

# Limits of stakeholder participation in sustainable development: “Where facts are few, experts are many.”<sup>1</sup>

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*The notion of including stakeholders, those affected (positively or negatively) by a sustainable development programme in both its design and implementation, has become a central concern for those implementing such programmes. Such an approach is often referred to as ‘stakeholder participation’, as ‘participatory development’ or more simply still as ‘participation’. How best to achieve this has been the topic of a substantial literature, with a host of different methodologies presented and promoted. Each has its own advantages and disadvantages, but there has been surprisingly little discussion in the sustainable development literature as to the limits and dangers of participation irrespective of the approach employed to ‘best’ facilitate it. Inter-linked with the limits of participation is the role of specialists and expert opinion in sustainable development. This paper discusses the results of participatory exercises conducted in Gozo (Malta) between 2003 and 2005. On the positive side, participation yielded many useful and interesting insights and invoked a sense of ‘involvement’ in sustainable development, but there were problems and these are discussed in this paper. For example, the outcome of the exercise crucially depends upon representation, and a simplified vision of ‘community’ often employed in participation to make it practicable can load the process in favour of certain stakeholder groups at the expense of others.*

Key words: stakeholder participation, sustainable development, conservation

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1 An oft-reported quotation of Donald R.Gannon.

## INTRODUCTION

The role of what is often referred to as ‘stakeholder’ participation in the sustainable management of protected areas is typically based upon an assumption that participation is a fundamental human right. Those affected have a right to be involved in the decision-making processes. Participation can also make conservation more effective. There are a number of points here, including the desirability of identifying variation in stakeholder perspective and how this can be addressed, the fact that people can feel more involved and motivated if they are included in the process and the identification of issues by locals which can be missed by outside experts. However, set against this are the problems of stakeholder participation, including the cost in terms of resources and time. There is also the issue of representation – the so-called ‘myth of community’. This has received much attention in the development literature in particular. This is related to the so-called ‘myth’ of consensus (Peterson *et al.*, 2005) allied to a myth of community (Guijt & Shah, 1998). Participatory techniques often attempt to draw out some underlying issues that need addressing or to go further and explore solutions that can emerge from the community itself. In either case agreements as to what ‘is’ and what ‘needs’ to be done are required, even if these are multiple rather than single in nature. Well-established techniques such as multi-criteria analysis (MCA), integrated assessment and risk-analysis can help elicit a pattern given such a set of multiple goals, objectives and perspectives (Marjolein & Rijkens-Klomp, 2002; Willis *et al.*, 2004; Mendoza & Prabhu, 2005). But what if there is little agreement over what the important issues are, let alone how to address them? What if people have little common interest and needs and hence there is little or no consensus? After all, any community encompasses a wide range of individuals and social units spanning gender, age, ethnicity, experience and wealth spectra, and *a priori* one would expect to find little consensus and would not be surprised if one did not emerge (Hibbard & Lurie, 2000). Participatory approaches could well discover such richness and acknowledge the lack of consensus, itself a valid finding and possibly engendering a new awareness among the community. It is more likely that these differences will lead to a diverse set of actions, some of which may well be contradictory such as environmental protection versus economic growth (Peterson *et al.*, 2005). Worse still it may be that differences are suppressed either by the community or, even worse, by the facilitator(s), in order to arrive at a supposed consensus (Mendoza & Prabhu, 2005). While everyone may feel a sense of fulfilment that the process is finally over, agreed action points may rapidly evaporate. The participatory exercise may also do no more than draw out the views and wishes of those with the loudest voice and simply reinforce and exacerbate existing power inequalities within the community (Mosse, 2001; Cornwall, 2003; Peterson *et al.*, 2005). Consensus becomes an expression of the desires of the minority at the expense of the majority.

Protected areas occupy a large proportion of the earth’s land surface, probably only second to forestry. In 2003 it was estimated that protected areas occupied more than 11% of the world’s land area (WRI, 2003). However, many are under pressure from

human activity. Currently some 55% of the global area protected in reserves is open to sustainable resource use and human intervention (Green & Paine, 1997), although there can be conflicts between conservation and development (Wells & Brandon, 1992; Kemf, 1993; Ghimire & Pimbert, 1997). Establishment of protected areas can be accompanied by the imposition of strict limitations on the use of natural resources leading in extreme cases to the eviction of communities living inside the parks (Colchester, 1994). Such 'imposed' reserves typically have little (if any) participation from the communities living in the protected zones. The result has sometimes been severe social conflict and opposition (Pimbert & Pretty, 1995). In the last ten years there has been a re-evaluation of the importance of local involvement and the introduction of more participative approaches which stress social justice (Phillips, 1999; Borrini-Feyerabend *et al.*, 2000; Barrow & Fabricius, 2002) and the need to consider conservation within an all-embracing umbrella of sustainable development.

In many ways the Mediterranean is a unique space in which to consider the conflict between conservation and development. There are 21 countries that bound the sea, ranging from developed countries on the Basin's northern shores to less developed ones on the southern shores. Its landscapes and topography, as well as the habitats and biota, all contribute towards the region's richness and diversity (Leon *et al.*, 1985). The destruction of Mediterranean Basin ecosystems can have serious and far-reaching effects, notably, the loss of essential functions in the balance of ecosystems, reduction in goods and services provided, and species extinction (Batisse, 1990). A further loss of species will diminish the aesthetic value of the region, which may have an unquantifiable effect on future generations (Cassar, 2001). Numerous important areas are not adequately protected and various are under threat, mainly from development (Synge, 1993; Blondel & Aronson, 1999).

