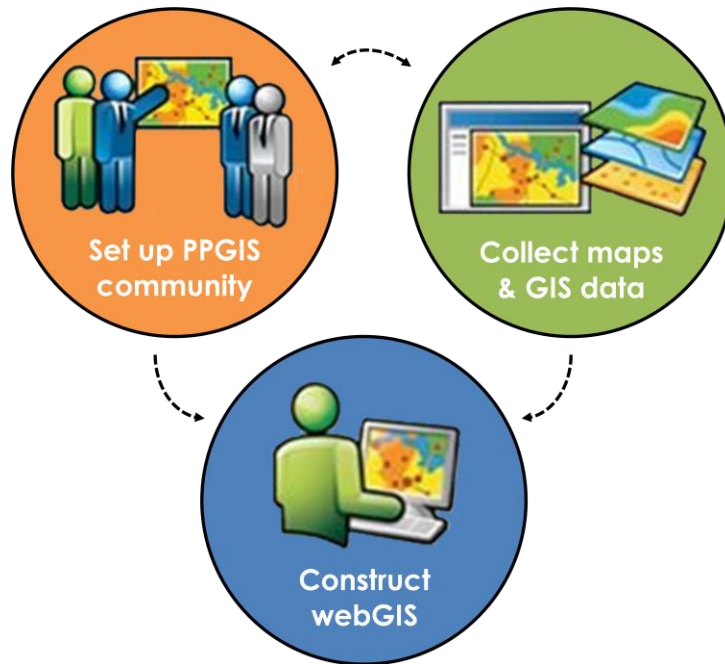


PPGIS Practical Guide

Prepared as part of the Mare Nostrum project: Bridging the Implementation Gap in Coastal Management around the Mediterranean



**Integrated Resources Management Co Ltd
IRMCo, Malta**

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www.marenostrumproject.eu



PPGIS Practical Guide



Integrated Resources Management Co Ltd
IRMCo, Malta

www.environmentalmalta.com

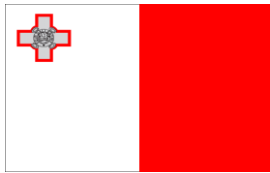


Mare Nostrum project

Bridging the implementation gap: facilitating cross-border ICZM implementation by lowering legal-institutional barriers in the Mediterranean Sea Basin

ENPI CBC MED Project – I-A_1.3_093

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The 2007-2013 ENPI CBC Mediterranean Sea Basin Programme is a multilateral Cross-Border Cooperation initiative funded by the European Neighbourhood and Partnership Instrument (ENPI). The Programme objective is to promote the sustainable and harmonious cooperation process at the Mediterranean Basin level by dealing with the common challenges and enhancing its endogenous potential. It finances cooperation projects as a contribution to the economic, social, environmental and cultural development of the Mediterranean region. The following 14 countries participate in the Programme: Cyprus, Egypt, France, Greece, Israel, Italy, Jordan, Lebanon, Malta, Palestinian Authority, Portugal, Spain, Syria, Tunisia. The Joint Managing Authority (JMA) is the Autonomous Region of Sardinia (Italy). Official Programme languages are Arabic, English and French.

The European Union is made up of 27 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders.

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Executive summary

The present guide sets out to define the use of Public Participatory GIS (PPGIS), adapted to suit particular requirements in the context of integrated coastal zone management (ICZM) in the Mediterranean. It builds on the set up of an all-inclusive PPGIS community which integrates with the community fabric in the selected pilot areas of the Mare Nostrum project.

The overarching purpose is to create a tool that empowers people to communicate effectively and to achieve transparent ICZM governance through the collaboration of all stakeholders. Its implementation as a web-based tool further promotes access to the general public.

Chapter 2 presents the framework for the PPGIS Practice and the different tasks involved, as well as an ethical protocol to assist in decision-making throughout the process.

In Chapter 3, methodologies for the different tasks: 1) Setting up a PPGIS Community Database, 2) Collecting maps & GIS data, and 3) Constructing a webGIS, are discussed step-by-step and linked to a variety of templates found in the Annexes.

The PPGIS Practice was first tried and tested in a pilot case in Malta, one of the local case studies in the Mare Nostrum project. The experiences in Malta have been used to illustrate the description of the different components of the PPGIS Practice, providing further insight and context.

With this document in hand, you will be prepared to start organising a PPGIS Practice in your local environment.

1. Introduction

1.1 What is PPGIS?

PPGIS stands for Public Participatory Geographic Information System. PPGIS is a visualization tool that taps local knowledge that cannot be obtained otherwise. PPGIS empowers 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.

1.2 Purpose

The purpose of this practical guide is to provide reference guidelines for PPGIS Practice to assist the Mare Nostrum partners, local decision-makers and communities, as well as other interested stakeholders, to define and establish a PPGIS community in the respective case study areas. This practical guide includes approaches, methodologies, and templates to prepare you for the data collection and other preparatory work for the PPGIS Practice. As such the practical guide provides both the framework for PPGIS Practice, as well as guidance for the methodology and practical organisation, and forms the backbone of the training programme on the *‘Design and Application of the PPGIS Instrument for Public Participation’* in Mare Nostrum.

This document is designed to help strengthen participatory processes and to prepare for PPGIS Practice in the local context of each case study area. It is meant to present the architecture of PPGIS Practice, by:

- identifying and setting up a PPGIS community
- describing the various building blocks (approaches and methodologies)
- presenting and describing templates and tutorials

This practical guide draws from several previous projects and in particular builds on the experience gained in recent EU co-financed projects SIRIUS and PLEIADeS (IRMC_o, 2011). Many ideas for the PPGIS training are adapted from the Training Kit on Participatory Spatial Information Management and Communication (CTA, 2010).

1.3 Objectives

The overall objective of the PPGIS Practice work is to contribute towards the goal of Mare Nostrum, which is to devise a bottom-up strategy for improved policy-making for coastal planning and management, and bridge the legal-institutional implementation gaps. In Mare Nostrum, PPGIS is used as a tool to aid people to communicate more effectively, to contribute to more transparent ICZM governance and to facilitate collaboration among all stakeholders.

