

The Assessment of the Coastal Zone Development at a Regional Level – the Case study of Portugal Central Area

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ABSTRACT

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The Portuguese mainland coast is entirely covered by Coastal Zone Management Plans (CZMP). Those plans show that there are great opportunities and strategic values at the Portuguese Coast from the socio-economic and environmental point of view. Therefore, the coast is also under a huge pressure, as result of a fast growing development intensified since the mid 50's of the 20th century.

This situation can be exemplified at the Central Portugal Coastal Zone, classified as a highly vulnerable area to coastal erosion, with a strong demographic pressure and human activities associated. This trend does not show any marks of slowing down, increasing the level of vulnerability for coastal population and settlements. As also the risk, reinforced by sea level rise due to climate change. The methodology used for the assessment of this development was based on a large set of thematic indicators: environment, socioeconomic and governance. The results identify problematic areas and the priority actions to be taken by the central administration towards the application of Sustainable Development principles.

This paper also points out the importance of the establishment of a National Coastal Observatory, for assessing and monitoring the development of the Portuguese Coastal Zone at a regional level. In addition is also enhanced the importance of these regional structures to the national Decision Support System (DSS).

ADDITIONAL INDEX WORDS: *decision support system, regional observatory, SDA Model*

INTRODUCTION

“The Changing Face of Europe’s Coastal Areas” published by the European Environment Agency (EEA 2006) draws the attention to the fast increase of coastal space use, stimulated mainly by the tourist and leisure industries, and a threat to the delicate balance of coastal ecosystems. According to this report, the population’s density on coastal zones is, on average 10 % higher than inland, reaching 50% in some countries. Even more worrying is the rate of change of natural coastal areas into artificial ones, being faster than the increase of population density.

In many European coastal zones, like the Portuguese, the percentage of artificial areas on the coast is more than 45% of the total area. Between 1990 and 2000, the artificial areas in coastal zones had increased in almost all the European countries. The highest increment took place in Portugal (34%), followed by Ireland (27%) and Spain (18%). As a result, many coastal zones suffer a so-called “coastal compression”, an expression that relates the dissemination of constructed areas and infrastructures over areas more and closer to the shoreline. This feature does not comply with the sustainable development principles present in the European Commission Recommendation (413/2002/CE).

STUDY AREA

Integrated at the central region of Portuguese mainland, the study area includes a coastal line of 140 km and eleven coastal councils: Ovar, Murtosa, Aveiro, Ílhavo, Vagos, Mira, Cantanhede, Figueira da Foz, Pombal, Leiria e Marinha Grande (Figure 1).

According to the Law Decree n° 309/93, that regulates the CZMP elaboration in Portugal, the intervention area of the plan, covers a terrestrial protection zone with the width of 500 metres, from the edge of the sea water, and a maritime protection band which extends to a depth of 30m (Figure 2). Exceptions are the areas under harbours jurisdiction, in this particular case, Aveiro and Figueira da Foz harbours.

The CZMP includes areas of maritime public domain and private domain, as shown in figure 2. The guidelines of the Plan should benefit the public use of the areas of public domain, strengthening the ‘public nature’ of these areas, looking for the articulation between the private and local interests with the essential demands for conservation and protection of the coast, in an integrated and global perspective (INAG 2006).

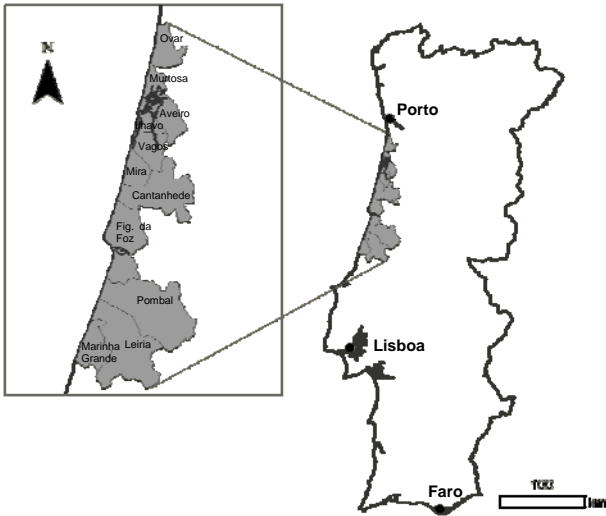


Figure 1. Location of the Study Area

METHODS

The diversity of subjects at a regional and local scale on the Portuguese coast is the result of the wide range of biophysical, human and economical differences. This should be stressed in future evaluations and present in indicators choice for monitoring and assessment process. This diversity also supports the design of a system of Regional Units of Observation (RUO), being part of a Sustainable Development Assessment Model (SDA Model). The SDA Model is based in the conceptual Pressure/ State/ Response approach indicated by the Organisation for Economic Co-operation and Development (OCDE). For the purpose of this paper it will be applied to the Portuguese coast, although it can be adapted to local and regional conditions in different countries. The

