

Spiteri A. and De Ketelaere D. (2015)

'Safeguarding the Green and Blue Open Spaces around Malta's Grand Harbour through Public Participatory GIS (PPGIS)', presented at the Cultural Mapping: Debating Cultural Spaces and Places Conference, 22-23 October 2015, Valletta, Malta

Safeguarding the Green and Blue Open Spaces around Malta's Grand Harbour through Public Participatory GIS (PPGIS)

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Keywords: public participatory GIS, community mapping, open spaces, crowdsourcing

Abstract

Mapping the Open Spaces in the Grand Harbour area using PPGIS proved to be a first ever application of crowdsourcing in Malta. From initial, one-to-one interviews with stakeholders in the Grand Harbour, it transpired that overdevelopment and the constant pressure on the open public spaces emerged as the most cited concerns, together with frustration about their lack of empowerment and the lack of enforcement. As a follow-up, a series of seminars were organized throughout 2014, around the theme 'Safeguarding and Sharing our Open Spaces', which led to the birth of a "Local Communities' Charter for Liveable Cultural Landscapes in Malta's Grand Harbour, A Place for Our Children". In a parallel effort, the authors embarked on a systematic mapping of the Open Spaces in the Grand Harbour area, collecting information on their use and their level of access among other. The field survey enabled the construction of a wide range of GIS maps to characterize the Open Spaces and in this regard the seminars provided the opportunity to collect feedback on how to make the information contained in the maps more intuitively legible. By the end of 2014, everything was in place to test the PPGIS, or community mapping, in practice, leading to the launch of *www.grandharbourcharter.net*, which enables the general public to read and sign the Charter, to visualise the Open Spaces of the Grand Harbour through a set of dedicated web maps, and gives the opportunity to crowdsource local knowledge of places of cultural and ecological value through online drawing of eco-heritage trails.

Introduction

The various activities presented in this paper have been carried out in the context of Mare Nostrum¹, a cross-border project that is aimed at exploring new ways of protecting the Mediterranean coastline, and is funded by the European Union under the ENPI CBCMED Programme². The project brings together 11 partners from Malta, Greece, Israel, Jordan and Spain, including leading research institutes, local municipalities, SMEs, environmental NGOs and port operators.

As the full title of the project "Bridging the policy-implementation gap in Integrated Coastal Zone Management (ICZM) across the Mediterranean Sea Basin" suggests, the project builds upon existing international efforts, such as the ICZM Protocol, adopted in January 2008 by the contracting parties to the Barcelona Convention³.

¹ http://www.enpicbmed.eu/sites/default/files/mare_nostrum_final.pdf

² <http://www.enpicbmed.eu/>

³ <http://www.unepmap.org/index.php?module=news&action=detail&id=30>

Most Mediterranean countries share the challenges of rapid shoreline development, extreme seasonal fluctuation in populations, vulnerability to coastal hazards and eroding environmental quality. Yet many of these countries are also characterized by inadequate planning, management and enforcement of the regulations, as well as a lack of a solid database and monitoring instruments to assist decision makers. The ICZM Protocol is the first supra-State legal instrument aimed specifically at coastal zone management to address these issues.

Currently, the implementation of the ICZM in the Mediterranean is impeded by a complex, overlapping or conflicting jurisdiction, with different roles and responsibilities found in various management bodies in most countries, let alone across borders. That's why an institutional coordination at national level is needed with comprehensive approaches and coordination between the various authorities at the national, regional and local levels in the field of coastal strategies, plans and programmes.

The Mare Nostrum project is focused to facilitate this institutional coordination, through the development of a Toolkit of Alternative Policy Instruments, addressed specifically on how to improve the implementation of the Protocol on ICZM and the EU Marine Strategy Framework Directive⁴. To reach this goal, the project takes a bottom-up approach: insights – and eventually possible instruments to overcome - the key legal, institutional and administrative impediments to the implementation of ICZM policies in each of the partner countries are collected and analysed from the local level upwards, through public participatory approaches including, and the subject of this paper, PPGIS or local community mapping practices.

IRMCo's role in Mare Nostrum

The Malta partner, IRMCo, is assigned with a two-fold responsibility in the project: first, to conduct the research into coastal planning policies and legislation for the local case study which is focused on the Grand Harbour, and second, to develop a practical guide and training programme for the application of local community mapping through what is known as Public Participatory GIS (PPGIS). For the latter task, the PPGIS Practice conducted extensively in Malta, in the inner Grand Harbour area, served as the pilot case study for a training programme attended by all partners in the project.

