Maltese Criminological Landscapes: A Spatio-Temporal Case Where Physical and Social Worlds Meet

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1 Introduction

Landscapes have taken many forms in the real and virtual worlds, placing more emphasis on the geographical perspective, sometimes at the risk of losing the spatio-social perspective. Studying thematic issues divorced from the locations they occur in results in a sterile outcome, since each activity has a time and space imperative attached to it. In his analysis of the morphology of landscapes, SAUER'S (1925) early assertion held true that geography without a substantive content remained an abstract relationship; with the essential content being the socio-cultural landscape (HIRSCHFIELD ET AL, 2001). This paper integrates both spatial and temporal crime, whilst linking crime statistics to such information layers as development and urban use, and zoning activities in a Maltese context (FORMOSA, 2007).

2 Interactivity between Crime and Space?

The theory of environmental criminology grew from the work of the Chicago School of Sociology, with the main proponents being SHAW and MCKAY (1942) and their 1930s' theory of social disorganisation, which was based on the concept of human urban ecology[1] (MAGUIRE et al, 1997; 308). Urban ecology posits that there is a positive correlation between crime, social issues and landuse (ENTORF *et al* (2000) Such studies emphasise the vitality of social landscapes and how they impinge on or are impacted by the physical landscapes. Opportunity Theory which studies the way urban structures and landscapes offer opportunities for crime (FELSON and CLARK, 1998), and Routine Activities Theory which postulates that each offender and victim follow repeatable paths or routines that are delineated by the space they live in over time (EKBLOM, 2001). Each fits in with environmental criminology theory in that the fundamental issue at stake is space. Where does an opportunity present itself and how does one get to make use of an opportunity and act accordingly, if not through the familiarity of the spaces inherent in his/her cognitive landscape mindmap? BRANTINGHAM and BRANTINGHAM (1984) further argue that all individuals carry in them a cognitive map of the city and engage in search patterns to identify areas of interest.

Urban planning clusters offence targets in specific areas, through increasing or reducing accessibility for opportunities. As opposed to opportunities in rural areas where a person is

[1] Also called the 'ecology of crime' due to the relationship between crime and the urban environment.

more conspicuous, urban areas become attractive to offenders especially where an area becomes prosperous (ENTORF et al, 2000). Criminological research into the physical landscape enables researchers to analyse and evaluate the areas under study, identify those characteristics that yield criminal activity and help to predict future criminal activities. In turn the analysis of the social interactionism in an area enables successful implementation of crime preventive strategies (CHAINEY and RATCLIFFE, 2005; SCHNEIDER and KITCHEN, 2007).

3 The Methodology

3.1 The Conceptual Model

A conceptual model was created by FORMOSA (2007) to enable an understanding of the complex Maltese data availability situation together with the spatial requirements for data within the different landscapes that are posited by the crime, social and urban worlds. FORMOSA (2007) highlighted the need to bring together each aspect and built a mindmap that helps set out a process to depict a basic and generic model on how crime, social and landuse issues interact together, which process also identified techniques and datasets that could be used in the identification and understanding of crime. The conceptual model, termed the **CRI**me and to the **SO**cial and **LA**nduse aspects, herein embedded as the acronym CRISOLA.

The model took shape through a tiered 3-phase process, with each iterative phase building up from an abstract level (Phase 1) through the identification of the main datasets (Phase 2) to a final individual attribute listing (Phase 3). The model is not exhaustive as it covers potential datasets that yet need to be created/surveyed, statistical measures identified as well as inclusion of other crime-relevant theories. Initially the conceptual Model catered for the crime aspect in isolation, but as described above crime does not stand alone: it interacts within a wider and more complex environment. The model outlines criminal activity within the social and physical structures it operates in through:

- the crime characteristics through an analysis of offender and offence composition and the interactivity between them (FELSON and CLARK, 1998),
- the social characteristics of an area through an analysis of its poverty/deprivation (GIDDENS, 1984),
- the physical characteristics of an area, particularly its landuse, structural and zoning parameters (EKBLOM, 2001).

