BEACHMED-e

Strategic management of beach protection measures for the sustainable development of the Mediterranean coastal areas

SUB-PROJET 3.2

Concerted actions, tools and criteria for the implementation of the Integrated Coastal Zones Management (ICZM) in the Mediterranean

ICZM-MED

PHASE A TECHNICAL REPORT

In English

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Phase A Technical Report

Concerted actions, tools and criteria for the implementation of the Integrated Coastal Zones Management (ICZM) in the Mediterranean

ICZM-MED

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1. Introduction

The coastal zone has been a major focus for the development of human society; moreover, large part of the world's living marine resources and the highest biodiversity is found in the coastal zone. However the diversity of coastal systems is affected directly and indirectly by thus numerous human activities concentrated at the coastal margins. When these activities develop together on the narrow coastal strip, problems tend to arise, creating conflicts over the use of renewable or non-renewable coastal resources. Defining and understanding the environmental issues associated with coastal zones are crucial, but the need to provide an effective executive structure for management is equally important. Coastal environments are dynamic, comprising continual fluxes of mass and energy. Coastal management should be prepared to endorse this dynamism and accommodate it within management structures.

The Bruntland report and the Rio Convention both identified the need for the sustainable development of the coastal zone. The multidisciplinary process "Integrated Coastal Zone Management" (ICZM) is seen as the means to achieve this. ICZM is a process which brings together all those involved in the development, management and use of the coast within the framework which facilitates the integration of their interests and responsibilities. ICZM is "a continuous, proactive and adaptive process with the general aim of implementing sustainable development in coastal zones and maintaining their diversity. To this end, it aims, by more effective management, to establish and maintain optimum (sustainable) levels of use, development and activity in coastal zones, and eventually to improve the state of the coastal environment" (EC, 1997).

Integrated coastal zone management has currently achieved a significant level of maturity as far as theoretical concepts are concerned and has been included in a number of coastal plans at various levels. The reference document within the European Union is Recommendation 2002/413/CE issued by the European Parliament and the European Council and, within the Barcelona Convention (and therefore specific to Mediterranean countries), which has recently been initiated by PAP/RAC on the protocol for integrated management of Mediterranean coastal areas.

1.1. ICZM in European Union

Europe has an extended continental shelf and a long coastline (89,000 km), in relation to its land area, that contains some of the most fragile and valuable natural habitats. Many of Europe's coastal zones face problems of deterioration of their environmental, socio-economic and cultural resources. Moreover the European coastal zones have problems which cannot be treated by individual countries separately, while

the EU policies influence the evolution of the coastal zones. Since 1996, the European Commission has been working to identify and promote measures to remedy this deterioration and to improve the overall situation in our coastal zones.

From 1996 to 1999, the Commission operated a Demonstration Programme on Integrated Coastal Zone Management (ICZM) designed around a series of 35 demonstration projects and 6 thematic studies (legislation and regulatory instruments, participation, technology, sectoral and territorial co-operation, role of EU policy and information). Thus, the demonstration programme was articulated around three key words: co-ordination, co-operation, concertation (fig. 1) The purpose of the demonstration programme was to lead to a consensus regarding the necessary measures in order to stimulate ICZM in Europe and to identify concrete actions that need to be taken for the implementation of ICZM, to discuss these widely and to prepare all involved parties for their adoption. This programme was aimed to provide technical information about sustainable coastal zone management, and stimulate a broad debate among the various actors involved in the planning, management or use of European coastal zones. The programme was intended to lead to a consensus regarding the measures necessary in order to stimulate ICZM in Europe. In 2000, based on the experiences and outputs of the Demonstration Programme, the Commission adopted two documents:

- A Communication from the Commission to the Council and the European Parliament on "Integrated Coastal Zone Management: A Strategy for Europe" (COM/00/547 of 17 Sept. 2000)
- A proposal for a European Parliament and Council Recommendation concerning the implementation of Integrated Coastal Zone Management in Europe (COM/00/545 of 8 Sept. 2000). This Recommendation was adopted by Council and Parliament on 30 May 2002.