PPGIS Practice in Mare Nostrum

Public Participatory Geographic Information System (PPGIS) is aimed at empowering local people and communities to use geo-spatial information technologies and maps to communicate with each other in an effective way. Adopting a spatial perspective helps to identify, understand and address issues of spatial relationships of land ownership and use on the ground, and approach spatial conflicts with a different perspective. PPGIS involves several mapping and participatory techniques, ranging from ground mapping (drawing in the sand), to participatory interpretation of remote sensing images, crowdsourcing online maps and data, networking, communication and alliance building (CTA, 2010). Schlossberg and Shuford (2005) elaborate further on the delineation between "Public" and "Participation" in PPGIS.

⁴ http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

PPGIS also brings in a visualization tool that taps local knowledge that cannot be obtained otherwise. In an interview with GIM International, Jack Dangermond – founder of Esri⁵ – explains that “maps are a way to visualise the story behind your data: seeing spatially enabled data on a map allows you to answer difficult questions and to ask new ones that you otherwise never would have thought to ask.” (GIM International, 2014)

In the context of the Mare Nostrum project, which focuses on coastal planning and management, PPGIS encourages people to think spatially and to read and draw maps. Local community members are encouraged to create local perception maps of the desired future of their coastline, to map out their solutions for contemporary coastal conflicts, to crowdsource locations where issues need to be tackled, and many more participatory mapping exercises.

From previous PPGIS project experiences it has been noted that communities are usually willing to participate in mapping processes if their purpose and outcomes are clear, which form an integral part of PPGIS ethics (Rambaldi, 2006). Therefore, and not least to avoid creating false expectations, it is necessary to be very precise about the whole process from the beginning and explain that: the participatory mapping process is aimed at achieving benefits for the community as a whole; the project’s research activities are geared to collect the local communities’ views on coastal planning and management in their environment; and that the outcomes of the process may be used to influence policies and practices so that communities’ views are taken into account in decision making.

PPGIS Pilot Practice in Malta

The PPGIS Practice was first tried and tested in a pilot case in Malta, on the topic of ‘Safeguarding and protecting the remaining Open Spaces in and around the Grand Harbour’. This topic expresses a local concern and is therefore clearly suitable to be dealt with through a Public Participatory approach (PP), while also calling for a spatial approach (GIS) to be used. The present paper describes the main outcomes of the research activities carried out by IRMCo for the Malta case study and are accessible online at www.grandharbourcharter.net (see Figure 1).

Figure 1. Homepage of www.grandharbourcharter.net



⁵ Esri is an international supplier of Geographic Information System (GIS) software, web GIS and geodatabase management applications (<https://en.wikipedia.org/wiki/Esri>)

The website enables the general public to read and sign the Citizen's Charter, to visualise the Open Spaces of the Grand Harbour through a set of dedicated web maps, and gives the opportunity to crowdsource local knowledge of places of cultural and ecological value through online drawing of eco-heritage trails.

The experiences gained through the pilot application in Malta provided further insights and context to the PPGIS Practical Guide⁶ (IRMCo, 2015), which provides both the framework for PPGIS Practice, as well as guidance for the methodology and practical organisation of PPGIS Practice events, and formed the backbone of a training programme held in Malta during November 2014 on the 'Design and Application of the PPGIS Instrument for Public Participation' for all partners in Mare Nostrum.

Local Communities' Charter for Liveable Cultural Landscapes in Malta's Grand Harbour, A Place for Our Children

A first major outcome, a citizen's charter with the title "Local Communities' Charter for Liveable Cultural Landscapes in Malta's Grand Harbour, A Place for Our Children", provides an active contribution to the Mare Nostrum project's Toolkit of Alternative Policy Instruments.

The Charter developed organically through a series of six think tank seminars, organized by IRMCo's team, bringing together the local communities of the Grand Harbour area in Malta, through the participation of local decision-makers, residents, NGO representatives, business owners, academics and local artists.

A summary of the activities which led to the idea of a Charter, the further development of its contents, and a glimpse on the further follow-up activities that are being planned following the endorsement of the Charter are presented below.