This is much the case in the Maltese Islands, where landscapes have become fragmented and biotopes often relegated to restricted refugia around which conflicting land uses abound. Frequently, the only physical connections between these patches of natural and semi-natural habitats are plots of agricultural land intersected by a myriad of criss-crossing dry stone rubble walls and a network of water conduits or *widien* (freshwater courses) that bisect entire stretches of landscape. These vegetation communities are dynamic systems that often gradually merge into each other forming mosaics and the dividing line between different assemblage types is often hazy and unclear. For example, maquis communities may change imperceptibly into high garrigues, or merge into phryganas that in turn integrate with steppic elements; some of the changes may be fundamental and apparent while in other cases, where merging with relatively similar habitat types or splitting into 'sub-communities' occurs, it may not appear so evident. Indeed the Maltese Islands provide a microcosm of a highly anthropised environment that one encounters throughout the Mediterranean Basin, where all natural and semi-natural communities interface with disturbed habitats or with secondary succession vegetation colonizing abandoned agricultural land.

This paper seeks to explore some of the tensions between conservation and sustainable development as envisioned by a range of diverse 'stakeholders'. The context is

the Island of Gozo (Malta) in the Mediterranean. The research has two components. First, how can a notion of 'ecological quality' be employed to identify areas that could be prioritised for conservation? Second, once such areas have been identified, to what extent is it possible to arrive at a consensus as to the human induced pressures that they may face?

## MATERIALS AND METHODS

### *Site selection*

The Maltese Islands are often seen as a microcosm of the Mediterranean. Despite their size, the islands are home to a rich variety of biotopes, which host several endemic forms. With the highest human population density in Europe, the Maltese Islands also have a very rich history, having been subject to numerous rules and civilizations over time, ranging from the Phoenicians, Romans and Arabs to French and British in more recent times. Each of these colonizers left their mark in a variety of ways, not least through the impact on the landscape. Since the archipelago was initially identified as a potential destination in the late Fifties, various changes were made to the landscape in order to accommodate the growing needs of the tourism industry. Concurrently, the phenomenon of agricultural land abandonment, common to most other countries in the region, has become most prevalent on mainland Malta. This is probably due to the fact that more and more people joined the services industry as new opportunities arose. However, this trend does not appear to be too evident on the Island of Gozo, where agricultural practice is still fairly widespread. One reason may be that Gozo is, as yet, not marketed as a separate destination and, therefore, only receives a small number of tourists compared to the main Island of Malta, mainly in the form of day-trippers.

The unplanned development of the years after independence, mostly but not exclusively that of the Seventies and Eighties, has disfigured entire rural landscapes beyond redemption. Even if tourism development has, thus far, not crept in as it did in Malta, over the millennia agricultural development has severely damaged ecosystems on Gozo (Cassar & Gauci, 2005). As a consequence, exceedingly important biotopes, supporting scientifically interesting biota, including a number of endemic forms such as the Maltese Salt-Tree (*Darniella melitensis*), a relic of the Tertiary, the Maltese Spurge (*Euphorbia melitensis*), the Maltese Everlasting (*Helichrysum melitense*), the Maltese Rock-centaury (*Palaeocyanus crassifolius*), the Gozo Hyoseris (*Hyoseris frutescens*) and the Maltese Cliff-orache (*Cremnophyton lanfrancoi*) among others, have literally become pocketed throughout Gozo within remaining habitats, such as karstic plateaux, sheer sea-cliffs and scree environments. Although recent planning and environment protection legislation has slowed the process of unsustainable urban sprawl somewhat, it is clear that some negative aspects of the scenario described above will persist, albeit, at a slower pace. Loss of habitats and biota will down-grade the aesthetic value and

rural character of the island's landscapes that may result in undesirable consequences for future generations, in both social and economic terms.

### *Data collection*

The research had a number of phases:

1. characterisation of the ecology of the entire island, based on field survey;
2. analysis of the characterisation in order to identify sectors within the island of high 'ecological quality' that may serve as candidate sites for conservation;
3. detailed characterisation of the sites identified as of high ecological value – nine sites;
4. the use of participatory methods to identify the human induced pressures that exist within and around the sites identified in (2) above; and
5. the use of a survey amongst a range of stakeholder groups to weight the relative importance of the pressures said to exist within and around the sites.

The first phase of the study was based on ecological field research carried out on the Island of Gozo between the summer of 2000 and early spring of 2003. The broad-brush survey of the entire island was conducted whereby habitats were characterized by visual assessment, during walkover surveys, on the basis of geomorphological features and biotic assemblages. All biotopes and assemblages across the island were mapped on survey sheets (scale 1:2500) and subsequently digitized. Each entry, representing the 809 different polygons within the Gozo ecology Geographic Information Systems (GIS), was subsequently weighted according to a set of evaluation criteria presented in Table 1. The suite of conservation value appraisal criteria are, by and large, based on the Ratcliffe Conservation Review Criteria of 1977 and the IUCN Criteria (modified Ratcliffe criteria) of 1986; however, the entire suite and each of their explanatory memoranda ('justification') were designed specifically for the current research on the Island of Gozo. These may also be extrapolated to other central Mediterranean island ecosystems, and, with further modification, they may also be applied universally.

