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A Socio-economic Approach for Coastal Zone Assessment

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Abstract

The PEGASO project (People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast) develops an ICZM governance platform which aims at producing integrated assessments in support of policy making decision for the sustainable development of the Mediterranean coastal zone. This paper presents the socio-economic approach developed for the assessment of the "Bouches du Rhône" (France) where conflicting uses and coastal waters pollutions are common management issues. In order to support decision-making, the socio-economic assessment intend to i) identify indicators at appropriate scales, ii) produce a clear overview of socio-economic pressures and associated environmental degradation, iii) analyse the existing links between ecosystem services production and human well-being and iv) underline the cost of management responses. This paper outlines detailed methodological approach developed for this task and the first results obtained in a case study dealing with the analysis of seaside tourism, nautical activities and coastal water quality.

Keywords:

Integrated Coastal Zone Management, local information system, socio-economic assessment, degradation costs, ecosystem services, well-being of coastal population, seaside tourism, nautical activities, microbial pathogens organisms, sewage treatment plant.

Introduction

Many pressures affect the Mediterranean coastal zone which suffers severe environmental degradation. The ICZM (Integrated Coastal Zone Management) Protocol of the Barcelona convention, entered into force in January 2008, emphasizes the need to manage marine and coastal environment in an integrated way, in order to support sustainable development of this social-ecological system. The Mediterranean ICZM Protocol is the first supra-State legal instrument aimed specifically at coastal zone management. This protocol defines ICZM as “a dynamic process for the sustainable management and use of coastal zones, taking into account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interactions, the maritime orientation of certain activities and uses and their impact on both the marine and land parts” (article 2, ICZM Protocol, UNEP/MAP/PAP, 2008). Integrated management therefore particularly implies taking into account the interrelationships that exist between uses of the sea and coastal zones and the environment that they potentially affect.

This social and political demand is addressed by the European research project PEGASO (People for Ecosystem based Governance in Assessing Sustainable development of Ocean and coast), which aims to develop new governance models that build on partnerships and participatory processes for the Mediterranean (according to article 14, ICZM Protocol, UNEP/MAP/PAP, 2008). The core of the project is the development of an ICZM Governance Platform that will enable the science and end user communities to share data and information, case studies and insights, so as to build a common understanding of issues and institutional perspectives affecting the Mediterranean coastal zone. The ICZM governance platform includes several components (spatial data infrastructure, ICZM toolbox, capacity building, etc.) in order to produce integrated assessments in support of policy making decision. The ICZM toolbox is one of them and aims at supporting sustainability assessments in the coastal zone using indicators, spatial ecosystem accounting, scenarios, participatory approach and socio-economic valuations. The tools and methodologies developed for this task must be tested and validated in 10 sites selected for their relevance in the Mediterranean and Black seas.

Despite its modest size, the administrative territory of Bouches-du-Rhône in France has been chosen as one of the ten CASES (Collaborative Application SitES) since its major geographic characteristics can be found along the French Mediterranean coast. This coastal zone has a wide variety of land and sea uses ranging from highly urbanized areas, tourist attractions, industrial complexes and protected rural wetlands. In consequence, conflicting uses and coastal waters pollutions are common management issues. The Bouches-du-Rhône CASES is expected to carry out an Environmental Territorial Diagnosis (ETD), who lists and describes problems, strengths and weaknesses, economic, social and ecological issues, taking into account the diversity of stakeholders. This ETD aims at understanding the social-ecological system by providing explanation on the past evolution and assessment of the future one, in order to support decision-making. As part of this ETD, the socio-economic assessment intend to identify indicators at appropriate scales, produce a clear overview of socio-economic pressures and associated environmental degradation, analyse the existing links between ecosystem services production and human well-being and underline the cost of management

responses. This paper presents the socio-economic approach developed for the assessment of the Bouches-du-Rhône CASES and provides a first application of this methodological framework to the water quality issue. Water quality is a major concern in the Bouches-du-Rhône coastal zone by reason of this resource emphasis for seaside tourism and nautical activities which contribute significantly to the local economy.