Set up a PPGIS Community: creating an enabling environment

As the PPGIS Practice aims to empower the local community and other local stakeholders, it must be ensured that a truly all-inclusive strategy is adopted to engage a wide variety of stakeholders. Through the desk research in the first phase of the Mare Nostrum project, government institutions and other entities that carry influence, decide on or implement coastal planning and management were identified. Twenty key local players were identified for the purpose of conducting stakeholder interviews. Starting from this initial list, the stakeholder database was expanded by asking people who had already expressed an interest whom they felt should be included (so-called snowball sampling), by making virtual and face to face contact with key persons of relevant institutions and entities, and by attending local events with relevance to our research (e.g. a forum on socio-economic regeneration in the region).

⁶ <http://marenostrumproject.eu/project-outputs/ppgis>

Introducing the case study issues to local stakeholders

The first think tank seminar was organised with the objective to share the results from the desk research and one-to-one interviews with stakeholders on coastal planning and management in Malta's Grand Harbour area, the local case study area. The interviewees, as well as other local stakeholders and champions, were invited to this think tank seminar to discuss the main issues of coastal planning and management, as well as potential instruments to improve the planning process in the local context through bottom-up efforts.

Figure 2. Presentations by Anna Spiteri (left) and the Mayor of Marsa, Francis Debono (right)
Source: Photographs by IRMCo Team during think tank seminar at Senglea Local Council



In the first seminar, Anna Spiteri, Managing Director of IRMCo, introduced the Mare Nostrum project and the process and outcome of the research conducted in the Grand Harbour area. The seminar focused on the main issues that were expressed by participants in the interviews that were part of the research: their concerns about overdevelopment and the constant pressure on the open public spaces in the Grand Harbour area, as well as frustration with their lack of empowerment and the lack of enforcement. Through her presentation, Anna showed the current state of some of the open spaces in the localities, which led to a discussion between the participants on the need to conserve these open spaces for the enjoyment of both the local community and tourists alike, and to safeguard them from inappropriate planning and development.

In response to her presentation, members of the local community added that there is a clear lack of institutional coordination, even between the Local Councils. The participants agreed that there is a need for more cooperation and a holistic approach when discussing the future development of the Grand Harbour area. Hence, it was suggested to invite the mayors of the different Local Councils to discuss the public open spaces in their locality, both in terms of threats and opportunities, to kick-off a discussion in a follow-up seminar.

In a parallel initiative, IRMCo's team also met with representatives of MEPA, Malta's Environment and Planning Authority, to explain the aim of the seminars and to prepare the ground for taking the outcomes of these seminars to the higher policy- and decision-making level.

Deepening the understanding of the pressures on open spaces

In the second seminar the mayors of five Local Councils in the Grand Harbour area were given the opportunity to share with the other participants the issues pertaining to the Open Spaces within their locality.

From the testimonies given by the mayors of the Local Councils, it appeared there are many common issues and frustrations: the cultural and natural heritage is not properly respected in redevelopment projects, trees are being uprooted and historic bastions are over-cleaned and losing their patina. Furthermore, it was felt appropriate to also consider the seascape when talking about the coastline, apart from the beaches and rocky shores on the land side of the coast.

Figure 3. An impression of the Green and Blue Open Spaces in the study area
Source: Photographs taken by IRMCo during field survey of Open Spaces



From the discussion it became apparent that there is a shared understanding that Local Councils are powerless in certain cases, as they do not have the legal authority to overrule government decisions. In general, the lack of public consultation does not allow residents to take ownership of activities and projects undertaken. The mayors and residents agreed that the remaining Open Spaces should be safeguarded as recreational areas providing green refuge within the densely built environment in the Grand Harbour area.

Through the snowball effect – asking the seminar attendees to identify further potential participants from within their social network, IRMCo substantially updated the stakeholder database and more people were invited to the seminars by means of an introductory e-mail and follow-up phone calls.

At the same time, IRMCo's team started a systematic mapping of the Open Spaces in the Grand Harbour area, by collecting information on their use, the degree of disturbance (natural open spaces) or maintenance (man-made open spaces), and other characteristics detailing among other the means and level of access to the open spaces. This field survey enabled the construction of various information layers characterizing the Open Spaces in a GIS.

A bottom-up proposal to address the issues

Reuben Grima, lecturer on Built Environment at the University of Malta, resident in the Grand Harbour, and one of the regular participants of the seminars, started the discussion of how all the aspirations and conclusions that were being reached in the seminars could be collected into one

document. Based on what had been conveyed throughout the seminars about the limited influence local stakeholders have in the planning process, and – since most Open Spaces are managed by the central government – and not by Local Councils, the idea of a Citizens’ Charter was born, expressing the moral authority, if not the legal authority, of Local Councils and local communities. Reuben also highlighted that the debate had demonstrated among other, the strong sense of commitment to place, how dedicated and well-informed participants spoke about the issues, the awareness that problems are shared among the different localities, as well as the frustration because of the limited power of local communities to address these problems.