The 10 desirable criteria were given a weight of +1 while the 3 undesirable criteria were each allocated a value of -1. It was decided to take the simplest approach possible, i.e., additive (Morse *et al.*, 2001). Thus:

$$EQ = \sum_{i=1}^{i=13} \pm c_i Q_i$$

Where:

EQ = 'ecological quality' for the polygon based on criteria (i) from 1 to 13

$c_i$  = coefficient (+1 or -1)

$Q_i$  = value of criterion i for the polygon

A series of digital map images, each indicative of the individual criteria, were produced and the summation of each of the criteria produced a digital map representing

Table 1. Criteria employed in the evaluation of ‘ecological quality’ (Cassar, ongoing research). a) Criteria considered as “positive” (desirable); b) Criteria considered as “negative” (undesirable).

a)

Criterion	Justification
1. Rarity	Linked with the presence of species that are listed in the Red Data Book for the Maltese Islands and, any assemblages and communities, as well as species newly discovered or whose status has deteriorated (since the publication of the RDB), that are deemed rare, scarce and/or endangered.
2. Endemism	Presence of endemic forms, including the palaeoendemics, neoendemics (which are uniquely Maltese) and subendemics. The latter comprise species that are restricted to the circum Sicilian island complex, which includes Sicily and its surrounding islands, the Maltese Islands, the Pelagian Islands (Lampedusa, Linosa and Lampione), and Pantelleria.
3. Irreplaceability	This criterion refers to the presence of locally important ecological resources such as species, assemblages and habitat types, which may be of value both ecologically and culturally. The presence of such assets immediately conveys a unique sense-of-place associated with local landscape perspective; the prominence of the archaeophytic carob ( <i>Ceratonia siliqua</i> ) within the context of the Maltese landscape is a case in point. Thus, it would be detrimental both culturally and ecologically if such assets, which characterise Maltese rural landscapes were to be eliminated, say, for purposes of infrastructure and development.
4. Distinctiveness	This criterion reflects the biogeographic importance of a biotope, assemblage or species. One may find species within the Maltese Islands that are not adequately represented on mainland Europe, but which coexist with distinct assemblages and communities to form mosaics. These are recognised by classification schemes (e.g. Palearctic Habitat Classification) as distinctive biotopes that are characteristic of the Maltese Islands or the circum Sicilian Island complex.
5. Extent	Conservation value of a given landscape or parcel of land is a function of its size or extent. Thus, larger extent equates with enhanced stability and reduced vulnerability to pressures, risks and impacts of immediate or surrounding land use. A landscape should be of sufficient extent to support viable ecological communities; this may also include adjacent agricultural areas or distant seminatural areas that are however linked by wildlife corridors. Areas of significant extent will, for example, provide species at the top of the food chain, such as raptors, suitable territory for foraging and hunting.
6. Naturalness	This is a somewhat difficult criterion, primarily in the context of the Mediterranean, where virtually all landscapes and assemblages have been influenced and/or modified by the human agency. ‘Relative disturbance’ may be a more appropriate way by which to describe this criterion; it suggests that those biotopes that have been least subject to modification are particularly valuable.
7. Regeneration	This criterion refers to two closely related scenarios, both relating to regeneration. In the first instance it refers to situations where a given terrain or habitat shows signs of unaided regeneration, either through secondary succession or through the diffusion of community elements from adjacent areas. The second scenario reflects the potential of a degraded biotope, in phytosociological and spatial terms, for ecological restoration and management.

Criterion	Justification
8. Richness & diversity	This criterion is linked primarily with species richness within a community/ biotope, but also to habitat diversity within a landscape. Such a criterion may be utilised to quantify the conservation value of areas (i) where relatively full communities occur; (ii) where a variety of ecologically valuable habitats occur within a parcel of land; and, (iii) where large scale regeneration is taking place, as a result of which, species richness within the assemblages present is high.
9. Connectivity	Presence of or close proximity to wildlife corridors and 'stepping stones' within a landscape and/or between habitats is a crucial component of conservation value and viability since major causes of decline or loss of biological diversity is often due to fragmentation or isolation of biotopes and ecosystems. Habitat connectivity facilitates movement of fauna, mostly, but also flora (as seeds and spores), across the terrain and ensures continued viability of populations and communities. In the Maltese Islands, and numerous other places within the Mediterranean, wildlife corridors may include dry stone rubble walls which form complex networks across farmland, dense <i>Opuntia</i> stands, carob tree dominated assemblages, valley systems with tributary channels and derelict land.
10. Protection status	Reflects the legal status, in terms of nature conservation and environmental management, of a given parcel of seminatural terrain within a landscape. This is an easily quantifiable criterion since any area that is under some form of legal protection within the Maltese Islands is clearly documented.

b)

