-Girgenti	Ghar Lapsi	IL-Kappelli Tal-Fawwara, Tal-Karmnu u IL-Luunzjata	IL-Buskett	IL-Fawwara	IL-Girgenti
273	Triq L-Iskola	Siġġiewi	IL-Fawwara	IL-Girgenti	Ghar Lapsi	Is-Salib Ta' L-Gholja	IL-Girgenti	IL-Fawwara
274	Triq It-Tabib Nikol Zammit	Siġġiewi	Ghar Lapsi	Is-Salib Ta' L-Gholja	IL-Kappella ta San Niklaw	Ir-Ramla IL-Hamra (Gozo)	IX-Xatt Ta' Marsaxlokk	IL-Buskett
275	Triq It-Tabib Nikol Zammit	Siġġiewi	Is-Salib Ta' L-Gholja	IL-Fawwara	Ghar Lapsi	IL-Fawwara	Ghar Lapsi	Dingli Cliffs
276	Triq It-Tabib Nikol Zammit	Siġġiewi	Ghar Lapsi	L-Istatwa Ta' San Nikola F'Misrah San Nikola	Wied Hesri	Ghar Lapsi	San Anton Gardens	Wied Iz-Zurrieq
277	Triq It-Tank	Siġġiewi	Ghar Lapsi	IL-Buskett	IL-Fawwara	Ghajn Tuffieha	IL-Fawwara	IL-Bahrija
278	Triq It-Tank	Siġġiewi	IL-Pjazza Ta' San Nikola	Is-Salib Ta' L-Gholja	IL-Fawwara	IL-Fawwara	IL-Buskett	Ghajn Tuffieha
279	Triq It-Tank	Siġġiewi	IL-Pjazza Ta' San Nikola	IL-Fawwara	IL-Girgenti	IL-Buskett	IL-Fawwara	IL-Girgenti
280	Manwel Dimech	Sliema	sea front	churches		Mdina	Rabat	
281	Manwel Dimech Street	Sliema	all sliema			Dwejra	Marsalforn	
282	Manwel Dimech Street	Sliema	Qui-Si-Sana			Mgarr		
283	Tonna Street	Sliema	Sliema Promenade			Buskett		
284	Tonna Street	Sliema	Ghar id-dud	Gnien Indipendenza		Dingli		
285	tonna street	Sliema	ghar id-dud	Stella Maris church		Sliema		

286	RudolphStreet	Sliema	Alhambra House			Mtahleb	Dingli	Fawwara
287	Rudolph Street	Sliema	Sliema Front			Ta'Qali		
288	Rudolph Street	Sliema	Sacro Cuor	Ghar id-dud		Sliema		
289	St Agatha Street	Sliema	Promenade	parks		Font Ghadir	Buskett	
290	St Agatha	Sliema	Gnien Indipenza	The Point		Mdina	San Anton	
291	St Agatha Street	Sliema	Gorg Bonello Dupuis	St Anne's square	Gnien Indipendenza	Mdina	Nadur	
292	Falzon Street	Sliema	public gardens	Gnien Indipendenza		Xaghri		
293	Falzon Street	Sliema	Ghar id-dud			Rabat		
294	Stella Maris Street	Sliema	Stella Maris Church	Towers	Ferry area	Buskett		
295	Stella Maris Street	Sliema	Stella Maris road	Old houses		Mellieha	St Paul's Bay	M'Xlokk
296	Stella Maris Street	Sliema	Rudolph street-Moorish house	St Anne's square	Sea+front	Kuncizzjoni	Gharghur Valley	
297	Melita street	Sliema	sea front			Attard gardens	Floriana	Grand Harbour
298	Melita street	Sliema						
299	Melita street	Sliema	Gnien Indipendenza	Sea front		Selmun	Ghajn tuffieha	Bird Sanctuary
300	Melita street	Sliema	Sea front	coffee shops		Blue Lagoon	Blue Grotto	
301	Borg Olivier Street	Sliema	Sliema promenade			Sliema front		
302	Borg Olivier Street	Sliema	Promenade	Tigne Point		Sliema Promenade	Wied iz zurrieq	
303	Borg Olivier Street	Sliema	The ferries	Promenade	Tigne	Ghar Lapsi	Comino	
304	borg olivier street	Sliema	Tigne Point	Dingli Circus	Promenade	Blue Grotto	M'Xlokk	Dingli cliffs
305	Depiro Street	Sliema	Independence Gardens	Tigne Point		Madliena	Senglea	

306	St Dominic Street	Sliema	Tigne	Exiles		Hagar Qim		
307	Gino Muscat	Sliema	Independence Gardens	Park at tigne	Promenade	Dingli Cliffs	Comino	
308	Tower Road	Sliema	Dingli Circus	Tigne	Sea front	Blue Grotto		
309	St Dominic Street	Sliema						
310	Tower Road	Sliema	Independence Gardens	Tigne	Ferries	Dwejra Gozo		
311	Wileg	St Lawrenz	Dwejra	Pjazza San Lawrence		Dwejra		
312	Pjazza San Lawrenz	St Lawrenz	Torri tad-Dwejra	It- Tieqa tad-Dwejra	Pjazza	Dwejra	Ta Cenc	
313	Pjazza San Lawrenz	St Lawrenz	Dwejra	San Dimitri		Dwejra		
314	Triq id-Duluri	St Lawrenz	Corner shop pjazza	DWejra	Knisja San Lawrenz	Dwejra	Comino	
315	Duluri	St Lawrenz	Gebla tal General	Torri tad - Dwejra	Tieqa tad-Dwejra	Dwejra		
316	Wileg Street	St Lawrenz	Ramla valley	Dwejra		Ramla Valley		
317	WILEG Street	St Lawrenz	Dwejra	Narrow streets	Church square	Dwejra	Mgarr ix xini	
318	Triq SAN LAWRENZ	St Lawrenz	Dwejra	Dwejra valley		Dwejra	Ta Pinu Walk	
319	Tower Street	St Lawrenz	Azure window	Inland sea	Cliffs overlooking dwejra valley	Dwejra	Ramla	
320	Wileg Street	St Lawrenz	St Lawrence Church	Dwejra	Cliffs	Dwejra		
321	Triq ta' Ciangura	St Lawrenz	Dwejra tower	Dwejra window	Chapels in square	Wied il Mielah	Dwejra	
322	Triq ta' Ciangura	St Lawrenz	Dwejra	Gebla tal General	Church	Village Square		
323	Wileg Street	St Lawrenz	Dwejra	village church		Near Ta Pinu		
324	Triq San Lawrenz	St Lawrenz	Dwejra window	General's	Dwejra tower	Mgar ix- xini	Wied il Mielah	Dwejra

				Rock				
325	Triq ta' Ciangura	St Lawrenz	Dwejra	Village church	Chapel in square	Near ta pinu	Wied il Ghasri	
326	Dun Salv Portelli Street	St Lawrenz	Village square	Chapel in village	Dwejra window and inland sea	Mgar ix- xini	HOndoq	Comino
327	Triq Ta' Ciangura	St Lawrenz	Park in Monserati	Dwejra	village square	Qbajjar	Dwejra	Comino
328	Monserat Street	St Lawrenz	Dwejra window	Village square	Village prominade	Promenade in front my house (San Lawrenz)		Dwejra tower
329	Dun Salv Portelli	St Lawrenz	Dwejra window	Inland sea		Ramla		
330	Bieb il Ghar	St Lawrenz	Dwejra window	General's Rock	qawra (inland sea)	Dwejra surroundings		
331	triq ta' ciangura	St Lawrenz	Village square		Church		In my own large garden, San Lawrenz	
332	Wileg Street	St Lawrenz	Dwejra	General's Rock	Church square and chapels	Wied il Mielah	Dwejra towers walk	San raflu
333	Wileg Street	St Lawrenz	Azzure window	Inland sea	Cliffs overlooking VALLEY	Dwejra	Ramla	Ghar - Ilma
334	Bieb il Ghar	St Lawrenz	Dwejra	Gebla tal General		Dwejra		
335	Dun Salv Portelli	St Lawrenz	Dwejra	Village square		Dwejra		
336	Triq it Torri	St Lawrenz	Dwejra window	Dwejra cliffs	St Lawrence promenade	Ta Pinu	Qbajjar	Dwejra
337	Wied Merill	St Lawrenz	Azzure window	General's rocK	Village square	Ramla	Dwejra	Qbajjar
338	Triq ta' Bieb il-Ghar	St Lawrenz	Dwejra	Pjazza ta San Lawrenz	San Dimitri	Dwejra	Lunzjata	San Dimitri
339	Triq Ta Bieb il-Ghar	St Lawrenz	Dwejra			Dwejra		

340	Triq il-Gebla tal-General	St Lawrenz	Dwejra			Dwejra		
341	triq San Gwann	Valletta	barrakka			Kuncizzjoni	bahar ic-caghaq	
342	triq San Gwann	Valletta	church Santu Wistin			Rabat Malta		
343	Old Bakery Str	Valletta	barrakka t'isfel	bajja tas-Sliema		barrakka t-isfel		
344	St Joseph Str	Valletta	M'Xlokk (suq)	front ta Xbiex	pjazza Regina l-Belt	il-veduta li ghandi mill gallerija		
345	St Joseph Str	Valletta						
346	St Joseph Str	Valletta	cimiterju (Paola)	Strada Rjali	Bugibba l-front	Zurrieq Blu Grotto	Rabat Malta, Mdina	
347	triq Republika	Valletta	barrakka t'isfel			barrakka ta fuq	barrakka t'isfel	
348	triq Republika	Valletta	Girgenti	salib ta l-gholja	Dingli Cliffs	Belt (Malta)	Mellieha	Girgenti
349	Republic Str	Valletta	Republic Str	taht il qanpiena (Belt)				
350	triq Teatru L-Antik	Valletta						
351	triq Teatru L-Antik	Valletta	St Johns Cathedral	Palazz tal Granmastri	Swar tal madwar	Mdina	Valletta	Marsamxett
352	triq West	Valletta	knisja tal Karmnu			Naxxar		
353	East Str	Valletta	barakka t'isfel	barakka ta fuq		barakka ta fuq	barakka t'isfel	
354	East Str	Valletta	barakka (both)	il-veduta ta' 3 cities	dahla tal port	had-Dingli	Mellieha	Bidnija
355	East Str	Valletta	barakka t'isfel	barakka ta fuq	Ta Qali	ta Qali	barakka (both)	
356	Christopher Str	Valletta	knisja ta San Frangisk	Strada Merkanti		Furjana gardens		
357	Christopher Str	Valletta	bahar taht is-sur	Knisja ta San	barakka	barakka	bahar taht is-sur,	

			(Valletta)	Pawl			Valletta		
358	Triq Biagio	Valletta				Buskett	Mellieha		
359	Triq Biagio	Valletta	Bastions Valletta	Barrakka Gardens	Floriana Gardens				
360	San Bastjan	Valletta	Barrakka	Fossa		Barrakka	Buskett	Selmun	
361	Triq Marsamxett	Valletta	Pjazzza San Gwann	Barrakka Gardens	Fortifications	By the sea	Barrakka Gardens		
362	Triq San Nikola	Valletta	Barrakka	Valletta Port	Fortifications	Mellieha Bay	Pembroke	Rabat country surroundings	
363	Triq San Nikola	Valletta	Fossa	Seaside Valletta		Buskett	San Anton		
364	Triq San Pawl	Valletta	St Elmo	Barrakka Gardens	Fortifications	Mellieha			
365	Triq marsamxett	Valletta	Fossa	Barrakka Gardens	Fortifications	Bahrija	Fiddien	Dingli	
366	Triq marsamxett	Valletta	Buskett	Barrakka Gardens		Buskett	Barrakka Gardens		
367	Triq Papa Piu V	Valletta	Buskett			Barrakka	Barrakka Gardens		
368	Triq Papa Piju V	Valletta	Valletta Waterfront	Bastions	Historical Places St John cathedral	Valletta Waterfront			
369	Misrah Mattia Preti	Valletta	Barrakka	Valletta square		Chadwick Lakes	Bahrija		
370	Triq san karlu	Valletta	Barrakka	Valletta gardens	Floriana Gardens	Gozo			
371	Triq san Pawl	Valletta	Barrakka	Valletta front	Valletta historical places	Buskett	Barrakka Gardens		
372	Triq Srug	Xaghra	Ggantija	Ninu's Cave	Ramla Dunes	Marsalforn	Dwejra		
373	Triq Srug	Xaghra	Ggantija	Marsalforn	Ramla				
374	Triq Srug	Xaghra	Ggantija						

375	Triq Ghonqa	Xaghra	Ir Ramla	Ggantija		Blue Lagoon	San Blas	ir- Ramla
376	Triq Ghonqa	Xaghra	Ggantija			Ta Cenc	L Ghadira Kercem	Ramla
377	Triq Masri	Xaghra	Ggantija	Marsalforn	Ramla	Xwejni	Ramla	Ghajn Barrani
378	Pjazza Vittorja	Xaghra	Il Mithna ta Kola	Ggantija	Ghar ta Ninu	Ir- Ramla	Wied il Mielah	Dwejra
379	Triq Marsalforn	Xaghra	Il Mithna	Ggantija	Church	Qbajjar bay	Wied il Mielah	
380	Patri Mathew Sultana	Xaghra	Valley	Mithna	Ggantija	Marsalforn	Qbajjar saltpens	Ghadira ta san raflu
381	Triq Marsalforn	Xaghra	Mithna ta Kelin	Ggantija	Ninu's caves	Dwejra	Kercem	Qbajjar
382	Pjazza Vittoria	Xaghra	Ggantija	Salvatur		Ggantija		
383	Triq Masri	Xaghra	Xerri's Grotto	Ggantija	Ramla	Ghajn Barrani	Ramla	
384	Triq Marsalforn	Xaghra	Ggantija	Ramla	Xerri's Grotto	Ghajn Barrani	Calypso Cave	
385	Triq Gnien Imrik	Xaghra	Calypso Cave area	Marsalforn Valley	Ramla Bay	Xwejni salt pans	Marsalforn valley	Ramla bay
386	Triq mikielang pace	Xaghra				Is-Srug	ta cenc cliffs	ramla bay
387	Triq l komuttiva	Xaghra	bajjiet	wieden	calyso			
388	Triq san guzepp	Xaghra						
389	Triq Marsalforn	Xaghra				il wied ta' Marsalforn	Qala fuq ir rih ta Kemmuna	
390	Triq L-Ghar ta Ninu	Xaghra	Ninu's Cave	Ramla	Ggantija	Ramla		
391	Triq Gnien Imrik	Xaghra	Ggantija	Calypso Cave	Ramla	Ta Cenc	Wied Tal Ghazien	Ramla Area
392	Triq Gajdoru	Xaghra						
393	Triq L-Ghar ta Xerri	Xaghra	Xerri's Grotto	Ggantija	Knisja tax-Xaghra	Ghajn Xejba	Ramla	
394	Triq San Anton	Xaghra	Ggantija	Xerri's Grotto	Ninu's Cave	Ramla	Wied ta Marsalforn	Ghajn Barrani
395	Triq Gnien Imrik	Xaghra	Ninu's Cave	Ggantija	Ghajn Barrani	Xwejni	Ramla	Ghajn Damma
396	Triq il-Knisja	Xaghra	Ggantija	Ramla	Xerri's Grotto	Ramla	Ras ir-Reqqa	Qbajjar
397	Triq Patri Mattew Sultana	Xaghra	Pjazza tax-XAGHRA	Ghajn Barrani	Ninu's Cave	Calypso Cave	Qbajjar	Ghajn Barrani
398	Triq Parisot	Xaghra	Ggantija	Xerri's Grotto	Ramla	Sellum tax	Ramla	Qbajjar

						Xaghra		
399	Triq Dun Gorg Preca	Xaghra	Xerri's Grotto	Ramla	Calypso Cave	Ramla	Dwejra	Marsalforn
400	Triq Qasam ta Dun Anton	Xaghra						
401	Triq it 8 ta Settembru	Xaghra	Xerri's Grotto	Calypso Cave	Ramla			

Appendix 11 - CNT places listed with spatial coordinates (Q. 13)