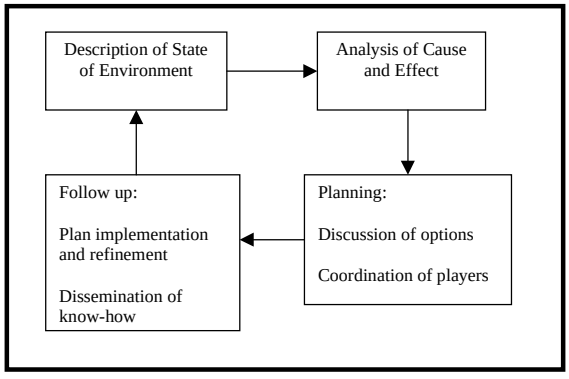

Figure 1. The steps in the Demonstration Projects – a cyclic process.

The Communication explains how the Commission will be working to promote ICZM through the use of Community instruments and programmes. The Recommendation outlines steps which the Member States should take to develop national strategies for ICZM. The national strategies, where all the coastal stakeholders should be involved, were due for spring 2006. According to these documents, the European Commission is not going to forward certain legislative measures for coastal zone management, but to promote the integration of ICZM principles and goals into the various sectoral policies.
Till now experience with environmental action programmes and regional planning work has clearly shown that sustainable development is being implemented too slowly in relation to the gravity and complexity of the problems of the coastal zones. Specific joint action by the Union and the Member States is therefore required in order to improve the effectiveness of legislation and of the existing financial and planning tools (EC, 2001).

1.2. ICZM in the Mediterranean

The Mediterranean area plays a pivotal role within the definition of regional strategies for ICZM. In fact, due to the environmental and socio-cultural peculiarities of this geographic area, since early ’70 the need to protect the marine environmental quality in a co-operative way among coastal states has been strongly perceived. To address this issue, in 1975 the Mediterranean Action Plan (MAP) was adopted in the framework of the Barcelona Convention. The MAP was mainly implemented through the development of specific programmes by the Regional Centres. Among them, one of the most important is the Regional Activity Centre for the Priority Actions Programme (PAP/RAC), which general aim is to initiate practical actions in order to contribute to the protection of the Mediterranean coastal environment, with specific attention to the strengthening of the national and local capacity building for the implementation of ICZM programmes. During the last years the activity of PAP/RAC mainly consists in the implementation of numerous ICZM pilot programmes, promoting since 1989 the Coastal Area Management Programme (CAMP) (UNEP/MAP/PAP, 2001).

Nevertheless, the lack of effectiveness and implementation of these documents has become obvious in the last years together with the pressing necessity to take one further step, ensuring a more effective application has become obvious. The first stage of this process was the attempt to create a new legal instrument on integrated coastal management in the Mediterranean. This purpose leads to the drawn of a Feasibly Study (PAP/RAC, 2002) that was subsequently accepted by all the Contracting Parties of

Barcelona convention (CPs). The first conclusions of this process were presented at the13th Meeting of CPs in Catania (November 2003). On the basis of the results of the Study, the CPs adopted a recommendation to "…prepare a draft text of the regional protocol on integrated coastal management, on the basis of a broad process of consultation among experts and all other interested parties in view of its consideration by the CPs" (13th Meeting of CPs in Catania, November 2003). The working group created in order to draft this protocol and composed by five legal and technical experts, has been established during a meeting held in Split (October, 2004). This group discussed the structure and the topics of the Protocol, the probably obstacles, but also the previous experiences (PAP/RAC, 2005b). Consequently, different versions of the regional protocol have been elaborated. The most recent draft version of the protocol has been presented during the 14th Ordinary Meeting of the CPs with a view to its possible approval by the 15th Meeting of the CPs in 2007 and to convene a diplomatic conference for its adoption to be held immediately following the 15th Meeting of the CPs.