existing characterization and assessment data of the CZMP OVAR-MARINHA GRANDE (CZMP OMG) is the starting basis. Therefore, the selection of information to be analysed in the scope of the application of the Assessment Model, is already focused on coastal management integration.

Comparing the indicators in the CZMP OMG with the ones presented in the Reference Guide provided by UNESCO (UNESCO 2003) it's possible to say that, there is a similarity between the nomenclatures used in both documents, this can be seen at Table 1; which tries to match the domains and indicators of the orientations contained in the UNESCO document and the ones contained in the CZMP OMG. Those resulted in the analysis presented at Table 2.

However, it wasn't possible to carry out a similar comparative analysis for the governance indicators. These are established to: measure the mitigation factors of the natural and human pressure to the improvement of the living conditions of populations; evaluate the policies performance. It is clear that this evaluation of performance is only possible after the implementation process starts. A Plan of Action must prepare and approved, and after a certain period of implementation is possible to evaluate its performance.

This analyse is usually made at national level, but it is important to look at the regional level of the CZMP. Only at this level is possible to evaluate in which way these plans reflect specific conditions like the institutional and financial ability (so needed to the success of the implementation expected in this kind of territorial management instrument).

The data for this analyse is presented in the final intervention proposals of CZMP, comprehensively detailed in the Execution and Financing Programmes. In the case of the CZMP OMG, the documents of the planning proposal are included in the Intervention Projects and the Execution and Financial budget (INAG/HP 1999).

The documents analyzed in this study, relate to the CZMP OMG, concerns all the documents produced through the several stages of its elaboration, where can be found a significant number of indicators characterized and analyzed as regards to its evolution.

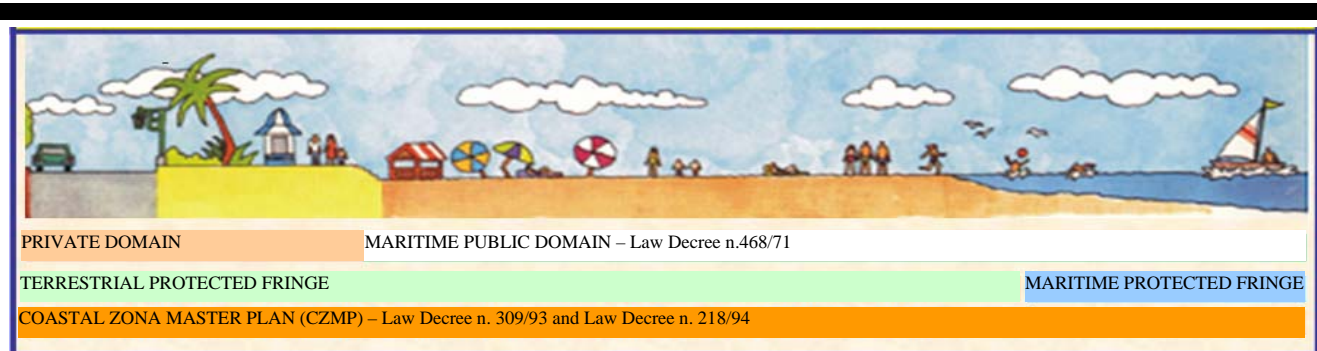


Figure 2. Boundaries of the Coastal Zone Management Plan

Table 1: Comparison between indicators of UNESCO and CZMP OMG (ALVES, 2006)

Domain	UNESCO	CZMP OMG
Environmental	Coastline Characteristics	Climate
	Coastline Characteristics	Geomorphology
	Coastline Characteristics	Natural Resources
	Water Quality	Hydric Resources
	Coastline Characteristics	Land Use and Spatial Planning Tools
	Biodiversity	Terrestrial Biota
	Biodiversity	Maritime Fauna and Flora
	Coastline	Coastal Dynamic
Socio-economic	Shipping Traffic	Harbour Activities
	Coastal Population	Population
	Coastal Population	Urban Network and Settlements
	Coastal Community Development	Transport and others infra-structures
	Other Economic Opportunities	Agriculture
	Fisheries	Fisheries
	Other Economic Opportunities	Aquaculture
	Other Economic Opportunities	Salt-works
Tourism	Tourism	
Public Access	Beach	