Respondent	Street address	Google lat/long		Q13b	Google lat/long		Q13c	Google lat/long	
#	*1*			*2*			*3*		
1	Triq il-marnisi M'Xlokk	35.839827	14.544467						
2	by the sea, M'Xlokk	35.839827	14.544467	Delimara Countyside	35.833117	14.562141	mtahleb/ Bahrija	35.894912	14.346532
3	Hofor	35.842243	14.563022	Delimara Countyside	35.833117	14.562141	Buskett	35.856152	14.39796
4	marnisi area	35.839827	14.544467	Delimara Countyside	35.833117	14.562141	Ghadira	35.96935	14.35063
5	sea side, M'Xlokk	35.839827	14.544467	Delimara	35.833117	14.562141	out at sea		
6	Kuncizzjoni	35.899774	14.349507	bahar ic-caghaq	35.939699	14.455984			
7	Rabat Malta	35.881909	14.398893						
8	barrakka t-isfel	35.89745	14.517446						
9	il-veduta li ghandi mill gallerija	35.899116	14.513535						
10	Zurrieq Blu Grotto	35.819682	14.452479	Rabat Malta, Mdina	35.881909	14.398893			
11	barrakka ta fuq	35.894946	14.512025	barrakka t'isfel	35.89745	14.517446			
12	Belt (Malta)	35.899116	14.513535	Mellieha	35.961098	14.360987	Girgenti	35.849181	14.41861
13	Mellieha	35.961098	14.360987	Dingli	35.851881	14.385641			
14	Buskett	35.856152	14.39796	Dingli	35.851881	14.385641	Landrijiet	35.886056	14.364764
15	Fomm ir- Rih	35.905731	14.339236	Mtahleb	35.880606	14.355243	Bahrija	35.894912	14.346532
16	Selmun	35.960419	14.38105	Dingli	35.851881	14.385641	Gozo	36.044776	14.239302
17	Zonqor	35.867711	14.573801	mellieha	35.961098	14.360987	Delimara	35.833117	14.562141
18	M'Xlokk Bay	35.839827	14.544467						
19	M'Xlokk Bay	35.839827	14.544467	M'Xlokk Square	35.839827	14.544467			
20	Buskett	35.856152	14.39796	Kennedy Grove	35.945321	14.418401	Pwales, Xemxija	35.946241	14.383232

21	at sea								
22	Mdina	35.886253	14.403204	Valletta	35.899116	14.513535	Marsamxett	35.900424	14.510421
23	Naxxar	35.914634	14.444231						
24	barakka ta fuq	35.894946	14.512025	barakka t'isfel	35.89745	14.517446			
25	had-Dingli	35.851881	14.385641	Mellieha	35.961098	14.360987	Bidnija	35.926399	14.398566
26	ta Qali	35.894616	14.416771	barakka (both)	35.894946	14.512025			
27	Furjana gardens	35.892515	14.50315						
28	barakka	35.894946	14.512025	bahar taht is-sur, Valletta	35.890079	14.508001			
29	Bahrija	35.894912	14.346532	Buskett	35.856152	14.39796	Kuncizzjoni	35.899774	14.349507
30	Chadwick Lakes	35.891929	14.389497	Bahrija	35.894912	14.346532	Buskett	35.856152	14.39796
31	Mtahleb	35.880606	14.355243	Bahrija	35.894912	14.346532	Buskett	35.856152	14.39796
32	Bahrija	35.894912	14.346532	Chadwick Lakes	35.891929	14.389497	Buskett	35.856152	14.39796
33	Bahrija	35.894912	14.346532	Chadwick Lakes	35.891929	14.389497	Buskett	35.856152	14.39796
34	Gnejna	35.920495	14.343663	Bahrija	35.894912	14.346532	Buskett	35.856152	14.39796
35	Dingli	35.851881	14.385641	Bahrija	35.894912	14.346532	Kuncizzjoni	35.899774	14.349507
36	Chadwick Lakes	35.891929	14.389497	Bahrija	35.894912	14.346532	Mtarfa	35.890829	14.396676
37	Fawwara	35.839649	14.409687	Bidnija	35.926399	14.398566	Bahrija	35.894912	14.346532
38	Buskett	35.856152	14.39796						
39	Dwejra	36.053248	14.191038	Wied il- Milah	36.078243	14.212699			
40	Wied il- Ghasri	36.078865	14.228655	Dwejra	36.053248	14.191038			
41	HONDOQ	36.027961	14.322005	Comino	36.014278	14.324146			
42	TA CENC	36.019715	14.26093	Dwejra	36.053248	14.191038			
43	DWEJRA	36.053248	14.191038	Ta cenc	36.019715	14.26093			
44	XWEJNI	36.076366	14.252158	Dwejra	36.053248	14.191038			
45	XLENDI	36.030635	14.216809	Gggantija	36.047244	14.269102			
46	MGARR IX XINI	36.020423	14.271111						

47	Ta Pinu area	36.061737	14.215311						
48	San Lawrenz -Rdum	36.055341	14.203517						
49	Villa Rundle	36.043356	14.243173						
50	Wied L-Ghasri	36.078865	14.228655	Wied ta Marsalforn	36.071393	14.25893			
51	Delimara	35.833117	14.562141						
52	Delimara	35.833117	14.562141						
53	Ta Qali	35.894616	14.416771						
54	Salib ta l-gholja	35.850235	14.41667	Delimara	35.833117	14.562141	Xatt ta M'Xlokk	35.839827	14.544467
55	M'Xlokk	35.839827	14.544467						
56	Dwejra	36.053248	14.191038						
57	Dwejra	36.053248	14.191038						
58	Lunzjata	36.042989	14.233023						
59	Lunzjata	36.042989	14.233023						
60	Dwejra	36.053248	14.191038	Xwejni	36.076366	14.252158			
61	Lunzjata	36.042989	14.233023						
62	Dwejra	36.053248	14.191038						
63	Dwejra	36.053248	14.191038	Ta Cenc	36.019715	14.26093			
64	Dwejra	36.053248	14.191038						
65	Dwejra	36.053248	14.191038	Comino	36.014278	14.324146			
66	Dwejra	36.053248	14.191038						
67	Ta Cenc	36.019715	14.26093						
68	Ta Cenc	36.019715	14.26093						
69	Ta Cenc	36.019715	14.26093	Mgarr ix-Xini	36.020423	14.271111			
70	Ta Cenc	36.019715	14.26093						
71	Xlendi	36.030635	14.216809						
72	Delimara	35.833117	14.562141	M'Xlokk	35.839827	14.544467			

73	Dwejra	36.053248	14.191038	Xlendi	36.030635	14.216809	Hondoq ir-Rummien	36.027961	14.322005
74	Buskett	35.856152	14.39796	Mdina bastions	35.8849	14.401896	San Anton Gardens	35.896089	14.447935
75	Buskett	35.856152	14.39796	Hastings Gardens	35.892515	14.50315	Furjana il-Mall	35.892515	14.50315
76	Mizieb	35.94488	14.360652	Bidnija	35.926399	14.398566	Ghadira	35.96935	14.35063
77	Fort Sant Angelo	35.892081	14.518546	Valletta Bastions	35.894946	14.512025	Mdina	35.886253	14.403204
78	Ghadira	35.96935	14.35063	Ghajn Tuffieha	35.93406	14.34428	Buskett	35.856152	14.39796
79	Buskett	35.856152	14.39796	Bajja tal mellieha	35.96935	14.35063	Xlendi Ghawdex	36.030635	14.216809
80	r-ramla l-hamra	36.061585	14.284122	zurrieq by boat	35.819682	14.452479	area tal fortizza wardija	35.93779	14.39271
81	st john's cathedral	35.899116	14.513535	dwejra	36.053248	14.191038	mdina bastions	35.8849	14.401896
82	toroq tal-birgu	35.888023	14.520392	bormla	35.881251	14.520519	valletta barrakka	35.894946	14.512025
83	mdina cathedral	35.886253	14.403204	tigne point	35.907569	14.511581	dwejra	36.053248	14.191038
84	dwejra	36.053248	14.191038	st johns cathedral	35.899116	14.513535	mdina bastions	35.8849	14.401896
85	Mtahleb	35.880606	14.355243	Wardija	35.93779	14.39271			
86	festa isla	35.885758	14.518311	ggantija	36.047244	14.269102	barakka valletta	35.894946	14.512025
87	hagar qim	35.827475	14.442783	tarxien tremples	35.869214	14.511284	mdina bastions	35.8849	14.401896
88	Buskett	35.856152	14.39796	Mosta Dome	35.909528	14.425948	Barrakka ta' fuq	35.894946	14.512025
89	blue grotto	35.819682	14.452479	fawwara	35.839649	14.409687			
90	is-salib tal-gholja	35.850235	14.41667	ghar lapsi	35.827757	14.423213	ghawdex id-dwejra	36.053248	14.191038
91	hagar qim	35.827475	14.442783	kappella tal-fawwara	35.839649	14.409687	girgenti	35.849181	14.41861
92	st johns cathedral valletta	35.899116	14.513535	port il kbir u l-barrakka valletta	35.890079	14.508001	waterfont	35.890079	14.508001
93	limestone heritage	35.853012	14.443159	zurrieq blue grotto	35.819682	14.452479	ghar lapsi	35.827757	14.423213
94	salib tal-gholja	35.850235	14.41667	hagar qim	35.827475	14.442783	mnajdra	35.827475	14.442783
95	girgenti	35.849181	14.41861	lapsi	35.827757	14.423213	fawwara	35.839649	14.409687
96	girgenti	35.849181	14.41861	ghar dalam	35.836603	14.528326	fawwara	35.839649	14.409687
97	Ta Cenc	36.019715	14.26093						
98	Ta cenc	36.019715	14.26093						

99	F'ghalqa privata								
100	Xwejni	36.076366	14.252158	Ta Cenc	36.019715	14.26093			
101	Ta Cenc	36.019715	14.26093	Dwejra	36.053248	14.191038	Lunzjata	36.042989	14.233023
102	TA Cenc	36.019715	14.26093						
103	Buskett	35.856152	14.39796	Mellieha	35.961098	14.360987			
104	Dwejra	36.053248	14.191038	Ta Cenc	36.019715	14.26093			
105	Ta Cenc	36.019715	14.26093						
106	Ta Cenc	36.019715	14.26093						
107	Ta Cenc	36.019715	14.26093						
108	Barrakka	35.894946	14.512025	Buskett	35.856152	14.39796	Selmun	35.960419	14.38105
109	By the sea			Barrakka Gardens	35.894946	14.512025			
110	Mellieha Bay	35.961098	14.360987	Pembroke	35.927444	14.471437	Rabat country surroundings	35.899774	14.349507
111	Buskett	35.856152	14.39796	San Anton	35.896089	14.447935			
112	Mellieha	35.961098	14.360987						
113	Bahrija	35.894912	14.346532	Fiddien	35.886238	14.379911	Dingli	35.851881	14.385641
114	Buskett	35.856152	14.39796	Barrakka Gardens	35.894946	14.512025			
115	Barrakka	35.894946	14.512025	Barrakka Gardens	35.894946	14.512025			
116	Valletta Waterfront	35.890079	14.508001						
117	Chadwick Lakes	35.891929	14.389497	Bahrija	35.894912	14.346532			
118	Gozo	35.881909	14.398893						
119	Buskett	35.856152	14.39796	Barrakka Gardens	35.894946	14.512025			
120	fawwara	35.839649	14.409687	hdejn id dar tal-providenza	35.837992	14.427436	dwejra gozo	36.053248	14.191038
121	fawwara	35.839649	14.409687	is-salib tal-gholja	35.850235	14.41667	girgenti	35.849181	14.41861
122	Fawwara	35.839649	14.409687	Ta'Qali	35.894616	14.416771	B'Bugia Pretty Bay	35.825304	14.529027
123	Ramla l-Hamra	36.061585	14.284122	Ggantija	36.047244	14.269102	Fawwara/Girgenti	35.839649	14.409687

124	Fawwara	35.839649	14.409687	Buskett	35.856152	14.39796	Lapsi	35.827757	14.423213
125	Fawwara	35.839649	14.409687	Dingli Cliffs	35.851881	14.385641	Dwejra	36.053248	14.191038
126	Fawwara	35.839649	14.409687	Lapsi bahar	35.827757	14.423213	Girgenti	35.849181	14.41861
127	San Anton Attard	35.896089	14.447935	Gnien haz Zejtun Mellieha	35.965851	14.367118	Selmun	35.960419	14.38105
128	ghadira	35.96935	14.35063	cirkewwa	35.983168	14.333852	selmun	35.960419	14.38105
129	dingli	35.851881	14.385641	buskett	35.856152	14.39796	mellieha	35.961098	14.360987
130	ghadira	35.96935	14.35063	ghajn tuffieha	35.93406	14.34428	l-ahrax	35.98466	14.364468
131	mellieha kollu	35.961098	14.360987	selmun	35.960419	14.38105	ghajn tuffieha	35.93406	14.34428
132	selmun	35.960419	14.38105	l-ahrax	35.98466	14.364468	majjistral park	35.944235	14.339761
133	Dwejra	36.053248	14.191038						
134	Dwejra	36.053248	14.191038	Ta Cenc	36.019715	14.26093			
135	Ta Cenc	36.019715	14.26093						
136	Ta Cenc	36.019715	14.26093						
137	Zurrieq	35.819682	14.452479						
138	Buskett	35.856152	14.39796	Delimara	35.833117	14.562141			
139	Rabat	35.881909	14.398893						
140	Howard Gardens (Rabat)	35.8849	14.401896	Il-Buskett	35.856152	14.39796	Il-Gnejna	35.920495	14.343663
141	Delimara	35.833117	14.562141						
142	M'Xlokk	35.839827	14.544467						
143	Delimara	35.833117	14.562141						
144	Santa Katerina (Ir-Rabat)	35.881909	14.398893	Dingli Cliffs	35.851881	14.385641	Il-Lunzjata (Ghawdex)	36.042989	14.233023
145	Delimara	35.833117	14.562141	Xorb L'Ghagin	35.843876	14.565978			
146	Il-Buskett	35.856152	14.39796	Had-Dingli	35.851881	14.385641	Nature Reserve tal-Mellieha	35.970393	14.349211
147	Il-Buskett	35.856152	14.39796	Il-Gnejna	35.920495	14.343663	Wied-Qirda (Zebbug Malta)	35.862584	14.468708
148	IL-Buskett	35.856152	14.39796	Ix-Xatt tal-blat taht il-promenade f'Tas-Sliema	35.917127	14.500807	Ghar Lapsi	35.827757	14.423213

149	IL-Buskett	35.856152	14.39796	IL-Kuncizzjoni (Rabat)	35.899774	14.349507	IL-Bahrija	35.894912	14.346532
150	Il-Buskett	35.856152	14.39796	Chadwick Lakes	35.891929	14.389497	Selmun	35.960419	14.38105
151	Chadwick Lakes	35.891929	14.389497	IL-Bahrija	35.894912	14.346532	Il-Buskett	35.856152	14.39796
152	Il-Wied tal-Qlejja (Chadwick Lakes)	35.891929	14.389497	IL-Buskett	35.856152	14.39796	Howard Gardens	35.8849	14.401896
153	L-Imtahleb	35.880606	14.355243	Ic-Chadwick Lakes	35.891929	14.389497	IL-Bahrija	35.894912	14.346532
154	L-Imtahleb	35.880606	14.355243	Chadwick Lakes	35.891929	14.389497	Is-Santi (jaghmel parti ma Bingemma)	35.910901	14.373339
155	IL-Buskett	35.856152	14.39796	Dingli Cliffs	35.851881	14.385641	Chadwick Lakes	35.891929	14.389497
156	IL-Buskett	35.856152	14.39796	Dingli Cliffs	35.851881	14.385641	L-Imtahleb	35.880606	14.355243
157	Il-Qammieh L/O Ghadira	35.96935	14.35063	Il-Bajja Tal-Mellieha	35.96935	14.35063	L-Armier	35.991646	14.360933
158	Selmun	35.960419	14.38105	Manikata	35.941511	14.352889	Dingli	35.851881	14.385641
159	Ghar Lapsi (Siggiewi)	35.827757	14.423213	Il-Bajja tax-Xlendi	36.030635	14.216809	Il-Bajja Ta' Marsalforn	36.071393	14.25893
160	Dingli Cliffs	35.851881	14.385641	L-Ahrax Tal-Mellieha	35.98466	14.364468	Is-Salib Ta' L-Gholja (Siggiewi)	35.850235	14.41667
161	Dingli Cliffs	35.851881	14.385641	Il-Buskett	35.856152	14.39796	L-Armier	35.991646	14.360933
162	Dingli Cliffs	35.851881	14.385641	Chadwick Lakes	35.891929	14.389497	Il-Kuncizzjoni (Rabat)	35.899774	14.349507
163	Il-Mistra	35.95833	14.389644	Is-Salib Ta' L-Gholja	35.850235	14.41667	Chadwick Lakes	35.891929	14.389497
164	IL-Fawwara	35.839649	14.409687	Is-Salib Ta' L-Gholja	35.850235	14.41667	IL-Buskett	35.856152	14.39796
165	Il-Buskett	35.856152	14.39796	Ghar-Dalam (B'Bugia)	35.836603	14.528326	Ghajn Tuffieha	35.93406	14.34428
166	IL-Buskett	35.856152	14.39796	IL-Girgenti	35.849181	14.41861	Ghar Lapsi	35.827757	14.423213
167	IL-Buskett	35.856152	14.39796	IL-Fawwara	35.839649	14.409687	Hondoq Ir-Rummien (Ghawdex)	36.027961	14.322005
168	IL-Buskett	35.856152	14.39796	IL-Girgenti	35.849181	14.41861	IL-Fawwara	35.839649	14.409687
169	Gnien taz-Zejtun	35.855114	14.533934						
170	Madwar IL-Kappella Tal-Providenza	35.854618	14.438332	Ghar Lapsi	35.827757	14.423213	IL-Fawwara	35.839649	14.409687
171	Is-Salib Ta' L-Gholja	35.850235	14.41667	Wied Hesri	35.858693	14.431713	IL-Fawwara	35.839649	14.409687
172	IL-Fawwara (Siggiewi)	35.839649	14.409687	Ghar Lapsi (Siggiewi)	35.827757	14.423213	Wied Hesri (Siggiewi)	35.858693	14.431713