Our aims are to:

- Use the research results to the benefit of the local community
- Build an archive of local knowledge
- Provide the local community with a platform for discussion
- Address issues that have come out of research, interviews and seminars
- Bridge the implementation gaps by providing bottom-up strategies to improve local decision-making processes, policies and legislation.

1.4 Terminology

A PPGIS community refers to a group of people, or stakeholders, who participate in ‘Public Participatory GIS’ (PPGIS) Practice. PPGIS has been defined in the ppgis Training Kit (CTA, 2010), as “the tool empowering ordinary people in the local community in adding value and authority to their spatial knowledge through the use of geo-spatial information technologies (GIT) and to use maps to communicate effectively”.

Traditionally a community is defined as a group of people living and interacting in a common location, normally sharing similar aspirations, belief, resources, preferences, needs and risks. Social and political conditions may affect locals’ aspirations and outlook.

Stakeholders are individuals or representatives of a group who have an interest in a particular issue. This includes people who make a decision, influence a decision, or can influence it, as well as those affected by it.

In Mare Nostrum, we go one step farther by introducing the web-based PPGIS interface, an online tool empowering people to communicate effectively and to work together towards transparent integrated coastal zone management and collaboration among all stakeholders. In each Mare Nostrum case study area we will identify and welcome an (in) definite number of persons, to be considered as the PPGIS community.

Chapter 3.1, *Creating a PPGIS Community Database*, elaborates further on the different types of stakeholders, how to identify and involve stakeholders, and how to involve people representative of the community.

2. The PPGIS framework

2.1 PPGIS Practice in Mare Nostrum

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.

The PPGIS Practice will open doors for various stakeholders and local communities to empower them to actively participate in the legal-institutional aspects of coastal planning and management issues, and direct the attention of decision-makers to novel ideas and solutions. Through the bottom-up approach, the results of the PPGIS Practice are embedded within the local socio-cultural, economic and environmental context of the case study areas within the Mare Nostrum project.

The PPGIS Practice was first tried and tested in a pilot case in Malta, one of the local case study sites in Mare Nostrum. The experience gained in Malta has been used to illustrate the description of the different components of the PPGIS Practice using real life examples to provide further insight and context.

The methodology for PPGIS Practice in Mare Nostrum is set out in Chapter 3, and comprises three main components:

1. Set up a PPGIS Community
2. Collect maps & GIS data
3. Construct a webGIS

These components are explained in detail, broken down step-by-step and illustrated with examples, tutorials and templates further on in this document. In the following section they are described briefly to present the architecture and give an overall picture of the PPGIS Practice in Mare Nostrum.

Set up a PPGIS Community

The PPGIS Practice aims to empower the local community and other local stakeholders. In order to create a truly all-inclusive bottom-up process, the strategy adopted approaches a wide variety of stakeholders. Ideally information should be kept in an organised spreadsheet set-up, the PPGIS Community Database, in order to keep track of contact details. The PPGIS Community Database facilitates communication flows and may be used as a checklist to monitor progress, on issues such as gender and age equality and representation of different stakeholder groups.

Collect maps & GIS data

To discuss local coastal planning and management issues from a spatial perspective, maps are an essential tool. In preparation for PPGIS Practice, maps and data need to be collected to be able to visualise, understand and discuss the issues at hand in a local case study area.

In preparation for the PPGIS Practice events it is advisable to identify and assemble existing maps, both in hardcopy form or as digital layers in a Geographic Information System (GIS). In addition to existing maps it may be necessary to create new maps, GIS layers or linked attribute data.

Construct a webGIS

To enable the PPGIS Community to interact with and add on to the existing and newly created maps, a webGIS was set up. The webGIS publishes existing maps, GIS layers and attribute data online, and creates an interface where people can draw their own maps. During the PPGIS Practice events participants will work with the maps and data provided and build further upon them, by adding their perspectives and local knowledge in order to create their own perception maps. The different maps and layers, including the perception maps created by the PPGIS Community, will be accessible online through the webGIS application.



Diagram representing the relationship between the three main components of PPGIS Practice (adapted from ESRI, ArcGIS for Server)

2.2 Good practices in PPGIS

The aim of the PPGIS Practice in Mare Nostrum is to empower people to draw their own vision of their coastal communities, and to give people a sense of ownership and responsibility over their own coastal resources. Clearly, different stakeholders often have diverging views and interests. Therefore, it is essential to acknowledge what is being said and by whom, and why a particular map is being published and promoted. The ‘*Who? and Whose? Questions*’ as proposed by Robert Chambers & others (Rambaldi et al., 2006) are helpful in understanding the dynamics of stakeholder meetings and discussions, and can be used to encourage open discussion and strive for a balanced outcome to the PPGIS Practice.

Some example questions are:

- *Who participates?*
- *Who decides on who should participate?*
- *Whose voice counts?*
- *Who controls the process?*
- *Who decides on what is important?*
- *Whose reality is expressed?*
- *Whose knowledge and perceptions are included?*
- *Who owns the output?*
- *Who has access to the information and why?*
- *Who will use it and for what?*
- *Who gains and who loses?*

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. Therefore, and not least to avoid creating false expectations, we have 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 Mare Nostrum team is interested in understanding the local communities’ views on coastal planning and management in their environment;
- the outcomes of the process may be used to influence policies and practices so that communities’ views are taken into account in decision making.