To present this methodology and the first results obtained, this paper is organized as follows. We first draw a general overview of sustainability problems in the Bouches-du-Rhône coastal zone. Secondly, we outline detailed methodological framework of the socio-economic approach developed for this CASES. Thirdly, we characterize social and economic weights of seaside tourism and nautical activities and we describe their interactions with the environment (impacts and dependencies). Fourthly, we assess degradation costs associated to microbial pollution of coastal waters (microbial pathogens organisms). Lastly, we conclude by underlining limits and benefits of the approach carried out and we suggest areas for improvement.

Sustainability Problems in The Bouches-du-Rhône Coastal Zone

The Bouches-du-Rhône county is one of the 95 counties of France mainland. In this study, the coastal zone includes marine area corresponding to homogeneous water bodies as classified by the Rhône-Méditerranée-Corse Basin Committee (RMC) and land area corresponding to the aggregation of coastal “communes”, the smallest administrative unit in France (Fig. 1). The coastal zone is a highly artificialised and densely populated area (596.4 inhabitants per km²: INSEE, 2010) but there is some great variation in the study zone (Fig. 1). By comparison with the whole French Metropolitan coastal zone, this area is twice populated (Colas, 2011). The actual land use is the result of two major and simultaneous processes begun in the 1970s: urban sprawl and deagriculturization (Courtot, 2005).

We can delimit several geographical units where physical characteristics, uses and management problems are different. From West to East (Fig. 1.), the first unit is Camargue which corresponds to the inner Delta of the river Rhône. This zone is made up of lagoons, wetlands, salt lakes, salt marshes, rural habitats (agriculture and livestock) and urban areas. There is a national park and a natural reserve where fauna is abundant and diversified. Principal activities are tourism, agriculture and livestock farming. The second unit is Gulf of Fos where industrial and port activities are dominant. This coastal zone is a dense urban area where beach tourism and mussel farming can also be found. The third unit is the Côte Bleue with small urban areas, small ports and marine protected areas. Tourism and water sports are common uses. The fourth unit is Marseille, a vast and very densely populated urban infrastructure. Tourism, deep sea and short sea shipping, cruises are important activities. Finally, the fifth unit is the Calanques area where a National park (land and marine) is meant to be developed. Activities are terrestrial and aquatic sports.

The management problems are different for each unit. In Camargue for example, the problems focus on coastal zone erosion and wetlands state depending on their sensitivity to terrestrial pressure and to sea level whereas in the Côte Bleue and the Calanques, the problems are mainly marine, and concern aquatic sports as well as water