173	Il-Fawwara (Siggiewi)	35.839649	14.409687	Il-Girgenti (Siggiewi)	35.849181	14.41861	Is-Salib Ta' L-Gholja (Siggiewi)	35.850235	14.41667
174	IL-Buskett	35.856152	14.39796	IL-Fawwara	35.839649	14.409687	IL-Girgenti	35.849181	14.41861
175	Is-Salib Ta' L-Gholja	35.850235	14.41667	IL-Girgenti	35.849181	14.41861	IL-Fawwara	35.839649	14.409687
176	selmun	35.960419	14.38105	ghajn tuffieha	35.93406	14.34428	ghadira u bird park	35.96935	14.35063
177	ghadira	35.96935	14.35063	ghajn tuffieha	35.93406	14.34428	dwejra ghawdex	36.053248	14.191038
178	Mdina	35.886253	14.403204	Rabat	35.881909	14.398893			
179	Dwejra	36.053248	14.191038	Marsalforn	36.071393	14.25893			
180	Mgarr	35.91943	14.366547						
181	Buskett	35.856152	14.39796						
182	Dingli	35.851881	14.385641						
183	Sliema	35.917127	14.500807						
184	Ir-Ramla IL-Hamra (Gozo)	36.061585	14.284122	IX-Xatt Ta' Marsaxlokk	35.841284	14.54501	IL-Buskett	35.856152	14.39796
185	IL-Fawwara	35.839649	14.409687	Ghar Lapsi	35.827757	14.423213	Dingli Cliffs	35.851881	14.385641
186	Ghar Lapsi	35.827757	14.423213	San Anton Gardens	35.896089	14.447935	Wied Iz-Zurrieq	35.819682	14.452479
187	Ghajn Tuffieha	35.93406	14.34428	IL-Fawwara	35.839649	14.409687	IL-Bahrija	35.894912	14.346532
188	IL-Fawwara	35.839649	14.409687	IL-Buskett	35.856152	14.39796	Ghajn Tuffieha	35.93406	14.34428
189	IL-Buskett	35.856152	14.39796	IL-Fawwara	35.839649	14.409687	IL-Girgenti	35.849181	14.41861
190	Dahlet Qorrot	36.048725	14.316761						
191	Dahlet Qorrot	36.048725	14.316761						
192	Fejn it torri ta kenuna	36.035522	14.284025	36.035522, 14.284025	36.051834	14.290985			
193	Qortin San Filep	36.05005	14.314339						
194	Dahlet Qorrot	36.048725	14.316761						
195	Mtahleb	35.880606	14.355243	Dingli	35.851881	14.385641	Fawwara	35.839649	14.409687
196	Ta'Qali	35.894616	14.416771						
197	Sliema	35.917127	14.500807						

198	Mellieha	35.961098	14.360987						
199	Selmun	35.960419	14.38105						
200	Zurrieq	35.819682	14.452479	Buskett	35.856152	14.39796	Had Dingli	35.851881	14.385641
201	Dwejra	36.053248	14.191038						
202	Sliema	35.917127	14.500807	Ghadira	35.96935	14.35063			
203	Dingli Cliffs	35.851881	14.385641	Mellieha	35.961098	14.360987			
204	Mellieha	35.961098	14.360987						
205	Mellieha Front	35.96935	14.35063						
206	Font Ghadir	35.916215	14.504359	Buskett	35.856152	14.39796			
207	Mdina	35.886253	14.403204	San Anton	35.896089	14.447935			
208	Buskett	35.856152	14.39796	Ghajn Tuffieha	35.93406	14.34428			
209	St Anton	35.896089	14.447935	M'Xlokk	35.839827	14.544467			
210	Mgarr	35.91943	14.366547						
211	Mdina	35.886253	14.403204	Nadur	36.051834	14.290985			
212	Xaghri	36.019715	14.26093						
213	Rabat	35.881909	14.398893						
214	Ahrax Tal-Mellieha	35.98466	14.364468	Mellieha	35.961098	14.360987			
215	Buskett	35.856152	14.39796						
216	Gnien Tar-Rabat	35.8849	14.401896						
217	Il-Gnien	35.8849	14.401896						
218	Rabat	35.881909	14.398893						
219	Buskett	35.856152	14.39796						
220	Mellieha	35.961098	14.360987	St Paul's Bay	35.946225	14.383159	M'Xlokk	35.839827	14.544467
221	Kuncizzjoni	35.899774	14.349507	Gharghur Valley	35.926906	14.461078			
222	Attard gardens	35.896089	14.447935	Floriana	35.892515	14.50315	Grand Harbour	35.890079	14.508001
223	Selmun	35.960419	14.38105	Ghajn tuffieha	35.93406	14.34428	Bird Sanctuary	35.970393	14.349211

224	Blue Lagoon	36.014278	14.324146	Blue Grotto	35.819682	14.452479			
225	Selmun	35.960419	14.38105	Dingli	35.851881	14.385641			
226	Mellieha	35.961098	14.360987						
227	Ghadira reserva	35.970393	14.349211	Foresta 2000	35.94488	14.360652	Buskett	35.856152	14.39796
228	Rabat	35.881909	14.398893	Selmun	35.960419	14.38105			
229	Ramla	36.061585	14.284122						
230	Ramla	36.061585	14.284122						
231	Rdum t' Esopu	36.055347	14.309032						
232	Dahlet Qorrot	36.048725	14.316761						
233	San Blas	36.056771	14.300727						
234	selmun mgiebah	35.960419	14.38105	mizieb	35.94488	14.360652	gnejna	35.920495	14.343663
235	Marsalforn	36.071393	14.25893	ta silg m'xlokk	35.845017	14.552346			
236	selmun	35.960419	14.38105						
237	wied iz zurrieq	35.819682	14.452479						
238	il wied, B'Kara	35.899571	14.46514						
239	ghajn tuffieha	35.93406	14.34428	l-ahrax tal-Mellieha	35.98466	14.364468			
240	ramlet il qortin	35.986891	14.351957	selmun	35.960419	14.38105			
241	l imgiebah	35.952186	14.382463						
242	selmun	35.960419	14.38105	mistra	35.95833	14.389644	L ahrax	35.98466	14.364468
243	l ahrax	35.98466	14.364468						
244	mistra	35.95833	14.389644	l imgiebah	35.952186	14.382463			
245	Ramla	36.061585	14.284122						
246	L ghalqa privata								
247	Ramla	36.061585	14.284122						
248	salini	35.947985	14.42547						
249	Qalet Marku	35.943028	14.450688	Id dwejra	36.053248	14.191038			

250	Gnien tal Kunsill	36.037825	14.293983						
251	Ramla	36.061585	14.284122						
252	mizieb	35.94488	14.360652	wied il ghasel	35.920554	14.42974			
253	wied speranza	35.909389	14.419184						
254	Selmun	35.960419	14.38105						
255	Buskett	35.856152	14.39796						
256	chadwick lakes	35.891929	14.389497						
257	xlendi	36.030635	14.216809						
258	Ramla	36.061585	14.284122						
259	Dahlet Qorrot	36.048725	14.316761						
260	IL Mizieb	35.94488	14.360652						
261	Belvedere Nadur	36.051834	14.290985						
262	Imgiebah	35.952186	14.382463						
263	Ramla	36.061585	14.284122						
264	Ramla	36.061585	14.284122						
265	buskett	35.856152	14.39796						
266	barakka	35.894946	14.512025						
267	Wied incinta	35.882371	14.432682						
268	Ramla valley	36.061585	14.284122						
269	Dwejra	36.053248	14.191038	Mgarr ix Xini	36.020423	14.271111			
270	Dwejra	36.053248	14.191038	Ta Pinu walk	36.061737	14.215311			
271	Dwejra	36.053248	14.191038	Ramla	36.061585	14.284122			
272	Dwejra	36.053248	14.191038						
273	Sliema front	35.917127	14.500807						
274	Sliema promenade	35.917127	14.500807	Wied iz Zurrieq	35.819682	14.452479			
275	Ghar Lapsi	35.827757	14.423213	Comino	36.014278	14.324146			

276	Blue Grotto	35.819682	14.452479	M'Xlokk	35.839827	14.544467	Dingli cliffs	35.851881	14.385641
277	Madliena	35.923821	14.467737	Senglea	35.885758	14.518311			
278	Hagar Qim	35.827475	14.442783						
279	Dingli cliffs	35.851881	14.385641	comino	36.014278	14.324146			
280	Dwejra Gozo	36.053248	14.191038						
281	Xorb l-Ghagin	35.843876	14.565978	mellieha	35.961098	14.360987	Mizieb	35.94488	14.360652
282	Dingli Cliffs	35.851881	14.385641						
283	Marsalforn	36.071393	14.25893	Dwejra	36.053248	14.191038			
284	Blue Lagoon	36.014278	14.324146	San Blas	36.056771	14.300727	ir- Ramla	36.061585	14.284122
285	Ta Cenc	36.019715	14.26093	L Ghadira Kercem	36.036626	14.19912	Ramla	36.061585	14.284122
286	Xwejni	36.076366	14.252158	Ramla	36.061585	14.284122	Ghajn Barrani	36.06907	14.270042
287	tal wej	35.91706	14.432991	HAGAR QIM	35.827475	14.442783			
288	blue grotto	35.819682	14.452479						
289	dwejra gozo	36.053248	14.191038						
290	mistra	35.95833	14.389644						
291	mgiebah	35.952186	14.382463						
292	marsalforn	36.071393	14.25893	Ta Cenc	36.019715	14.26093			
293	ghajn barrani	36.06907	14.270042	Sunset Dwejra	36.053248	14.191038	Is Salini Tax Xwejni	36.076366	14.252158
294	lunzjata	36.042989	14.233023	Ghadira Ta San Raflu	36.036648	14.19912	Xlendi	36.030635	14.216809
295	wied il mielah	36.078243	14.212699	DWEJRA	36.053248	14.191038			
296	village square	36.055341	14.203517						
297	near ta pinu	36.061737	14.215311						
298	mgar ix- xini	36.020423	14.271111	WIED IL MIELAH	36.078243	14.212699	DWEJRA	36.053248	14.191038
299	near ta pinu	36.061737	14.215311	WIED IL GHASRI	36.078865	14.228655			
300	mgar ix- xini	36.020423	14.271111	HONDOQ	36.027961	14.322005	COMINO	36.014278	14.324146
301	qbajjar	36.076305	14.252264	DWEJRA	36.053248	14.191038	COMINO	36.014278	14.324146

302	promenade in front my house (san lawrenz)	36.055341	14.203517	DWEJRA TOWER	36.053248	14.191038			
303	ramla	36.061585	14.284122						
304	ta cenc	36.019715	14.26093	Dwejra	36.053248	14.191038			
305	dwejra surroundings	36.053248	14.191038						
306	in my own large garden, san lawrenz	36.055341	14.203517						
307	wied il mielah	36.078243	14.212699	DWEJRA TOWERS WALK	36.053248	14.191038	SAN RAFLU	36.036648	14.19912
308	fuq is sur	35.894946	14.512025	Dwejra	36.053248	14.191038	Marsalforn	36.071393	14.25893
309	dwejra	36.053248	14.191038	RAMLA	36.061585	14.284122	GHAR - ILMA	36.044244	14.218153
310	dwejra	36.053248	14.191038						
311	dwejra	36.053248	14.191038						
312	xwejni	36.076366	14.252158	Dwejra	36.053248	14.191038	Xlendi	36.030635	14.216809
313	ta pinu	36.061737	14.215311	QBAJJAR	36.076305	14.252264	DWEJRA	36.053248	14.191038
314	ramla	36.061585	14.284122	DWEJRA	36.053248	14.191038	QBAJJAR	36.076305	14.252264
315	ir- ramla	36.061585	14.284122	WIED IL MIELAH	36.078243	14.212699	DWEJRA	36.053248	14.191038
316	qbajjar bay	36.076305	14.252264	WIED IL MIELAH	36.078243	14.212699			
317	marsalforn	36.071393	14.25893	QBAJJAR SALTPENS	36.076305	14.252264	GHADIRA TA SAN RAFLU	36.036648	14.19912
318	dwejra	36.053248	14.191038	KERCEM	36.041834	14.227568	QBAJJAR	36.076305	14.252264
319	ggantija	36.047244	14.269102						
320	Ta Cenc	36.019715	14.26093	Dwejra	36.053248	14.191038	Xlendi	36.030635	14.216809
321	Ghadira Ta San Rafflu	36.036648	14.19912	Ta Cenc	36.019715	14.26093	Xlendi	36.030635	14.216809
322	Ta Cenc	36.019715	14.26093	Mgarr ix- Xini	36.020423	14.271111			
323	Ta Cenc	36.019715	14.26093	Mgarr ix-Xini	36.020423	14.271111	Saguna Cliffs	36.019822	14.236692
324	Ta Cenc	36.019715	14.26093	Mgarr ix-Xini	36.020423	14.271111			
325	Xwejni	36.076366	14.252158						
326	Marsalforn	36.071393	14.25893	Dwejra	36.053248	14.191038	Xlendi	36.030635	14.216809

327	Xlendi	36.030635	14.216809						
328	Fanal Ta Gordan	36.059017	14.22032	Villa Rundle	36.043356	14.243173	Lunzjata u widien ohra	36.042989	14.233023
329	Wied il Ghasri	36.078865	14.228655	Xwejni	36.076366	14.252158	Qbajjar	36.076305	14.252264
330	Dahlet qorrot	36.048725	14.316761						
331	Dingli cliffs	35.851881	14.385641	HAGAR QIM	35.827475	14.442783			
332	Dwejra gozo	36.053248	14.191038						
333	Ghajn Barrani	36.06907	14.270042	Ramla	36.061585	14.284122			
334	Xwejni	36.076366	14.252158	Dwejra	36.053248	14.191038	Xlendi	36.030635	14.216809
335	Ghajn Barrani	36.06907	14.270042	Calypso Cave	36.060674	14.279596			
336	Dwejra	36.053248	14.191038	Lunzjata	36.042989	14.233023	San Dimitri	36.071112	14.204506
337	Ta' Qali	35.894616	14.416771	Buskett	35.856152	14.39796			
338	San blas	36.056771	14.300727	Dahlet qorrot	36.048725	14.316761	Dwejra	36.053248	14.191038
339	Xwejni salt pans	36.076366	14.252158	Marsalforn valley	36.071393	14.25893	Ramla bay	36.061585	14.284122
340	Ta Cenc	36.019715	14.26093	Mgarr ix-Xini	36.020423	14.271111			
341	Wied l ghasri	36.078865	14.228655	San blas	36.056771	14.300727	Kemuna	36.014278	14.324146
342	Is-Srug			ta cenc cliffs	36.019715	14.26093	ramla bay	36.061585	14.284122
343	Dahlet qorrot	36.048725	14.316761	Wied San blas	36.056771	14.300727	Wileg, qala	36.039742	14.312184
344	San blas	36.056771	14.300727	Dahlet qorrot	36.048725	14.316761			
345	San blas	36.056771	14.300727	Dahlet qorrot	36.048725	14.316761			
346	Ta Cenc	36.019715	14.26093	Ramla	36.061585	14.284122			
347	il wied ta' Marsalforn	36.071393	14.25893	Qala fuq ir rih ta Kemmuna	36.039742	14.312184			
348	San Blas	36.056771	14.300727	Wied il- Mielah	36.078243	14.212699	Ramla Cave	36.061585	14.284122
349	Dwejra	36.053248	14.191038						
350	Dwejra	36.053248	14.191038						
351	Ramla	36.061585	14.284122						
352	Ta Cenc	36.019715	14.26093	Wied Tal Ghazien			Ramla Area	36.061585	14.284122

353	Is-Sanap	36.019715	14.26093	Ta Cenc	36.019715	14.26093	Xlendi Cliffs	36.030635	14.216809
354	Mgarr ix Xini	36.020423	14.271111	Ta Cenc	36.019715	14.26093	Dwejra	36.053248	14.191038
355	Ghajn Xejba	36.050231	14.264667	Ramla	36.061585	14.284122			
356	Ramla	36.061585	14.284122	Wied ta Marsalforn	36.071393	14.25893	Ghajn Barrani	36.06907	14.270042
357	Xwejni	36.076366	14.252158	Ramla	36.061585	14.284122	Ghajn Damma	36.054471	14.257795
358	Ramla	36.061585	14.284122	Ras ir-Reqqa	36.081161	14.235704	Qbajjar	36.076305	14.252264
359	Calypso Cave	36.060674	14.279596	Qbajjar	36.076305	14.252264	Ghajn Barrani	36.06907	14.270042
360	Sellum tax Xaghra	36.050231	14.264667	Ramla	36.061585	14.284122	Qbajjar	36.076305	14.252264
361	Ramla	36.061585	14.284122	Dwejra	36.053248	14.191038	Marsalforn	36.071393	14.25893

