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# Design Policy Options supported by Marine and Coastal Ecosystem Services Assessment and Valuation: a Case Study in Portugal

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## ABSTRACT

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Marine and Coastal Ecosystems provide services and benefits to human well-being whose value is inadequately incorporated into decision-making. Studies are being developed on Ecosystem Services but the challenge remains on how can Ecosystem Services better inform policy options. This paper presents the governance framework analysis and assessment in the study area of Peniche-Nazaré, in Portugal. This research is part of the project on Economic Valuation and Governance of Marine and Coastal Ecosystem Services funded by Gulbenkian Oceans Initiative. This project aims to assess the economic value of Ecosystem Services provided by the region of Peniche-Nazaré (coastal and marine zones). The research started with the analysis of the governance framework (policies, strategies, plans, programmes and institutions). In the study area, this framework supported the characterization of activities and processes, providing inputs on key Ecosystem Services, environmental drivers of change and threats. This analysis demonstrated that the last decade has seen an intensification of strategic documentation and regional funding programmes, due to the European funding context. The assessment highlights the priority axes of investment which are Tourism, Nature Conservation, Fisheries and Energy. This investigation will clarify the key Ecosystem Services that are relevant to specific policies, strategies and programmes, in the region. The final results of this project will inform policy makers, NGOs and businesses in improving planning and regulatory decisions at different policy levels.

**ADDITIONAL INDEX WORDS:** *Governance, Planning Process, Decision-making; Nazaré-Peniche*

## INTRODUCTION

The relation between Ecosystems Services (ES) and the human well-being is becoming more evident to policy makers. Several policies are assimilating the ES approach into planning process, making the concepts operational and linked to decision-making process (Dunbar *et al.*, 2013; Maes *et al.*, 2012; Ruckelshaus *et al.*, 2013). However, research points that integration of ES into day-to-day policy-making is far from being achieved. The 'integration of ES' into policies as defined in Helming *et al.* (2013) means the "consideration of ES at all stages and for all sectors of policy making. As stated in Kumar *et al.* (2013) at the beginning of the policy cycle is essential to clarify the key ES that are relevant to specific policies and framed as part of the problem concerned. In this process the threats to biodiversity caused by human-induced changes should be identified. Likewise trends and conditions of ES, their relationship with human-well-being and development goals needs to be assessed (Kumar *et al.*, 2013). In this context, the Convention on Biological Diversity (CBD) played a key role in bringing ES into policy agenda.

In 2010 the CBD adopted a strategic plan for biodiversity for the period 2011-2020 including 20 targets, known as the Aichi

Targets (UNEP, 2010). These targets complement the previous conservation-based biodiversity targets and add the ES (Target 11). Following this tendency, in 2011, European Union (EU) also published a set of 6 targets for 2020 (EU Biodiversity Strategy 2020) to "halt the loss of biodiversity and the degradation of ES and restoring them in so far as feasible while stepping up the EU contribution to averting global biodiversity loss" (European Commission, 2011). This strategy is in line with other cross-cutting EU policies in the marine field as the Water Framework Directive (Directive 2000/60/EC) and, more recently, the Marine Strategy Framework Directive (Directive 2008/56/EC) that aims to improve the ecological and environmental status of European member-states waters. Portugal, as part of European Union is adopting and implementing new environmental targets and changing its marine policy landscape, in line with Europe 2020 Strategy (COM(2010) 2020 final), the Integrated Maritime Policy (IMP) (COM(2007) 575 final) or the Fisheries Policies (Regulation n.º 1380/2013). There is also a new marine and maritime policy agenda that is now being the focus of attention driven by the new legal framework for Portuguese maritime spatial planning (Law n.º 17/2014, April 10) developed in the last three years and supported by the new Ocean Strategy (RCM n.º 12/2004, February 12).

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With a vision of protection, conservation and management of oceans and marine ecosystems, in 2013, Calouste Gulbenkian Foundation (FCG) created the Gulbenkian Ocean Initiative (GOI). This initiative aimed to increase public and political understanding of the role of oceans in human well-being commissioning the research project “The Economic Valuation and Governance of Marine and Coastal Ecosystem Services” (MCES Project) focused on the region of Peniche and Nazaré districts (coastal and marine zone). The main goal of this project is to assess the economic value of coastal and marine ES, and how these contribute to improve decision-making processes and raise marine environmental awareness. This paper shows the relevance of the governance framework analysis and assessment within this context; how this can be a valuable method for identifying the key ES relevant to specific policies and how these policies can be designed in order to better integrate the ES status and conditions, targets and threats.