In the month following the first mention of the Charter, IRMCo’s team together with Reuben Grima, Catherine Polidano, a teacher by profession, and other seminar participants joined forces to formulate a draft Charter based on the main issues and opinions raised during the seminar: Open Spaces, Fortifications, Trees, and the issue of the Patina. A draft structure and content of the charter was then presented for discussion at the fourth think tank seminar which took place at the Paola Local Council (see Figure 4).

Figure 4. Reuben Grima (left) and Anna Spiteri (right) presenting a draft structure and content of the charter
Source: Photographs taken by IRMCo during think tank seminar at Paola Local Council



The charter contains a rationale introducing the aims and scope of the Charter, and 6 separate sections, pertaining to: a) Green and Blue Open Spaces, b) Coastal Areas, c) Trees, d) Soil, Agricultural Land & Valleys, e) Built Heritage, and f) Genuine Public Participation. After the seminar the participants were asked to carefully read the Charter and invited to send their comments and feedback to be able to create a final version of the Charter.

In parallel to the discussion on the Charter, Dirk De Ketelaere, senior researcher at IRMCo, presented the progress with the construction of GIS maps of the Open Spaces, and invited the participants’ feedback on how to make the information more intuitively legible.

A Charter is born

The Local Communities’ Charter for Liveable Cultural Landscapes in Malta’s Grand Harbour, “A Place for Our Children”, was launched during a media event in the presence of Minister for Social Dialogue, Consumer Affairs and Civil Liberties, Helena Dalli, and was signed by the representatives of Local

Councils and NGOs, and numerous residents (see Figure 5). The Charter was discussed in different media, such as in newspaper articles⁷, blogposts⁸ and on the radio.

Figure 5. Minister for Social Dialogue, Helena Dalli, at the launch of the Charter (left), the Mayor of Cospicua, Alison Zerafa, signing the Charter (right)

Source: Photographs taken by IRMCo on the occasion of the Charter launch at Senglea Local Council



Following its launch, the Charter has been brought to the attention of various policy- and decision-making bodies, and was submitted to the chairman of MEPA, the planning authority. The Charter was accepted to become part of their ongoing Local Plan revision process, proving its application as a bottom-up instrument to promote integrated coastal planning and genuine public participation.

Furthermore, at the invitation of the European Neighbourhood Instrument (ENI)⁹, Anna Spiteri presented her organization's grassroots-produced Citizens' Charter, Sharing and safeguarding the cultural landscapes of the Grand Harbour, at the NextMed Conference held in Rome during December 2014¹⁰, which was attended by over 500 participants and marked the launch of a new phase of cross-border cooperation in the Mediterranean¹¹.

Crowdsourcing local knowledge of places of cultural and ecological value

A further idea that emerged from the seminars was to map the Places of Interest (places of cultural, historic, archaeological, ecological and/or religious importance) and to create eco-heritage trails connecting these places, with the goal to present the Green and Blue Open Spaces of the Grand Harbour as an area of local recreational and touristic value.

In preparation for the PPGIS Practice two distinct tasks have been considered. The first task concerns the collection of maps and GIS data, to ensure adequate and timely information is available on the

⁷ <http://www.independent.com.mt/articles/2014-09-21/news/grand-harbour-protection-charter-launched-6659112966/>

⁸ <http://marenostrumproject.eu/news-events/blog/malta-mare-nostrum-partner-leads-on-landmark-iczm-charter>

⁹ Known as the European Neighbourhood Partnership Instrument (ENPI) when the project started in 2013

¹⁰ <http://marenostrumproject.eu/news-events/blog/malta-citizens-charter-for-iczm-featured-at-enpi-rome-nextmed-conference>

¹¹ <http://www.enpicbmed.eu/communication/nextmed-conference-over-500-participants-attend-launch-new-phase-cross-border-cooperat>

topic at hand. The second task relates to constructing a webGIS, through which the PPGIS Community can interact with the information contained in the maps, and add their own knowledge and/or perceptions.

