

**CONSTRUCTION OF A METHODOLOGY TO EVALUATE ECONOMIC
AND ENVIRONMENTAL EFFECTS OF MARITIME ACTIVITIES AND USES. A LOCAL
CASE STUDY.**

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Abstract

This paper presents an original methodology developed to facilitate the apprehension of maritime topics into regional planning documents, by analyzing economic and environmental effects of maritime activities and uses. This work is a part of the SYSCOLAG program which is a pilot operation at national level for experimenting with a knowledge-pooling system applied to the field of integrated coastal area management (ICAM). SYSCOLAG aims to constitute an interface between 'knowledge' and the 'users of knowledge' on questions related to the conservation and the development of the coastal zone of the Languedoc-Roussillon. With this aim, a pilot model have been developed to propose a methodology to evaluate economic and environmental effects of maritime activity and uses in a territorial planning document. The application of this pilot model to the Thau case study have been realised on the basis of working groups of experts (scientists, local authorities and endusers) and also by the organisation of public meetings at the initiative of the local authority (Syndicat Mixte du Bassin de Thau) as part of the consultation process of this management plan. In this pilot model, which is the furthest advanced in the current state of progress of the programme, this phase made it possible to identify the stakes and the priorities for the sustainable development of the territory concerned (Thau lagoon) as well as the available resources (e.g. informations), which constitute the basis for the development of suitable information synopses. Here, the methodology developed, aims at completing the commonly used and mainly terrestrial economic valuation, and environmental impact analyses. Moreover, it will be highlighted that, even if this tool is specific to maritime activities and uses, this work allows to go hand in hand with any project of Integrated Coastal Zone Management.

Keywords

Sustainable Development, Integrated Coastal Zone Management, Indicators, Thau Lagoon.

INTRODUCTION

In France, since the new law of 2000 about Solidarity and Urban Renewal, coherent territories in terms of environmental, social and economic purposes, have been incited to envisage their own development in the long term. For that purpose, a territorial planning document based on the consultation between different stakeholders (scientists, decision makers and local population) and called *Schéma de Cohérence Territoriale* (SCOT), has been proposed to the different management structures of those territories. A SCOT allows to set planning and development objectives, to set a global project to a particular territory, to face its different needs concerning landscape planning, habitat, economic development, traveling, and environmental protection. It is an efficient juridical tool because it stands out in front of all the other planning documents inferior to it. The SCOTs working out happens in four steps accompanied with numerous studies and reports 1) a progressive diagnosis, 2) an initial reference state of the environment, 3) a sustainable planning and development project and 4) an ultimate document presenting the general trends of action.

Since 2005, the SCOTs are able to incorporate a specific paragraph dealing with planning, protection and bring out of marine and coastal topics, as soon as their territory owns a coastline. This allows them to analyze interdependences between terrestrial landscapes and the sea, and facilitates the consideration of maritime topics at every level of inferior planning documents. Nevertheless, a rapid overview of the French coastal planning documents highlights that the majority of them considers less maritime purposes than other terrestrial ones.

This situation is particularly striking in the coastal zone because the vulnerability of this area to human pressure is further exacerbated by the sharp rate of demographic expansion recorded at the global scale over the past decades (UICN 2004), which is particularly marked in the Mediterranean area (Benoît & Comeau 2005). Because the population of the coastal zone is expected to double in the next 20-to-30 years (FAO 1998), it is likely that human pressure will continue to increase. The resulting increase in and diversification of uses have given rise to numerous conflicts to which the existing sector-based management systems have not been able to find effective solutions.

Coastal zone managers do not dispose of a proper operational framework which might enable them to reconcile two frequently conflicting facets of the management process: economic development and the conservation of these interface environments. This antagonism is all the more apparent in that the economic value of ecosystems and of biodiversity are rarely integrated in the decision making process because they are difficult to assess (Costanza *et al.* 1997, Loreau *et al.* 2006). In addition, the multiplicity of decision making levels and of territorial management scales, seriously complicates the sharing of

information between the various stakeholders in the coastal zone. In this context, the need for effective communication between the different stakeholders for successful implementation of coastal zone management plans and policies is paramount (Mazouni & Rey-Valette 2002, Rolland 2005). This is exemplified by the diverse field of disciplines of scientists and policy makers involved in coastal management (Woodward 2000).