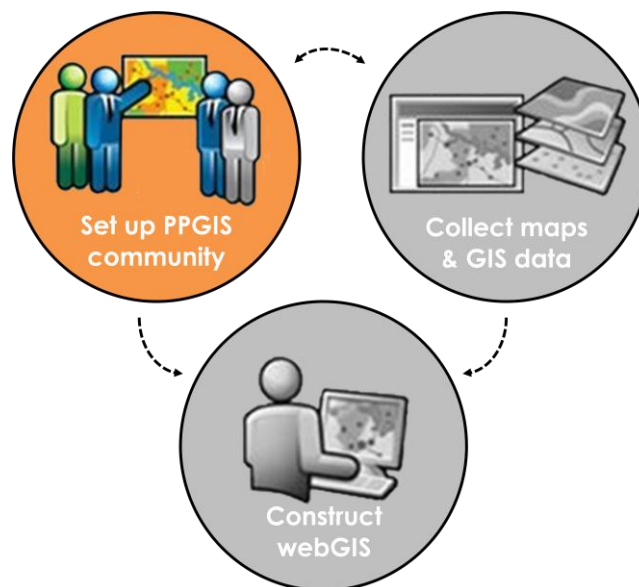
3. Methodology

Through the case study research and stakeholder interviews in the first phase of the Mare Nostrum project, data and information were collected about coastal zone management and planning and the legal-institutional framework in the respective case study areas, and in particular the main issues and implementation gaps that are present. Since the Mare Nostrum project specifically aims for a bottom-up approach to bridge the implementation gap, another perspective should be added to the data and information already collected - that of the local community. Through PPGIS Practice people are encouraged to think about local issues spatially and to draw perception maps, highlighting issues, ideas or solutions for their coastal zone.

The present chapter sets out the tasks that are required to prepare for PPGIS Practice events. The first set of tasks relates to **setting up a PPGIS Community**, to ensure that a variety of people and perspectives in the PPGIS Practice are brought together. The second set of tasks relates to **collecting maps and GIS data**, to ensure appropriate maps for the PPGIS Practice have been obtained. The third set of tasks relates to **constructing a webGIS**, the medium where the PPGIS Community can interact with the information contained in the maps, and add their own knowledge and/or perceptions.

To facilitate the tasks at hand and to streamline data collection between the partners and across the case study areas in the Mare Nostrum project, several templates have been constructed. These are referred to in the text and have been grouped in Annex 2.

3.1 Set up a PPGIS Community



What sets the PPGIS Practice apart from traditional mapping and GIS is the focus on public participation. The Mare Nostrum project takes a bottom-up approach to improved decision-making for coastal planning and management. Inclusion of a wide variety of local stakeholders in the PPGIS Community is essential to ensure an approach that is all-inclusive and takes into account different perspectives and interests.

The following tasks outline a methodology to create the PPGIS Community and ensure varied perspectives from people participating in the PPGIS Practice:

1. Introduce the case study issues to local stakeholders
2. Identify who would be interested in joining the PPGIS Community
3. Complete the PPGIS Community Database with participant info

Task 1: Introduce the case study issues to local stakeholders

In line with the commitment of all project partners to take the results of our case study research, including the outcome of our interviews, back to the local stakeholders and local community, the first step is to present and discuss the case study issues that came out of the initial phase of the Mare Nostrum project. In addition to using printed or online media to communicate the results and insights from the case study research, it will be useful to organise one or more seminar or workshop events to present and discuss the results with local stakeholders. Meeting face to face with people aids in building trust, brings people in real contact with one another, and allows for interactive discussion, rather than predominantly one-way communication.

Some guiding questions may aid in selecting participants, such as: “*Who plays an active role in the local community?*”, “*Who has an interest in what happens locally?*”, “*Who will be affected by planning decisions in the local community?*”, “*Who decides on coastal planning and management issues at the local level?*” etc. A common approach to stakeholder analysis is the **power/interest matrix**, which identifies two types of stakeholders: people with *power* – those who can influence and make decisions, and people with an *interest* – those who are influenced by these decisions.

In the context of the Mare Nostrum project, the following special categories of stakeholders need to be distinguished in terms of dealing with integrated coastal zone management:

- Local residents, who use the coastal zone for a wide variety of purposes, related to income generation, domestic tasks, recreational activities, art, education and many others, as well as those who often have a special relationship with the coast close to their home. Their interests and needs should not be overlooked or understated in new developments or other changes in the planning and management of the coastal zone.
- People who depend on coastal activities for their livelihood, both those who are directly connected to the coastline, such as fishermen and boat builders, as well as more recent arrivals to the scene, such as those working in the hospitality and retail sector

(restaurants, cafés and hotels; boating, diving, surfing and other water sport schools and shops, etc.).

- Decision makers, local, regional and/or national political figures who draft and implement policies and laws and take decisions.
- Harbour industry representatives and workers.
- Other coastal users, such as local and foreign tourists, who come to enjoy the coastal zone.
- People with coastal expertise, people in the natural sciences, such as biologists, chemists and environmental scientists, as well as planners, engineers, architects, etc.

Apart from identifying and inviting different types of stakeholders, it is also important to consider the level of participation, or why a particular participatory approach is being used. Public participation can range from ‘stakeholders being informed or receiving education about a topic’ to ‘stakeholders being able to participate directly in the decision-making process’, with many variations in between, as has been visualised in different ‘participation ladders’ (e.g. Arnstein, 1969; Wiedemann and Femers, 1994 in Schlossberg and Shuford, 2005). It is useful to define what you are trying to achieve with the PPGIS Practice in your case study area, and to discuss this with stakeholders to avoid misunderstandings or frustrations at a later stage.

The case study research can provide a departure point for a stakeholder analysis as it includes a basic inventory of relevant government authorities and other organisations that influence or make decisions, policies and laws. Furthermore, for the stakeholder interviews local key players have been identified and contacted.

To widen the range of stakeholders, and to ensure a variety of stakeholders, online and offline research into local organisations, clubs, cultural centres, and other meeting places is also a helpful addition. Web searches and actual visits to the case study area such as walks in the area, visits to the local council, talking to people and taking an interest in local events are also helpful familiarisation activities. Asking already selected stakeholders to identify other potential participants from within their social network, so-called **snowball sampling**, is another method to expand the range of local stakeholders.

When organising an event to present the results and insights of a case study research, time management is essential - besides time to present research, time for questions and discussions should be allocated. Discussing planning and land use issues in a local context will undoubtedly evoke strong reactions and opinions from the audience. To capture this energy and use it to generate interest in the topic, there needs to be time and space for the participants to react and share their views.