Maps and GIS data collection of the Open Spaces in and around the Grand Harbour

To discuss local coastal planning and management issues from a spatial perspective, maps are an essential tool. In order to visualise, understand and discuss the issues at hand, maps and data of the Open Spaces in and around the case study are needed. Detailed information on their use, degree of disturbance (Natural Open Spaces) or level of maintenance (Man-made Open Spaces), and other characteristics including the means and level of access to the Open Spaces would bring focus to the debate. In the absence of readily available maps, a systematic survey was initiated to map the Open Spaces and record their ‘attributes’.

The Open Spaces are grouped in three broad categories: agricultural, natural and man-made, with further subdivision of the ‘land classes’ as shown in Table 1. A legend was then defined for the various attributes (see Table 2) and a data collection sheet was prepared to record information on the Open Spaces during field work.

Table 1 Typology of the Open Spaces

Agricultural areas	Natural Open Spaces	Man-made Open Spaces
Cultivated fields	Wooded area	Landscaped garden
Orchard	Shrubland	Roadside landscaping
	Rocky beach	Promenade
	Sandy beach	Sports facility
		Playground
		Paved area
		Car park
		Cemetery
		Boat yard
		Water body

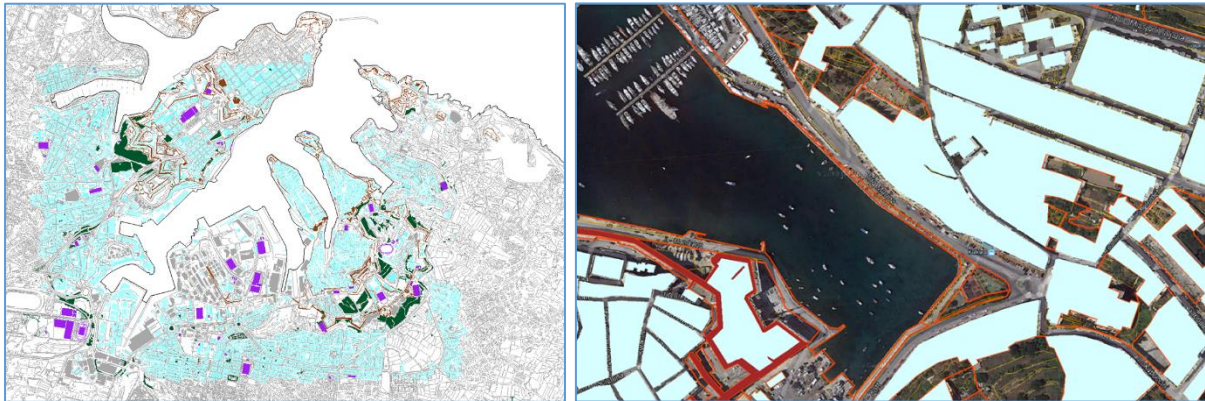
Table 2 Attribute information to characterize the Open Spaces

Degree of disturbance ¹	Level of maintenance ²	Level of Access	Means of access	Tree Canopy
Generally undisturbed	Regularly maintained	Public access	On foot	0% (sealed)
Moderately disturbed	Not regularly maintained	Restricted hours	On foot and by bicycle	0% (natural)
Heavily disturbed	Neglected	Members only	Motorized vehicles	< 5% (scant cover)
		No public access		15-25% (moderate cover)
		Temporarily closed		> 65% (dense cover)

¹ Natural Open Spaces, ² Man-made Open Spaces

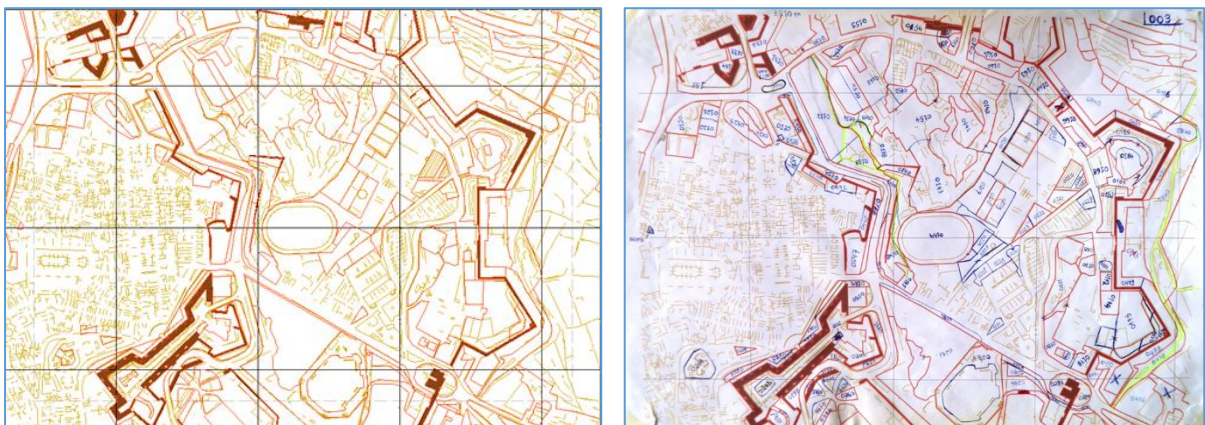
The required primary digital data were purchased from the local planning authority (MEPA), starting from the purchase of a set of six topographic survey sheets (scale 1:2500), which cover the southern part of the Grand Harbour. This data was imported in ILWIS¹² (desktop GIS software) to enable the a priori extraction of selected layers: built up areas, fortifications, wooded areas and sports facilities (see Figure 6a). Consequently, a map of - potential - Open Spaces was created by superimposing the aforementioned features on images obtained from Google Earth and georeferenced in ILWIS (see Figure 6b).