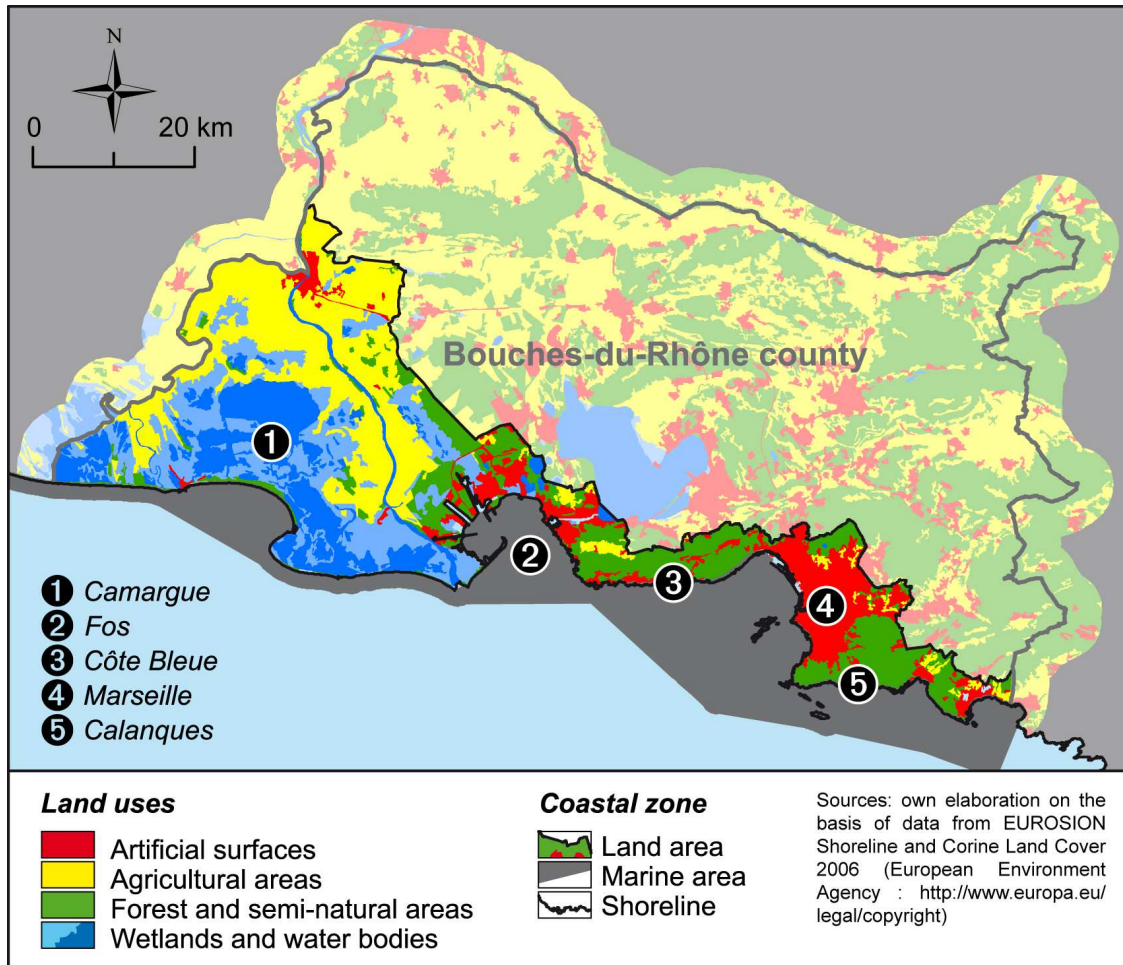


Fig. 1. The Bouches-du-Rhône coastal zone

quality. For the Gulf of Fos and Marseille coastal zones, the issues are both terrestrial and marine, with urban clusters, industrial and port activities extending inland and accounting strongly for sea water quality. The common problem to all units is the intensification of dominant uses and their economic, social and environmental impacts. There is also a segmentation for the management of units. The management tools (Natura 2000, regional and national parks, etc.) are not continuous along the coastal zones (Natural Regional Park for Camargue, Industrial port zone for Fos, Marine Park for the Côte Bleue, etc.), and their segmentation follows the specialization of units. This strategy aims to protect the sensible zones and to contain impacting zones where heavy industry and tourism develop.

Socio-economic Approach Developed to Support Integrated Assessment

The socio-economic approach is developed as part of the integrated assessment (IA) in support of policy making decision in the Bouches-du-Rhône county. “IA can be defined as an interdisciplinary process of combining, interpreting and communicating knowledge from diverse scientific disciplines in such a way that the whole cause-effect chain of a problem can be evaluated from a synoptic perspective (...)” (Rotmans and

Dowlatabadi, 1997). It is an iterative participatory process that links knowledge (science) and action (policy) regarding complex issues (van der Sluijs, 2002). It aims at producing useful information for decision-making. In this context, the socio-economic assessment is expected to build and estimate indicators at appropriate scales, which may be used to i) provide a clear overview of socio-economic pressures and associated environmental degradation, ii) analyse the existing links between ecosystem services production and human well-being, and iii) underline the cost of both environment degradation and management responses. This assessment forms a part of the first step of the ICZM cycle (issue identification and assessment) described by Olsen (1993). Possible outcomes are multi-criteria analysis (MCA) or cost-effectiveness analysis (CEA) to test potential effects of new management scheme implementation.

In order to undertake this assessment, we implement a framework which has been developed and applied to the three French marine regions as the social and economic analysis during the initial assessment step of the Marine Strategy Framework Directive (Directive 2008/56/EC). The PEGASO project offers the opportunity to implement this methodological framework to a smaller scale than the ones of the national assessment. The methodology consists in building local indicator systems, which describe the current situations and could also estimate subsequent changes over time. It is made up of two parts: a social and economic valuation of direct uses of the marine and coastal ecosystems and an assessment of the degradation costs due to the overuse, misuse or mismanagement of certain marine ecosystems and resources.