Appendix 12 - PA places listed with spatial coordinates (Q.10)

Respondent	Q10	Google lat/long		Q10a	Google lat/long		Q10b	Google lat/long	
#	*1*			*2*			*3*		
1	Marnisi	35.839827	14.544467	Delimara	35.833117	14.562141			
2	Delimara	35.833117	14.562141	Kalanka	35.824425	14.559693			
3	Delimara	35.833117	14.562141	Hofor M'Xlokk	35.842243	14.563022	M'Xlokk Promenade	35.83983	14.54447
4	Delimara	35.833117	14.562141	Marnisi Area	35.839827	14.544467	St Peter's Pool M'Xlokk	35.83312	14.56214
5	M'Xlokk Promenade	35.839827	14.544467	M'Xlokk at sea	35.839827	14.544467			
6	barrakka	35.894946	14.512025						
7	church Santu Wistin	35.898507	14.510891						
8	barrakka t'isfel	35.89745	14.517446	bajja tas-Sliema	35.917127	14.500807			
9	M'Xlokk (suq)	35.839827	14.544467	front ta Xbiex	35.908642	14.502718	pjazza Regina l-Belt	35.89912	14.51354
10									
11	cimiterju (Paola)	35.871121	14.50012	Strada Rjali	35.899116	14.513535	Bugibba l-front	35.95241	14.40902
12	barrakka t'isfel	35.89745	14.517446						
13	Girgenti	35.849181	14.41861	salib ta l-gholja	35.850235	14.41667	Dingli Cliffs	35.85188	14.38564
14	Republic Str	35.899116	14.513535	taht il qanpiena (Belt)	35.898587	14.518456			
15	san Pawl Rabat	35.881909	14.398893	Howard Gardens	35.8849	14.401896	saqqajja	35.88295	14.40515
16	Il-Foss Mdina	35.8849	14.401896	Buskett	35.856152	14.39796	Dingli	35.85188	14.38564
17	Fomm ir-Rih	35.905731	14.339236						
18	selmun	35.960419	14.38105	Dingli	35.851881	14.385641			
19	St peters	35.833117	14.562141	Delimara	35.833117	14.562141			
20	Bajja Marsaxlokk	35.839827	14.544467	Delimara	35.833117	14.562141			
21	Square Marsaxlokk	35.841284	14.54501	By the sea	35.841284	14.54501			
22	Square Marsaxlokk	35.841284	14.54501	Delimara	35.833117	14.562141			
23	at sea			M'xlokk Square	35.839827	14.544467			
24									
25	St Johns Cathedral	35.899116	14.513535	Palazz tal	35.899116	14.513535	Swar tal	35.89495	14.51203

				Granmastri			madwar		
26	knisja tal Karmnu	35.900097	14.51232						
27	barakka t'isfel	35.89745	14.517446	barakka ta fuq	35.894946	14.512025			
28	barakka (both)	35.894946	14.512025	il-veduta ta' 3 cities	35.894946	14.512025	dahla tal port	35.89008	14.508
29	barakka t'isfel	35.89745	14.517446	barakka ta fuq	35.894946	14.512025	Ta Qali	35.89462	14.41677
30	knisja ta San Frangisk	35.897218	14.510877	Strada Merkanti	35.899116	14.513535			
31	bahar taht is-sur (Valletta)	35.890079	14.508001	Knisja ta San Pawl	35.881921	14.398878	barakka	35.89495	14.51203
32	Buskett	35.856152	14.39796	Bahrija	35.894912	14.346532	Kuncizzjoni	35.89977	14.34951
33	Buskett	35.856152	14.39796	Mdina	35.886253	14.403204	Chadwick Lakes/Mtahleb	35.89193	14.3895
34	Howard Gardens	35.8849	14.401896	Mdina	35.886253	14.403204			
35	Buskett	35.856152	14.39796	Bahrija	35.894912	14.346532	Chadwick Lakes	35.89193	14.3895
36	Bidnija	35.926399	14.398566	Mtarfa	35.890829	14.396676	Howard Gardens	35.8849	14.4019
37	Gnejna	35.920495	14.343663	bahrija	35.894912	14.346532	Mdina	35.88625	14.4032
38	Howard Gardens	35.8849	14.401896	bahrija	35.894912	14.346532	Mdina	35.88625	14.4032
39	Howard Gardens	35.8849	14.401896	Chadwick Lakes	35.891929	14.389497	Mtarfa	35.89083	14.39668
40	Howard Gardens	35.8849	14.401896	Mdina	35.886253	14.403204	Fuq is-sur	35.89495	14.51203
41	San Bastjan	35.878384	14.401563	Mdina	35.886253	14.403204	saqqajja	35.88295	14.40515
42	Citadella	36.046665	14.239474	Is-Sur	35.894946	14.512025	Pjazza San Gorg	36.04478	14.2393
43	CITADELLA	36.046665	14.239474	VILLA RUNDLE	36.043356	14.243173	TOKK	36.04478	14.2393
44	CITADELLA	36.046665	14.239474	PJAZZA SAN GORG	36.044776	14.239302	VILLA RANDAL	36.04336	14.24317
45	CITADELLA	36.046665	14.239474	TEATRU	36.046665	14.239474			
46	BAZILICA	36.061737	14.215311	Citadella	36.046665	14.239474			
47	SAN GORG	36.044776	14.239302						
48	CITADELLA	36.046665	14.239474	Villa Rundle	36.043356	14.243173	THE LANES SQAQIJIET		
49	SAN GORG	36.044776	14.239302	Citadella	36.046665	14.239474			
50	CITADELLA	36.046665	14.239474	Tokk	36.044776	14.239302			
51	CITADELLA	36.046665	14.239474	Villa Rundle	36.043356	14.243173			
52	Cittadella	36.046665	14.239474	Pjazza Indipendenza	36.044877	14.239046	Villa Rundle	36.04336	14.24317
53	Katidral	36.046665	14.239474						

54	Cittadella	36.046665	14.239474						
55	seafront M'Xlokk	35.839827	14.544467						
56	Bugibba	35.952413	14.409016	Delimara	35.833117	14.562141			
57	Knisja ta Pompei	35.841284	14.54501						
58	Seafront	35.841284	14.54501						
59									
60									
61	Katidral	36.046665	14.239474	Ministeru			Sta Martha	36.0421	14.2472
62	Cittadella	36.046665	14.239474	Villa rundle	36.043356	14.243173			
63	Katidral	36.046665	14.239474	Villa rundle	36.043356	14.243173	San gorg	36.04478	14.2393
64	Katidral	36.046665	14.239474						
65	Katidral	36.046665	14.239474						
66	Cittadella	36.046665	14.239474						
67	DWEJRA	36.053248	14.191038	pjazza san lawrence	36.055341	14.203517			
68	TORRI TAD-DWEJRA	36.053248	14.191038	it- tieqa tad-dwejra	36.053248	14.191038	PJAZZA	36.05534	14.20352
69	DWEJRA	36.053248	14.191038	san dimitri	36.071112	14.204506			
70	CORNER SHOP PJAZZA	36.055341	14.203517	dwejra	36.053248	14.191038	KNISJA SAN LAWRENZ	36.05534	14.20352
71	GEBLA TAL GENERAL	36.053248	14.191038	torri tad - dwejra	36.053248	14.191038	TIEQA TAD-DWEJRA	36.05325	14.19104
72	Ta Cenc	36.019715	14.26093						
73	Ta Cenc	36.019715	14.26093						
74	Ta Cenc	36.019715	14.26093						
75	Ta Cenc	36.019715	14.26093						
76	Ta Cenc	36.019715	14.26093						
77	Playing Field Sannat	36.029762	14.241532						
78	Xorb l-ghagin	35.843876	14.565978						
79									
80	Dwejra	36.053248	14.191038						
81	basilica st helen	35.899571	14.46514	stazzjoni antika	35.886885	14.399493	nicec		
82	il-knisja il-Qadima	35.899571	14.46514	Basilica St Elena	35.899571	14.46514	Stazzjon	35.88689	14.39949
83	Basilica St helen	35.899571	14.46514						
84	Il Wied ta' Bkara	35.899571	14.46514	Basilica	35.899571	14.46514			

85	Stazzjon	35.895258	14.463973	Basilica	35.899571	14.46514	Pjazzez u kappelli		
86	Basilika	35.899571	14.46514	L-Istazzjon	35.886885	14.399493	Pjazza ta Santa Elena	35.89957	14.46514
87	stazzjon	35.895258	14.463973	diversi knejjes			nicec		
88	toroq antiki u sqaqin			basilica	35.899571	14.46514	stazzjon	35.88689	14.39949
89	bandli			basilica	35.899571	14.46514	sqaq		
90									
91									
92	Santa Elena B asilica	35.899571	14.46514						
93									
94									
95									
96	toroq antiki			salib ta' l-gholja	35.850235	14.41667	pjazza san nikola	35.85462	14.43833
97	knisja san niklaw	35.83517	14.441481	fawwara	35.839649	14.409687	lapsi	35.82776	14.42321
98	is-salib tal-gholja	35.850235	14.41667	fawwara	35.839649	14.409687	ghar lapsi	35.82776	14.42321
99	salib tal-gholja	35.850235	14.41667	pjazza san nikol	35.854618	14.438332	knisja il-qadima	35.85462	14.43833
100	salib tal-gholja	35.850235	14.41667	fawwara (Kappella tal-karmnu)	35.839649	14.409687	dar tal-providenza	35.83799	14.42744
101	salib tal-gholja	35.850235	14.41667	fawwara	35.839649	14.409687	lapsi	35.82776	14.42321
102	parocca san nikola	35.854618	14.438332	nicec fit-toroq			salib tal-gholja	35.85024	14.41667
103	salib tal-gholja	35.850235	14.41667	lapsi	35.827757	14.423213	girgenti	35.84918	14.41861
104	Ta Cenc	36.019715	14.26093						
105	Ta Cenc	36.019715	14.26093						
106	Knisja Sannat	36.029762	14.241532	Ta Cenc	36.019715	14.26093			
107	Ta Cenc	36.019715	14.26093						
108	Saguna Cliffs	36.019822	14.236692	Ta Cenc	36.019715	14.26093			
109	Ta Cenc	36.019715	14.26093						
110	Ta Cenc	36.019715	14.26093						
111									
112	Bastions Valletta	35.894946	14.512025	Barrakka Gardens	35.894946	14.512025	Floriana Gardens	35.89252	14.50315
113	Ta Cenc	36.019715	14.26093	Seguna Cliffs	36.019822	14.236692	Church	36.02976	14.24153
114	Ta Cenc	36.019715	14.26093						

115	Ta Cenc	36.019715	14.26093						
116	Ta Cenc	36.019715	14.26093	Saguna Cliffs	36.019822	14.236692			
117	Barrakka	35.894946	14.512025	Fossa	35.901498	14.515391			
118	Pjazzza San Gwann	35.899116	14.513535	Barrakka Gardens	35.894946	14.512025	Fortifications	35.89495	14.51203
119	Barrakka	35.894946	14.512025	Valletta Port	35.890079	14.508001	Fortifications	35.89495	14.51203
120	Fossa	35.901498	14.515391	Seaside Valletta	35.890079	14.508001			
121	St Elmo	35.901212	14.518289	Barrakka Gardens	35.894946	14.512025	Fortifications	35.89495	14.51203
122	Fossa	35.901498	14.515391	Barrakka Gardens	35.894946	14.512025	Fortifications	35.89495	14.51203
123	Buskett	35.856152	14.39796	Barrakka Gardens	35.894946	14.512025			
124	Buskett	35.856152	14.39796						
125	Valletta Waterfront	35.890079	14.508001	Bastions	35.894946	14.512025	Historical Places St John cathedral	35.89912	14.51354
126	Barrakka	35.894946	14.512025	Valletta square	35.899116	14.513535			
127	Barrakka	35.894946	14.512025	Valletta gardens	35.899116	14.513535	Floriana Gardens	35.89252	14.50315
128	Barrakka	35.894946	14.512025	Valletta front	35.890079	14.508001	Valletta historical places	35.89912	14.51354
129	ghar lapsi	35.827757	14.423213	salib tal-gholja	35.850235	14.41667	girgenti/fawwar a	35.83965	14.40969
130	knisja parrokjali	35.854618	14.438332	salib tal-gholja	35.850235	14.41667	fawwara kwiet u pittoreska	35.83965	14.40969
131	Fawwara	35.839649	14.409687	Salib il Gholja	35.850235	14.41667	toroq sbieh u antiki bin nicec		
132	Limestone Heritage	35.853012	14.443159	Salib-il-Gholja	35.850235	14.41667	Ghar Lapsi	35.82776	14.42321
133	Salib Tal-Gholja	35.850235	14.41667	Lapsi Bahar	35.827757	14.423213	Knisja San Nikola	35.85462	14.43833
134	Kappella tal-Providenza	35.854618	14.438332	Knisja parrokjali	35.854618	14.438332	Limestone Heritage	35.85301	14.44316
135	Kappelli zghar u nicec			Fawwara	35.839649	14.409687	Hal Xluq Kappella	35.8468	14.44507
136	santwarju	35.961098	14.360987	ghadira	35.96935	14.35063	shelters		
137	Santwarju	35.961098	14.360987	Pjazza tal-	35.961098	14.360987	Ghadira	35.96935	14.35063

				Parocca					
138	Ghaj Zejtuna	35.965851	14.367118	Qammieh	35.96935	14.35063	Ta'Ciantar (manikata)	35.94424	14.33976
139	santwarju	35.961098	14.360987	ghadira	35.96935	14.35063	selmun	35.96042	14.38105
140	ghadira	35.96935	14.35063	santwarju	35.961098	14.360987	bajja ghajn tuffieha	35.93406	14.34428
141	santwarju	35.961098	14.360987	ghadira	35.96935	14.35063	selmun palace	35.96042	14.38105
142	Cittadella	36.046665	14.239474	Villa Rundle	36.043356	14.243173			
143	Ta Cenc	36.019715	14.26093						
144	Ta Cenc	36.019715	14.26093						
145	Ta Cenc	36.019715	14.26093						
146									
147	Xatt ta M'Xlokk	35.839827	14.544467						
148	Rabat Malta	35.8849	14.401896						
149	Howard Gardens	35.8849	14.401896	Il-Knisja ta' San Pawl	35.881921	14.398878	Roman Villa	35.88509	14.40017
150	Mdina	35.886253	14.403204	Birgu	35.888023	14.520392			
151	Knisja ta Pompei	35.841284	14.54501						
152									
153	Howard Gardens	35.8849	14.401896	Tal-Virtu hdejn Is-Seminarju	35.882948	14.405147	Il-Bahrija	35.89491	14.34653
154	Xorb L'Ghagin	35.843876	14.565978	Fomm ir-rih	35.905731	14.339236	L-ahrax tal Mellieha	35.98466	14.36447
155	Howard Gardens	35.8849	14.401896	Il-Parrocca Ta' San Pawl	35.881921	14.398878	Il-Katakombi Ta' San Pawl u Sant' Agatha	35.88192	14.39888
156	L-Imdina	35.886253	14.403204	Howard Gardens	35.8849	14.401896	Il-Katakombi Ta' San Pawl	35.88192	14.39888
157	Village Core	35.881909	14.398893	Howard Gardens	35.8849	14.401896	Il-Grotta ta' San Pawl	35.88192	14.39888
158	L-Imdina	35.886253	14.403204	Il Pjazza Tar-Rabat	35.881909	14.398893	Howard Gardens	35.8849	14.4019
159	Roman Villa	35.885092	14.400168	Katakombi Ta' San Pawl	35.881921	14.398878	L-Imdina	35.88625	14.4032
160	IL-Buskett	35.856152	14.39796	Howard Gardens	35.8849	14.401896	Chadwick Lakes	35.89193	14.3895
161	Howard Gardens	35.8849	14.401896	IL-Knisja Ta' San Pawl	35.881921	14.398878	Il Kappella Ta' San Luqa	35.88201	14.39158
162	Howard Gardens	35.8849	14.401896	L-Imtahleb	35.880606	14.355243	Il-Knisja Ta' San	35.88192	14.39888