### Study site

The study site is located in the west region of mainland Portugal, the study area is part of Oeste region (NUT III). (Figure 1). The characterization phase of MCES Project was focused on the bio-physical features, socio-economic dynamics and governance framework.

Around 360000 inhabitants live in this territorial area, circa of 2500 km<sup>2</sup> (FCG, 2015). In this study were considered five municipalities Alcobaça, Nazaré, Caldas da Rainha, Óbidos and Peniche. From the ecological point of view there is a wide representation of marine and coastal habitats: Berlengas archipelago, Óbidos coastal lagoon, São Martinho do Porto bay, supratidal and intertidal zones of sandy and rocky shores, dune fields, pelagic and benthic habitats from the coast line to the deep sea and the Nazaré canyon extending from near-shore to abyssal depths.

The importance of Berlengas as insular ecosystem, the biological value of the surrounding marine area, high botanical interest and the island's role in terms of marine birds were responsible factors for classifying the islands as a Natural Reserve (Decree-law n.º 264/81, September 3).

The variety of ES support several existing and potential activities and uses in the area such as fisheries, aquaculture and related transformation activities; shellfish collection, algae, sand and gravel extraction; shipbuilding industry, leisure and tourism activities, wave energy conversion, marine resources extraction, educational and research activities (FCG, 2015).

### METHODS

The methodological approach to the analysis and assessment of the governance framework was a four step process consisting of: collection; analysis, assessment and stakeholders meetings. First, was done a collection of information from policy and strategic documents and from administrative structures of territorial scope in the area from 2000 onwards (*i.e.* legislative and strategic planning documents, projects, R&D projects, public or private initiatives). Second, the analysis of the information was supported by a literature review of policies,

strategies, planning tools and projects. The level of the analysis was extended from local, regional, national and international level. The information was analyzed considering the relevance to MCES Project namely the hierarchy, degree of influence, sector of activity; associated institutions, competences and time frame. Third, information was assessed and combined in order to identify the main policy targets, key strategic activities and drivers of change and threats. Finally, two meetings with local stakeholders were held in Peniche in autumn 2014 to gather their perceptions on the information and to identify other documents of relevance.

### RESULTS

Table 1 presents the condensed analysis and assessment of the policies, strategies, planning tools and projects and their relevance to MCES Project. The priority axes of development and the key activities and processes were extracted from the strategic policy documents and projects (Figure 2). The most relevant targets at the study area are connected with Europe 2020 (employment, climate change, R&D, education and poverty); IMP; Renewable Energy, and Nature Conservation Targets.

Drivers are here defined as anthropogenic activities that may generate environmental effects. Main environmental drivers of change and threats, identified from the analysis of the governance framework are: industrial and urban pressure and its related impacts on water quality; touristic pressure, land use changes in the coast, coastal erosion, fisheries and shipping (Figure 3). Their spatial distribution is focused in the urban area around Peniche, Nazaré, southern beaches of Peniche and, during the summer, in the Berlengas archipelago.

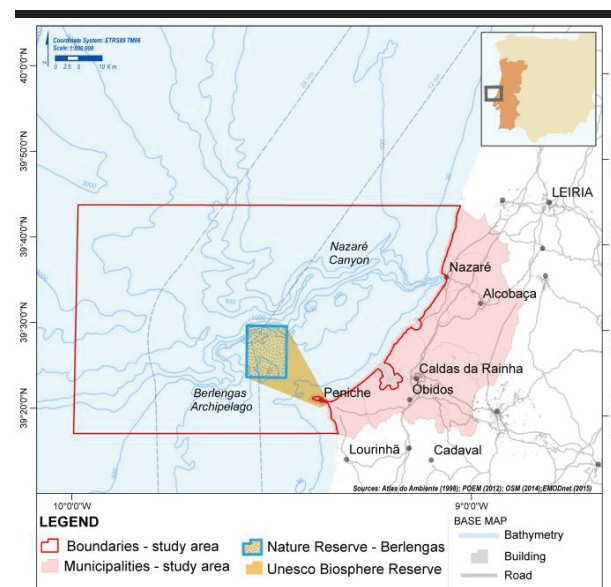


Figure 1. Location of study site area (adapted from FCG, 2015).