Figure 1 outlines the Phase 1 thought-process needed to reach an initial structure within which to analyse any relationships between the three disciplines. Whilst, the high-level Phase 1 Model enables a generic focus on the study in question, a more detailed second level model was required which helped point at and identify the interactivity between the three parameters. This is accomplished preferably through the identification of datasets that may be used for analysis. Being a mindmap model, Phase 2 (Figure 2) sought to identify those literature-related issues and integrate them within the model. It reviewed the different Theories, Datasets, Spatio-Temporal Aspects, predictors and the main tenets that can be

used in such a study on crime. Taking the model one step further to Level 3, a series of statistical measures are listed for the variables within each dataset identified for model integration The model does not attempt to solve all crisola issues but depicts the potential future studies that can be attempted..

Social	Crime	Urban
Analysis of the Social structure of the area under study	Analysis of crime in the area under study through offences and the behaviour of offenders	Analysis of spatial constructs through a study of landuse zoning, spatial aggregates and physical structures
↓	↓	↓
Focuses on socio-economic and socio-cultural parameters towards an understanding of poverty and deprivation as a surrogate for social and community health	Focuses on offences as a measure of attractiveness of an area and focuses on offender data as a measure of social disorganization	Focuses on landuse zoning as a measure of affluence, leading to an understanding of opportunity structures
↓	↓	↓
Identifies the social-spatial constitution of the areas, leading to a social-zoning structure	Identifies the criminal-spatial constitution of the areas leading to a crime-zoning structure	Identifies the physical constitution of the areas leading to a landuse-zoning structure
↓	↓	↓
Impact on social capital – social cohesion	Impact on security and safety	Impact on spatial capital
↓	↓	↓
Social change	Crime change	Landuse change

Fig. 1: Phase 1 - Conceptual Model Logical Matrix

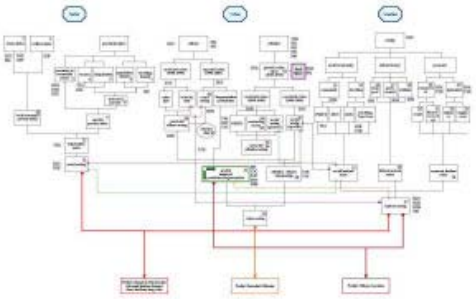

Fig. 2: Phase 2 - Conceptual Model Logical Matrix - Linkages

3.2 The Research Methods

Many authors have debated the issue of use of crime-mapping in terms of effectiveness of GI technology to aid crime analysis and in turn crime reduction, such as the need to go beyond the hotspot map and delve into the mechanisms of what makes a crime. The tools used in this study include CrimeStat, SPSS, MapInfo (Hotspot Mapping Extension), and Vertical Mapper. Methods and statistics included; spatial distribution, distance statistics, 'Hot spot' analysis routines and Interpolation statistics, particularly Moran's I, hot spot, NNA interpolation. Note that each of these methods necessitates knowledge of the limitations in using that specific method which limitations are dependent on a number of factors. These include the sample size taken, the number of minimal points set as the threshold for identifying the least hotspot size, amongst others. In addition, NNH as well-as K-Means employed in the study show their results through ellipsoids, which in effect can cover areas that may not be prone to high incidences being investigated but still fall within the ellipsoid since such a tool cannot eliminate areas within its boundary without compromising the ellipsoid integrity.

4 Results

4.1 The international comparison

The results show that Malta is a relatively safe country both at European and Island levels (FORMOSA, 2007). The macro-micro analysis shows that islands register higher means per category than the EU level mainly in assaults, drug offences, homicides and rapes. Robbery is the serious category that has a higher mean at EU level. In the case of less serious crimes, the inverse is true: islands have lower means for vehicle theft, burglaries, fraud and

thefts with bribery being lower than the EU mean. Within this context, Malta appears to be relatively safe since it registers lower means for all serious crimes than the islands means except for robberies. Malta, though having similar physical characteristics to other islands (insularity, density and size) experiences a different offence structure that reflects more the EU level than the Islands' level.