							Pawl		
163	IL-Knisja Ta' San Pawl	35.881921	14.398878	Howard Gardens	35.8849	14.401896	L-Imtahleb	35.88061	14.35524
164	L-Imdina	35.886253	14.403204	Howard Gardens	35.8849	14.401896	Il-Knisja Ta' San Pawl	35.88192	14.39888
165	Howard Gardens	35.8849	14.401896	IL-Buskett	35.856152	14.39796	IL-Grotta Ta' San Pawl	35.88192	14.39888
166	Id-Dar ta' L-Anzjani fejn hemm hafna attivitajiet	35.961098	14.360987	Is-Santwarju Tal-Madonna Tal-Mellieha	35.961098	14.360987	Il-Knisja Tal-Madonna Tal-Vittorja	35.88567	14.42355
167	Village Square	35.961098	14.360987	Mellieha Bay	35.96935	14.35063	Activity Park at Selmun	35.96042	14.38105
168	Is-Santwarju Tal-Madonna Tal-Mellieha	35.961098	14.360987	Il-Bandli ta' wara il-Knisja fejn hemm Veduta sabieha ta L-Ghadira	35.961098	14.360987	Il-Bajja Ta' Lghadira	35.96935	14.35063
169	Is-Santwarju Tal-Madonna Tal-Mellieha	35.961098	14.360987	It-Torri L-Ahmar	35.974451	14.342967	Il-Madonna Ta' L-Ghar	35.96013	14.36208
170									
171	Is-Santwarju Tal-Madonna Tal-Mellieha	35.961098	14.360987	L-Armier	35.991646	14.360933	Il-kosta tal-blat taht Santa Marija Estate	35.96782	14.36858
172	L-Ahrax Tal-Mellieha	35.98466	14.364468	L-Ghadira	35.96935	14.35063	Ic-Cirkewwa	35.98317	14.33385
173	Seaview Cafeteria fejn hemm veduta sabieha tal bajja tal-Mellieha	35.961098	14.360987	L-Ghadira	35.96935	14.35063	Ic-Cirkewwa	35.98317	14.33385
174	Limestone Heritage	35.853012	14.443159	Il-Knisja il-Qadima	35.854618	14.438332	Wied Hesri	35.85869	14.43171
175	Ghar Lapsi	35.827757	14.423213	Il-Girgenti u Is-Salib Ta' L-gholja	35.850235	14.41667	Wied Hesri	35.85869	14.43171
176	Il-Knisja IL-Qadima	35.854618	14.438332	Il-Binja Tal-Qorti	35.899116	14.513535	Wied Hesri	35.85869	14.43171
177	IL-Pjazza Ta' San-Nikola	35.854618	14.438332	IL-Knisja Ta' San Nikola	35.854618	14.438332	IL-Fawwara	35.83965	14.40969
178	IL-Palazz Ta' L-Inkwizitur	35.851142	14.40674	IL-Knisja Tal-Providenza	35.854618	14.438332	Is-Salib Ta' L-Gholja	35.85024	14.41667

179	Gnien taz-Zejtun	35.855114	14.533934						
180	IL-Pjazza Ta' San Nikola	35.854618	14.438332	Limestone Heritage	35.853012	14.443159	Is_Salib Ta' L-Gholja	35.85024	14.41667
181	Is-Salib Ta' L-gholja	35.850235	14.41667	IL-Fawwara	35.839649	14.409687	IL-Kappella Ta' Hal-Xluq	35.8468	14.44507
182	IL-Pjazza Ta' San Nikola	35.854618	14.438332	Wied Hesri	35.858693	14.431713	Is-Salib Ta' L'Gholja	35.85024	14.41667
183	IL-Fawwara	35.839649	14.409687	Is-Salib Ta' L'Gholja	35.850235	14.41667	Ghar Lapsi	35.82776	14.42321
184	IL-Girgenti	35.849181	14.41861	Ghar Lapsi	35.827757	14.423213	IL-Kappelli Tal-Fawwara, Tal-Karmnu u IL-Luunzjata	35.83965	14.40969
185	IL-Fawwara	35.839649	14.409687	IL-Girgenti	35.849181	14.41861	Ghar Lapsi	35.82776	14.42321
186	santwarju	35.961098	14.360987	ghajn tal hasselin mellieha	35.961098	14.360987	shelters		
187	santwarju	35.961098	14.360987	bahar santa maria estate l-isfel	35.967823	14.368578	ghadira	35.96935	14.35063
188	sea front	35.917127	14.500807	churches					
189	all sliema	35.917127	14.500807						
190	Qui-Si-Sana	35.917127	14.500807						
191	Sliema Promenade	35.917127	14.500807						
192	Ghar id-dud	35.912512	14.506995	Gnien Indipendenza	35.916347	14.49807			
193	ghar id-dud	35.912512	14.506995	Stella Maris church	35.91205	14.504318			
194	Ghar Lapsi	35.827757	14.423213	Is-Salib Ta' L-Gholja	35.850235	14.41667	IL-Kappella ta San Niklaw	35.83517	14.44148
195	Is-Salib Ta' L-Gholja	35.850235	14.41667	IL-Fawwara	35.839649	14.409687	Ghar Lapsi	35.82776	14.42321
196	Ghar Lapsi	35.827757	14.423213	L-Istatwa Ta' San Nikola F'Misrah San Nikola	35.854618	14.438332	Wied Hesri	35.85869	14.43171
197	Ghar Lapsi	35.827757	14.423213	IL-Buskett	35.856152	14.39796	IL-Fawwara	35.83965	14.40969
198	IL-Pjazza Ta' San Nikola	35.854618	14.438332	Is-Salib Ta' L-Gholja	35.850235	14.41667	IL-Fawwara	35.83965	14.40969

199	IL-Pjazza Ta' San Nikola	35.854618	14.438332	IL-Fawwara	35.839649	14.409687	IL-Girgenti	35.84918	14.41861
200	Torri Kenuna	36.035522	14.284025	Torri Ta Isopu	36.055347	14.309032	Dahlet Qorrot	36.04873	14.31676
201	Dahlet Qorrot	36.048725	14.316761	Church	36.051834	14.290985			
202	Torri Kenuna	36.035522	14.284025	Belvedere Nadur	36.051834	14.290985			
203	Qortin San Filep	36.05005	14.314339	Torri T' Isopu	36.055347	14.309032	Wied Bingemma	36.04513	14.29585
204	San Blas	36.056771	14.300727	Dahlet Qorrot	36.048725	14.316761	Ramla	36.06159	14.28412
205	Alhambra House	35.911981	14.500536						
206	Sliema Front	35.917127	14.500807						
207	Sacro Cuor	35.907984	14.500321	Ghar id-dud	35.912512	14.506995			
208	Stazzjon	35.895258	14.463973	Church	35.899571	14.46514			
209									
210									
211									
212									
213	l-Ahrax Tal-Mellieha	35.98466	14.364468	Widien					
214	Mellieha Seaside	35.96935	14.35063						
215	Sanywarju tal-Mellieha	35.961098	14.360987	Parks					
216	Promenade	35.917127	14.500807	parks					
217	Gnien Indipenza	35.917127	14.500807	The Point	35.907569	14.511581			
218	Golden Bay	35.934521	14.344473	Delimara	35.833117	14.562141	Qajanza	35.83379	14.53091
219	Xatt ta M'Xlokk	35.839827	14.544467						
220	St Anton gardens	35.896089	14.447935	Xatt ta M'Xlokk	35.839827	14.544467			
221									
222	Gorg Bonello Dupuis	35.917127	14.500807	St Anne's square	35.909172	14.50561	Gnien Indipendenza	35.91635	14.49807
223	public gardens	35.917127	14.500807	Gnien Indipendenza	35.916347	14.49807			
224	Ghar id-dud	35.912512	14.506995						
225	Gharukasa	35.98466	14.364468	Ahrax Tal-Mellieha	35.98466	14.364468	St Marija estate	35.96782	14.36858
226	Mdina	35.886253	14.403204	Catacombs	35.881909	14.398893	Roman Villa	35.88509	14.40017
227	Buskett	35.856152	14.39796	Mdina	35.886253	14.403204	IL-Gnien Tar-Rabat	35.8849	14.4019
228	Il-Gnien	35.8849	14.401896	Roman Villa	35.885092	14.400168			

229	Gnien Tar-Rabat	35.8849	14.401896	Mdina	35.886253	14.403204			
230	Stella Maris Church	35.91205	14.504318	Towers			Ferry area	35.91251	14.507
231	Stella Maris road	35.91205	14.504318	Old houses					
232	Rudolph street-Moorish house	35.911981	14.500536	St Anne's square	35.909172	14.50561	Sea+front	35.91713	14.50081
233	sea front	35.917127	14.500807						
234									
235	Gnien Indipendenza	35.916347	14.49807	Sea front	35.917127	14.500807			
236	Sea front	35.917127	14.500807	coffee shops					
237	Selmun	35.960419	14.38105	Ahrax tal-Mellieha	35.98466	14.364468			
238	Santwarju	35.961098	14.360987	Gharucasa	35.98466	14.364468			
239	Selmun	35.960419	14.38105	all of Mellieha	35.961098	14.360987			
240	Gnien	35.98466	14.364468	Santwarju	35.961098	14.360987			
241	Ramla	36.061585	14.284122	Dahlet Qorrot	36.048725	14.316761	San Blas	36.05677	14.30073
242	Ramla	36.061585	14.284122	Belvedere Nadur	36.051834	14.290985			
243	San Blas	36.056771	14.300727	Dahlet Qorrot	36.048725	14.316761			
244	Dahlet Qorrot	36.048725	14.316761	Ramla	36.061585	14.284122			
245	San Blas	36.056771	14.300727	Torri Kenuna	36.035522	14.284025	Torri Isopu	36.05535	14.30903
246	stazzjon	35.895258	14.463973	Basilika	35.899571	14.46514	knisja tal herba	35.90099	14.46489
247									
248									
249									
250	Stazzjon	35.895258	14.463973						
251									
252									
253	stazzjon tal ferrovija	35.895258	14.463973	Il knisja	35.899571	14.46514	Il knisja l qadima	35.89957	14.46514
254	knisja tal herba	35.900994	14.464886						
255	knisja l qadima	35.899571	14.46514	mithna ta ganu	35.899941	14.455882	il knisja l qadima	35.89957	14.46514
256	selmun	35.960419	14.38105	torri l abjad	35.99538	14.364572	pillboxes		
257	santwarju tal madonna	35.961098	14.360987	il knisja	35.899571	14.46514	fort campbell	35.96372	14.39018
258	popeye village	35.96094	14.342461	selmun	35.960419	14.38105			

259	torri ta selmun	35.960419	14.38105	santwarju tal madonna	35.961098	14.360987	torri l ahmar	35.97445	14.34297
260	anchor bay	35.96094	14.342461	dahlet ix xmajjar	35.995564	14.367218	ramlet il qortin	35.98689	14.35196
261	selmun	35.960419	14.38105	torri l ahmar	35.974451	14.342967			
262	knisja tal mellieha	35.961098	14.360987	il madonna ta l ghar	35.961098	14.360987	shelter		
263	Knisja	36.037825	14.293983	Ramla	36.061585	14.284122			
264	Ramla	36.061585	14.284122	San Blas	36.056771	14.300727	Dahlet Qorrot	36.04873	14.31676
265	Ramla	36.061585	14.284122	San Blas	36.056771	14.300727			
266	kapella ta santa lucija	35.914634	14.444231	Palazzo parisio	35.915344	14.443592	torri tal kaptan	35.92007	14.44226
267	palazzo parisio	35.915344	14.443592	kapella ta san pawl ta targa	35.920069	14.442256	cart ruts	35.91706	14.43299
268	Triq santa lucija	35.914634	14.444231	palazzo parisio	35.915344	14.443592			
269	Gnien tal Kunsill	36.037825	14.293983	Ramla	36.061585	14.284122	San Blas	36.05677	14.30073
270	Ramla	36.061585	14.284122						
271	Palazzo Parisio	35.915344	14.443592	IL knisja	35.914634	14.444231			
272	il kazin tal banda	35.914634	14.444231	cart ruts	35.91706	14.432991			
273	Kapelli			Knisja	35.914634	14.444231			
274	Torri Gauci	35.918956	14.441635	Triq Santa Lucija	35.914634	14.444231	Knisja	35.91463	14.44423
275	IL Knisja	35.914634	14.444231						
276	Cart Ruts								
277	IL Knisja	35.914634	14.444231	Kapella Ta Santa Lucija	35.891494	14.396608	Cart Ruts	35.91706	14.43299
278	Palazzo Parisio	35.915344	14.443592	San Pawl ta targa	35.920069	14.442256			
279	Torri tal kaptan	35.920069	14.442256	cart ruts	35.91706	14.432991			
280									
281	Belvedere Nadur	36.051834	14.290985	Ramla	36.061585	14.284122	Torri Isopu	36.05535	14.30903
282	Kapella san pawl ta targa	35.920069	14.442256	statwa ta san pawl	35.920069	14.442256	san pawl milqi	35.93346	14.41138
283	st pauls church	35.920069	14.442256						
284	Belvedere Nadur	36.051834	14.290985						
285	Torri tal kaptan	35.920069	14.442256						
286	Ramla	36.061585	14.284122	Torri Kenuna	36.035522	14.284025	San Blas	36.05677	14.30073
287	Cart ruts								
288	Parocca	35.914634	14.444231	st.lucy chapel	35.891494	14.396608			

289	Gnien belvedere nadur	36.051834	14.290985						
290	Ramla	36.061585	14.284122						
291									
292	palazzo parisio	35.915344	14.443592	pillbox	35.926058	14.438981	tradefair	35.91728	14.44199
293									
294	ramla valley	36.061585	14.284122	dwejra	36.053248	14.191038			
295	dwejra	36.053248	14.191038	narrow streets			church square	36.05534	14.20352
296	dwejra	36.053248	14.191038	dwejra valley	36.053248	14.191038			
297	azure window	36.053248	14.191038	inland sea	36.053248	14.191038	cliffs overlooking dwejra valley	36.05325	14.19104
298	st lawrence church	36.055341	14.203517	dwejra	36.053248	14.191038	cliffs	36.05325	14.19104
299	sliema promenade	35.917127	14.500807						
300	promenade	35.917127	14.500807	tigne point	35.907569	14.511581			
301	the ferries	35.912512	14.506995	promenade	35.917127	14.500807	tigne	35.90757	14.51158
302	tigne point	35.907569	14.511581	dingli circus	35.915854	14.499795	promenade	35.91713	14.50081
303	independence gardens	35.917127	14.500807	tigne point	35.907569	14.511581			
304	tigne	35.907569	14.511581	exiles	35.918423	14.498895			
305	independence gardens	35.917127	14.500807	park at tigne	35.907569	14.511581	promenade	35.91713	14.50081
306	palazzo parisio	35.915344	14.443592	tempji tal qadi	35.937939	14.411477	tal wej	35.91706	14.43299
307	chapels in naxxar	35.914634	14.444231	palazzo parisio	35.915344	14.443592	village core	35.91463	14.44423
308	tal wej	35.91706	14.432991	palazzo parisio	35.915344	14.443592			
309	ggantija	36.047244	14.269102	Ninu's Cave	36.051162	14.261593	Ramla Dunes	36.06159	14.28412
310	ggantija	36.047244	14.269102	Marsalforn	36.071393	14.25893	Ramla	36.06159	14.28412
311	ggantija	36.047244	14.269102						
312	ir ramla	36.061585	14.284122	Ggantija	36.047244	14.269102			
313	ggantija	36.047244	14.269102						
314	ggantija	36.047244	14.269102	marsalforn	36.071393	14.25893	Ramla	36.06159	14.28412
315	palazzo parisio	35.915344	14.443592						
316	tal wej	35.91706	14.432991	palazzo pariso	35.915344	14.443592	TEMPJI TAL QADI	35.93794	14.41148
317	dingli circus	35.915854	14.499795	tigne	35.907569	14.511581	SEA FRONT	35.91713	14.50081
318									

319	independence gardens	35.917127	14.500807	tigne	35.907569	14.511581	FERRIES	35.91251	14.507
320	palazzo pariso	35.915344	14.443592						
321	palazzo parisio	35.915344	14.443592						
322									
323	ta cenc	36.019715	14.26093	mgarr ix xini	36.020423	14.271111			
324	lunzjata	36.042989	14.233023	cittadella	36.046665	14.239474	villa rundle	36.04336	14.24317
325	cittadella	36.046665	14.239474	villa rundle	36.043356	14.243173			
326	dwejra tower	36.053248	14.191038	dwejra window	36.053248	14.191038	chapels in square	36.05534	14.20352
327	dwejra	36.053248	14.191038	gebla tal general	36.053248	14.191038	church	36.05534	14.20352
328	dwejra	36.053248	14.191038	village church	36.055341	14.203517			
329	dwejra window	36.053248	14.191038	general's rock	36.053248	14.191038	dwejra tower	36.05325	14.19104
330	dwejra	36.053248	14.191038	village church	36.055341	14.203517	chapel in square	36.05534	14.20352
331	village square	36.055341	14.203517	chapel in village	36.055341	14.203517	dwejra window and inland sea	36.05325	14.19104
332	park in monserati			dwejra	36.053248	14.191038	village square	36.05534	14.20352
333	dwejra window	36.053248	14.191038	village square	36.055341	14.203517	village prominade	36.05534	14.20352
334	dwejra window	36.053248	14.191038	inland sea	36.053248	14.191038			
335	ta cenc	36.019715	14.26093	mgarr ix-xini	36.020423	14.271111			
336	dwejra window	36.053248	14.191038	general's rock	36.053248	14.191038	qawra (inland sea)	36.05325	14.19104
337	village square	36.055341	14.203517	church	36.055341	14.203517			
338	dwejra	36.053248	14.191038	general's rock	36.053248	14.191038	church square and chapels	36.05534	14.20352
339	cittadella	36.046665	14.239474	pjazza	35.881909	14.398893	lunzjata	36.04299	14.23302
340	azzure window	36.053248	14.191038	inland sea	36.053248	14.191038	cliffs overlooking valley	36.05325	14.19104
341	dwejra	36.053248	14.191038	gebla tal general	36.053248	14.191038			
342	dwejra	36.053248	14.191038	village square	36.055341	14.203517			
343									
344	dwejra window	36.053248	14.191038	dwejra cliffs	36.053248	14.191038	st lawrence promenade	36.05534	14.20352
345	azzure window	36.053248	14.191038	general's rock	36.053248	14.191038	village square	36.05534	14.20352
346	il mithna ta kola	36.049696	14.266834	ggantija	36.047244	14.269102	ghar ta ninu	36.05116	14.26159