Criterion	Justification
11. Habitat loss	Evidence of severe degradation and habitat loss due to human agency. This is largely consistent with the following factors: insensitive urban expansion and ancillary development; illicit dumping of inert waste; farmyard slurry and concrete sluicing; quarrying; inappropriate afforestation; damming of valley systems and watercourses; and, large scale reclamation for cultivation.
12. Displacement	Manifests a significant presence of invasive species, often alien or opportunistic forms, characterised mainly by generalist species (ruderals) capable of exploiting transient gaps in habitat-space and, subsequently, by low diversity assemblages consistent with the steppic early pioneer stages of a secondary succession. Such representation is indicative of intensive biotope or habitat disturbance.
13. Fragmentation	Evidence of landscape fragmentation as a result of infrastructural development, such as: (i) road construction; (ii) coastal 'embellishment' such as hard-landscaped promenades; and, (iii) establishment of open-pit quarries and open-air storage for quarried materials, farmsteads, batching and asphalt plants within rural 'outside development zone' areas. Other cases in point that lead to fragmentation include poor landscaping design often using inappropriate planting schemes, untraditional methods of agriculture, hotel and other catering establishments in remote rural areas, golf courses, scrap yards, concentrations of bird-trapping sites in ecologically sensitive areas, and, screeding of watercourses (conversion of valleys into country lanes and roads), among others.

ecological quality. It may, of course, be argued that the effect of one criterion may exert a more substantial pressure on the landscape and its ecology than another and therefore their respective weightings should vary. However, it is unlikely that differential weightings would change the map of ecological quality for Gozo hence a weighting of  $\pm 1$  in this context is a reasonable assumption.

Once the sites of high ecological quality had been identified it was necessary to characterise them in greater depth to provide confirmation of their quality. Assessment employed line intercept (direct measurement through line transect approach) or quadrat (modified Braun-Blanquet approach) methods. Biotopes within each of these sites were characterized on the basis of the Palaearctic habitat classification – Malta Biotope list (Devillers-Terschuren & Devillers-Terschuren, 2001) (Table 2).

The pressures which exist at each site were then identified. This stage of the process was participatory in nature. The approach selected was soft systems methodology (Bell & Morse, 1999, 2003). A number of discussion meetings and participatory seminars were held with key respondent/stakeholder groups. A week-long activity, entitled “*Landscape integrity assessment for sustainability in the coastal zone*”, was held in Gozo with participants from various Mediterranean countries, together with Maltese and Gozitan counterparts. The participants were subdivided into working groups of between three and five persons per group and asked to produce ‘rich pictures’ based on their observations and findings to describe key issues afflicting the sites. Rich pictures are an informal way for workshop participants to share their thoughts and express their concerns in a manner that could be discussed and reviewed by colleagues. As a tool of communication, rich picture methodology brings out a wealth of information in terms of emotions, description and content; it is only after the rich picture is produced and the intended outcome discussed with other groups that major issues of importance are raised and ‘new foci for shared concern raised’ (Bell & Morse, 2003). The step that followed was the identification of pressures and the tasks required to address the issues, which the participants then presented in plenary. A second focus group seminar was held during the initial part of 2005, where a group of local planners were familiarized with the selected sites and their surrounding landscapes. Three work parties visited each of the sites and identified the key issues afflicting the sites. The planners then created ‘rich pictures’ to describe pressures they had identified for each of the selected sites, subsequently deriving a list of the actions/solutions deemed necessary to tackle the issues. The pressures identified by all focus group seminars were more or less similar.

The final phase of the research was the weighting of the importance of the pressures identified using the ‘soft systems methodology’. Laminated cards with images of common pressures existing at the selected sites within the coastal landscapes were produced and a total of 230 stakeholders were approached and asked to rank the pressures in terms of their importance on the island. Stakeholders were selected from the following groups:

- (i) affected locals, which included farmers (land-owners), rambles, locals that frequent the sites for their scenic value and Maltese residents in Gozo;



- (ii) resource users, which include bird shooters and trappers, hoteliers, restaurant and cafe owners, shop owners, quarry owners and the like;
- (iii) government and other official agencies, such as the Ministry for Gozo, Local Councils, the Malta Environment & Planning Authority, Heritage Malta, etc.;
- (iv) non-governmental organizations (NGOs), such as Nature Trust, BirdLife (Malta) and Wirt Ghawdex (Gozo Heritage Society); and
- (v) scientific community, which includes individuals who have an academic interest in the natural history of Gozo, in its landscapes and landform and in its rural cultural heritage.

Every effort was made to ensure that the size of the sample was representative in terms of realities in Gozo, that are governed by group size and geographical extent, so as to engage the widest possible stakeholder coverage in the exercise. Essentially, interviewees ranked the pressures identified for the nine selected sites with regard to impact significance and magnitude. As it happened, some of the interviewees had site specific information, while others had a much wider overview. The pressures ranked were:

- quarrying;
- pollution from agriculture;
- urbanisation;
- visitor/recreational pressures;
- hunting and trapping;
- grazing;
- landfill;
- reclamation, land abandonment and proliferation of alien species.

Ranks were from 1 (least important or significant) to 8 (most important/deemed most significant), and the results were analysed with non-parametric methods (Mood's median test) to identify differences in perception between the stakeholder groups. Mood's median test can be used to test the equality of medians from two or more populations and, like the Kruskal-Wallis Test, provides a non-parametric alternative to the one-way analysis of variance.