4.2 Spatial Level Considerations

The study attempted to understand where offences occur and if there is any relationship between offences and the locations they occur in at the different spatial levels. Running an SDe test, at 1StDev and 2StDev results show that most offences are concentrated in Malta, whereas the island of Gozo hosts relatively few offences.

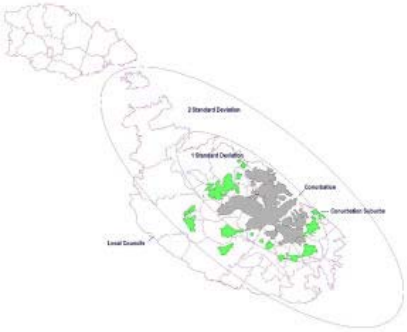

Fig. 3: Offence Standard Deviational Ellipse (SDe) at 1NNH and 2NNH

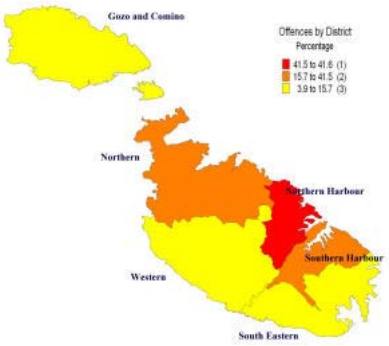

Fig. 4: District offences by region

This exercise once highlights the fact that 68% of all crimes (1StDev) fall mainly within the conurbation, however in difference to the offender residence, where the main concentration lived within the Grand Harbour area, the offence ellipse exhibits a NW-SE orientation (FORMOSA, 2007) (Figure 3). At NUTS 4 analysis (Figure 4) the Northern Harbour district as the highest offence-registering area in the Maltese Islands, which area hosts the main commercial and recreational areas. At an average above 7,000 offences per year (42% of total), this district hosts twice as much as the next highest district (Southern Harbour) at less than an average of 3,500 (21%).

Spatial clustering methodology was then used to identify movements of offence hotspots, allowing for comparative analysis at 2NNH. The 1999-2000 (Figure 5a) comparative analysis shows that southern tourist areas lost their hotspot with a new one being created in the furthest northern ones. However, the Northern Harbour localities of Pieta, Pembroke and San Giljan saw movements out of the area towards more southern areas and into such localities as Qormi, a commercial locality. The 2000-2001 map reflects a slight compacted move towards the Southern Harbour region from the Western district towards Marsa, and Paola (Figure 5b). This movement continued over the next two years (Figure 5c-d) with consolidation of hotspots in most Western and Northern Harbour recreational localities.

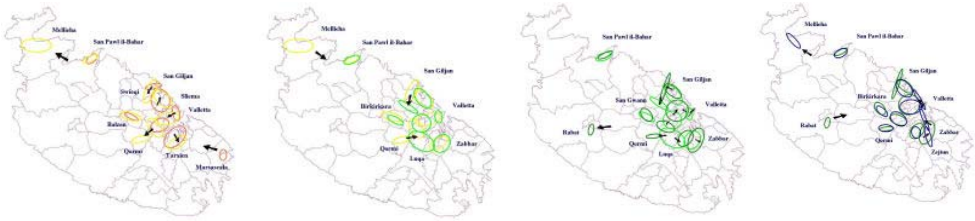

Fig. 5a: 1999 – 2000 Fig. 5b: 2000 – 2001 Fig. 5c: 2001 – 2002 Fig. 5d: 2002 – 2003

Fig. 5: 2NNH (Spatial Clustering) inter-annual change analysis 1998-2003 - at 25 points minimum per hotspot

In the case of Malta, police districting could be changed and further refined to reflect such changes as well as enable predictabilities of flow through analysis of landuse and social activities. Instead of the current 11 districts comprising 20 cross-boundary divisions, the areas outside of the ellipsoidal boundaries would be reviewed for their offence component and undertake amalgamation between districts. Also, using this method and knowledge on landuse and social issues, one can predict where offences would occur in the future in relation to new development being built such as new massive construction projects in Tigne (the tip of Sliema) presenting entertainment patterns issues over time and space, leading to the potential migration of revellers from San Giljan to Tigne.