347	il mithna	36.049696	14.266834	ggantija	36.047244	14.269102	church	36.05023	14.26467
348	valley	36.036648	14.19912	mithna	35.899941	14.455882	ggantija	36.04724	14.2691
349	mithna ta kelin			ggantija	36.047244	14.269102	ninu's caves	36.05116	14.26159
350	ggantija	36.047244	14.269102	salvatur	36.044776	14.239302			
351	ta cenc	36.019715	14.26093	xlendi	36.030635	14.216809	mgarr ix-xini	36.02042	14.27111
352	mgarr ix-xini	36.020423	14.271111	ta cenc	36.019715	14.26093			
353	ta cenc	36.019715	14.26093	mgarr ix-xini	36.020423	14.271111			
354	mgarr ix- xini	36.020423	14.271111	Ta Cenc	36.019715	14.26093			
355	villa rundle	36.043356	14.243173	Cittadella	36.046665	14.239474	lunzjata	36.04299	14.23302
356	cittadella	36.046665	14.239474	Lunzjata	36.042989	14.233023	villa rundle	36.04336	14.24317
357	basilika ta san george	36.046665	14.239474	Cittadella	36.046665	14.239474	katidral	36.04667	14.23947
358	cittadella	36.046665	14.239474	Pjazza	36.044776	14.239302	lunzjata	36.04299	14.23302
359	cittadella	36.046665	14.239474	Cittadella	36.046665	14.239474	villa rundle	36.04336	14.24317
360	cittadella	36.046665	14.239474	Lunzjata	36.042989	14.233023	villa rundle	36.04336	14.24317
361	dahlet qorrot	36.048725	14.316761	Knisja	36.051834	14.290985			
362	xerri's grotto	36.051162	14.261593	Ggantija	36.047244	14.269102	ramla	36.06159	14.28412
363	ggantija	36.047244	14.269102	Ramla	36.061585	14.284122	xerri's grotto	36.05116	14.26159
364	Dwejra	36.053248	14.191038	Pjazza ta San Lawrenz	36.055341	14.203517	san dimitri	36.07111	14.20451
365	Torri ta kenuna	36.035522	14.284025	Torri ta sopu	36.055347	14.309032			
366	church	35.899571	14.46514						
367	Piazza San pietru u san pawl	36.037863	14.293837	Ramla	36.061585	14.284122			
368	San blas	36.056771	14.300727	Dahlet qorrot	36.048725	14.316761	Torri ta kenuna	36.03552	14.28403
369	Calypso Cave area	36.060674	14.279596	Marsalforn Valley	36.071393	14.25893	Ramla Bay	36.06159	14.28412
370	Mgarr ix-ini	36.020423	14.271111	Ta Cenc sea cliffs	36.019715	14.26093	Ta Cenc land cliffs (Sanap)	36.01972	14.26093
371	San blas	36.056771	14.300727	Dahlet qorrot	36.048725	14.316761	Torri ta Isopu	36.05535	14.30903
372	bajjiet			wieden			calyso	36.06067	14.2796
373	Dahlet qorrot	36.048725	14.316761	Ramla	36.061585	14.284122	San blas	36.05677	14.30073
374	Knisja	36.037825	14.293983	Pjazza tar rahal	36.037825	14.293983			
375	Knisja	36.037825	14.293983	Pjazza	36.037825	14.293983	My garden		
376	Ta Cenc	36.019715	14.26093	Mgarr ix-Xini	36.020423	14.271111	is-Sanap	36.01972	14.26093
377	San Blas	36.056771	14.300727	Dahlet Qorrot	36.048725	14.316761	Ramla	36.06159	14.28412

378	Dwejra	36.053248	14.191038						
379	Dwejra	36.053248	14.191038						
380	Ninu's Cave	36.051162	14.261593	Ramla	36.061585	14.284122	Ggantija	36.04724	14.2691
381	Ggantija	36.047244	14.269102	Calypso Cave	36.060674	14.279596	Ramla	36.06159	14.28412
382	Ta Cenc	36.019715	14.26093	Mgarr ix Xini	36.020423	14.271111	Tal Bardan	36.02465	14.23494
383	Mgarr ix Xini	36.020423	14.271111	Ta Cenc	36.019715	14.26093	Sanap	36.01972	14.26093
384	Xerri's Grotto	36.051162	14.261593	Ggantija	36.047244	14.269102	Knisja tax-Xaghra	36.05023	14.26467
385	Ggantija	36.047244	14.269102	Xerri's Grotto	36.051162	14.261593	Ninu's Cave	36.05116	14.26159
386	Ninu's Cave	36.051162	14.261593	Ggantija	36.047244	14.269102	Ghajn Barrani	36.06907	14.27004
387	Ggantija	36.047244	14.269102	Ramla	36.061585	14.284122	Xerri's Grotto	36.05116	14.26159
388	Pjazza tax-XAGHRA	36.050231	14.264667	Ghajn Barrani	36.06907	14.270042	Ninu's Cave	36.05116	14.26159
389	Ggantija	36.047244	14.269102	Xerri's Grotto	36.051162	14.261593	Ramla	36.06159	14.28412
390	Xerri's Grotto	36.051162	14.261593	Ramla	36.061585	14.284122	Calypso Cave	36.06067	14.2796
391	Xerri's Grotto	36.051162	14.261593	Calypso Cave	36.060674	14.279596	Ramla	36.06159	14.28412

Appendix 13 - Places of high CNT ranked according to frequency (n=198, 599 frequencies)

Ranking	Index match (unique records)	Frequency	%
1	**Dwejra**	**59**	**9.8**
2	**Buskett**	**53**	**8.8**
3	**Ta' Cenc**	**33**	**5.5**
4	**Ramla**	**26**	**4.3**
5	**Fawwara**	**25**	**4.2**
6	**Selmun**	**18**	**3.0**
7	**Bahrija**	**17**	**2.8**
8	**Dingli Cliffs**	**16**	**2.7**
9	**Mellieha**	**15**	**2.5**
10	**Chadwick Lakes**	**13**	**2.2**
11	**Ghar Lapsi**	**13**	**2.2**
12	**Xlendi**	**12**	**2.0**
13	**Girgenti**	**12**	**2.0**
14	**Ghajn Tuffieha**	**11**	**1.8**
15	**Dingli**	**10**	**1.7**
16	**Mgarr ix-Xini**	**10**	**1.7**
17	**Delimara**	**10**	**1.7**
18	**Dahlet Qorrot**	**10**	**1.7**
19	**M'Xlokk**	**9**	**1.5**
20	**Upper Barrakka**	**9**	**1.5**
21	Xwejni	9	1.5
22	Rabat	8	1.3
23	Lunzjata	8	1.3
24	Ghadira	8	1.3
25	Marsalforn	8	1.3
26	Blue Grotto	7	1.2
27	San Anton Gardens	7	1.2
28	San Blas	7	1.2
29	Qbajjar	7	1.2
30	Mtahleb	6	1.0
31	Hagar Qim	6	1.0
32	Ghajn Barrani	6	1.0
33	Comino	6	1.0
34	Mdina	5	0.8
35	Ta' Qali	5	0.8
36	Wied il-Ghasri	5	0.8
37	Salib tal-Gholja	5	0.8
38	Mizieb	5	0.8
39	Wied il- Mielah	5	0.8
40	Is-Salib tal-Gholja	5	0.8
41	L-Ahrax tal-Mellieha	5	0.8
42	Kuncizzjoni	4	0.7
43	Gnejna	4	0.7
44	Howard Gardens	4	0.7
45	Mistra	4	0.7
46	Imgiebah	4	0.7
47	Ggantija	4	0.7
48	Mdina Bastions	4	0.7
49	Barrakka Gardens	4	0.7
50	Lower Barrakka	3	0.5

Ranking	Index match (unique records)	Frequency
51	Valletta	3
52	Ramla l-Hamra	3
53	St. John's Cathedral	3
54	Sliema	3
55	Wied iz-Zurrieq	3
56	Sliema Promenade	3
57	Ghadira ta' San Raflu	3
58	Countryside, Delimara	3
59	Bidnija	3
60	Marnisi, M'Xlokk	2
61	Marnisi, M'Xlokk	2
62	M'Xlokk Bay	2
63	Hondoq	2
64	Ta' Pinu	2
65	Villa Rundle	2
66	Zurrieq	2
67	Mgarr	2
68	Ahrax tal-Mellieha	2
69	Blue Lagoon	2
70	Xrobb l-Ghagin	2
71	Wied il-Mielah	2
72	Near Ta' Pinu	2
73	Qbajjar Bay	2
74	San Lawrenz	2
75	Wied ta' Marsalforn	2
76	Calypso Cave	2
77	Il-Bajja tal-Mellieha	2
78	Ghar Dalam	2
79	Nadur	2
80	Marsalforn Valley	2
81	Hondoq ir-Rummien	2
82	L-Armier	2
83	Ramla Bay	2
84	Hofor	1
85	Fomm ir- Rih	1
86	Zonqor	1
87	Naxxar	1
88	Floriana Gardens	1
89	Rdum, San Lawrenz	1
90	Fort St. Angelo	1
91	Birgu streets	1
92	Mdina Cathedral	1
93	Festa, Senglea	1
94	Limestone Heritage	1
95	Mellieha Bay	1
96	Valletta Waterfront	1
97	Santa Katerina, Rabat	1
98	Wied tal-Qlejja, Chadwick Lakes	1
99	Il-Qammieh l/o Ghadira	1
100	Gnien taz-Zejtun	1

Ranking | Index match (unique records) | Frequency | Ranking | Index match (unique records) | Frequency

101	Kappella tal-Providenza	1
102	Torri ta' Kenuna	1
103	Qortin San Filep	1
104	Mellieha Front	1
105	Font Ghadir	1
106	Rizerva, Ghadira	1
107	Rdum ta' Esopu	1
108	Il-Wied, B'Kara	1
109	Ramlet il-Qortin	1
110	Salini	1
111	Qalet Marku	1
112	Gnien tal-Kunsill	1
113	Wied Speranza	1
114	Belvedere, Nadur	1
115	Wied Incinta	1
116	Ramla Valley	1
117	Madliena	1
118	Tal-Wej	1
119	Village Square	1
120	Fuq is-Sur	1
121	Fanal tal-Jordan	1
122	Xwejni Salt Pans	1
123	Is-Sanap	1
124	Ghajn Xejba	1
125	Sellum tax-Xaghra	1
126	Bahar ic-Caghaq	1
127	Kennedy Grove	1
128	Barakka (both)	1
129	Bahar taht is-Sur, Valletta	1
130	Hastings Gardens	1
131	Valletta Bastions	1
132	Bormla	1
133	Tigne Point	1
134	Wardija	1
135	Tarxien Temples	1
136	Mosta Dome	1
137	Kappella tal-Fawwara	1
138	Port il-Kbir	1
139	Pembroke	1
140	Fiddien	1
141	Dar tal-Providenza	1
142	Gnien Haz-Zejtun, Mellieha	1
143	Cirkewwa	1
144	Il-Kuncizzjoni, Rabat	1
145	Manikata	1
146	Il-Bajja tax-Xlendi	1
147	Wied Hesri	1
148	Ix-Xatt ta' Marsaxlokk	1
149	St. Paul's Bay	1
150	Gharghur Valley	1
151	Floriana	1
152	Foresta 2000	1
153	Tas-Silg, M'Xlokk	1
154	Wied il-Ghasel	1
155	Ta' Pinu walk	1
156	Senglea	1
157	Ghadira Ta' San Raflu, Kerċem	1
158	Sunset, Dwejra	1
159	Dwejra Tower	1
160	Dwejra Towers walks	1
161	Qbajjar Salt Pans	1
162	Kercem	1
163	Ta' Cenc Cliffs	1
164	Wied San Blas	1
165	Qala fuq ir-Rih ta' Kemmuna	1
166	Ras ir-Reqqa	1
167	Landrijiet	1
168	Rabat, Gozo	1
169	Pwales, Xemxija	1
170	Marsamxett	1
171	Mtarfa	1
172	Xatt ta M'Xlokk	1
173	Il-Mall, Furjana	1
174	Fortizza, Wardija	1
175	Valletta Waterfont	1
176	Mnajdra	1
177	Countryside, Rabat	1
178	Pretty Bay B'Bugia	1
179	Majjistral Park	1
180	Nature Reserve, Mellieha	1
181	Wied Qirda, Zebbug	1
182	Is-Santi, Bingemma	1
183	Imtahleb	1
184	Il-Bajja ta' Marsalforn	1
185	Kuncizzjoni, Rabat	1
186	Wied Hesri, Siggiewi	1
187	Grand Harbour	1
188	Bird Sanctuary	1
189	Is-Salini Tax-Xwejni	1
190	San Raflu	1
191	Ghar Ilma	1
192	Saguna Cliffs	1
193	San Dimitri	1
194	Kemmuna	1
195	Wileg, Qala	1
196	Ramla Cave	1
197	Xlendi Cliffs	1
198	Ghajn Damma	1
	TOTAL	**599**

Appendix 14 - Places of high PA ranked according to frequency (n=286, 602 frequencies)

Ranking	Index match (unique records)	Frequency	%
1	Ta' Cenc	29	4.8
2	Ramla	26	4.3
3	Howard Gardens	21	3.5
4	Ggantija	20	3.3
5	Dwejra	18	3.0
6	Salib tal-Gholja	18	3.0
7	Is-Santwarju tal-Madonna tal-Mellieha	18	3.0
8	Cittadella	16	2.7
9	Ghar Lapsi	15	2.5
10	Fawwara	15	2.5
11	Sliema Promenade	15	2.5
12	Mdina	14	2.3
13	Villa Rundle	14	2.3
14	Palazzo Parisio	13	2.2
15	Dahlet Qorrot	12	2.0
16	San Blas	12	2.0
17	Ghadira	11	1.8
18	Buskett	10	1.7
19	Delimara	9	1.5
20	Tigne	9	1.5
21	Citadella	8	1.3
22	Azure Window, Dwejra	8	1.3
23	Mgarr ix-Xini	8	1.3
24	Xerri's Grotto	8	1.3
25	M'Xlokk Promenade	7	1.2
26	Selmun	7	1.2
27	Ninu's Cave	7	1.2
28	Katidral	6	1.0
29	Stazzjon, Birkirkara	6	1.0
30	Bastions, Valletta	6	1.0
31	Torri ta' Kenuna	6	1.0
32	Lunzjata	6	1.0
33	Basilica St. Elena	6	1.0
34	Torri ta' Isopu	6	1.0
35	Gebla tal-General	6	1.0
36	Girgenti	5	0.8
37	Pjazza San Gorg, Rabat, Gozo	5	0.8
38	Il-Pjazza ta' San Nikola	5	0.8
39	Belvedere, Nadur	5	0.8
40	Bahrija	5	0.8
41	Pjazza, San Lawrenz	5	0.8
42	Barrakka Gardens	5	0.8
43	Wied Hesri	5	0.8
44	Fortifications	5	0.8
45	Lower Barrakka	4	0.7
46	Basilica St. Helen	4	0.7
47	Limestone Heritage	4	0.7
48	Roman Villa	4	0.7
49	Ghar id-Dud	4	0.7
50	Independence Gardens, Sliema	4	0.7
51	Knisja, San Lawrenz	4	
52	Village Square, San Lawrenz	4	
53	Calypso Cave	4	
54	Knisja ta' San Pawl	4	
55	Cart Ruts	4	
56	Inland Sea	4	
57	Dwejra Cliffs	4	
58	Is-Salib tal-Gholja	4	
59	Il-Knisja l-Qadima	3	
60	Il-Knisja ta' San Pawl	3	
61	Nadur Church	3	
62	Kapella ta' Santa Lucija	3	
63	Torri tal-Kaptan	3	
64	Tal-Wej	3	
65	Chadwick Lakes	3	
66	Independence Gardens	3	
67	Church, Birkirkara	3	
68	Ahrax tal-Mellieha	3	
69	Knisja, Naxxar	3	
70	Church, San Lawrenz	3	
71	Chapel, San Lawrenz	3	
72	Ta' Cenc Cliffs (Sanap)	3	
73	Fomm ir-Rih	2	
74	Marsaxlokk Square	2	
75	Ta' Pompei Church	2	
76	Torri tad-Dwejra	2	
77	Xrobb l-Ghagin	2	
78	Parocca San Nikola	2	
79	Saguna Cliffs	2	
80	Foss	2	
81	Valletta Waterfront	2	
82	L-Ahrax tal-Mellieha	2	
83	Gharukasa	2	
84	Stella Maris Church	2	
85	Triq Santa Lucija	2	
86	Il-Knisja, Naxxar	2	
87	Dingli Circus	2	
88	Dwejra Tower	2	
89	Il-Mithna ta' Kola	2	
90	Dingli	2	
91	Upper Barrakka	2	
92	Mtarfa	2	
93	It-Tokk, Rabat, Gozo	2	
94	It-Tieqa tad-Dwejra	2	
95	San Dimitri	2	
96	L-Istazzjon	2	
97	Pjazza San Nikola	2	
98	Pjazza, Rabat	2	
99	Katakombi ta' San Pawl	2	
100	It-Torri l-Ahmar	2	