Social and economic valuation of direct uses of the marine and coastal ecosystems

The first part of the assessment involves defining the economic and social importance of different sectors related to the marine environment, by describing the main activities relying on natural resources uses (fisheries, etc.), depending from well-preserved ecosystems (tourism, etc.) or having a significant impact on the marine environment (agriculture, industry, etc.). This pressures-dependencies and pressures-impacts framework provides a social and economic assessment of direct and indirect uses of the marine and coastal ecosystems. The assessment consists in (i) characterizing the economic and social weight of public, merchant and recreative activities, (ii) describing the political and environmental regulations applicable and (iii) outlining interactions and interdependencies between activities and environment (dependence from well-preserved ecosystems, impacts on coastal zone but also positive feedbacks).

Associated degradation costs

The second part is to assess degradation costs. From an economic point of view, environmental degradation corresponds to ecosystem capital depreciation and consequently there's a need to prevent, avoid or compensate this degradation in order to sustain common ecosystem services supporting economic welfare and social well-being. The costs associated with environmental degradation belong to four broad categories. The first category encompasses the costs of the devices dedicated to the observation and the monitoring of marine ecosystems. The second and third categories are more usual: they are made of the costs associated with the measures and actions which aim at either

preventing or avoiding ecosystem degradation (second category) or restoring environmental assets used up by the economy (third category). The fourth category includes the costs of the residual impacts.

Degradation costs are assessed by accounting the different types of pressures which are responsible for degradation in order to get an overview and an estimation of ecosystem capital depreciation. According to data and knowledge availability, degradation costs analysis may apply to past, present or potential degradations. In practice, this analysis is focus on the costs of current individual and collective actions for information, prevention and remediation and on the impacts of present degradation (losses of amenities or benefits as they are perceived at the present time). In opposition to the social and economic valuation of direct uses of the marine and coastal ecosystems, costs are assessed by degradation topics (marine litter, invasive species, eutrophication, etc.) in order to deal with primarily major themes of degradation wich are often well described in scientific and grey literature and are easily related to sectoral use(s). The following process is carried out: (i) define degradation thematic; (ii) identify and quantify costs related to degradation thematic; and (iii) document quantitatively and/or qualitatively residual impacts costs on human wellbeing through multi-criteria analysis. Residual impact costs are assessed against a baseline where there is no degradation.

Building local information system

Integrated assessment “means assembling, summarizing, organizing, interpreting, and possibly reconciling pieces of existing knowledge, and communicating them so that they are relevant and helpful to an intelligent but inexpert decision-maker” (Parson, 1995). Local information system is an interesting tool to reach this objective. Indicators must give understandable information about complex systems in order to be useful for decision-making processes and to support strategic planning processes. The indicator system requires the following properties: few indicators, qualitative and quantitative indicators, trends and movements must be captured, special indicators must be selected to represent the characteristics of the specific coastal area (Hong et al., 2006). Indicator’s spatial units must also correspond so far as possible to user practices, management schemes and/or ecosystemic scales. Indicators system is then used to rebuild existing statistical information at the scale of natural resources management in order to produce another map of the local economy and associated pressures. It aims to get a measure at the scale of the issues, according to potential environmental management/governance units. One the major difficulty is to resolve conflict between socio-economic and geographic precision. Detailed economic and social data are often available for national and regional scales but miss at the local level. So we must simultaneously use existing databases, scientific and grey literature and collect complementary information with local stakeholders in order to produce a correct and useful picture of drivers, pressures and associated degradations at the desired scale. Finally, indicators deal with multiple criteria by nature (like social reality) and their building process is a continuous way. Indicators system must be completed when emerging issues are detected in the study area.

Social and Economic Valuation of Seaside Tourism and Nautical Activities

In order to illustrate the assessment process, the methodological framework before-mentioned is implemented in a case study dealing with coastal water quality. This is a major issue in the Bouches-du-Rhône county because of significant importance of this resource for seaside tourism and nautical uses which are contributing activities to the local economy. We present in this subsection some indicators produced to inform social and economic weights of seaside tourism and nautical activities. To give full meaning to the indicators produced for the coastal zone of the Bouche-du-Rhône county, so far as we can, we use, as a frame of reference, the French Mediterranean coastal zone (same administrative units).