Reviewing the zoning categories, the results show that **the rural parameter** registered only 10% of all offences. **The coastal parameter** registered very high offences rates mainly due to the fact that the highest recreational and residential densities fall within the coastal areas. This is evidenced by a 60% component of theft from retail and leisure areas as against the 40% for all the non-coastal areas. **The village core parameter** shows that the old areas that have suffered a population loss and have subsequently suffered serious offences as are drugs offences (41% of all national offences) and assaults (40%) adhering to the Broken Windows Theory (WILSON and KELLING, 1982). **The old medieval cities parameter** (inelastic cities) of Valletta, Bormla, Birgu, Isla and Mdina, characteristically exhibiting a declining population show very low offence rates.

4.3 The Structural and Use Constructs

This section attempted to understand if there is a relationship between crime and the use to which a location is put, where it occurs, and which offences are more prevalent. The main zones analysed were categorised into social and community, residential, industry, commercial, recreation, country parks, as well as the extents to development. The residential areas comprise the majority of offences with residences taking up to 44% of all offences with a higher relative percentage of serious offences registered than the non-serious category (Table 3). Parks on the other hand have very low crime rates due to the short-term high-density use where the presence of large number of people deters offenders.

A further case-study approach was taken in order to investigate non-residential areas and the relationship between offences and the main retail areas. The first categorisation is based

on commercial and retail areas as designated by the Malta Planning Authority (Retail Topic Paper, 2001), which identified a specific number of councils into town centres. These centres between them hosted 16,322 offences or 16% of all reported offences.

Zoning Comments	Serious Offences	Non Serious Offences	Total Offences
Social and Community	2.65	3.47	3.44
Residential	50.33	44.06	44.23
Industry	1.04	1.92	1.90
Parks	0.31	0.58	0.57
Commercial	13.14	13.71	13.70
Recreation	5.88	7.34	7.30
Development Zones	21.32	20.58	20.60
Rural Areas	5.34	8.33	8.25
Total	**2,603**	**96,729**	**99,332**

Tab. 3: Offences by landuse zones

These crimes occurred in areas that host 4,618 commercial/retail units or 29% of all such units in the islands. Crime rates in both centre types saw a gradual increase in the number of offences over the last three years, increasing from 15% to 18% of all crimes. The main localities taking up the bulk of these offences relates to the conurbation town centres particularly the San Giljan area, followed by Valletta. Refer to the two highest peaks in Figure 6, which also shows the disproportion between the town centres.

A spatial analysis based on NNH clustering shows that 714 of 1479 (48.3%) recreational units fall within a few hotspots indicating high rates of concentration of retail units, whilst 866 (58.6%) of these units also fall within the police (geopol) offence hotspots. Such a finding shows that a high rate of recreational units fall within the main offence hotspots and are more liable to become targets of crime. This is confirmed through an intersect analysis of hotspots generated for the two variables, which results shows that 82.4% or 28 out of 34 recreational zone hotspots fall within or intersect with offence hotspots. Most of these areas fall within the main recreation and commercial towns of San Giljan, Valletta, Rabat – Gozo (Victoria) and San Pawl il-Bahar. Figure 7 depicts San Giljan offence and recreation hotspot intersects as well as the retail units location.