Ranking	Index match (unique records)	Frequency
101	St. Anne's Square	2
102	Mithna ta' Ganu	2
103	Marsalforn	2
104	Mgarr ix Xini	2
105	Pjazza, Nadur	2
106	Ghajn Barrani	2
107	Saqqajja	2
108	Azzure Window	2
109	Stazzjon	2
110	Floriana Gardens	2
111	Il-Kappella Ta' Hal-Xluq	2
112	Il-Grotta ta' San Pawl	2
113	Cirkewwa	2
114	Ferry area	2
115	Knisja l-Qadima, B'Kara	2
116	San Lawrenz Promenade	2
117	Knisja, Xaghra	2
118	Marnisi	1
119	Barrakka	1
120	Santu Wistin Church	1
121	M'Xlokk (suq)	1
122	Cimiterju, Paola	1
123	Republic Street, Valletta	1
124	San Pawl, Rabat	1
125	Il-Foss, Mdina	1
126	St. Peter's Pool	1
127	St Johns Cathedral, Valletta	1
128	Tal-Karmnu Church	1
129	Barakka (both)	1
130	San Frangisk Church	1
131	Bahar taht is-Sur, Valletta	1
132	Bidnija	1
133	Gnejna	1
134	San Bastjan	1
135	Basilica Ta' Pinu	1
136	Bugibba	1
137	Seafront	1
138	Corner shop Pjazza, San Lawrenz	1
139	Gebla tal-General, Dwejra	1
140	Playing Field, Sannat	1
141	Il-Wied ta' B'Kara	1
142	Knisja San Niklaw	1
143	Knisja, Sannat	1
144	Pjazza San Gwann, Valletta	1
145	St. Elmo	1
146	Kappella tal-Providenza	1
147	Ghajn Zejtuna	1
148	Rabat, Malta	1
149	Village Core, Rabat	1
150	Elderly House, Mellieha	1

Ranking	Index match (unique records)	Frequency
151	Village Square, Mellieha	1
152	Seaview Cafeteria , Mellieha	1
153	Inquisitor's Palace	1
154	Gnien taz-Zejtun	1
155	Sliema	1
156	Qui-Si-Sana	1
157	Qortin San Filep	1
158	Alhambra House	1
159	Sacro Cuor	1
160	Golden Bay	1
161	St. Anton Gardens	1
162	Gorg Bonello Dupuis	1
163	Public Gardens, Sliema	1
164	Stella Maris Road	1
165	Rudolph street-Moorish House	1
166	Gnien Indipendenza	1
167	Gnien Pubbliku, Mellieha	1
168	Tal-Herba Church	1
169	Popeye's Village	1
170	Torri ta' Selmun	1
171	Anchor Bay	1
172	Gnien tal-Kunsill, Nadur	1
173	Band Club, Naxxar	1
174	Torri Gauci	1
175	San Pawl tat-targa Chapel	1
176	St. Pauls Church	1
177	Parocca, Naxxar	1
178	Ramla Valley	1
179	The Ferries	1
180	Chapels, Naxxar	1
181	Valley, Xaghra	1
182	Basilika ta' San Gorg	1
183	Church, B'Kara	1
184	Pjazza San Pietru u San Pawl	1
185	Pjazza, Xaghra	1
186	Kalanka	1
187	Hofor M'Xlokk	1
188	Marnisi Area	1
189	M'Xlokk at sea	1
190	Ta' Xbiex Promenade	1
191	Strada Rjali	1
192	Taht qanpiena, Valletta	1
193	By the sea, M'Xlokk	1
194	M'Xlokk Square	1
195	Palazz tal-Granmastri	1
196	Il-veduta ta' 3 cities	1
197	Strada Merkanti	1
198	Is-Sur	1
199	Teatru, Rabat, Gozo	1
200	Pjazza Indipendenza	

Ranking	Index match (unique records)	Frequency
201	Fawwara (Kappella tal-karmnu)	1
202	Seguna Cliffs	1
203	Fossa	1
204	Valletta Port	1
205	Seaside Valletta	1
206	Bastions	1
207	Valletta Square	1
208	Valletta Gardens	1
209	Knisja Parrokjali, Siggiewi	1
210	Pjazza, Mellieha	1
211	Qammieh	1
212	Birgu	1
213	Tal-Virtu hdejn Is-Seminarju	1
214	Imtahleb	1
215	Bandli, Mellieha	1
216	L-Armier	1
217	Knisja l-Qadima, Siggiewi	1
218	Il-Binja tal-Qorti	1
219	Knisja ta' San Nikola	1
220	Knisja tal-Providenza	1
221	Ghajn tal-Hassellin, Mellieha	1
222	Santa Maria Estate beach	1
223	L-Istatwa Ta' San Nikola, Siggiewi	1
224	Church, Nadur	1
225	Mellieha Bay	1
226	Torri l-Abjad	1
227	Dahlet ix-Xmajjar	1
228	Kapella ta' San Pawl tat-Targa	1
229	San Pawl tat-Targa	1
230	Statwa ta' San Pawl tat-Targa	1
231	Pillbox	1
232	Dwejra Valley	1
233	Exiles	1
234	Tempji tal-qadi	1
235	Salvatur	1
236	Xlendi	1
237	Pjazza, Rabat, Gozo	1
238	Knisja, Nadur	1
239	Pjazza, Lawrenz	1
240	Marsalforn Valley	1
241	St. Peter's Pool, M'Xlokk	1
242	Pjazza Regina, Valletta	1
243	Bugibba Front	1
244	Dingli Cliffs	1
245	Swar tal-madwar	1
246	Dahla tal-Port	1
247	Ta' Qali	1
248	Barakka	1
249	Kuncizzjoni	1
250	Chadwick Lakes/Mtahleb	1
251	St. Martha	1
252	Pjazza Santa Elena, B'Kara	1
253	Knisja il-Qadima, Siggiewi	1
254	Dar tal-Providenza	1
255	Church, Sannat	1
256	St. John's Cathedral	1
257	Valletta Historical Places	1
258	Knisja San Nikola	1
259	Ta' Ciantar, Manikata	1
260	Ghajn Tuffieha Bay	1
261	Selmun Palace	1
262	Il-Katakombi ta' San Pawl u Sant' Agatha	1
263	Il-Katakombi ta' San Pawl	1
264	Il-Kappella ta' San Luqa	1
265	L-Imtahleb	1
266	Il-Knisja tal-Madonna tal-Vittorja	1
267	Activity Park, Selmun	1
268	Il-Madonna tal-Ghar	1
269	Santa Marija Estate coast	1
270	Il-Kappelli tal-Fawwara, tal-Karmnu u l-Lunzjata	1
271	Il-Kappella ta' San Niklaw	1
272	Wied Bingemma	1
273	Qajjenza	1
274	Santa Marija Estate	1
275	Knisja tal-Herba	1
276	Fort Cambell	1
277	Torri l-Ahmar	1
278	Ramlet il-Qortin	1
279	San Pawl Milqi	1
280	Trade Fair	1
281	Village core	1
282	Ramla Dunes	1
283	Tempji ta-Qadi	1
284	Ramla Bay	1
285	Calypso	1
286	Tal-Bardan	1
	TOTAL	**286**

Appendix 15 - Potential urban green spaces within the Grand Harbour conurbation which could be valorised to help increase CNT and PA (Frendo 2016)

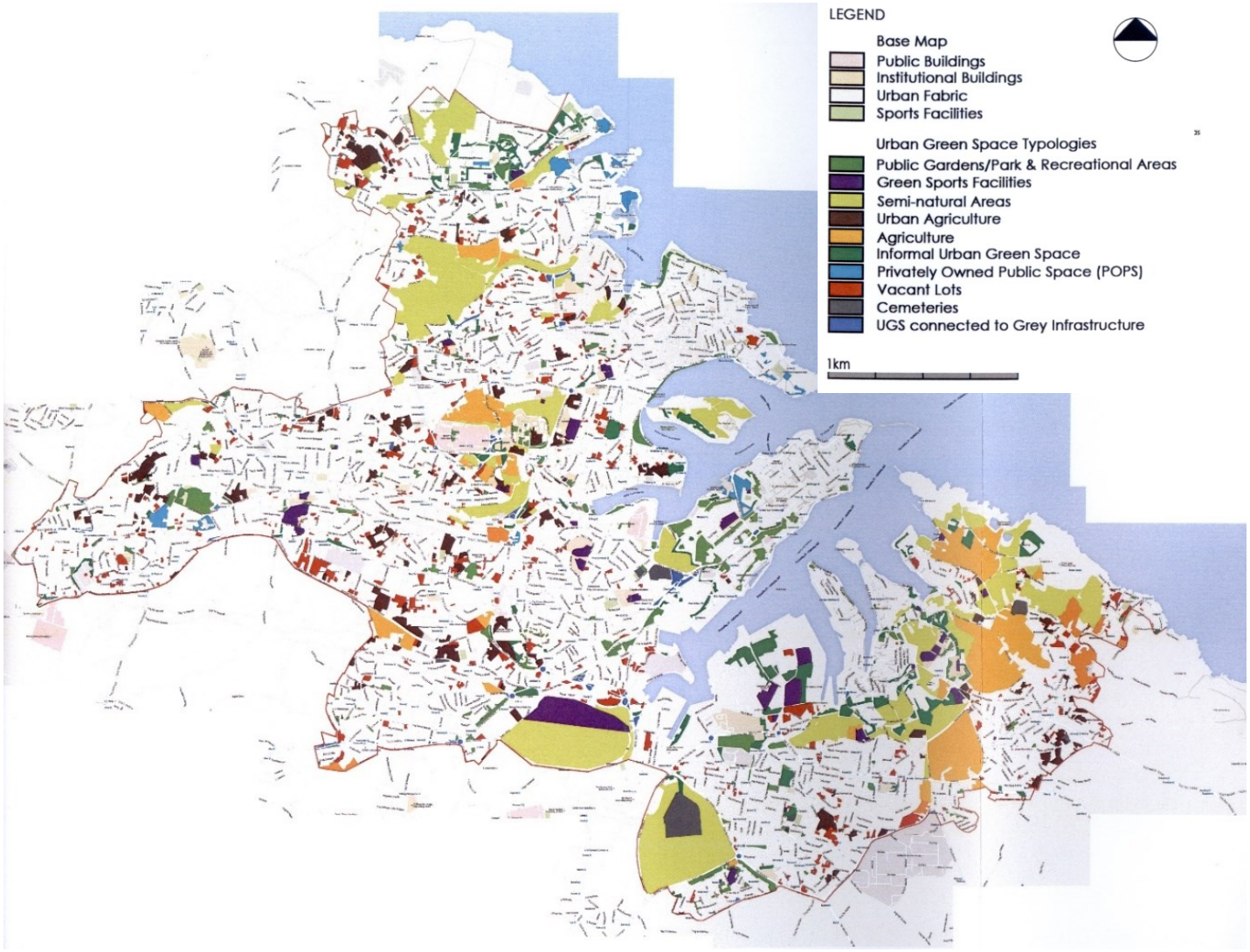


Figure 54 - Potential urban green spaces within the Grand Harbour conurbation which could be valorised to help increase CNT and PA (Frendo, 2016)

Appendix 16 - Policy makers' validation interview

The role of connectedness to nature & place for participatory protected area management.

Brian Restall, Institute of Earth Systems.

PhD. Candidate in Environmental Management and Planning.
Supervisors - Dr. Elisabeth Conrad, Prof. Saviour Formosa.

This works explores the importance and intricacies of social factors like attachment to place and connectedness to nature, and their impact on environmental behaviour. It also builds a case for 'socio-spatial learning' were community engagement is framed within spatial planning and applied to protected area management. The study argues that socio-spatial planning can bring diverse community perceptions to the attention of environmental management, and can provide a basis for understanding these perceptions and interdependencies within complex spatial changes.

Interview Questions

1) What are your main responsibilities?

2) How long have you been working in the planning field?

3) Have you been involved in the formulation of any policies or policy documents? If yes, which?

4) Do they think it is useful to understand how people relate to place; which places matter to them and why?

5) Are you aware of whether concepts of place attachment/connectedness to nature have been considered in any local initiatives?

6) Have you dealt with socio-spatial planning in your planning experience?

7) Are there any policies that deal with the subject of socio-spatial planning?

8) Do you think that environmental and ecological protection is the only measure to safeguard protected areas, and do you envisage further planning functions which also include socio-spatial input, like people's attachment to nature and place for instance?

9) What is your impression about the current relations between the PA and local communities?

10) To what extent do you feel that local communities are engaged with protected areas and invested in their management/success? What do they think would be necessary to mobilize local communities?

11) A GIS platform is available online here: http://mgo.ms/s/6oqsg Is this information useful from your point of view? What do you think about the interface, the way it is presented, how could this be more useful,

any criticisms, who is the ideal target group/audience, how do you think these results could contribute to better management.

12) Do you see any way in which such information could be used to formulate more effective plans and policies?

13) Do you think there are differences in the level of engagement/interest for different sites?

14) Do you think socio-spatial learning can inform protect area management and strategy?

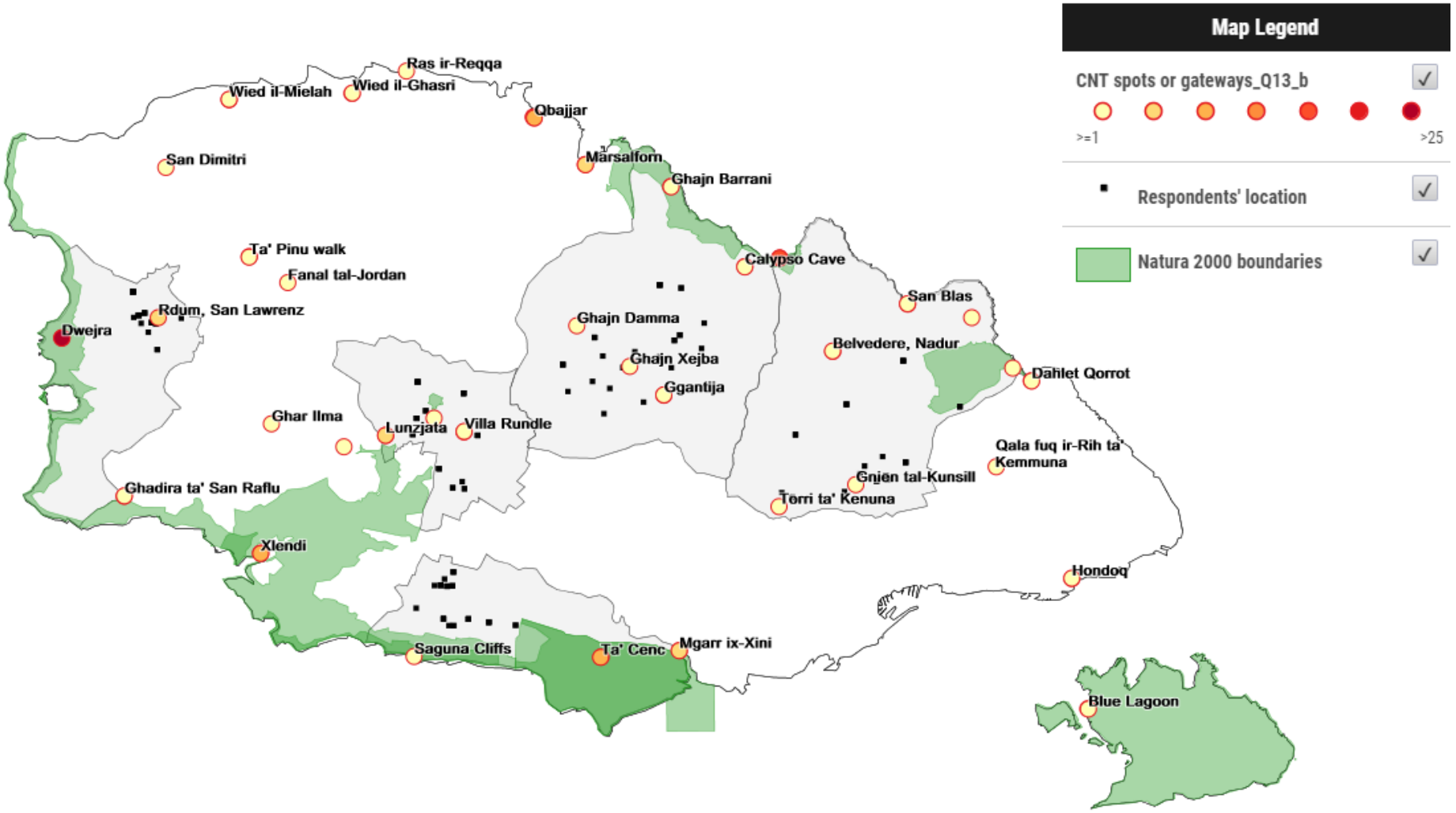
15) Should we have a spatial strategy which integrates human connections to place and nature for instance? How can this be achieved?