Task 2: Identify who would be interested to join the PPGIS Community

Ideally people from different backgrounds should be considered for participation in the PPGIS Practice event, such as: local residents, decision-makers, planners, fishermen, NGOs, restaurant owners, academics, architects, artists, teachers, lawyers, etc. An extensive list of different stakeholder categories to consider for the PPGIS Practice has been drawn up and can be found in the PPGIS Community Invitation Form.

➤ **Template:** *PPGIS Community Invitation Form: Annex 2, Template A*

The seminar/workshop events mentioned in Task 1 also provide the opportunity to gauge if people are interested in joining the PPGIS Community. In addition to apparent interest and enthusiasm in the topic of the PPGIS Practice, finding out whether people are committed and able to make time to join the workshops is additionally beneficial. Allowing prospective participants to fill in the PPGIS Community Invitation Form generates commitment and expectations.

Task 3: Fill the PPGIS Community Database with participant info

The PPGIS Community Database is essentially a tool to collect information about the pool of stakeholders that together form the PPGIS Community in an organised spreadsheet set-up. The information collected in the PPGIS Community Invitation Forms in the PPGIS Community Database can be used as an address book, for communication purposes and as a checklist to monitor progress on target for goals such as equal gender representation and representation of a wide variety of stakeholder groups.

➤ **Template:** *PPGIS Community Database: Annex 2, Template B*

Example from the Malta pilot case

Through the case study research conducted in Malta in the first phase of the Mare Nostrum project, an initial attempt at building a stakeholder database was started. Government institutions and other entities that carry influence, decide on or implement coastal planning and management were identified and a list was compiled. For the stakeholder interviews over 20 key local players were identified and interviewed. Starting with these stakeholders, a list was drafted in spreadsheet format, collecting contact details and other relevant information, including occupational involvement and/or other interest in the topics at hand.

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).

In order to communicate the results of the case study research, in particular to those who had helped building up the knowledge base by participating in the stakeholder interviews, a seminar was organised at a local historical venue. A wide variety of local stakeholders were invited: residents, mayors, boat owners, artists, historians, and NGO representatives, among others. The seminar kicked off with an introduction to the Mare Nostrum project, the project's goals and the progress and results so far. After this presentation, there was an open discussion with all participants about the coastal planning and management issues that were raised. From the feedback of participants it was evident that the seminar was a much needed and appreciated event. As a result a series of seminars followed in which new GIS maps being constructed were discussed, as well as local issues. The outcome of these seminars also led to the drawing up of Charter that reflects the prevailing concerns of the local community. Although the make-up of the group of stakeholders varied slightly in subsequent seminars, a solid core group of interested participants joined for every seminar, showing real commitment and an active interest to change and influence local issues together.

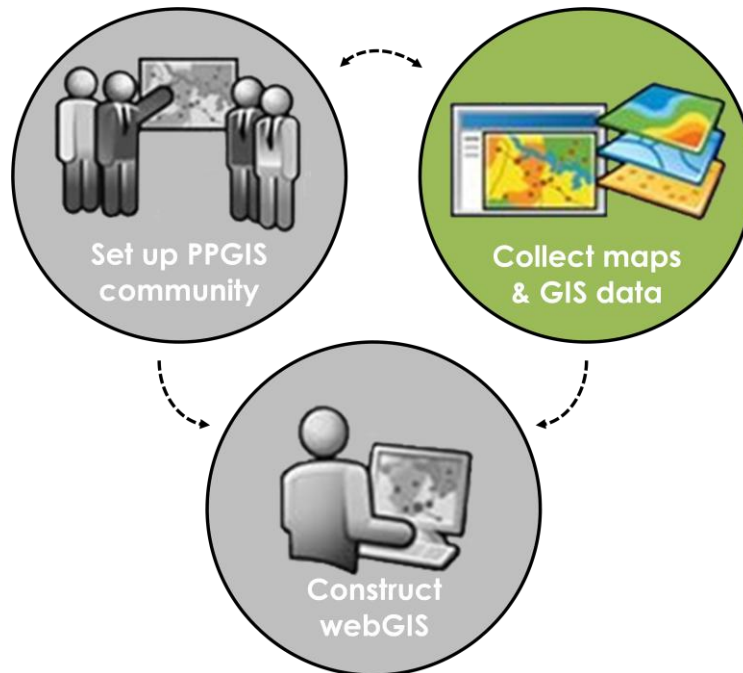


Presentation of the case study results // One of the mayors discusses local issues in his community

Information on the growing group of stakeholders was continually updated by collecting their contact details, information on their occupation, and other valuable data. The PPGIS Community Invitation Form was filled in together with the participant and this information was compiled in the PPGIS Community Database. This spreadsheet tool was used to keep track of contact information, gender and stakeholder group representation, and attendance at the seminars. Apart from the monthly seminars, group e-mails to the entire PPGIS Community are used to keep people informed about the contents of the seminars, in the

form of detailed minutes of the discussions, and as a means of communicating with others involved about interesting events and developments.

3.2 Collect maps & GIS data



The research conducted in the initial phase of the Mare Nostrum project sought to identify the legal-institutional implementation gaps in coastal planning and management within the local socio-cultural, economic and environmental context of the respective case studies. Presenting the issues and their context in a spatial manner by visualising them in maps offers new perspectives and a better understanding of the issues at hand.

In an interview with GIM International, Jack Dangermond – founder of Esri – 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)

The following tasks together form a methodology ensuring the available data for the appropriate maps, GIS layers and attribute data for the PPGIS Practice:

1. Identify the main issues
2. Identify which maps are needed
3. Assemble existing maps
4. Consider additional maps
5. Construct new maps

Task 1: Identify the main issues

Which issue, or issues, will be addressed in the PPGIS Practice should first be established. There are probably multiple issues that emerge from a case study research and the stakeholder interviews. Not all of these issues will be suitable or appropriate for the PPGIS Practice. Some issues will not be suitable for a spatial approach or will be too big or complex to address in the PPGIS Practice (e.g. infrastructure of national importance).