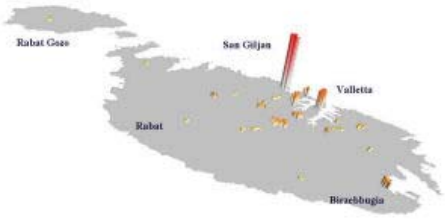

Fig. 6: Town Centre Offences: 3D map

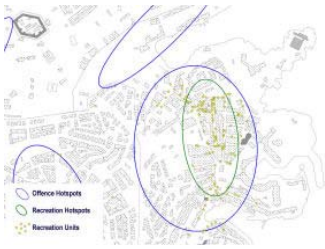

Fig. 7: NNH *geopol* hotspots overlaid on recreational hotspots - San Giljan

A more detailed analysis was undertaken to investigate the relationship between the activities and the locations they occur in, which exercise employed buffer analysis. Buffers were created at 50m, 100m and successive 100m intervals. Queries were run aimed at gauging the number of offences within each buffer, by crime type, and serious and non-serious category. Figures 8a-b show San Giljan and its recreational area known as Paceville. In synthesis, crimes are high in the retail footprint areas, increase by buffer distance for the first 400m then start declining up to 1000m. The analysis of offence categories by retail vicinity shows that 15% of all crimes occurs within the footprint zone (retail area). This analysis indicates that most offences occurring in this initial zone are made up of 'theft other', theft from retail areas, criminal damage, and vehicle crime. These categories total 84.2% of crimes occurring in the footprint zones.

Fig. 8a: Aerial Photo: 2004

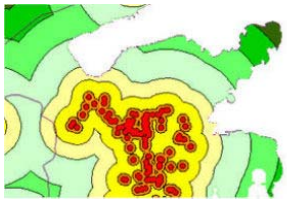

Fig. 8b: Buffer Zones

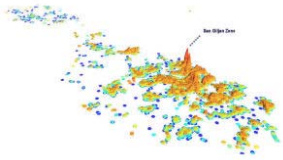

Fig. 9: 3D point density – vehicle crime

This is not surprising, considering that the Maltese climate is very mild and allows human interaction outside of the retail areas and in the streets such as the notorious Paceville streets where revellers stay outside on the streets drinking, partying and socialising, irrespective of the season type. In the case of vehicle crime and criminal damage, which includes damage to vehicles and property, offences increase by distance. Though high in the first zone at 19% in both cases, they increase to 30% of all offences for vehicles and 26% for criminal damage at 400m. This type of change is understandable since the offences fall within the zones that people tend to park in, principally the immediate roads that intersect with or are on the periphery of the recreational area. With few official and secure car parks (at the time of study) in the vicinity of the retail areas, visitors to the area park anywhere in the vicinity, flowing out to the neighbouring streets and main roads. This results in high vehicle crime in the these buffer zones both in term of theft from cars, theft of cars and damages to both cars through tempering and damages to homes in the vicinity. The latter, is also evidenced from the slight increase in dwelling burglaries in the distant buffer zones. Figure 9 shows a 3D map of the extent to which this Paceville peaking occurs where a very small cluster of roads spreads offences in all the neighbouring areas.

5 Conclusions

An area designation analysis shows that the Maltese islands experience a predominantly urban-related crime scenario. The study highlighted the social and urban landscapes that have a relationship to criminal activity. An analysis of land use categories identified that whilst residential areas host the highest offence counts, they also serve as spill-overs from neighbouring activities such as retail. Interestingly, residential areas have a high serious-

crime component. The more dynamic recreational activity plays host to high volumes of crime, which occur in concentrated areas, where offences are mainly property-related. However, a deeper analysis shows that offences in the recreational areas are related to distance in that the category of crime depends on the distance traveled from the retail entity. Cluster analysis shows that there is a relationship between offences and retail. The analysis also showed that San Giljan, particularly its Paceville sub-locality keeps hitting the top mention in all the offence analysis categories. Review of urban processes and their impact on crime is recommended since the phenomenon does not form part of the local planning process, with on-the-ground repercussions such as the post-decision diffusion of offences into neighbouring areas, depopulation and its Broken Windows implications, hotspot concentrations into specific areas and the relative repercussions on the socio-structural fabric. The CRISOLA constructs depend highly on changes within each, with physical landscapes providing a heavy push to the stability pendulum. If architecture and urban planning strategies provide synergies to improve the physical fabric, they enable the build up of the social cohesion and social capital fulcrums that regulate criminal activities.

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