Figure 6. a) Selective extraction of digital data and b) Identifying potential Open Spaces
Source: a) MEPA digital data and b) Google Earth imagery in background



The earlier purchase also included a selection of hardcopy maps at the scale of 1:5000. This scale, in a trial exercise, proved to be too small to work with in the field. Therefore, selected subsections of the digital GIS data at scale 1:2500 were printed on A3 size paper for fieldwork purposes. These print-outs incorporated also the potential open spaces (see Figure 7a). During field survey, potential Open Spaces were verified (see Figure 7b) and their respective attribute information was added in the purposely drawn up data collection sheets. Back at the office, these attributes were inputted in an Excel datasheet. Corrections to the earlier (potential) Open Spaces were digitized and attribute information was imported into ILWIS. Consequently, a diverse set of maps, each visualizing specific attributes of the Open Spaces could be created.

Figure 7. a) Print-out of potential Open Spaces and b) Verification of Open Spaces through field survey
Source: a) ILWIS print-out and b) IRMCo field survey of Open Spaces



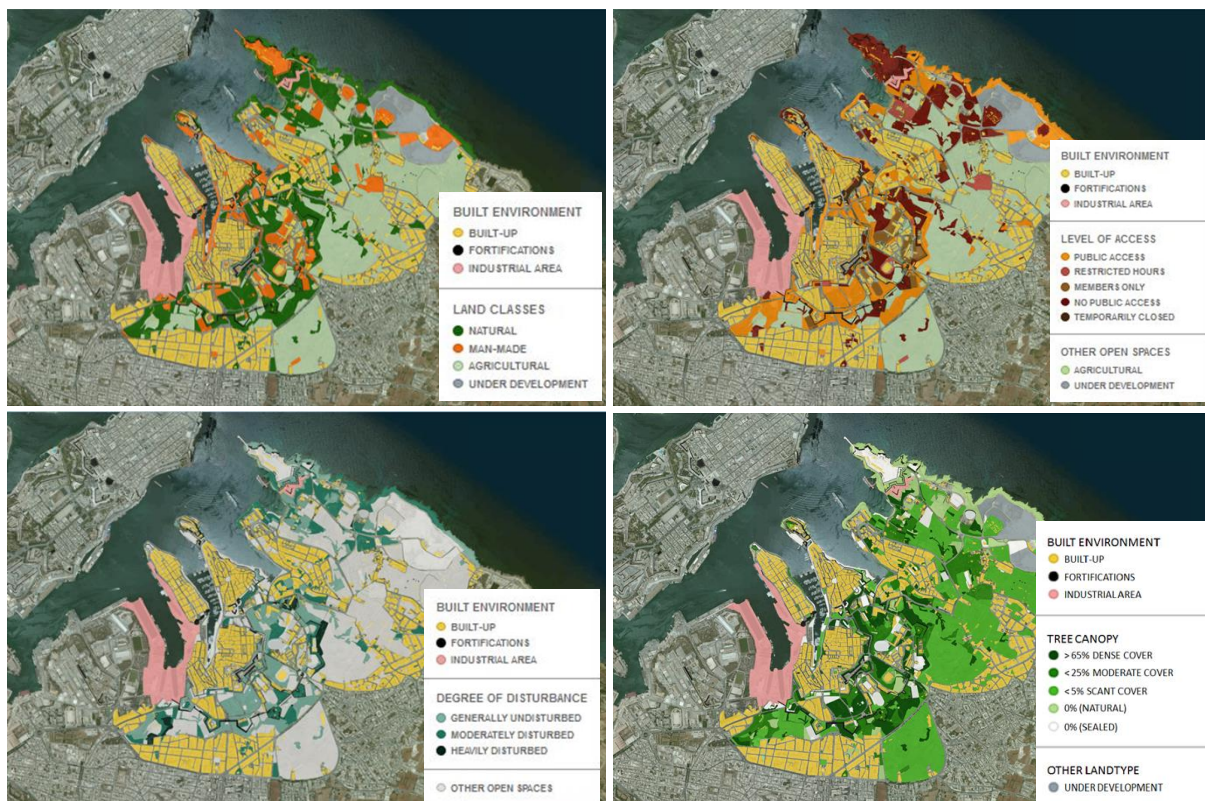
¹² Integrated Land and Water Information System (ILWIS), <http://www.ilwis.org/>