In this context, our study has been carried out to develop a methodological tool aiming at facilitating the integration of maritime approaches into terrestrial planning documents. The tool proposed here, is composed of three complementary parts based on maritime activities and uses. The first part concerns a methodology of socio-economics effects valuation, the second one, a methodology of environmental effects valuation, and the third one, a grid allowing to measure the interactions between activities and uses. All those methodologies have been constructed in a way to introduce a hierarchy between all those effects and in a way to replace environmental and socio-economic effects at the same level. Finally, the ultimate goal of this tool is to facilitate the construction or the identification of indicators of sustainable development, and firstly for major effects or interactions.

CONTEXT

This study orchestrated by the Cépralmar is a part of the multidisciplinary research programme SYSCOLAG (Mazouni et al, 2006). Set up jointly by the Regional Council of the Languedoc-Roussillon and Ifremer, it is based on a close partnership between four universities in the region (located in Montpellier and Perpignan) and research organisations involved in research on the coastal zone (BRGM¹, CEMAGREF², CNRS³ and IRD⁴). The main objective of this programme concern the integration of scientific expertises on questions related to the development of the coastal zone.

The SYSCOLAG programme is a pilot operation in France for experimenting with a knowledge-pooling system applied to the field of integrated coastal area management (ICAM). SYSCOLAG aims to constitute an interface between 'knowledge' and the 'users of knowledge' on questions related to the conservation and the development of the coastal zone of the Languedoc-Roussillon. To that end, SYSCOLAG offers a both transdisciplinary

¹ French research institute dedicated to geology

² French institute dedicated to agricultural and environmental engineering research

³ French national center for the scientific research

⁴ French public science and technology research institute contributing to sustainable development of the countries of the South, with an emphasis on the relationship between man and the environment

approach associating life sciences, earth sciences, social and informatic sciences and multi-stakeholders approach (associating scientists, decision-makers, professional users of the sea, environmental protection associations, and the general public) to integrated management of the coastal zone of the Languedoc-Roussillon. The system developed in this programme is based on know-how (particularly in integrated expertise and information systems) and an array of innovative information processing tools dedicated to a public of experts and for the general public. To date, SYSCOLAG has provided a basis for federating the multidisciplinary teams from various organisations concerned by issues related to this coastal zone. In addition, it has contributed to the improvement of communication between the scientific community and other coastal zone stakeholders, and in particular, with the local management organisations.

Therefore, the main objective of this program has been to allow the construction of tools proposing adapted information to local actors demand. To achieve this aim, and to demonstrate the beneficence derived from consultation and sharing of knowledge, three pilot models have been set up by the program SYSCOLAG about various topics (development of a harbour project, management of underground water resources and a guideline for the diagnosis of maritime topics in a planning document (SCOT)).

In the present paper, we only detail the work realised for the third pilot model. It concerned not only the inventory of knowledge and its release in an accessible format, but also the organisation of these informations to set up a methodology for management structures. To reach that goal, a close partnership has been established with the local agency (Syndicat Mixte du Bassin de Thau), as part of the marine sub-project of their management plan for the Thau territory.

The tool developed, principally aims at helping to build an intermediary work document and a protocol facilitating the apprehension of maritime topics before the different diagnoses; it does not aim at elaborating a final document as these diagnoses could be. In fact, this tool is the result of structuring maritime topics and of an important reflexion that only allow an evaluation of effects of maritime activities and uses on environment and economy, and an analyse of their interactions. The tool aims at elaborating a hierarchy between these effects and interactions to enable to identify points on which diagnoses must be based on. Moreover, carrying out at the same level evaluations of effects on environment and economy, it allows to have a global vision and to weigh simultaneously these effects, and to

imagine the comparison between a situation of environmental protection, and an opposed one reaching an unconditional economic development.

First, it has made it possible to mobilise the various partners in order to work out a common conceptual framework of discussion on the question of the maritime economy and its components. The next phase involved identifying and indexing the available resources. Finally, as a backup to the discussions held in the public consultation workshops, the available knowledge provided a basis for the development of indicators for the monitoring of the environmental and economic impact of actions identified as essential for the maritime sector. It is also important to point out that in parallel with this SYSCOLAG pilot model, the tools developed here are currently used for the indexing of studies and projects on the Thau basin, related to the questions of the water quality and of the inputs. More generally, these SYSCOLAG tools are used for indexing all the resources gathered within the Thau lagoon Observatory.

This tool aimed to be considered as a tool of discussion and sharing and used into a working-group composed by a representative selection of actors of the coastal territory, and will be useful to initiate discussion about several common-places. The approach must be participative and the study must be justified by a real wish of the local population. Among the different advantages of this tool, consultation must not be neglected because it guarantees the success of the final planning document application.