Asking questions such as: “*Which issues were mentioned most often by the people we interviewed?*”, “*Where have people identified areas of conflict?*”, “*To which topics do the implementation gaps we have identified relate?*”, “*With which problems is the local community confronted?*”, and “*Which areas are subject to competing land uses?*” can assist in deciding which issues are suitable for the PPGIS Practice; i.e. suitable for a spatial approach and of concern to the local community.

Task 2: Identify which maps are needed

Having identified the issue(s) being addressed in the PPGIS Practice, ensure that the appropriate maps, GIS layers and attribute data to address the issue(s) are available, so as to provide people with the relevant information, and to document and guide a discussion.

Revisiting the *Map & Data Availability Questionnaire* completed in the initial phase of the Mare Nostrum project provides a quick overview of the maps and data that are available. Ideally the maps and GIS data availability in light of the issue selected should then be reviewed. Additionally, review the information collected through the questionnaire regarding the availability, ownership, copyright, price, language, scale, format and year of publication. Maps, GIS layers and attribute data that are useful to document and guide a discussion should then be selected. This exercise may also reveal missing maps and/or data that would be required for the discussion and documentation of issues being addressed in the PPGIS Practice.

➤ **Template:** *Map & Data Availability Questionnaire: Annex 2, Template C*

Task 3: Assemble existing maps

Existing maps and GIS data (in-house, purchased, etc.) that have been identified in the above Task 2 could be assembled either as hardcopy maps, GIS layers, or both.

Hardcopy maps can be more practical for use outside the office, such as fieldwork, as well as for facilitating discussion during the PPGIS Practice events. Most people can easily relate to a topographic map or satellite image of the area they live and/or work in, so having a large

hardcopy map of the case study area at hand during the PPGIS Practice events provides easy reference material and a good starting point for discussion. Size and scale of the hardcopy maps requires careful consideration. In general, a large sized map (e.g. A1 or A0) with a small scale (e.g. 1:20.000) will be more useful to present the case study area to a group of people, and a small sized map (e.g. A4 or A3) with a large scale (e.g. 1:5.000) will be more suitable for fieldwork.

GIS layers or other digital data (e.g. data from the statistics office that can be linked to spatial data through linking the attribute tables of GIS layers) are very useful for spatial analysis and for creating maps that meet the particular requirements of the case study area, as these can combine different layers and highlight the features that are important to document the issue(s) at hand, as opposed to a predefined hardcopy map. The GIS data can also be used to create a map that will serve as a base map layer for the digital perception maps that will be constructed during the PPGIS Practice events.

Before assembling or purchasing data, it is important to look into matters such as the compatibility of different file formats, geographic projection (or coordinate) systems, and the spatial boundaries of GIS layers; failing to do so can lead to inconsistencies that can be time-consuming to correct afterwards.

Task 4: Consider additional maps

Based on the information gathered in the previous tasks, determine whether any further maps or data are needed, but not readily available, to document and guide a discussion on the issue(s) selected for the PPGIS Practice in the case study area. Outdated maps, maps lacking necessary or relevant detail, or areas not covered by existing maps can be among the reasons to consider constructing new or additional maps.

In order to identify additional data that characterizes the issue addressed in the PPGIS Practice, as well as existing maps and GIS data, brainstorming with colleagues and project partners may prove useful.

Task 5: Construct new maps

Discussing and planning with a GIS expert helps in identifying what the attribute table for a map being constructed should look like, and how to collect the attribute data. By reviewing the maps and GIS data assembled or purchased aspects that need to be built on can be identified. Often existing points, (poly)lines and/or polygons of maps can be used as a basis for the construction of a new map, rather than having to digitize all the features again. Determine which information can already be obtained through desk research, e.g. by viewing satellite imagery on Google Maps or Google Earth.

When creating a data collection method for fieldwork, how data will be collected (e.g. on paper or digitally, such as on a tablet), and which materials will be needed (data collection sheets, existing maps, GPS, camera, tablet, etc.) are key considerations. Additional to this is allocating enough time and resources for fieldwork, data collection, the inputting of data and the processing of the information. Invariably this process normally takes longer than envisaged. Preferably the materials and working method that have been devised should be tried out in the field at different locations to find out what works and what doesn't. In the field difficulties and problems that may not be obvious before fieldwork are common. Testing the method on the ground provides an opportunity to adapt and fine-tune the data collection method or approach before starting formal data collection. If the test phase is omitted there is a chance that later on problems will arise that could be much more difficult and time-consuming to resolve.

Planning the best way to bring the spatial and attribute data being collected in the GIS software and trying it out before starting the fieldwork, enables the collection of data that fits in with the later steps of data inputting, processing and analysis. Finding out if the features the data is describing are already digitized avoids duplication of work, allowing for the possibility of linking them to new attribute data without digitizing the features again.

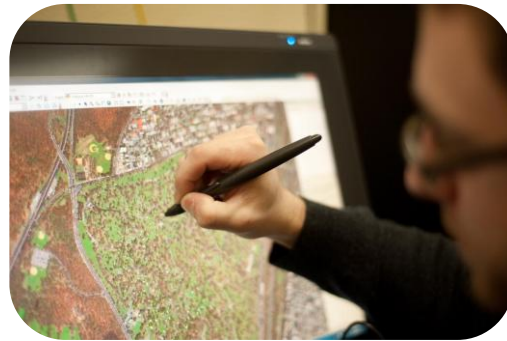
Once the new map(s) is finalized, it is advisable to review whether the maps, GIS layers and attribute data assembled, purchased and created match the requirements of the PPGIS Practice event.

Example from the Malta pilot case

From the desk research and the stakeholder surveys conducted in Malta it clearly emerged that the Grand Harbour, Malta's case study area, is under high pressure from competing uses. All stakeholders expressed concern that over-development, combined with a poor planning process, a lack of vision and only limited stakeholder consultation, could result in forever losing or damaging the remaining open spaces and the coastal cultural landscape of the Grand Harbour. These concerns led to the decision of what to address in the Pilot PPGIS Practice in Malta: how to safeguard the Open Blue and Green Spaces that are still present in the area and how to share the untapped potential of the cultural and natural resources that these open spaces represent between the Local Councils.