The rate of tourist accommodation is low in comparison with other Mediterranean coastal zones (Colas, 2011) and the accommodation supply is very unevenly distributed (table 1). 67% of beds are located in secondary houses. We suffer a lack of recent data concerning tourist attendance for the coastal zone. However, it seems than tourist visits are mainly carried out in the coastal zone according to a survey published in 1997 which showed than 57% of journeys were made in coastal municipality (Martin and Deflaux, 1997). An orientation survey carried out by the Bouches-du-Rhône tourist observatory in 2003 valued average journey duration at 4.7 days and average spendings estimation at 41 euros (€) (CDT, 2004). Using these figures and tourist overnights for the year 2009 (43,317,400 overnights: CDT, 2010), we can estimate than tourist attendance generate 1 billion € of gross revenue per year for the coastal zone, about 2.4% of the Bouche-du-Rhône gross domestic product.

The tourist attendance produces mostly employments in the food and beverage services activities and industries from this sector represent nearly 5% of all industries located in this coastal area (Table 1). According to CDT (2010), the tourism economy has been growing faster than other merchant activities for the last years and tourism is locally an important contributing sector to the economy, notably in seaside resorts. Heliotropism and sea proximity are the third and fourth attractiveness mentioned as reasons to visit the Bouches-du-Rhône county by tourists interviewed during the orientation survey carried out in 2003 (44% of responses: CDT, 2004).

There are few seaside resorts in this area. Despite this, marina and nautical activities are common places and uses (Table 2). According to Martin and Deflaux (1997), the most practiced activities are scuba diving and sailing. In 2009, about 15,000 memberships of nautical sports club were listed (Table 2). These data represent minimum value. For example, most of scuba divers in France do not practice their activity within sports club (53%: Chauveau, 2005). Most of them are not tourists but local residents who regularly practice their activity.

It is difficult to assess the effects estimation of marina and nautical activities for the coastal zone. At the national scale, a recent survey has shown that one marina generates on average 7.6 direct employments and there is also one indirect employment for ten berths (FFPP, 2011). These figures compared to the importance of pleasure boats berth capacity in the Bouches-du-Rhône coastal zone suggest that sailing industry is important for economy in this area. Nautical activities certainly have important economic and social benefits but further local information is needed to properly assess this trend.

Table 1. Some characteristics of tourist economy in the coastal zone

Characteristics of tourist accommodation		Total	Standard deviation	Data source(s), year(s)
Tourist accommodation (No of beds)		125,066	9,176	INSEE, 2010
Touristic function rate ^a		12.0	191.2	INSEE, 2010
Tourist density (No of beds/km ²)		71.4	254.4	INSEE, 2010
Enterprises and employments dependant from tourist attendance		Total	As % of all merchant activities ^b	Data source(s), year(s)
Accommodation ^c	No of companies	739	0.72	INSEE, 2008
	No of employments	3,176	0.75	INSEE, 2008
Food and beverage service activities	No of companies	5,123	4.97	INSEE, 2008
	No of employments	12,738	3.03	INSEE, 2008

^aThe touristic function rate is the ratio between capacity and population. A rate of 100 indicates that the capacity is equivalent to the resident population.

^b103,106 organizations and 420,904 employments for the whole Bouches-du-Rhône coastal zone.

^cHotels and similar accommodation; holiday and other short-stay accommodation; camping grounds, recreational vehicle parks and trailer parks; other accommodation.

Table 2. Some characteristics of seaside and nautical activities

Seaside resort		Total	As % of the French Mediterranean coastline	Data source(s), year(s)
"Pavillon bleu" : No of municipalities		3	6.8	Pavillon bleu, 2010
No of exploited beaches		7	3.4	CGEDD, 2009
Marina				
No of marinas		38	35.5	OPP, 2010
Total amount of berth		17,242	25.7	OPP, 2010
Nautical activities				
Scuba diving	No of places	102	27.2	RES, 2010
	No of sports club	97	–	FFESSM, 2010
	No of memberships ^a	≈ 6,150	26.7	MSS, 2009
Sailing, windsurfing, canoeing, oars	No of places	27	18.8	RES, 2010
	No of sports club	33	–	FFV, 2010
	No of memberships ^a	≈ 9,139	13.9	MSS, 2009

^aLacking the municipal data, the number of memberships of sports club located in the Bouches-du-Rhône coastal zone has been assessed on the basis of club sports percentage located in the coastal municipalities.