THEORETICAL FRAMEWORK AND STRUCTURATION OF THE TOOL

Maritime economy concept

The strategy carried out through this methodology, has been to propose a clear and structured definition of maritime and coastal resources to all the management structures; only activities and uses depending on those resources have been considered and therefore, the approach of maritime economy can be facilitated. Then, analyses of economic and environmental impacts of maritime activities and uses allow to complete the commonly used and mainly terrestrial economic valuation and environmental impact analyses.

1 Geographic localisation

Located at the interface between terrestrial and maritime domains, coastal zone is characterised by a the interdependence of these two different components. Therefore, a common framework to define a maritime territory has been proposed (Couix & Le Roy, 1994) and is composed by :

- Local administrative districts owning a coastline or a direct contact with a lagoon, an estuary, a delta, etc.
- Others local administrative districts close to a maritime domain and participating to the economic and environmental equilibrium of the territory,
- Immersed territory of each of these local administrative districts.

On this third point, it appears less clear to set up boundaries for the coastal zone. Our approach proposes to consider the entire surface legislatively allowed for an administrative district that is to say until 12 nautical miles (Figure 1). As this methodological tool deals with strict maritime topics, only immersed maritime domain (until 12 nautical miles, boundary of the DPM⁵) will be considered. Nevertheless, as the DPM concerns only the ground and the underground of the sea, notions of surface and water column must be added to finalize the definition of the maritime domain (Figure 2).

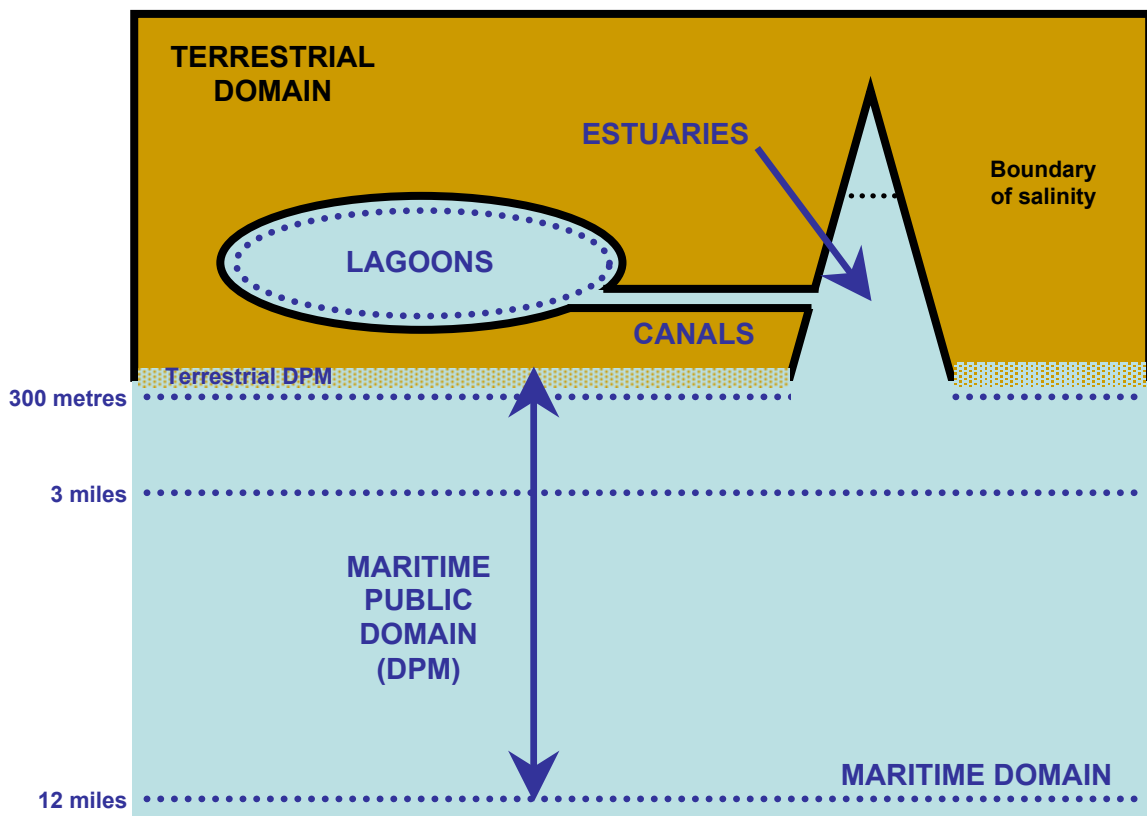


Figure 1: Schematic presentation of the maritime and terrestrial boundaries of a maritime territory.