## RESULTS

With some of the criteria described in Table 1 above, there is a greater spatial concentration of high values than with others. There appears to be some correlation between *distinctiveness*, *endemism*, *richness & diversity*, *naturalness* and *protection status*, for example, which show a marked concentration of high values at three general locations on the island, notably the Dwejra/Qawra region, the Ta Cenc area and the Ta Magun/Ta Tocc region. One of the principal reasons why these sites harbour such important ecological features is possibly due to the fact that the terrain is karstic, thus, with much exposed rock and shallow pockets of soil. The lack of soil cover, coupled

by the sites' exposure to strong winds, has caused people to pay little attention to these locations in terms of farming opportunities. Over the centuries, people tended to shy away from these areas, as a result of which, the biotopes present continued to develop with relatively less disturbance than other areas on the island. Consequently, criteria such as *richness & diversity* and *naturalness* scored highly in these areas.

*Rarity* is particularly evident along inaccessible coastal areas such as rupestral environments, sheer sided valleys, sea cliffs and escarpments. There is obviously some overlap between this criterion and *endemism*, for example, since most endemic species, with the possible exception of *Chiliadenus bocconei*, are rare, localised or vulnerable.

*Irreplaceability* refers to the presence of locally important ecological resources such as species, assemblages and habitat types that may be of value both ecologically and culturally. The presence of the archaeophytic assemblages, such as those comprising the carob (*Ceratonia siliqua*), within the context of the Maltese landscape is a case in point. Carobs are ubiquitous in the rural environment of the Maltese Islands and would normally be seen dotting the landscape, mostly on the three most common land cover elements in Gozo, that is, on the verges of fields, at the base of escarpments and on valley-beds, hence the widespread distribution of this criterion.

For other criteria, *connectivity*, *fragmentation*, *regeneration* and *extent*, there is a more even distribution across the island. The reasons are varied and for the most part unrelated. In the case of *connectivity*, this largely depends on geomorphology and land use relating to agriculture, since the criterion refers to wildlife corridors, which include: (i) dry stone rubble walls, a most common landscape feature in the Maltese Islands that manifests complex networks of such walls across farmland; (ii) dense *Opuntia* stands, which are exceedingly common in Gozo and which serve much the same purpose as the hedgerows of northern Europe where wildlife corridors are concerned; (iii) carob tree dominated assemblages, which create a habitat of dense thickets among boulder screes, escarpments and open farmland, thus serving as 'stepping stones' within a landscape and/or between habitats; (iv) valley systems that link different parcels of land; and, (v) derelict land that serves as a linkage within rural landscapes. The hilly topography criss-crossed by numerous valleys and freshwater run-off conduits, together with extensive agricultural practice across the entire island, all contribute to the provision of linkages across and within rural landscapes in Gozo; hence, the even distribution of this criterion. For *fragmentation*, the smallness of the island (67.1 km<sup>2</sup>) coupled with a relatively large local and visitor population has caused the authorities to invest considerably in the island's infrastructure. Road and other infrastructural development across the island, but particularly in coastal areas, has resulted in the fragmentation of entire landscapes. Gozo's largest land user, i.e., agricultural practice, both in terms of livestock farms and open field cultivation, has also contributed vastly towards landscape fragmentation. Predictably, in order to support the on-going construction activity, the establishment of open pit quarries and open air storage for quarried materials, batching and asphalt plants within rural zones have also left their mark. In addition, large concentrations of bird trapping sites, often in ecologically sensitive areas, have also led to the fragmentation of the landscape.

The criterion *regeneration* refers to two related scenarios: (i) where a given terrain or habitat shows signs of unaided regeneration, either through secondary succession or through the diffusion of community elements from adjacent areas; and, (ii) when a degraded biotope has the potential, in phytosociological and spatial terms, for ecological restoration and management. The GIS map for this criterion shows a fairly widespread spatial extent, largely due to the prevalent trend in agricultural land abandonment as a result of which natural regeneration slowly sets in. Another reason is due to the availability of a fair number of degraded biotopes, which potentially can be restored.

*Extent* in the context of Gozo refers to relatively largish parcels of land of sufficient size to support viable ecological communities. In this context, it may also include adjacent agricultural areas or outlying semi natural areas that are however linked by wildlife corridors. The spatially widespread nature of this criterion in Gozo is largely due to the fact that agriculture, the biggest land user in Gozo, surrounds most existing biotopes, thus serving as a buffer zone for ecologically important sites.

The criterion *displacement* indicates a considerable presence of invasive species, often the result of intensive biotope or habitat disturbance, as generalist species and, subsequently, steppic early pioneer stages of a secondary succession exploit transient gaps in habitat space. Although this phenomenon is fairly widely distributed across the entire island, there appear to be significant concentrations on the northern segment of Gozo where the topography is rugged and the landscape is characterised by hilly terrain, karstic plateaux and related escarpments. The reason for this substantial presence of invasive species may be associated with agricultural land abandonment due to the difficulty in cultivating the rugged landscape, as a consequence of which, the terrain, which would have been initially disturbed by farmers, would provide favourable habitat for the establishment of alien and ruderal species.