Table 1. Main policies, strategies, planning tools and projects and its relevance for MCES Project at national and regional level

# Design Policy Options supported by Marine and Coastal Ecosystem Services Assessment and Valuation

Date	Legislation	Relevance to MCES Project
<b>NATIONAL</b>		
2007	Spatial Plan for the Nature Reserve of Berlengas (POAP) 2007-2013. (Decree-law n° 264/81, September 3)	Implementation programme to safeguard flora and fauna, to manage marine resources and also to contribute to the spatial management of touristic activities in the island.
2007	Strategic Plan for Fisheries (PEN Pescas) 2007-2013 (RCM n° 79/2008, May 16)	Promoted competitiveness of fisheries sector in adequacy to available and exploitable resources, to ensure the sustainable development of coastal areas dependent on fisheries.
2008	Portuguese Maritime Spatial Planning (POEM) (approved by Ruling No. 32277/2008)	Provides a survey of activities and uses (existing and potential) in the Portuguese maritime continental space.
2009	Strategy for Integrated Coastal Zone Management (ENGIZC) (RCM n° 82/2009, September 8)	Establishes a long-term vision of 20 years incorporating a sustainable, well managed, competitive and safe coastal zone; reaffirms a new coastal zone paradigm.
2010	Strategy for Adaptation to Climate Change (ENAA) (RCM n° 24/2010, April 1)	Selects sectorial working groups for development of adaptation measures on territory and urban development; several measures are connected with preservation and protection and improving knowledge on marine and coastal ES
2012	Marine Strategy for the subdivision of the Continent (DQEM) (Decree-law n° 136/2013, October 7)	Establishes a framework to achieve or maintain the good environmental status in the marine environment by 2020. Next steps are the creation and implementation of regulatory measures.
2010/2013	Energy Strategy (ENE 2020) Action Plan for Renewable Energies 2020 (RCM n° 29/2010, April and RCM n° 20/2013, April 10)	Aims at ensuring 60% of produced electricity and 31% of energy consumption originate from renewable energy sources. Pilot area for waves and offshore wind energy production (off the coast of São Pedro de Moel). Estimated contribution of 6 MW for wave energy and for offshore wind energy of 27 MW installed capacity.
2013	National Ocean Strategy (ENM) 2013-2020 (RCM n° 12/2014, February 12)	Strategy and action plan; selects several activities of interest present in the study area and provides visions, objectives and guiding principles for future development.
2013	Strategic Plan for Tourism (PENT) 2013-2015 (RCM n° 24/2013, April 16).	Highlights urban and environmental sustainability, service quality and Portugal Brand. Identifies different type of products in Centre Region: nature, sun and sand, gastronomic/wine tourism and health and nautical tourism as emerging trends.
2014	Strategic Plan for Aquaculture 2014-2020	Aims to promote aquaculture as a balance and alignment factor of production with the consumption needs.
2014	Basis of the Policy for Marine Spatial Planning and Management (LBOGEM) of the National Maritime Space (Law 17/20014, April 10)	Legal framework for spatial planning and management of national maritime space.
<b>REGIONAL</b>		
2002	Coastal Zone Management Plan (POOC), stretch Alcobaca – Mafra (RCM n° 11/2002, January 17)	POOC is a binding plan constraints coastal use for safeguard of ecosystems. Identified risk and assigns coastal protection works to locations in danger, such as reinforcement of dunes, coastal protection, stabilization of cliffs or protection of scarps. The most pressing measures still not implemented were recently updated to PAPVL
2005	Óbidos Lagoon Candidacy to Regional Protected Landscape	Joint proposal candidacy to Protected Landscape of Óbidos Lagoon at regional scale developed by ICNF (governmental body), municipalities and ONGs in the region.
2006/2009	Peniche Municipal Strategy for the Sea 2006-2010 Magna Carta Peniche 2025	Peniche, a touristic city focusing on tourism and surf center developed a strategy focusing mainly on sea economy, renewable energies, tourism and urban planning.
2007	ECOS Project and Berlengas Laboratório de Sustentabilidade	Two regional projects both started in 2007 and already finished. Developed by public entities focusing on tourism, sustainable development and renewable energies.
2007	Grupos Acção Costeira Oeste	Programme supporting the development of fisherman communities.
2009	SURGE Project	Private consortium installed a grid-connected wave energy converter (Waveroller) in Peniche and now developing a wave farm of several units.
2009	Regional Spatial and Management Plan for West and Tagus River Region (PROT-LVT) (RCM n° 64-A/2009, August 26)	Identifies main trends for the region: territory strong development of the touristic sector; reinforcement of the local administrative and associative powers; strong pressures on land use.
2009	Rip Curl Pro Peniche	Touristic and sports events related with surf practice, one held in Peniche and other in Nazaré.
2010	North Canyon Project	
2011	Berlengas Biosphere Reserve Man and Biosphere Programme (Berlengas MAB UNESCO)	Plan of Action of the Biosphere Reserve.
2013	River Basin Management Plan (RBMP) of Ribeiras do Oeste and Vouga, Lis and Mondego (RCM n° 16-B/2013, D.R. n° 58)	Following the Water Framework Directive, includes ecological status as measure of quality of water bodies and establishes several measures for attaining this status, monitoring programmes.
2013	West Regional Strategy (OESTE 2020) Portugal	Regional strategy focus in tourism, fish and seafood industry, surf, shipbuilding and education.
2014	Operational programme and Strategy for the Centre Region 2014-2020 (CRER 2020). Research and Innovation Strategy (RI3 Centro)	Address the problems and challenges the region faces towards Europe 2020 Strategic goals. Main target areas are related with natural endogenous resources, aquaculture, fish, canned fish, salt, surf economy, renewable energy and tourism.