Attending to the approach of DGA (2000), sustainable development, *indicators*, should be assumed as guide for management of projects and specific programmes, evaluation of strategies, definition of sustainable paths by economies and national and regional ecological systems. It is also important to mention, that the concept of Indicator of Sustainable Development for the coastal zone, has been identified, using as main criteria: the management value in the understanding of the several target groups (population, experts, decision makers and other stakeholders) and the application ability to other geographical areas and execution levels (local and national). This was the conceptual support chosen for develop in the case study of the CZMP OMG.

While an assessment model is undergoing, this tool should be used in the planning cycle until its final implementation, and for characterization of the state and systems conditions. The main purpose of model use is to contribute for the monitoring and evaluation methodology of development of the coastal zone. The indicators selection criteria should also be present; as also the definition of limits and goals to reach; for example: percentage of population with water supply, goal: 100% of the population.

The 5 domains of the SDA Model are:

- Regional Units of Observation (RUO) with the same level of importance as the indicators; since its prominent role is to assume the running of the model itself. Therefore the SDA Model should be understood as a way of permanent maintained update, related to the coastal zone area its influence.

- Monitoring: represents the understanding of the constant process of analysis; the behaviour of the systems; and the different parameters. That should allow the introduction of correction measures, if there is a deviation on the path to reach the proposed goals.

- Management: represents not a simple technical process of data analysis. It also represents the handling of the whole process of

collection, handling and the accessibility of data, crucial for the national RUO network.

- Financing: presumes the existence of a group of financial recourses, guiding for the safe and successful running of the model. Therefore, referring to the necessary acquisition of information for the analysis and handling of data (statistical, digital cartography, information actions accompaniment, meetings, etc.).

- Implementation: should not only be seen as a way of analyze and evaluate strategies, policies, plans and programmes with influence in the area of observation, but also in the scope of the implementation of the own model.

Not indifferent to this assessment exercise is the attempt of integration for some of the principles of the Strategic Environmental Assessment Directive (SEA), which wasn't compulsory at the time that CZMP were carried out.

It's important to evaluate the monitoring of its outcome more so than the reach of the plan (10 years, according to the law), which in some cases are approaching its *terminus*, requiring its revision.

It is fundamental that the monitoring and assessment process of the plan starts as a valid tool of support to the decision-making. The continuous problems (several times referred in the vast scientific and technical literature) in the availability of data are a strong argument to the creation of the Regional Observatories. These Units should be based on regional research institutions, (as those found in Portuguese Universities), in order to have a closer monitoring and assessment of the development conditions of the coastal zone. Also the current international trends of the Regional and National Observatories were considered in the definition and creation of the SDA model.

The resemblance of what happens in other countries, the creation of observatories of the coastal zones, at a regional level, can give a solid base to a future National Strategy of Integrated Coastal Zone Management proposal.

Also important is the comprehension of the availability of the information obtained and treated in the RUO. As it has already been mentioned, the level of information will be less complex while we go up in the information pyramid (DGA 2000; UNEP 2002; BOTELHO 2004; ALVES 2006). This means that for researchers and academic audiences the data will be provide without handling, depending on its purpose. However, if the target audience is identified as being part of the general population, the information should be aggregated, less complex and, eventually, delivered as an *index*.

The coastal zone of the Portuguese Central Region, between the municipalities of Ovar and Marinha Grande, was chosen as a case study for application of this methodology. The reason for this choice is the fact that it is considered, in several studies, as one of the areas where the natural and human pressure is to be seen with greater sharpness in a closer future. The fact that there is a planning tool for this area, approved and in the implementation phase, was another circumstance that was considered for this decision. Another important issue is related to the fact that this is the area by excellence of the studies carried out by the University of Aveiro, therefore with a great know-how about Integrated Coastal Zone Management issues in this area, which is extremely important for the SDA Model application.

The application of the Assessment Model to coastal zone is developed with the existing data in the CZMP OMG, in particular the data produced during the preparation and definition stages of the specific developing planning model for this territory.

RESULTS AND DISCUSSION

When choosing the selected indicators, its availability was taken in consideration, between the amounts of the studies made when the Plan was being elaborated. Its analysis lead to the planning model proposed for the region and the data represent a reference board in the evaluation of the Central Region coastal zone development.