⁵ DPM : Maritime Public Domain.

The natural DPM is composed by the ground and the underground of the sea, of lagoons, canals, deltas and estuaries, until the beaches on the coastline. The artificial DPM is composed by ports, infrastructures of production or for maritime security.

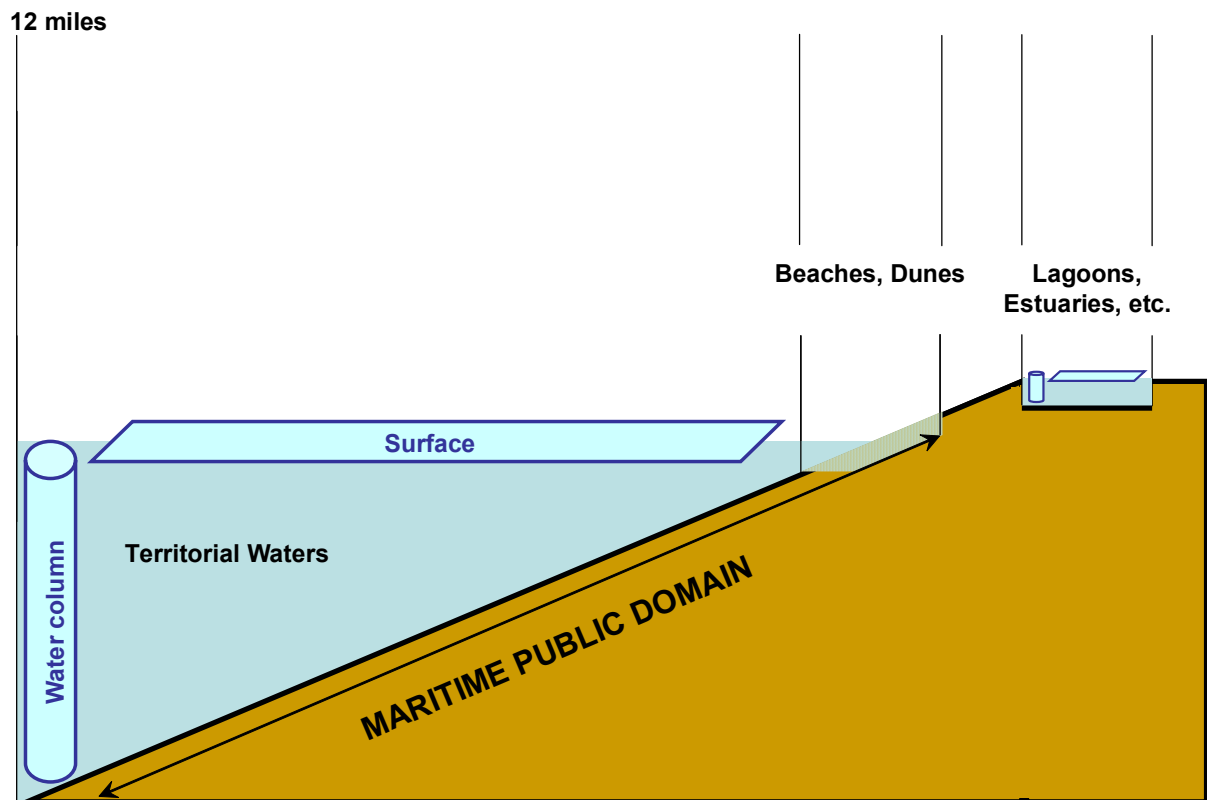


Figure 2: Definition of the considered maritime domain.

2. Definition of resources, maritime activities and uses

Thanks to this definition of the maritime domain, it is easy to identify which resource is maritime and which is not. Therefore, different types of resources have been identified from living maritime resources (species, ecosystems, etc.) to Maritime and coastal travel or Maritime defence and security etc...)

Valuation method proposed

1. Principles of the employed valuation methodology

After having defined the territory of a case study, its maritime resources and thus, its maritime activities and uses, the tool allows a qualitative valuation of the effects of these activities and uses to introduce a hierarchy and identify the major effects on which diagnoses must be based.

In that way, valuations of these effects show if they are positive or negative, and then, measure their importance. The importance of each effect is evaluated by different criteria for which each qualitative option is linked to a notation system from 1 to 3; then, the average among all these criteria correspond to a colour codification, which is the final result obtained for an effect. Criteria of valuation are generic in order to be adapted to the majority of cases.