Purchased digital GIS data as well as topographic hardcopy maps from the local planning authority were used as base maps for the case study area. We prepared the digital GIS data for importation in our desktop GIS software, ILWIS, and thereafter imported the data. One A0 overview hardcopy map at scale 1:10.000 (small scale) was bought, as well as a selection of A3 maps for fieldwork and for use at the PPGIS Practice at scale 1:5.000 (large scale). With an initial plan to use large scale hardcopy maps, a field trial exercise found that bigger scale maps were needed for use in the field, as the features in the 1:5000 maps were too small to work with. Therefore, selected subsections of the digital GIS data at scale 1:2500 were printed on A3 sized paper for fieldwork purposes.

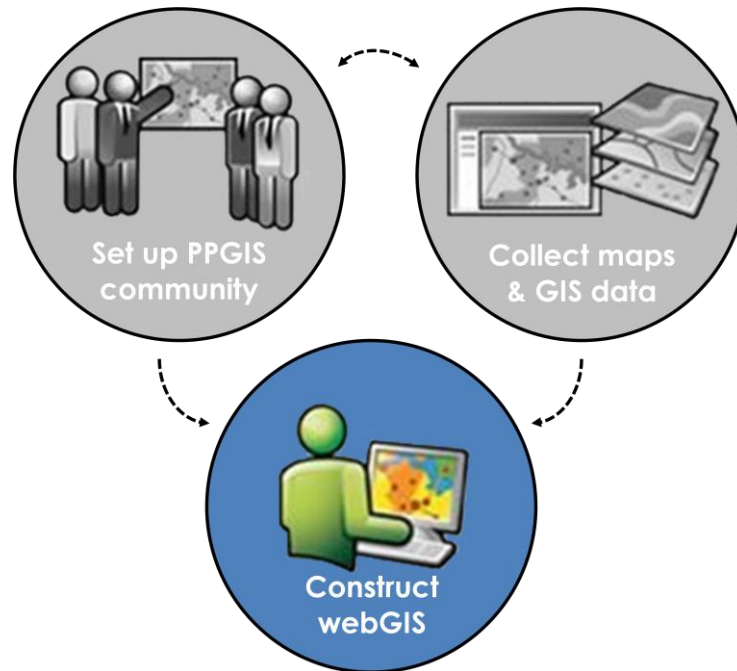
Additional maps were needed (digital layers in GIS) to document the open spaces in the case study area in terms of: land type, human impact in terms of the level of disturbance or maintenance, accessibility, means of access, tree cover and predominant type of trees. A legend was defined for each of these attributes and a Data Collection Sheet was prepared for use in the field and the collection of information on open spaces.



Surveying an open space next to the fortifications // Digitizing the data at the office

The open spaces identified were digitized and drawn during the field survey, and their attribute information inputted in an Excel datasheet, which was later imported into the GIS software. In the GIS software we used, we created a number of attribute maps, visualizing attributes such as land type, human impact, and accessibility in dedicated maps views.

3.3 Construct a webGIS



To work towards a truly bottom-up, all-inclusive approach to coastal planning and management, the information and opinions contained in the GIS layers and perception maps should be easily accessible and available to a wide public. To facilitate such access, the maps are being compiled in a webGIS.

According to ArcGIS, one of the market leaders in the GIS field, webGIS or web mapping is defined as “a Geographical Information System (GIS) that uses web technology to communicate between a server and a client”. Since webGIS is defined by both service and consumer activity, it is more than just web cartography, and often offers some interactivity, through information or animation processes.

The following tasks together form a methodology to set up a webGIS for the PPGIS Practice:

1. Anticipate the type of mapping output
2. Choose software for web mapping
3. Set up the webGIS interface

Task 1: Anticipate the type of mapping output

Having decided on a suitable and appropriate issue for the PPGIS Practice, how the issue will be addressed in the context of the PPGIS Practice should be considered, in particular by anticipating the type of mapping output. Through the webGIS, the PPGIS Community will be

able to interact with the spatial data that has been collected and maps that have been created, for example by adding their own information or opinion to it. This offers a range of mapping outputs and participants can anticipate what would work best in their local coastal planning context. Possible ideas and examples in this context are:

- Coastal visioning map: a participatory planning tool for resolving coastal conflicts and for communicating peoples' visions for coastal areas or sites that will be redesigned or redeveloped.
- Coastal alert map: a participatory monitoring tool to pinpoint locations where relevant action and/or enforcement is needed, which can be applied to a number of coastal zone issues, such as oil spills, pollution, erosion, etc.
- Coastal access corridor map: a crowdsourcing tool that can be used with a view to restore or improve public access to the coast, by asking people to determine where, in their opinion, would be the most suitable locations and what means are required to create coastal access corridors.
- Coastal setback map: a purposely created GIS layer which shows one or more predefined coastal setback lines (including e.g. the 100 meter coastal setback line as defined in Article 8 of the ICZM protocol, and coastal setback lines as may be defined in national legislation), for people to use as information and campaigning material to challenge development plans in the coastal setback zone.
- Coastal trail map: a mapping tool to allow people to submit their ideas and suggestions for a coastal walk which may join places e.g. of natural (ecological) and historical interest.

This is by no means an exhaustive list of options and there are many other possibilities for using maps in an interactive way in a webGIS setup.

Task 2: Choose software for web mapping

There are two main objectives to the PPGIS Practice: 1) publish online existing or newly created maps, GIS layers and attribute data of the respective case study areas, which provide insight into the local context and issues, and 2) provide a web-based interface in which the PPGIS Community, or the wider public, can draw their own perception maps or add information to the maps based on their knowledge of the area.

There are different webGIS solutions available, both free and paid services, all with their own set of merits and drawbacks. A foremost distinction with regard to the expected outcomes of the PPIGS Practice lies in the fact that some webGIS solutions are solely dedicated to online publishing, where others only offer the possibility for online drawing. As detailed further below, combined use of these solutions can still offer a cost-effective alternative to those webGIS solutions that cater to both functionalities.