It may appear that *habitat loss* is not significant in Gozo. However, this criterion portrays a snapshot of the situation at the time of assessment as otherwise one would have been compelled to consider all agricultural land that once supported natural biotopes. Thus, wherever there was clear evidence of severe degradation and habitat loss due to human agency, such as (i) insensitive urban expansion and ancillary development; (ii) illicit dumping of inert waste, farmyard slurry and concrete sluicing on semi natural or natural areas; (iii) quarrying; (iv) inappropriate afforestation; (v) damming of valley systems and watercourses; and, (vi) large scale reclamation for cultivation, the polygon in question would have scored, in this case, a “-1”. The impacts that were registered included all of the above but were largely related to quarrying activity and associated spill over, bird trapping sites, reclamation of land for agriculture, insensitive construction and farm related activity. Although it does not seem to occupy a significant spatial extent, it is nonetheless widespread, and, given that more habitat loss is registered in the future, there is a good chance that this will influence the distribution of other criteria such as naturalness, extent, connectivity and possibly others.

Employing the criteria listed in Table 1, the results of mapping ecological quality across the island are shown in Figure 1. The key in this figure represents values rang-

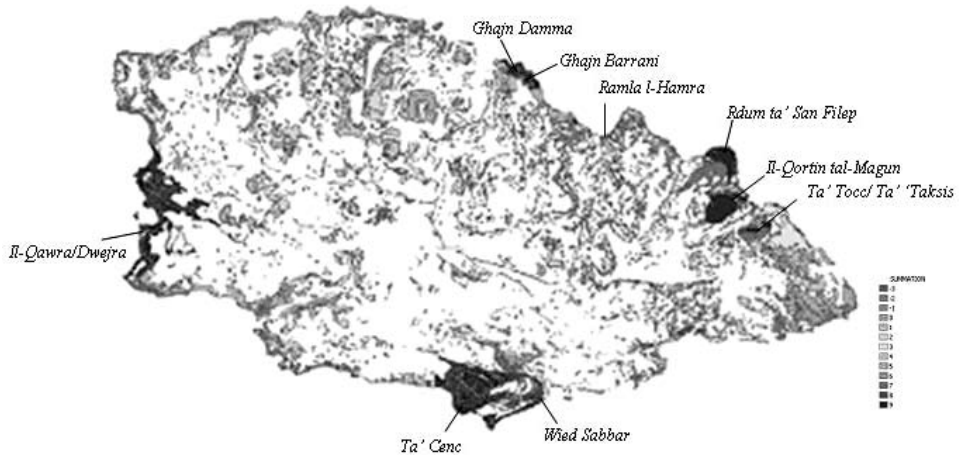


Figure 1. Map representing ecological quality of Gozo. Ecological quality of each polygon was found by summation of the criteria in Table 1, with each criterion being weighted +1/-1. The nine sites selected for more detailed investigation are shown in Table 2.

ing from -3 (low ecological value) to +9 (high ecological quality). As can be seen from Figure 1, a number of coastal sites have a high ecological quality and it is these sites, which were then employed for more detailed analysis.

No doubt, the biotopes at these sites became more diverse and species rich after the cessation of large-scale herding at least half a century or so ago. The sites *per se* are also of minor importance where agriculture is concerned since the terrain mostly comprises karstic topography, rugged escarpments, steep sided valleys, coastal dunes and/or acute clay slopes. Therefore, there would have been little interest over time in developing these into agricultural parcels of land, although some did, in the past, contain cultivated pockets of land. Additionally, the northern (Ghajn Damma, Ghajn Barrani, Ramla l-Hamra, Ta Tocc/Ta' Taksis, Rdum San Filep and Tal-Magun) and western sites (Dwejra/Qawra) are quite exposed to strong north-westerly winds.

In assessing the sites during the soft systems process, key respondent/stakeholder groups were asked to identify predominant pressures and key issues afflicting the sites and the surrounding landscape. The pressures identified for these nine sites during the process are summarised in Table 3. It appears that bird hunting and trapping are present at every site. This is not surprising since such activity is deemed, practically, endemic within the context of the Maltese Islands. Also, in view of the rural character of the sites in question, coupled by their coastal location (ideal for incoming migratory birds), bird shooting and trapping is typically widespread.

For the subsequent ranking exercise:

- 'Urbanisation' was used to cover 'illegal construction', 'threat from development' and 'proximity of urbanisation'.
- 'Recreational pressure' was used to cover 'visitor pressure', 'unregulated camping', 'climbing and abseiling' and 'recreational activities'.

Table 2. The nine sites of high ecological quality and their characterisation.