Nevertheless, to equalize the system of notation for each effect, it is needed that valuations are measured by a unique and same working group owning multidisciplinary knowledge. Moreover, discussions between partners during the working group allow the constitution of a common reference frame, and a collective learning favourable to integrated management.

2. Effects and interactions valuation methodologies

Valuation of environmental effects caused by maritime activities and uses:

For the environmental valuation, effects of maritime activities and uses on both maritime and terrestrial domains will be considered. The qualitative valuation aims at identifying activities and uses causing observed effects, components of the environment subject to these effects, and the nature and the importance of these effects. Finally, these effects are classified and only the dominant would remain (table 1). Here we have considered different criteria to characterise the environmental effect, from the spatial impact to the duration, the intensity and the frequency of occurrence. Furthermore, we consider that the non reversibility of an effect of an activity on a resource is important.

Table 1 presentation of the criteria used for the valuation of the environmental effect of activities.

Criteria for valuation of the environmental effect

value attributed		1	2	3
spatial impact	A	local	global	out of border of the territory
duration of the effect	B	short term	middle term	long term
intensity,	C	low	medium	strong
frequency, occurrence	D	rare	ocasionnaly	frequent
when the effect is non reversible	M	<input type="checkbox"/>	add enough points to go to the next superior class	

Valuation of socio-economic effects caused by maritime activities and uses:

For the socio-economic valuation, the qualitative valuation consists in measuring the effects of only maritime activity and uses on the economy, the socio-economy, the employment and the territorial heritage (Table 2). Finally, these effects are classified and only the dominant would remain. In this first approach, all the criteria are considered with the same weight.

Table 2 - Presentation of the criteria used for the valuation of the economical effect of activities

criteria for valuation					notes
		1	2	3	
A	richness	low	average	high	direct contribution to the richness of the territory
B	contribution to the local budget of the administrations	low	average	high	taxation, related to the size of the firms
C	dynamism of the activity on the territory	low	average	high	opening and diversification of the market, innovation
A	contribution à une répartition homogène des activités	low	average	high	geographic implantation on the territory
B	professional structuration	low	average	high	professionnal structuring
C	links with training and research	low	average	high	constraints/advantages for constituting competitive pole
A	contribution to the local employment	low	average	high	direct employment
B	level of qualification	low	average	high	direct employment
C	seasonality of the employment	low	average	high	direct employment
A	contribution to the local patrimony	low	average	high	identity, representation of the activity on the territory
B	valorisation local resources	low	average	high	valorisation of the resources, link with primary sectors
C	contribution to the attractivity and renown	low	average	high	attractivity and renown

Valuation of interactions between maritime activities and uses:

The valuation of interactions between maritime activities and uses is also qualitative. It analyses interactions that could be positive or negative, using results of the two precedent valuation methodologies completed by supplementary considerations:

- Identification of the commercial linkage existing between maritime merchant activities; identification of synergies and antagonisms,

- Identification of indirect effects of an activity to another one (negative effect upon a resource employed by another maritime activity, for instance).

3. Identification of sustainable development indicators

Build a terrestrial diagnosis is the occasion to set up sustainable development indicators in a favourable context allowing their effective appropriation by highlighting important points needing to be gone further into. It has been showed that indicators and their construction processes are useful in many ways; of course, they allow to measure but also they produce an inventory and a hierarchy of priorities, and allow communication to be set up between local actors.

An indicator is not a simple measure of a parameter but an answer to a social preoccupation relative to an identified problem. Indicators are in fine destined to local actors, who have their own vision of the territory; thus, problems interpretation and indicators construction aim at obtaining a consensus around these visions (Turpin, 1993). Indicators, and their construction processes, can therefore be considered as useful tools helping to consultation and to convergence of territory representations (Rey-Valette et al. 2006).

Finally, the proposed tool allows to facilitate a valuation, a classification and then, a hierarchy of effects and priorities, adapted to integrated coastal zone management. Moreover, its functions are opened to modifications and ameliorations in order to allow it to be more adaptable to each territory, and to assure its efficiency. It must be highlight that one of the main advantages issued from this tool, is to facilitate consultation and discussion between local actors, decisions makers and scientists through the elaboration of a representative working group, and to confront the different visions in order to identify problematic points for which the planning document must set objectives. This tool goes with the wish to develop both research-action approach and consultation in landscape planning.

Acknowledgements

This research programme was carried out within the programme SYSCOLAG with the financial and technical support of the Regional Council of the Languedoc-Roussillon and its partners (Cépralmar, IFREMER, BRGM, IRD, CEMAGREF, CNRS and the universities of Montpellier I, II and III and Perpignan).

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