Construction of a webGIS

To enable the PPGIS Community to interact with and add on to the newly created maps of the Open Spaces, a webGIS was set up. Not many webGIS software offer an interface in which people can draw and/or add data or information to existing maps. An example of a software that offers both functionalities, i.e. uploading and publishing the GIS layers and attribute data, as well as an interface in which people can draw, is *ArcGIS Online*, a proprietary software.

For the purpose of the PPGIS Pilot Practice, it was opted to first try out and learn more about the different functionalities offered by various webGIS solutions. We opted for *CartoDB*¹³ to upload and publish the GIS layers and data. It offers a choice of base maps that can be used as a background when creating map views, together with a visualization wizard which provides several options of how to visualize the data by making use of filters, and customizable info-windows which are activated when clicking or hovering over a feature. Figure 8 brings a selection of map views of the Open Spaces in the Grand Harbour which were created in *CartoDB*, using the Nokia Daylight Satellite Image as a base map.

Figure 8. Clockwise: a) Land classes of Open Spaces, b) Level of access to Open Spaces, c) Degree of disturbance in Natural Open Spaces, and d) Tree canopy in Open Spaces
Source: IRMCo maps of Open Spaces created in CartoDB



*Google My Maps*¹⁴ was then used as an interface through which people can add their own information, data and ideas in the form of polygons, (poly)lines, points, as well as attribute data and geo-tagged

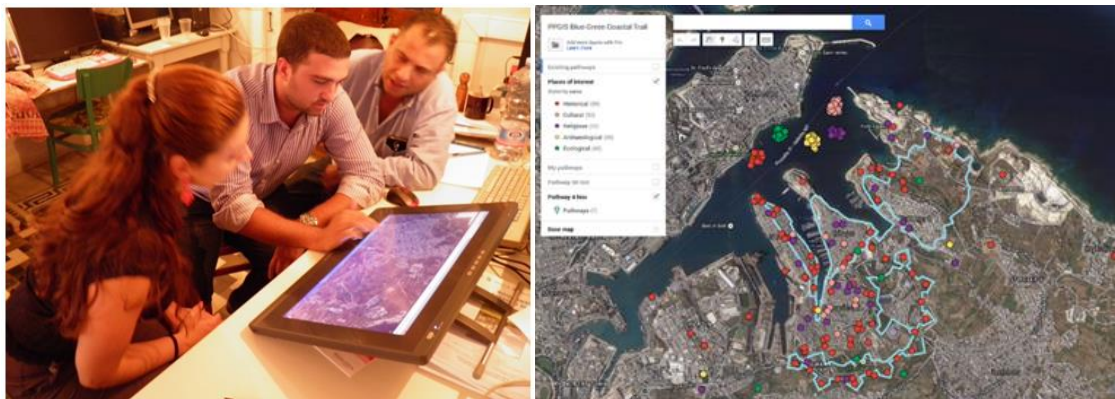
¹³ www.cartodb.com

¹⁴ <https://www.google.com/maps/d/>

pictures, on top of a satellite image as a base map. *Google My Maps* is very easy to use and familiar to many people, thus it avoids a steep learning curve and is widely accessible.