Site	Characterisation
Il-Qortin tal-Magun	Plateau formation with <i>Cistus</i> garrigue, Western-Mediterranean <i>Anthyllis phrygana</i> , Sicilian Channel <i>Periploca</i> scrub, Mediterranean Heath and Hybleo-Maltese sea cliff community.
Wied Sabbar	Steep sided gorge with rocky slope and valley-bed biotopes, including Maltese Rdum community- <i>Triadения</i> brush mosaic, Thermo-Mediterranean buckthorn <i>Asparagus</i> brush, Tree spurge formation, <i>Aloe vera</i> assemblage and Italo-Sicilian sub-Mediterranean deciduous thickets.
Il-Qawra/Dwejra	Solution subsidence structure and associated escarpments with large concentrations of Maltese Rdum and aerohaline communities.
Ramla l-Hamra	Coastal sand dunes with elements of Western Tethyan embryonic dunes and Northern Mediterranean sand couch dunes, together with Mediterranean <i>Cyperus capitatus</i> dune assemblage.
Ta' Cenc	Sheer coastal cliffs with a somewhat species-rich example of Maltese Rdum communities with numerous endemic forms, Thermo-Mediterranean <i>Coronilla</i> garrigue and Thermo-Mediterranean brush).
Irdum San Filep	Coastal boulder scree with Mediterranean Heath, Tree-spurge formation, Labiate garrigue, Spiny spurge garrigues – cushion garrigues of very dry soils of the Thermo-Mediterranean zone, Ermes and Buckthorn <i>Asparagus</i> brush.
Ghajn Barrani	Clay dominated hillside, freshwater and maritime assemblages comprising Chaste tree thickets, Tree-spurge formation, Aerohaline community, West Mediterranean Tamarisk thickets and Riparian cane formations.
Ghajn Damma	Clay slopes and sheer coastal escarpment with Mediterranean halo-nitrophilous scrub, Maltese Rdum and aerohaline communities and Chaste tree thickets.
Ta' Taksis/Ta' Tocc	Inland escarpment with mixed assemblages comprising Labiate garrigue, Italo-Sicilian sub-Mediterranean deciduous thickets, Mediterranean Heath and Southern riparian galleries and thickets.

Pressure to construct illegal structures in the countryside and the prevalence of trampling also score highly in the local context. Other pressures of some significance include the often illegal take-up of land for reclamation purposes (which results in the loss of semi natural assemblages), the abandonment of agricultural land (which brings with it rubble-wall degradation and, as a result, accelerated erosion), and the release of herbicides and pesticides into the environment, notably into the hydrological system. Other pressures, which do not appear to be widespread within the selected sites, but whose impact would do irreversible harm, include open pit quarrying, the spread of urban development, the use of alien species and consequent displacement of indigenous flora, and disturbance caused by recreational activities in ecologically sensitive areas.

Grazing was generally ranked as the least important pressure and urbanisation as the highest. The other pressures rest between these extremes but there were some significant differences between stakeholder groups. For four of the pressures there was a statistically significant difference amongst the stakeholder groups in terms of their

Table 3. Pressures identified by key actors during the soft-systems process. Shaded cell = presence of pressure at site.

Pressures	Sites of high ecological quality								
	Dwejra/Qawra	Ghajjn Barrani	Ghajjn Damma	Ramla L-Hamra	Rdum S.Filep	Ta' Cenc	Ta' Magun	Ta' Tocc	Wied Sabbar
Quarrying	Shaded						Shaded		
Illegal construction	Shaded	Shaded	Shaded	Shaded	Shaded		Shaded	Shaded	
Hunting and trapping	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded
Pollution from agriculture	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded
Land abandonment	Shaded				Shaded	Shaded	Shaded	Shaded	Shaded
Threat from development						Shaded			Shaded
Visitor pressure	Shaded			Shaded					
Unregulated camping	Shaded			Shaded					
Climbing and abseiling	Shaded								
Grazing	Shaded				Shaded		Shaded		
Planting of / displacement by alien species	Shaded				Shaded		Shaded		
Landfill		Shaded							
Recreational activities				Shaded		Shaded			Shaded
Land take-up through uncontrolled reclamation		Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	Shaded	
Proximity of urbanization							Shaded	Shaded	

perceptions of pressure: pollution from agriculture, urbanisation, recreation and land fill. Indeed the data suggest that there are three groups of responses:

- Group 1: NGO representatives and the scientific community,
- Group 2: affected locals and resource users,
- Group 3: official agencies.

The correlation between responses of categories within the first group is perhaps not too surprising, given that there is much interaction between these categories. A similarity in ranking of pressures between them would therefore be expected. Similarly the categories of affected locals and resource users would also be expected to share similar outlooks on pressures faced by Gozo. Given the somewhat frugal way of life in Gozo, many affected locals would in effect also double as resource users on occasion, particularly since many locals are land owners who would be willing to exploit economic gain if the opportunity arose. Hence, the correlation between responses of these two categories was, to a certain degree, expected.

The only significant difference in ranking of pressures between the sexes was with regard to 'reclamation', with women seeing it as less of a problem than men. This may be attributed in part to the lifestyle in Gozo, where men have more exposure to out-

door agricultural activities as also hunting and trapping, and women may therefore be less aware of the extent and consequences of the issue.

There were some significant differences between age groups, although the pattern was difficult to discern. Grazing, for example, was considered as more of a problem by the 31-40 age group compared with other age groups, but the reasons for this are not entirely clear, although one may speculate that members of this age group seek to visit the countryside for recreational purposes with families, and may associate grazing with potential competition for countryside use. An interesting trend with regard to differences between age groups was that associated with landfill. A clear pattern of declining importance attributed with increasing age was evident. Those under 31 considered the issue as more important than those over 50. This is clearly related to environmental awareness and health concerns especially with regard to young children.