16) What do you think are the main aspects of a socio-spatial approach which could apply social constructs like connection to place and nature more strategically in environmental planning?

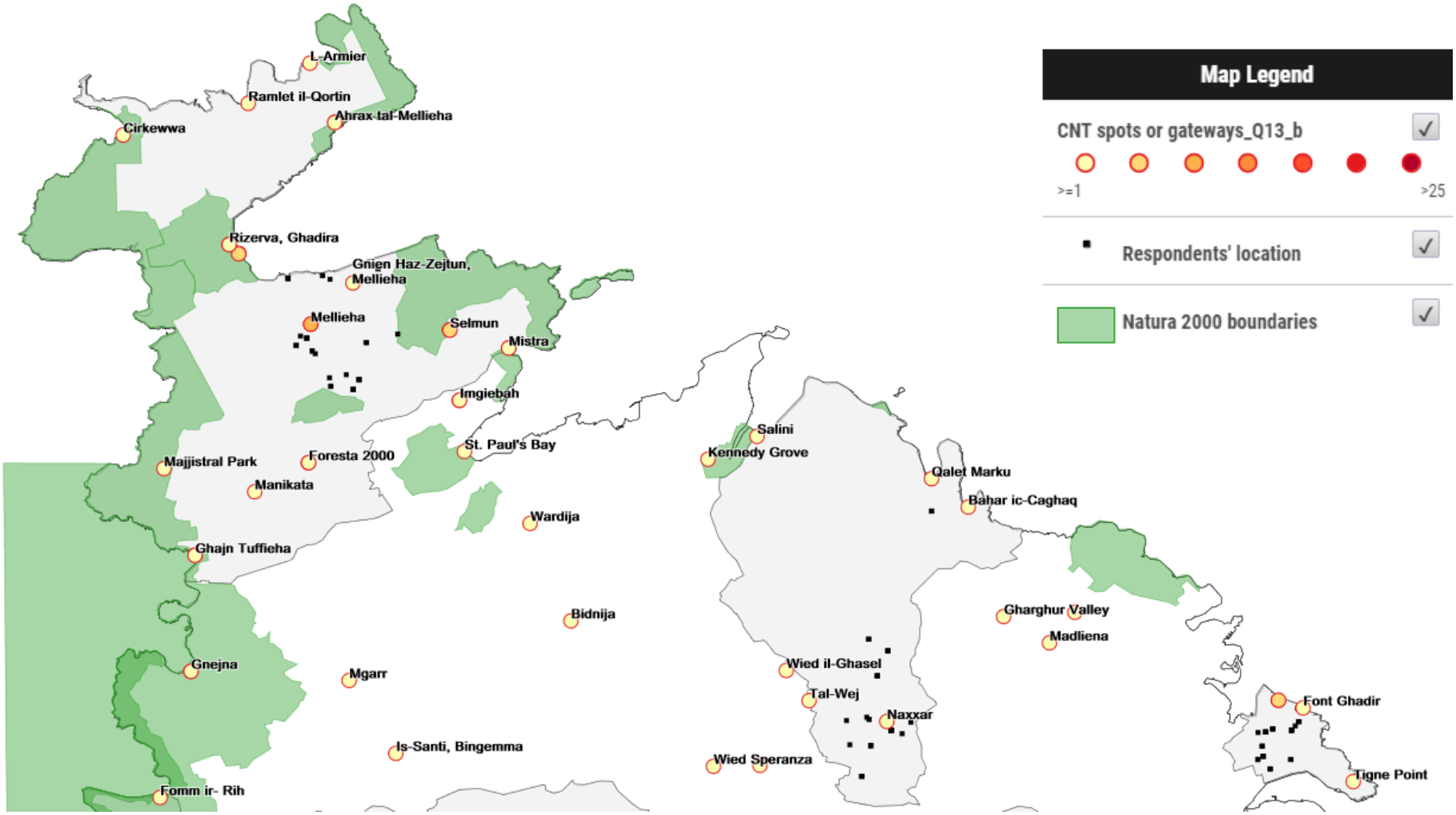
17) What priority actions are needed to bring about changes in the legal and institutional framework? Consider the following levels: Inter-institutional commissions; Governmental negotiation (lobbying, legal reforms); Participation of other actors (private sector, academia, civil society)

18) Are there any other social constructs which could have a major role to play in environmental management and planning?

Appendix 17 - CNT Focused map - Gozo

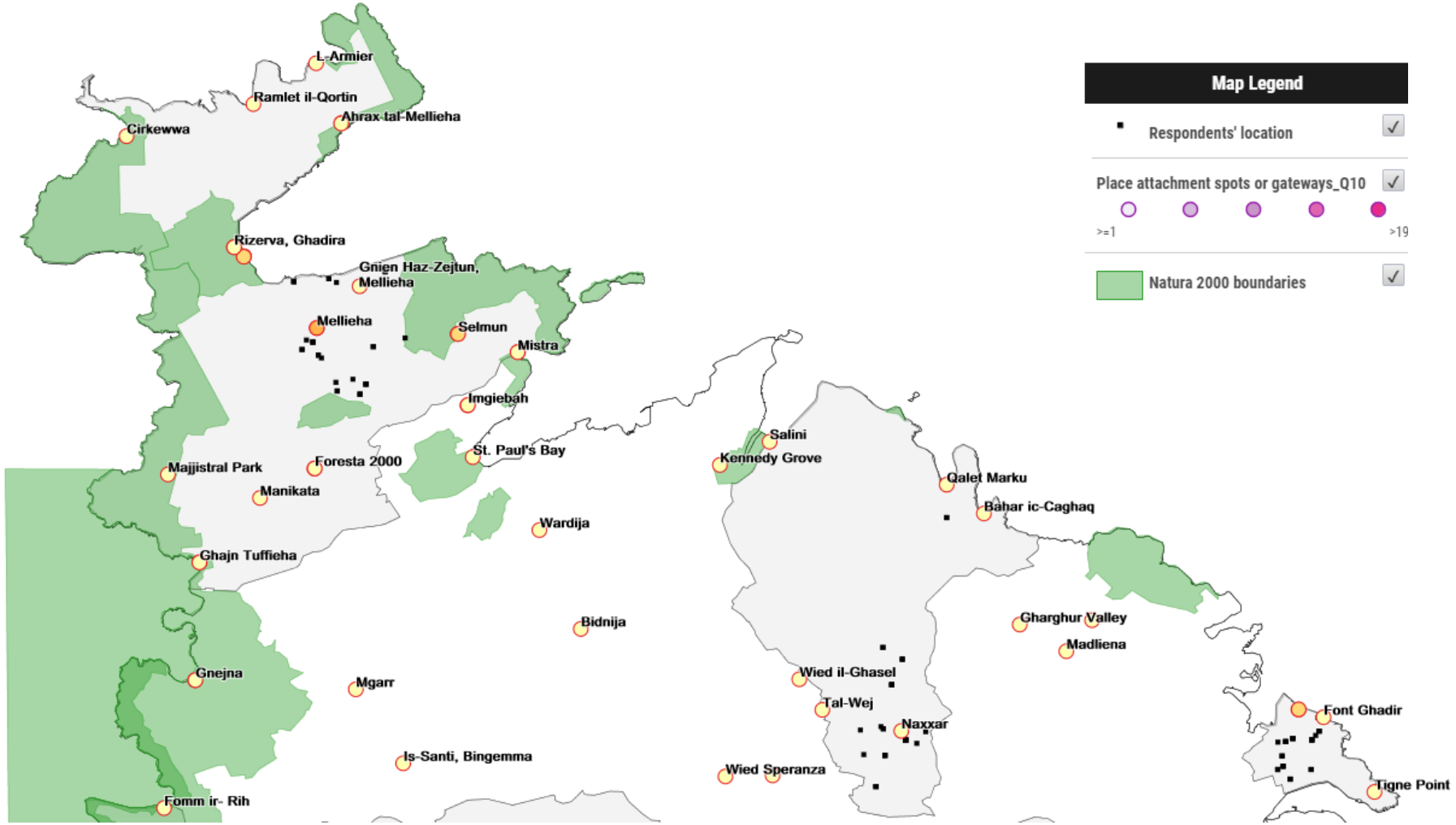


Appendix 18 - CNT Focused map - North Malta

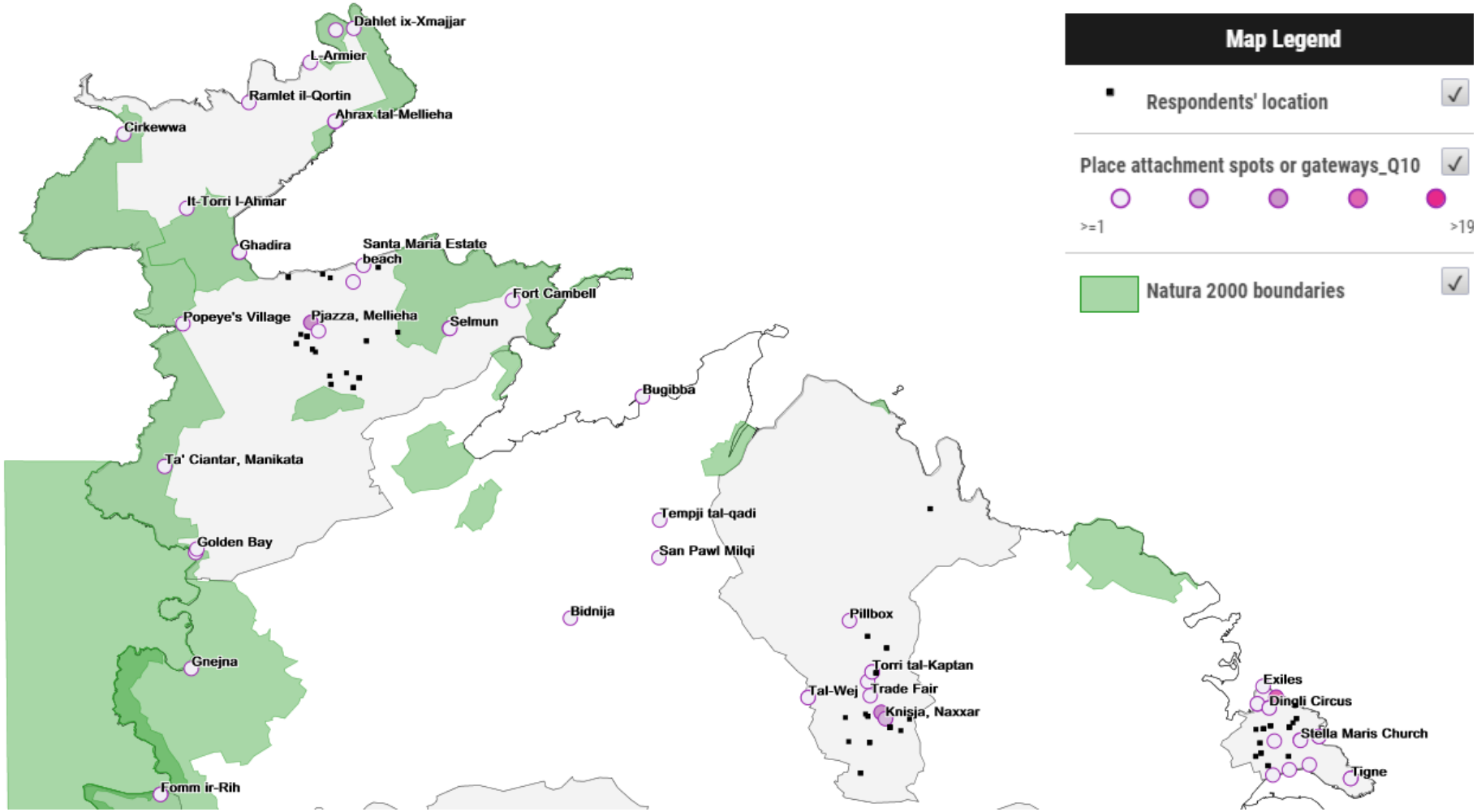


Appendix 19 - CNT Focused map - South Malta

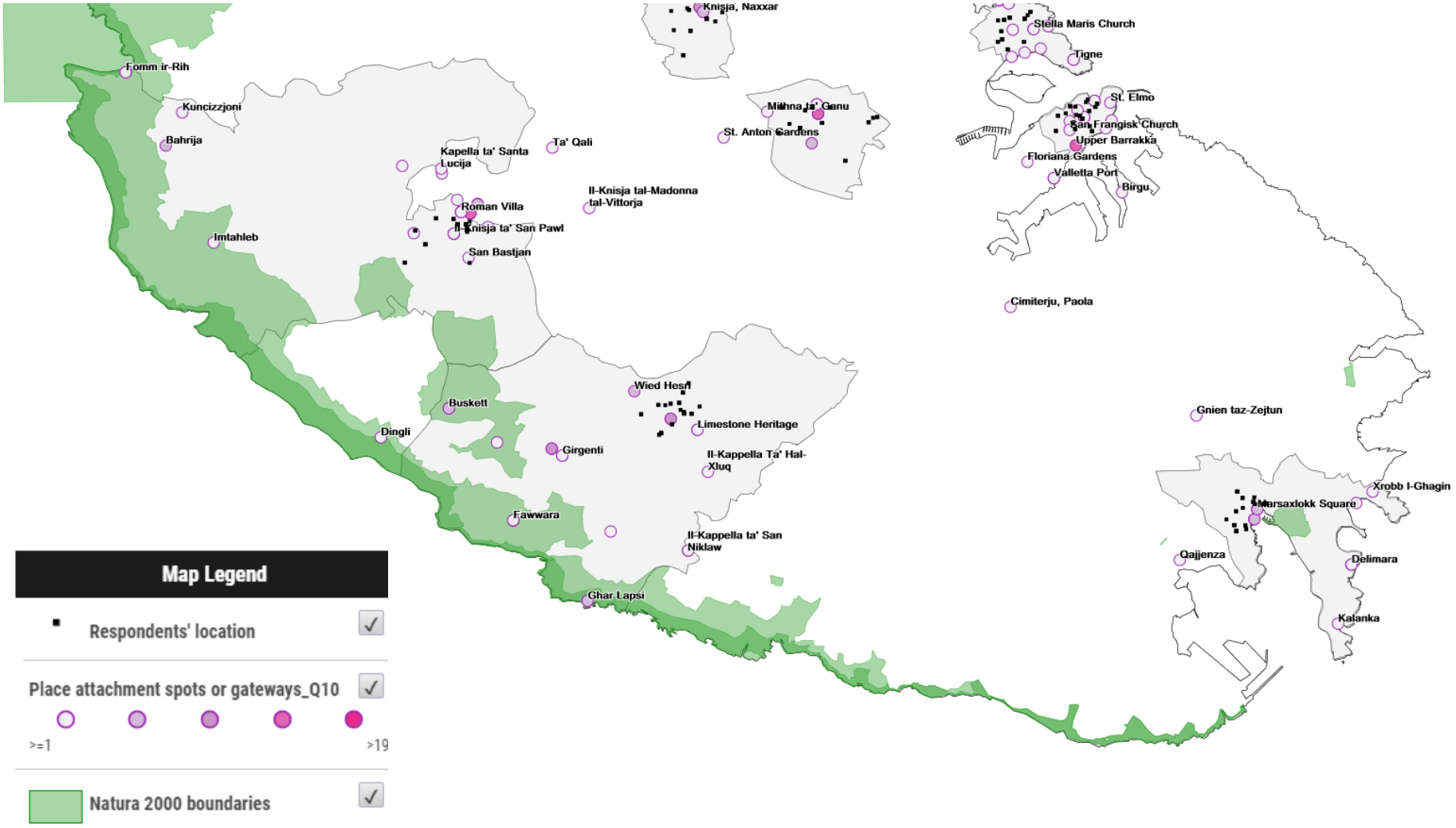
Appendix 20 - PA Focused map - Gozo



Appendix 21 - PA Focused map - North Malta



Appendix 22 - PA Focused map - South Malta



"The historical record leaves little doubt that the educated, including the highly educated, have gone astray in their moral and political thinking as often as anyone else. …Well-informed people are likely to have more elaborate and internally consistent worldviews than inattentive people, but that just reflects the fact that their rationalisations are better rehearsed."

Christopher H. Achen & Larry M. Bartels (2016). *Democracy for Realists: Why Elections Do Not Produce Responsive Government*. Princeton University Press.