It was tried to show the diversity among the existing indicators in the Plan. Probably the same will happen to the rest of the all CZMP. Therefore these studies were and will continue to be in the future considered as an analysis of the characteristics of the Portuguese coastal zone and a starting point for an evaluation of its development.

The available information resumed on the characterization CZMP studies, allows its use as reference data that can be easily integrated and used in an effective assessment process, to check its evolution or any kind of modification produced from the proposals execution.

The CZMP OMG presents 65 indicators distributed basically by the environment and socioeconomic domains and others 9 about the management of the Plan. Of this framework, 20 were selected, grouped on the following domains: 5 environmental; 12 socioeconomic and 3 of governance. Table 2 shows the assessment exercise carried out aiming to check its evolution and behaviour (adapted from ALVES 2006). This way a continuous monitoring process can be more easily achieved. Therefore it is important to clarify that in order to put everything in an operational context the different tasks and competences must be clarified. The scientific institutions should design and structure the

Table 2: Behavior of the Indicators at the Coastal Zone Management Plan Ovar - Marinha Grande

Domains	Indicator	Type:	Behavior:	
Environmental	Bathing Water Quality	S	☺	
	Blue Flag	S	☹	
	Coastal Dynamics	P	☹	
	Land Use	P	☺	
	Nature Conservation	R	☺	
Socio-economic	Population Living at the Coastal Area	P	☹	
	Public Participation, in Consultancy Process	R	☺	
	Constructions at Risk Areas	P	☹	
	Use of the Maritime Public Domain	P	☹	
	Urban and expected Urbanizing Areas	P	☹	
	Roads infrastructures	P	☺ ☹	
	Fisherman's licensed and boats typology	S	☹	
	Fisherman's licensed by ports	S	☹	
	Agriculture	P	☹	
	Beach area available per user	S	☺	
	Beach Access	S	☺	
	Parking Zones	S	☺	
	Governance	Local Administration Investments in Environmental Issues	R	☺
Central Administration Investments, in the Area of Plan		R	☺	
Investments Predicted in Areas of Maritime Public Domain		R	☺	
S: State	R: Response	P: Pressure	Increase	Decrease

process, based on goals established by decision makers, limited by the data provided to establish the reference situation. This is a general view of the model and process implementation. As we have seen on the case study a more detailed approach can be done, but the remaining issue is that it can be applied at different scales and institutional arrangements.

CONCLUSION

The creation of a Sustainable Development Assessment Model for the Coastal Zone (SDA Model) was intended to contribute for the management of the coastal zone, showing that the diversity of the existing information can be worked out together. The selected indicators are based in the study framework, produced during the elaboration of the Plan, its analysis lead to the proposed planning model, in that same Plan, thus allowing:

- To verify the existence of a data framework that, in a conjugation and integration of factors, can be used in an effective assessment process of its evolution. It can also result in an eventual change produced due to the implementation of the Plan.
- To show that diversity should reflect, on one hand, the scale of analysis, and on the other, the goal of the evaluation. In this case study, the main goal of the indicators utilization was to evaluate the efficiency of the different the tools contained on the Coastal Zone Management Plans.
- To apply a methodology based in the PSR model developed by the OCDE and in the studies also applied of the European Topic Center.
- To reassure that the model is simple and reveals a consensus acceptance and basis proposals to the evaluation of the sustainable development. The SDA Model introduces an innovative variable highlighting the creation importance of the Regional Observation Units of Monitoring and Assessment.

As mentioned previously, the creation of a national observatory, that is already happening in others countries, should be based on structures of regional observation and research, and be assumed as a critical issue of the Portuguese National Strategy of Integrated Coastal Zone Management, currently in preparation. It is also suggested the connection to the Research & Development excellence centres, based on the ability that the universities and, research units have in design more real, accurate and operational monitoring processes. This is supported by the close knowledge of the area of the spatial planning and Coastal Zones Management that Universities and Research Units have in Portugal. Otherwise, with the interdisciplinary nature and the policies integration, specific features will be diluted in the concept of management.

This study is concluded with a strong recommendation for the creation of the Regional Units of Observation (RUO) of monitoring and assessment, where the methodology developed in SDA Model can be implemented. However, this proposal doesn't settle in the principle that this is the way for managing the coastal territory, its problems and potentials by itself, but can play a fundamental role helping it.

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