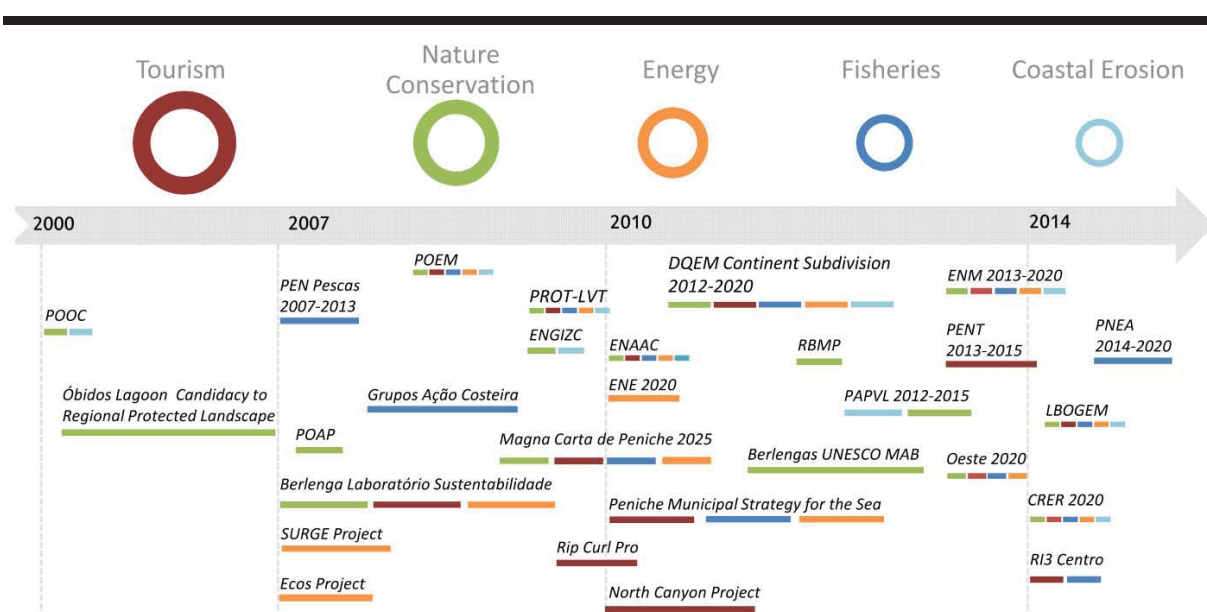


Figure 2. Priority axes and its relation with strategic policy documents and projects (the colors below the names correspond to the thematic sectors included and the size of the circles corresponds to the relevance of the themes).

## DISCUSSION

From the analysis of Figure 2 we note that most of the documents presented were produced in the last 7 years (between 2007 and 2014), indicating that a strong revision effort of strategies and policy orientations was carried out in that period.

Nature conservation appears more often in the older documents, before 2010, mostly associated with protection of landscapes and biodiversity values that were being threatened, as the Spatial Plan for Berlengas. Also in the Óbidos Lagoon, for example, a candidacy supported by the municipality was developed in a time of high urban development in the region, likewise to what occurred in the rest of the country.

The region has two important fishing ports and fisherman community, in Nazaré and Peniche. Fishing has an historical importance and its continually referenced in the governance framework. In the last years the European legislation favored the diversification of fisherman communities promoting the Fisheries Task Groups (Grupos de Ação Costeira) aiming to provide fishing communities with tools for generating capacities and create value at all stages of the supply chain.