1.3. Objectives

The various efforts on ICZM that have been carried out at a local district level; therefore a system that ensures a coordinated approach on a regional level is needed. The objectives of this sub-project is the collection of existing studies in this sector in order to create a structure for Integrated Coastal Zone Management on a regional level and to select study areas in each region that participate in the project (East Macedonia and Thrace, Lazio, Liguria and Languedoc-Roussillon, where different approaches to ICZM will be evaluated in a pilot approach to different sites. The pilot sites will be described analytically, the coast evolution will be presented, the way ICZM principles can be applied will be also described and coastal integrated management scenario proposals will be developed, coastal state indicators will be measured, public policies will be evaluated, management intervention criteria will be established and tools that can be applied will be proposed or applied. Furthermore the process of concerted actions between different stakeholders will be evaluated. The conclusions from all the above activities and the international best practices and policies along with the practical experience acquired on the case study areas will contribute towards the setting up of a Mediterranean and national integrated management strategy.

2. Region of East Macedonia and Thrace

2.1. General information

Greece covers an area of approximately 130,000 km², with 20% of it divided among its 3000 islands, and a coastline of 18,000 km in length, which is the longest in the European Union. The Greek coastal zone is of high ecological, cultural, recreational and economic value, playing an important role in the development of the country. However, Greek legislation does not provide a clear definition of the coastal zone. Specific legislation exists only for the shore and foreshore, which is part of a wider legislative framework on public property (public domain). This property is managed and directed as public ownership and not within a more integrated framework that takes into consideration environmental, cultural, socio-economic, physical planning and development characteristics (Theodoropoulos et al., 2002).

Legislative framework for the management of coastal areas in Greece does not exist, but segmentally can be found in laws and provisions that regulate subjects of residential growth, tourism, industry and protection of environment.

More specifically Law 2791/2001 "Seashore, Beach and other provisions", which replaced law 2344/40 "On the seashore and the beach", provide definitions for elements that constitute the coastal area (seashore, beach, old seashore, coastal area) and appoint the way that coastline is determined and process of expropriation of lands that are found inside the limits of coastal zone. It forecasts the widening of seashore (beach), the manufacture of works for the protection from erosion and finally, it provides in detail rules for the implementation of work that serves various economic activities,

With Residential Law 1337/83 are regulated the subjects of protection of coasts. The coastal zone is separated in three areas: the area of seashore, the area of beach and the area of 500 metres. Each one of them is delimit and are conditioned by specific regulations in regard to the structural, the demolition arbitrary and fencing of coastal plots.

Environmental Law 1650/86 can be applied in the land-planning planning of areas with big biological, ecological, aesthetic and geomorphologic value. More specifically, it forecasts the characterization of regions and the determination of their limits and their protection areas, importing a total of economic regulations, such as exchange of areas, obligatory expropriation, compensation etc. Moreover, it establishes the Approval of Environmental Terms and the development of Studies of Environmental Repercussions for the authorisation of installation works.

Finally with the Common Ministerial Decision 5796/1691996, are determined the limits of the National Park that is constituted by the Delta of wetlands of River Nestos, Lagoon Vistonis and the Lake Ismarida.

The most recent national strategy for the protection of coastal zones was presented in the Report of Greece on Coastal Zone Management (YPEHODE, 2006) is describes the National strategy for the protection of coastal zone. On the basis of the research projects and studies carried out in previous years, a draft Ministerial Decision was prepared in 2002-2003 for a "Special Framework of Spatial Planning and Sustainable Development of the Coastal Areas". This would constitute a national strategy for the entire coastal space including continental and insular parts of Greece. The idea was to develop a policy for the coastal areas at three levels: a) at national level, there would be spatial planning objectives, orientations and criteria for a further concretisation of the policy at different lower-scale levels of management, b) at regional level, there would be identification of geographical zones where the policy could be more effectively applied, with more concrete orientations and targets, and c) at local/municipal level, within specific geographical zones, there would be concrete master-plans and regulatory measures for the management of the specific coastal zones, providing for all relevant sectoral policies and land-use in a sustainable perspective. Major purpose of this strategy was to identify mid-term actions and policies for inclusion in the Operational Programme 2000-2006, so that the Greek coastal areas could be managed in a rational way, sustaining the population and the necessary development activities and protecting, at the same time, the natural resources and ecosystems.