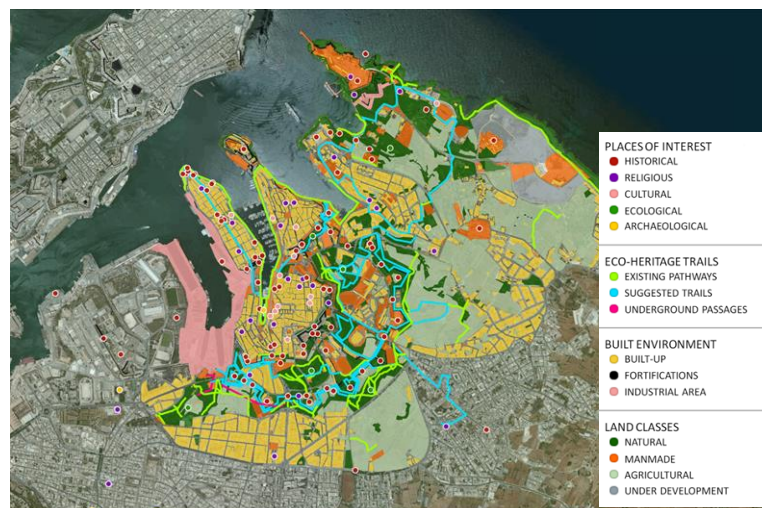
Existing pathways which had been mapped during the field survey of the open spaces were drawn as a reference and potential starting point for the drawing of an Eco-Heritage Trail on *Google My Maps*. A legend was created to guide the identification of places of historical, cultural, religious, archaeological and ecological interest (see Figure 9).

Figure 9. Marc Vella Bonnici, Mayor of Żabbar Local Council adding places of interest on Google My Maps
Source: IRMCo



It is also worthwhile to note that the information added on Google My Maps can be retrieved in .kml format, and then imported into other webGIS solutions, such as CartoDB. The easy-to-follow steps¹⁵ guide how to share the information added on Google My Maps, so that it can be included with the next ‘published’ version of the Eco-Heritage Trails in CartoDB by IRMCo’s Team.

Figure 10. Crowdsourced Places of Interest and Eco-Heritage Trails in Malta’s Grand Harbour
Source: Crowdsourced information compiled and published with CartoDB by IRMCo



¹⁵ <http://www.grandharbourcharter.net/draw%20a%20trail.html>

Concluded in November 2014, the PPGIS Pilot Practice has since been gradually extended to cover all areas around the Grand Harbour. Sixteen additional topographic survey sheets were purchased and the field survey progressed to include the local councils of Floriana and Valletta.

Acknowledgements and disclaimer

The Mare Nostrum project is funded by the European Union under the ENPI CBC Mediterranean Sea Basin Programme. The project's total budget is 4.32 million Euro, of which 90% is financed by the EU through the European Neighbourhood and Partnership Instrument. The contents of this paper are the sole responsibility of IRMCo and can under no circumstances be regarded as reflecting the position of the European Union or of the ENPI CBC Mediterranean Sea Basin Programme's management structures.

Conclusion

The PPGIS Pilot Practice in the Malta case study brings not only a significant contribution to the goal of Mare Nostrum, which is to devise a bottom-up strategy for improved policy-making for coastal planning and management, but also proved to be a timely vehicle for local communities and local councils around the inner Grand Harbour to come together for the first time and discuss common concerns.

PPGIS encourages people to think about issues in spatial terms, and empowers them to draw their own vision for their own communities with a sense of ownership and a sense of responsibility. Indeed the experience gained has demonstrated that PPGIS Practice is more than just drawing maps: it is an opportunity for people to come together, share stories and local knowledge and discuss prevalent issues. The aspirations expressed in the charter, and the visions expressed through the drawing of eco-heritage trails demonstrate a strong sense of commitment to place.

In conclusion, our goal at IRMCo is to work towards ensuring that the Charter and the PPGIS maps, which are the first maps of the area embedded within the local socio-cultural milieu, would be taken on board by relevant decision makers and respected as a legitimate output of great value from the inner Grand Harbour communities.

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Short bio-note of authors

Managing Director Anna Spiteri and Senior Researcher Dirk De Ketelaere run IRMCo, a people centred & knowledge driven research company.

We offer 20 years’ experience as professional researchers in land and water issues, with projects taking us from the Maltese Islands to North Africa, the Middle East, and recently to South America. Our portfolio ranges from local Environmental Impact Assessments to in-depth research on Water Resources & Irrigation; Coastal Zone Management; Climate Change & other disciplines. To date we have participated in 15 EU sponsored research projects.

We specialise in weaving public participatory approaches, communication platforms & dissemination strategies, in multi-actor & multi-disciplinary scientific scenarios that stimulate confidence among project partners and gain significance with the relevant stakeholders, end-users, decision makers and local communities.