Environmental impacts of coastal tourism and nautical activities present varying types and degrees. The most important issue is certainly the shoreline artificialisation and urbanization owing to coastal tourism. Pleasure boats anchorage can also be problematic for local seagrass. Overall, there is generally no conflict between nautical practices and maintaining good conservation status of habitats and species. Single activity does not pose major problems but it is more often the combination of all activities, especially in summer, which can exert strong pressure on ecosystems (Maison, 2009). By contrast, seaside and nautical activities are uses importantly relying on coastal water quality.

Associated Degradation Costs to Microbial Pathogens Organisms

During 2006, the main causes of non-compliance of bathing water in France are structural deficiencies in sewage system, occasional failures and non-point source discharges (MSS, 2009). It is generally agreed that agricultural and urban areas have a direct impact on the sanitary quality of bathing and shellfish waters within a defined perimeter from the coastline varying according to literature sources. The impacts of microbial pathogens organisms (MPO) on human health result from the practice of leisure activities (swimming, nautical sports) in contaminated water or consumption of contaminated shellfish from aquaculture activities or professional and recreational fishing. The presence of MPO in the marine environment can cause loss of amenities for leisure activities as well as economic losses to tourism, aquaculture and fisheries industries through the decommissioning and/or temporary closures that may be applied to bathing water areas, aquaculture production location and land fishing zone.

Regulations

The regulations related to contamination of the marine environment by MPO deal only with the reduction of impacts on human health. This regulation has three components: i) measures mitigating the environmental contamination by waste water discharges and feces (Directive 91/271/EC), ii) quality standards for bathing waters (Directive 2006/7/EC) and (iii) health standards for shellfish intended for human consumption (regulation 854/2004/EC). The *Escherichia coli* and/or intestinal enterococci are mostly used as overall indicators of the presence of microbial pathogens in the marine environment.

The Directive 91/271/EC concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. Its aim is to protect the environment from any adverse effects caused by the discharge of such waters. Since the 12/31/2005, all cities over 2,000 population equivalent (PE) must have a collection and treatment system. Non collective sewage system is allowed for certain industrial sectors and not densely populated area if the same level of environmental protection is ensured. As for microbiological contamination, the impacting zone reaches a 5 kilometers perimeter from the shoreline (Amouroux, 2009), all the costs related to sewage system located within this perimeter are therefore considered to preserve the microbiological quality of coastal waters.

According to the Directive 2006/7/EC, the classification of bathing waters has four levels of quality: very good (A), good (B), sufficient (C) and poor quality (D). A coastal area of poor quality is subject to management measures including identification of sources of pollution, their reduction and mitigation, as well as public information or even a temporary ban. The closure can be permanent if the coastal area is classified as "poor quality" bathing waters for five years. All the costs associated to these measures have been considered.

Classification of shellfish areas for commercial fishing or shellfish farming is required; this ranking is determined by the prefecture from the statistical information provided by the REMI (monitoring network of microbiological control of shellfish

operated by IFREMER) over a 3-years measurement range. For areas where the results are unfavorable, a complementary study of the zone can be achieved. Based on the results of regular monitoring and alerts, areas classified as A can be closed temporarily for contamination levels higher to the 1000 E. coli/100g threshold (for areas classified as B, the threshold is set to 4600 coli/100g). Recreational fishing for shellfish (for family consumption only) is permitted in A-areas, and tolerated in France in B-areas, the users to take precautions before consumption of shellfish (recommended cooking) and is prohibited in designated area C or D. Recreational fishing outside classified production areas are exposed to a legislative vacuum.

Degradation costs associated to MPO

The degradation costs associated to MPO represent more than 150 million € for the year 2010 (Table 3).

Monitoring and information costs taken into account are limited to monitoring networks of the microbiological quality of shellfish waters (REMI monitoring network operated by Ifremer), bathing water (Regional Health agencies) and sites of nautical activities (monitoring network set up by the NGO Surfrider, which relies on volunteers to carry samples but mobilizes also permanent workers as well as dedicated resources, including laboratory analysis). This costs category represent about 185,000 € for the year 2010.