2.2. ICZM in the region

Two of the 35 demonstration projects (see chapter 1.1) were carried out in the coastal zone of the Region of East Macedonia & Thrace. The first one was the Strymonikos project, entitled «Concerted Actions for the Management of the Strymonikos Coastal Zone», which was implemented in the west coasts of the Region (Koutrakis et al., 2003). The project was funded by the LIFE instrument, with the purpose to contribute to the development and implementation of Community environmental policy, through concerted actions in the Strymonikos coastal zone. It was implemented by two research institutes, namely the Fisheries Research Institute and the Goulandri Museum of Natural History - Greek Biotope/Wetland Centre (Koutrakis & Lazaridou 1999, Koutrakis *et al.* 1999, 2000). The main actions of the project were:

- Description of the area: in the study area the environmental (in the land and marine space), the social and economic traits were studied. The results helped in the formulation of proposals for the sustainable management of the area.
- Localisation of possible threats for the marine environment: for the diagnosis of these threats, a monitoring program of the main physico-chemical and biological parameters of the coastal area's marine environment was organised. Monitoring of these parameters contributed in the estimation of the eutrophication and pollution levels.
- Formulation and operation of a Co-ordination Scheme for the Management of the Coastal Zone with representatives from the public and local authorities constitutes an essential step towards the achievement of the project's aims. The committee started action since May 1997 with the participation of representatives of Ministry of Agriculture, Ministry of Environment, Physical Planning and Public Works and Ministry of Macedonia and Thrace, as well as representatives of two Regions and four Prefectures, that the project zone belongs to. Moreover, in order to promote dialogue between all the institutions involved in the management of area, informative meetings with all the institutions of region were organised.
- Installation and operation of Information Centre for the Protection of the Strymonikos Gulf Coastal Area in Asprovalta - Thessalonika, which is equipped with modern audiovisual equipment and promotes the activities of briefing, sensitization and education.
- Briefing of public with regard to a) the policy of European Union as concerns the inegrated management of coastal areas, v) the values of coastal zone and c) the need for positive action via participative processes and consultations.

The experience from the Strymonikos demonstration project showed that a good knowledge of the environmental, social, economic and administrative features of the area to be managed is the essential first step in planning integrated management and sustainable development.

Also, continuous monitoring of the area is necessary to detect environmental changes. Moreover, the Information Centre that was created has proven to be a very useful tool for supporting actions of environmental awareness, training, dissemination of information, and for promoting participation of the public and local authorities as well. However, co-ordination in the form of a legally instituted management body is indispensable for the implementation of ICZM. The deficiencies in legislation are still present and pose substantial obstacles to concerted management of the area (Koutrakis, 2002)

The second project was carried out in the coastal zone of the Prefecture of Kavala. It was funded by the TERRA instrument. The TERRA CZM Project, entitled 'Integrated Management Plan for the Kavala Prefecture Coastal Zone', carried out by the Development Agency of the Prefectural Administration of Kavala (AENAK) S.A., the Prefecture of Kavala, and the Region of Eastern Macedonia and Thrace, through a planning contract in the context of the European TERRA Programme, which is co-financed by the Directorate-General for Regional Policy and Cohesion of the European Commission. The Prefecture of Kavala was also partner of the TERRA CZM Network, formed by local and regional government organizations from three regions of the European Union (Prefecture of Kavala, Greece, Region of Flanders, Belgium and Region of Algarve, Portugal) and observers from the Region of Southern Holland and the Municipality Dunlaoghaire - Rathdown of Ireland. The program included:

1) The development of Integrated Management of Coastal Areas for the Prefecture Kavala, in the frames of which the following sector-based studies were worked out: a) Land-planning and Urban Planning, v) Transports Infrastructures, c) Tourist development, d) Exploitation of subsoil, e) Agriculture and st)Fisheries.
2) The creation of a Monitoring System of the Coastal Areas of Prefecture of Kavala with the production and continuous actualisation of cartographic background with the help of photomaps and satellite pictures and the development and operation of a Geographic Information System (G.I.S.). This work will constitute a flexible tool of land-planning planning and application of developmental programs, not only for the Prefecture but also for the new Municipalities of the Prefecture.
3) The education of executives of Prefecture Kavala and of the Region of East Macedonia and Thrace with regard to the technological and organisational subjects of coasts' management.
4) The exchange of experiences, information and practises between European of Local Government Organisations.
5) The distribution of results of he project in interested institutions not only in national (Prefectures, Regions, Municipalities, Ministries, Private institutions) but also in international level (Partners of Network, other Networks).

Finally in the frame of the same project, the Prefecture Kavala realised also the demonstration project entitled: "Observatory of Coastal Areas for the Prefecture of Kavala". The specific project constitutes a flexible developmental tool for the Prefectural Self-government of Kavala, with application in all the length of coasts of the Prefecture and helped to fill the gap that existed in this sector. Apart from the monitoring of activities and localisations of "arbitrary" buildings in the coasts, because of the explosive

dimension that received this problem the last 20 years, record the present and future activities in the coastal area, with the use of modern technologies (Prefecture Kavala 2001).

2.3. Description of the pilot site

The Region of Eastern Macedonia and Thrace occupies the north-eastern part of Greece and covers an area of approximately 1415.75 ha and a little over 561.838 inhabitants. The Region borders easternly on Turkey, northern on Bulgaria and westwards on the Region of Central Macedonia. Its south west boundary is North Aegean Sea. The Region is constituted by the following five prefectures: Kavala, Drama, Xanthi, Rodopi and Evros **(fig. 2)**.

The coastal regions of the Prefecture of Kavala may be divided geographically into the four areas listed below:

- Nea Karvali – Keramoti district (eastern coast)
- Nea Iraklitsa – Orfano district (western coast)
- Metropolitan Kavala district (central coast)
- Thassos district (island coast)

The western coast extends for 50 km from the Delta of the Strymon eastward to the western edge of the city of Kavala, and is generally east-facing. The morphology of this shore is characterised by an alternation of rocky stretches and sandy beaches, and it is particularly exposed to wave action. In general, the western coastal district is where local tourism and holiday homes are concentrated, and construction is heavy and growing.

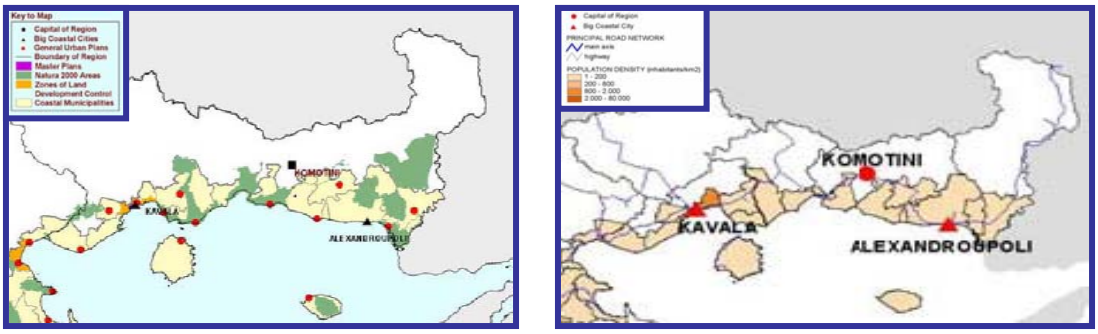

Figure 2: Map of the Region of East Macedonia and Thrace. Map (a) represents the coastal municipalities and indicative legal provisions and (b) represents population density in coastal municipalities.