Between 2007 and 2010 energy related legislation has been increasing. The transposition of the Energy Directive (2001/77/CE) was first published in 2003 and at the time the high targets for renewable energies in Portugal induced the creation of wave energy projects. Surge Project appeared in this context along with other initiatives in Portugal. As of 2010 the renewable energy targets and tariffs were reviewed and the impetus for creation of a wave energy cluster decreased. Nevertheless, Surge Project is active and received EU funding in 2014 for improving the technology and growing up in scale. The coastal erosion appearance is more evident after the publication of the National Strategy for Coastal Zone, in 2009

and also motivated by strong storms episodes that have gathered momentum, as the significant loss of territory. At the same time, tourism gathers more relevance at regional level showing up as main driver of change since projects as North Canyon in Nazaré and Rip Curl world tour in Peniche are occurring. Coastal erosion and tourism, both as threats and drivers of change are gaining relevance and prominence in the regional strategies and the interest demonstrated by touristic projects is arising.

In the last 10 years, the production of legislative acts in the coastal and maritime area has been intense. The creation of a legal framework for maritime spatial planning and management was driven by the increasing interest in the exploration of marine resources (within and beyond the continental shelf) and by the publication of the Integrated Maritime Policy and Blue Growth Agenda. This agenda aims to improve maritime sectors, as “an initiative to harness the untapped potential of Europe’s oceans, seas and coasts for jobs and growth” (European Commission, 2012). This perspective was also embedded in the National Ocean Strategy and reflected in the new legal framework for maritime spatial planning and management. These laws tend to relate more closely to maritime sectors of development, looking for a sustainable use of resources, and considering nature conservation as another sector to have into account.

Legislative documentation has been showing a multi-sectorial character, favoring the development of different activities strongly motivated by tourism. The European framework and funding schemes have widely contributed to this fact. The regional strategies favor the demand of the European funds in their texts and show an impressive fast embedment of the European 2020 targets and agenda.

The strategic policy documents and projects with relevance in the study area show that the main axes of development in the region are concerned with Tourism, Nature Conservation, Energy, Fisheries and Coastal Erosion. This is closely in line with the outputs extracted from MCES Project – Study site characterization that supported for further economic valuation the following activities and processes: fisheries, tourism, scientific and educational services.

Main drivers and threats presented in Figure 3 are more prominent in Peniche, as this is the major human settlement in the coastal area, a widely renowned spot for surfing practice and a departing point for Berlengas archipelago. Environmental threats are mostly related with water quality status and coastal erosion as spotted by the Berlengas Nature Reserve Plan and the Coastal Zone Management Plan.

The analysis of the main drivers of change and threats extracted from the policy analysis provides relevant information on the most pressing issues that the region is facing. This information allows the identification of the most vulnerable ecosystem and the ES which are more prone to be impacted by anthropogenic activities.

### CONCLUSIONS

The study of the governance framework analysis is a valuable method for informing and improving the design of policies supporting ES. From the analysis of the policy documents were extracted the key activities and processes in the study area, which are nature conservation tourism, fisheries, energy and coastal erosion. The mapping of the threats and drivers

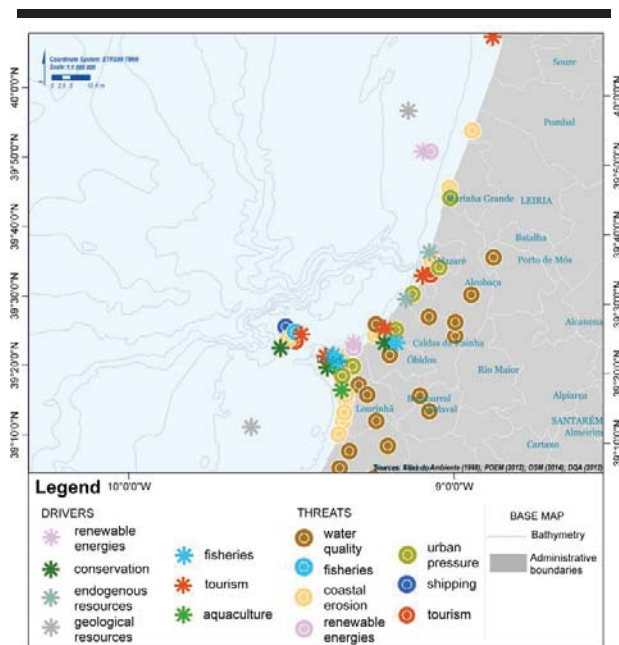


Figure 3. Main drivers of change and threats recognized in the study area and its surroundings.

contributes to the assessment of the most vulnerable ecosystems

and ES in the study area. EU targets and funding are relevant drivers for the creation of new policies. This study shows that to have an effective ES integration into policies it is necessary to translate and combine the environmental concerns with the relevant axes of development and the main drivers of change into planning policies, at the different scales of action and since the beginning.

### ACKNOWLEDGMENTS

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