Costs of prevention and avoidance measures represent nearly 99.9% of the total quantified costs. This category includes operating cost of facilities who treat urban waste water. It consist of sewage system for collective sanitation, plus individual sanitation facilities. Sewage plants not only aim at decreasing the microbiological contamination but also at reducing nitrates and phosphates to prevent eutrophication. This estimate assumes that the fight against microbiological contamination of marine waters is the primary objective.

Costs of mitigation and remediation concern only shellfish products. They are made of the costs associated with the measures and actions taken by companies in order to purify shellfish products (shellfish purification tank). This costs represent about 70,000 € for the year 2010.

Lastly, residual impacts can not be assessed with monetary value so we present indicators related to different types of amenities losses for coastal population. Bathing waters and nautical places of poor quality are few. There are occasional beach closures, notably in Marseille coastal zone, during heavy rain at the end of summer.

Table 3. Degradation cost associated to MPO

Parameters and Indicators	Costs	Source(s), year(s)
1. Monitoring and information measures		
REMI monitoring network: No of controled places	3	IFREMER, 2010
REMI monitoring network: No of samplings	24	IFREMER, 2010
REMI monitoring network: average cost by sampling (€)	317	IFREMER, 2009
REMI monitoring network: total cost	7,608	–
ARS monitoring network: No of controled places	58	ARS, 2010
ARS monitoring network: No of samplings	1,041	ARS, 2010
ARS monitoring network: average cost by sampling (€)	153	IFREMER, 2009
ARS monitoring network: total cost	159,273	–
Surfrider monitoring network: No of controled places	10	Surfrider, 2010
Surfrider monitoring network: No of samplings	247	Surfrider, 2010
Surfrider monitoring network: average cost by sampling (€)	72	Surfrider, 2010
Surfrider monitoring network: total cost	17,784	–
Research projects, surveys, sanitary classification: annual cost	Not available (minor cost)	
Total 1	184,665	–
2. Prevention and avoidance measures		
Population connected to the collective network, 0-5 km (IE)	2,212,550	AERMC, 2009
Sewage treatment plan: average cost per year (€/IE)	18	AESN, 2004
Collective sewage network: average cost per year (€/IE)	52	AESN, 2004
Collective sewage system: total cost per year	154,878,500	–
Population not connected (0-5 km) (N. inhabitants)	8,483	INSEE, 2006
Non collective sewage system: average cost per year (€/IE)	85	AESN, 2004
Non collective sewage system, total cost per year	721,055	–
Liquid manure control (< 1 km from shoreline)	Not available (minor cost)	
Total 2	155,599,555	–
3. Mitigation and remediation measures (annual costs of shellfish products sanitary purification)		
Shellfish purification tank, annual investment costs (€/company)	1,300	IFREMER, 2010
Shellfish purification tank, annual running costs (€/company)	2,600	IFREMER, 2010
No of companies with a purification agreement	18	DPMA, 2009
Total costs of shellfish purification in B-areas	70,200	–
Total 3	70,200	–
DEGRADATION COSTS	155,854,420	–
4. Residual impacts		
Percentage of beaches with insufficient quality (C or D)	1.7%	ARS, 2010
Percentage of nautic sites with insufficient quality (C or D)	6.9%	Surfrider, 2010
No of beach closures per year (days)	92	DRASS, 2005-2006
No of temporary bathing interdiction (days)	19	DRASS, 2005-2006
Percentage of shellfish farming zones classified C or D	0%	IFREMER, 2010
No of shellfish farming zone closures (days)	0	IFREMER, 2009
No of human diseases due to contaminated shellfish products	Not available (very few number)	

Conclusion

Establishing a set of common indicators on a local spatial scale contribute to providing a coherent assessment framework allowing local sustainability benchmarking and enhancing the analyses of asymmetries within a region (Mascarenhas et al., 2010). The socio-economic approach applied in support of the integrated assessment of the Bouches-du-Rhône is useful to decision-makers by reason of the market derived information produced. Indeed, the assessment based on monetary valuation of ecosystem services through the concept of Total Economic Value including non market goods and services, raises a number of issues: reliability, aggregation issues, misinterpreting results and analyses (value from surrogate markets), and lack of references for coastal and marine transfer values. Unlike this type of valuation, the cost approach produces minimum (and realistic) values of degradation. We need however to build new spatial indicators to better analyse interactions between uses, pressures, ecosystem services and well-being of coastal population.

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