There are a number of options to explore that cater to different needs and resources. To make an informed decision and choose the software that is right for the task at hand, the following

variables could be considered: the size and format of the data to upload, the expected number of users, the privacy and sharing options of maps, and the functionality that will be required to achieve the type of mapping output anticipated for the PPGIS Practice. Typically, these parameters also affect the cost of proprietary webGIS solutions.

Most webGIS solutions offer a choice of one or several basemaps: topographic maps or satellite images, often available in a variety of styles. Basemaps can be used as a background for the layers to be imported or created, and are useful because they provide spatial context.

It is evidently important that GIS layers, and their attribute data, are imported correctly in the webGIS software. Most webGIS solutions offer a choice of import file formats. Common options for importation of files are shapefiles (.shp) or zipped shapefiles (.zip) containing the shapefile and associated files (.shp, .dbf, .prj, and .shx) to upload polygon, (poly)line and point files; comma-separated value (.csv) or Excel files (.xls) for spreadsheet data; and .kml or .kmz for layers created in Google My Maps and Google Earth.

Ensuring a correct georeferencing is obtained between the GIS layers and the basemaps provided by the webGIS is perhaps the most important aspect. Each GIS layer needs a coordinate system, or map projection, providing the map with information about the location of the data in the GIS layer, either in latitude/longitude values (for a geographic coordinate system), or in x/y values (for a projected coordinate system).

If the GIS layers are not correctly shown with respect to the basemaps provided by the webGIS, this may be due to incomplete or inconsistent information about the coordinate system in one or more of the GIS layers.

Task 3: Set up the webGIS interface

The webGIS allows the creation of maps, or *map views*, using different layers, such as a basemap, combined with the GIS layers that have been imported. The map views being created will be used by the PPGIS Community as baseline information or inspiration. Keeping the target audience in mind when preparing the maps, and making sure that the map view(s) clearly communicate the issue (and its context) selected for the PPGIS Practice, are key issues.

Different map views can be created to highlight different aspects of the data embedded in the GIS layers. From a visual perspective, the GIS layers and their attribute data of the case study area are likely overlapping. Arranging the basemap and GIS layers in such a way that the information desired is shown in the map view avoids this problem. Thinking about **the colours and shape of different features**, and using variations in contrast, transparency, and outlines ensures the map is readable and different map features are easy to distinguish.

Deciding on a **clear style and content for the legend** and keeping the number of categories at a minimum, makes interpreting a map easier. Typically it becomes hard to interpret a map

which contains more than five categories. For point features, it is advisable to consider using symbols and make an informed choice about them, making use of intuitive associations with symbols and creating a recognizable, homogenous style throughout. The same considerations apply to the information which will be added by the PPGIS Community.

In some webGIS software it is possible to create info-windows that appear when clicking or hovering over a feature. In this instance, the info-window can be configured to show information (attribute data) in a text format that could be additional to the information that is shown in the map view.

Most webGIS also offer a choice on how to make the map views created accessible online. Common options are **to invite people to the map views** created through a link, to share the link with people, and/or to embed the map views in a website. Typically, these options may also be tied to different authorization levels, so that for example only people with a password can access the map, only people with the link can access the map, or anybody can access the map.

Example from the Malta pilot case

From the case study research in Malta, the need for the preservation of the remaining blue and green open spaces in the Grand Harbour, and making its cultural and natural heritage more accessible to the public, emerged as one of the main issues that is suitable to address through the PPGIS Practice. It is both a spatial issue and of concern to the local community.

In terms of mapping output from the PPGIS Practice, the creation of a Coastal Trail Map was envisaged, a trail leading past the blue and green open spaces in the harbour area, connecting places of natural and cultural interest.

Not many webGIS software offers an interface in which people can draw and/or add data or information to existing maps. An example of software that offers both functionalities: uploading and publishing the GIS layers and attribute data, as well as offering an interface in which people can draw, is *ArcGIS Online*, proprietary software. For the purpose of the PPGIS Pilot Practice trying out and learning more about the different functionalities offered by free webGIS solutions was a first step. The free version of *CartoDB* was used to upload and publish the GIS layers and data. It offers a choice of basemaps that can be used as a background when creating map views. *Google My Maps* 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 pictures, on top of a satellite image as a basemap. *Google My Maps* is very easy to use and familiar to many people, thus it avoids a steep learning curve and is widely accessible. *Google My Maps* output (in *.kml* format) can easily be imported into other webGIS solutions, such as *CartoDB*.

In preparation for the PPGIS Pilot Practice event, 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 a Coastal Trail Map on *Google My Maps*. A legend was created to guide the identification of places of

natural (ecological, geological) and cultural (historical, archaeological, religious) interest, as well as transport access points and public facilities. In parallel to this, a series of map views of the open spaces in the Grand Harbour were created in *CartoDB*, using the Nokia Daylight Satellite Image as a basemap. These map views show the land(use) type, accessibility and means of access of the open spaces, their level of maintenance and/or disturbance to highlight opportunities and challenges in the area. Within *CartoDB*, you have the option to manipulate how to view and visualize the data by making use of filters, a visualization wizard and customizable info-windows that appear as you click or hover over a feature.



Using the interactive tablet during PPGIS Pilot Practice event // Screenshot of map view in CartoDB

During the PPGIS Practice event a meeting room equipped with a laptop, projector and screen, and two large interactive tablets was set up. The aims and expected outcome of the PPGIS Practice event were briefly presented. The created maps views in *CartoDB* were then shown on the screen. Following a brief discussion of the different maps and the information contained in them, the participants were shown how to use the interactive tablets to add their ideas and suggestions for the trail in a layer in *Google My Maps*. The participants were asked to contribute places of interest, which were marked with a point and information (e.g. name, date, significance) added as attribute data, as well as line features indicating their proposals for the location of the trail. At the end of the event the contributions were discussed within the group in order to develop a common and shared proposal for the Coastal Trail. The created layer was then saved in *.kml* format and imported in *CartoDB*, to be used as a layer supplementing the basemap and the layers created through fieldwork. The local PPGIS Community aims to present this Coastal Trail Map, in conjunction with the Local Community Charter, to the local planning authority to present their vision and input to the Local Plans, which are currently in the process of being revised.