The median scores of stakeholder group responses derived were combined with pressures identified at the nine sites to generate a set of cumulative scores of pressure for these sites, as perceived by the different stakeholder groups (Figure 2).

As indicated in Figure 2, the sites with the highest scores (i.e. greatest threat) are Irdum San Filep and Il-Qortin tal-Magun. With regard to these two sites, there also appears to be a good level of conformity in the perception of pressures amongst the different stakeholder groups. There was less conformity with regard to identification of pressures for the other seven sites and this is especially true of those sites ranked lowest in terms of pressure (threat), namely Ta' Cenc and Wied Sabbar. However, NGO representatives and the scientific community identified a higher level of threat than other stakeholders. It may be that these two groups are particularly aware of

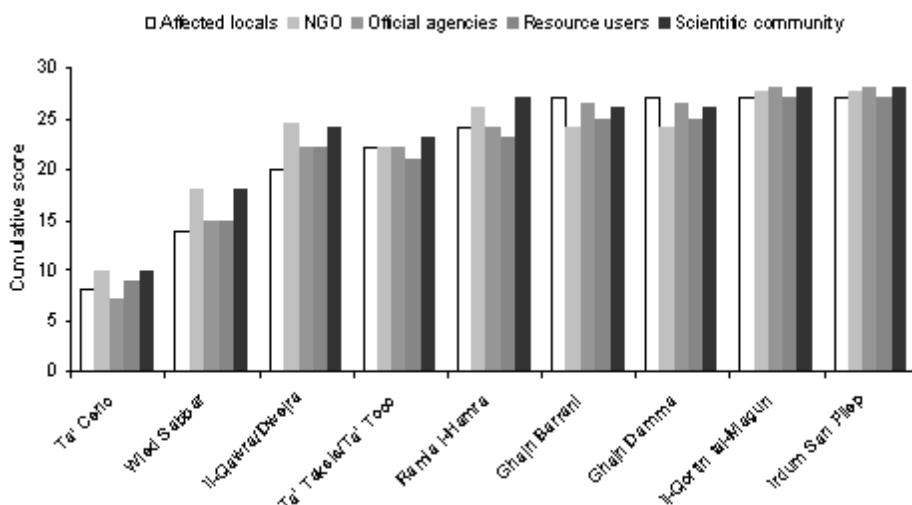


Figure 2. Cumulative scores of pressure for the nine sites identified as being of high ecological quality.

the issues at these two sites due to a much publicised pending development application for these sites. One should note, however, that the methodology adopted did not request participants to rank the identified pressures in relation to the nine sites but rather with regard to the island in general. The correlation between the pressures identified at the sites and the stakeholder responses was extrapolated at a later stage through statistical methods. If, however, respondents had been asked to rank pressures with specific regard to individual sites, it is envisaged that the responses may possibly have been different.

## DISCUSSION

The results collected to date provide evidence that ecological quality can be used to identify sites of importance for conservation. While the criteria employed and weighting method used are open to discussion and elaboration, the results do appear to identify sites of known ecological importance on the island. In this study, this process comprised an expert driven undertaking, which in essence involved mapping of ecological assets on an island scale through a broad-brush survey. This was followed by more detailed field characterisation that engaged the use of transect and quadrat methodology of macrophytes at the nine specific sites that from the initial phase appeared to support important ecological communities and assemblages. The detailed assessment clearly confirmed the importance of these sites.

The participatory phase of the research involved key respondents/stakeholders in identifying the pressures prevalent at the sites and in ranking their relative importance throughout the island. Participation as employed here was a relatively straightforward process spanning an initial 'soft systems' process followed by a more formal ranking survey. The results show that differing pressures exist at the sites and stakeholder groups do perceive these pressures as being different in terms of relative importance. While there was generally little difference based on gender, there were some differences based on age group and more based on stakeholder categories. However, some correlations between the responses of different stakeholder groups were evident, such as for instance, responses of NGO representatives and of members of the scientific community.

The on-going Gozo research presents a suite of challenges, not least the quantification of pressures and responses and their 'weighting' by stakeholder groups. The result is envisaged to be a methodology that builds upon participatory approaches understanding the conflict between conservation and development with a view to making the latter more sustainable. However, problems remain. While the expert driven step of the process may appear to be very objective in the sense that it was based on a modified version of the widely accepted Ratcliffe criteria, it does incorporate a great deal of subjectivity with regard to what criteria to include, how they should be assessed and how they should be weighted. Also, while the participatory process gener-



ated many useful insights, there is the issue of representation to consider. For the soft systems component, pressures were identified by selected groups of people and the results therefore reflected the views of these groups.

The next step will be to superimpose the ecology layer of the GIS onto the digitised layer of landscape units with a view to identify any correlation between ecological value and landscape type. It is further envisaged that the acquired methodology may be extrapolated, for conservation purposes, to other scenarios further afield, within the Mediterranean and beyond. The development of this methodology, which encompasses ecological quality and pressures, is specific to sites rather than landscapes. However, it would be a relatively straightforward task to repeat the expert participatory process using landscape as the spatial unit of assessment rather than 'sites'. In this case, what matters is that respondents can resonate with the spatial unit, and landscapes, as delineated in the present study, provide readily apparent and easily recognizable units.

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