References & further reading

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Annex 1 Tips for organising a PPGIS Practice event

To ensure the organisation of a successful event, this Annex lists a number of helpful tips.

Participants and their role

There are different approaches to decide who to invite to the PPGIS event, such as:

- Open invitation: you could send an invitation around to all the people you have spoken with and met during your case study research, collected in the PPGIS Community Database.
- Selective invitation: you could select people you think would be suitable for the PPGIS Practice because of their knowledge of, or vision for, your case study area.

When determining whom to invite, and how, do keep in mind the following consideration. We encourage you to aim for gender and age equality and representation of different stakeholder groups, to work towards achieving a balanced outcome. Keep in mind the good practices for PPGIS presented in section 2.2. Use some of the following questions to guide your choices: *'Who is deciding whom to invite?'*, *'Who is left out?'*, *'Who is a stakeholder?'*, and *'Who represents the local community?'* Furthermore, consider what group size you can accommodate within the limitations of your space or resources. Also consider that clear communication and productive collective discussion is more difficult to achieve in a bigger group.

Venue

Think about a strategic location and inviting venue for your PPGIS event. Choose a venue that characterises your case study area, be it a local community centre, local school or historical site. Also consider how easy it is to reach the venue, and whether it is easily accessible for participants through different transport forms, e.g. by public transport, by bicycle or by car.

Many meeting rooms are tucked away inside buildings, and lack fresh air and light. We encourage you to find a venue that has a pleasant atmosphere, natural light, and a source of fresh air. These factors greatly contribute to the well-being of the participants and hence to the productivity of the PPGIS Practice event. Some plants and flowers also help towards creating a welcoming atmosphere.

Timing

One of the aims of the PPGIS Practice is to improve the local decision-making process, policies and legislation, and to bring the solutions, ideas and vision of the local community to the attention of decision-makers. To achieve that, linking the outputs of the PPGIS Practice to events in the wider legal-institutional context – such as an upcoming political decision, revision of laws and policies, debates in parliament, a civil society protest – can be of great aid in creating visibility and attention for the output of the PPGIS Practice.

With regards to the timing of your event, try to find out during what timeslots of the day, and which days of the week, the participants of your PPGIS Practice are most likely to be available. If you decide to organise an event around lunch- or dinner time, consider providing some food or snacks.

Invitation

Write an inspiring and exciting invitation that will make people curious about PPGIS and mapping the case study area. Stress the importance of local knowledge and perceptions and the use of (web) maps to convey the people's message to local decision-makers.

Include in your invitation all the practical details of the event: time, place, duration, and a short description of what you aim to achieve during the PPGIS Practice event. After sending out invitations by e-mail or post, make sure to follow them up with phone calls, for more personal contact, making it more likely people will attend the PPGIS Practice event.

You can also consider sending the brochure explaining what PPGIS is and how it is used in Mare Nostrum together with your invitation, so that people will have a clearer idea of what the PPGIS Practice Event is about. We have included a template in English (we recommend that you have it translated into your local language).

➤ **Template:** *PPGIS brochure: Annex 2, Template D*

The event

We suggest setting up the space where the PPGIS Practice event will be held in a circle or roundtable format, which allows everyone to see each other, is conducive to discussions and instrumental in making everyone feel and be treated as equals.

We have included a template to help you create an agenda for the day to plan and outline the different components of the PPGIS Practice event. The following is a draft guideline of what the PPGIS event could look like, although it can be changed according to your needs.

➤ **Template:** *Agenda PPGIS Practice event: Annex 2, Template E*

The set up and shape of your event will depend on the issue you have chosen for your PPGIS Practice, the number of participants, and the type of mapping output you want to produce. To take two scenarios as an example:

- a) Creating a trail map: during the event participants will use (online) mapping software to create a map with points of interest and then draw desired walking trails.
- b) Creating an alert map: during the event participants are trained on how to use the alert map, which will be hosted online and maintained and moderated. The alert map will be

filled by participants, and other members of the public, over time from anywhere with an internet connection.

Many other types of mapping outputs are possible, and the shape the event will take depends on your choices and preferences.

Materials

Here is a list of some of the equipment & material that may be required for the PPGIS Practice Event. Select according to the type of mapping exercise:

- Laptops/computers
- Screen & projector
- Photo- & video-camera with tripods
- Digital tablets
- Large working tables, (or large space in meeting/working room)
- Topographic & thematic maps, satellite images, to be used as base maps (digital and/or hardcopy)
- Pin boards, (or wall space), pins, small sheets of paper with tape or sticky notes
- Blackboards or whiteboards, with dry-erase markers & pens
- Large sheets of craft paper or a flip chart
- Pencils of different colours, erasers, marker pens, and highlighter pens, masking tape, scissor, long rulers, measuring tape & compass

Documentation

Consider to document the PPGIS Practice event by taking notes of the discussions, and taking photo and video footage. Before you take photos and videos, explain to people what the footage will be used for and ask them for their consent.

We have drawn up a template for the filming of the events, containing a list of questions and some filming tips.

➤ **Template:** *PPGIS Practice event recording: Annex 2, Template F*

Follow-up

Discuss with the participants what will happen with the maps, with the data and information contained in them, and with the insights and knowledge that have been unearthed through the PPGIS Practice. Devise a plan how to bring the results of the PPGIS Practice to the attention of the policy-makers, other interested parties, and the wider public.

Agree on a way how to keep each other, the members of the PPGIS Community, informed of further developments, and discuss how to make the materials created (maps, GIS layers, but also minutes, photos and videos) available and accessible, as well as on how they can be used.

Annex 2 Templates

For the templates refer to the separate, attached documents:

Template A *Invitation Form PPGIS Community*

Template B *PPGIS Community Database*

Template C *Map & Data Availability Questionnaire*

Template D *PPGIS brochure*

Template E *Agenda PPGIS Practice event*

Template F *PPGIS Practice event recording*