The eastern coast extends for 40 km westward from the Nestos Delta to the southward thrusting promontory of Akroneri and the west-facing Agiasma shore. It is characterised by low sandy formations, and apart from the port of Keramoti has no harbours. Its road system features only roads running towards the coast, with nothing following the shoreline. One negative element is the presence of the airport very close to the lagoons in the area of Aghiasma, while the new planning of the Ministry of Environment Planning and Public Works removes a part of the protected area of the Nestos Delta (part of the Vassova Lagoon) from the protective provisions of the national legislation. Intense negative impact in the coastal area of the area is expected to have the proposed installation of storage reservoirs for fuels in the limits of the protected area (NW of Vassova Lagoon) and their proposed supply by tankers that will transport fuels in navigable anchorage in a very near distance from the coastal zone.

Unlike the eastern coastal district, a heavily-used road with a large proportion of heavy vehicles runs parallel to the shore for the whole length of the western coast (international traffic heading for Istanbul). Completion of the Egnatia Road, which will run through the Pieria Valley, is expected to relieve the congestion on this road, when the shore road will be used solely to serve the requirements of this western coastal district. This area has (small) port facilities at Nea Iraklitsa and Nea Peramos.

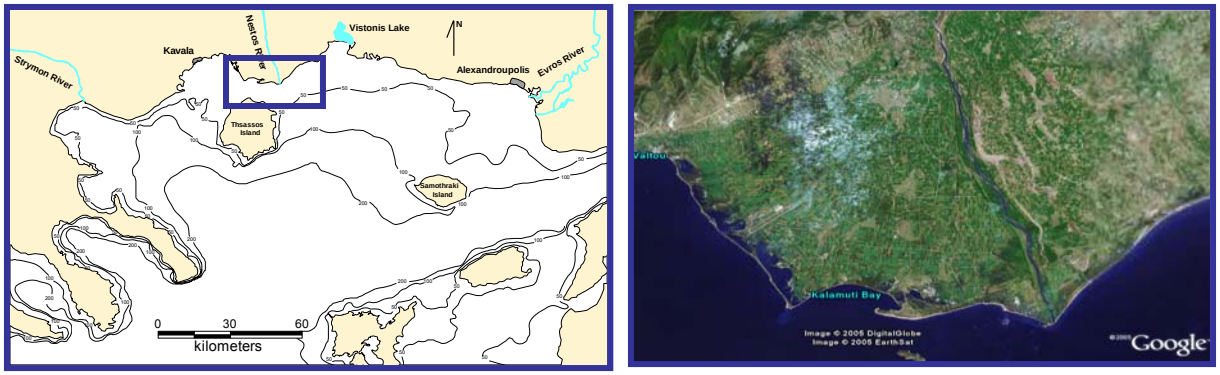

Figure 3: The River Nestos Delta (pilot site) is sited in the East side of the Kavala Gulf

The 30 km of the central coast run from the western edge of the city of Kavala to the Agiasma shore, generally in a south-easterly direction. The principal features of this section of coast are the dense urban development of the greater Kavala area and the extensive industrial development towards the east. The natural environment of these shores is varied, but is dominated by the single port system of the greater Kavala area. The port activities extend to the entire Gulf of Kavala, with a negative impact on the natural environment.

The Gulf of Kavala is found in the Thracian Sea, north of the Thassos Island and belongs administratively in the Prefecture of Kavala and in the Region of East Macedonia and Thrace. The Kavala Gulf constitutes the second in size, semi closed water basin in the Thracian Sea and coastal shelf of Northern Aegean, after Strymonikos Gulf. It has an amphitheatrical shape with axis of symmetry in the direction NNE-SSW. Its average depth is 32 m. and the maximum depth of 60 m. in the centre of "Thassos πλατό". The Gulf of Kavala communicates with the North Aegean via the "channel of Thassos and the "Thassos πλατό". The channel of Thassos is expanded between the Bight of Keramoti and the Island of Thassos. The direction of the channel is Eastern, the width of the channel is 7.300 m. and the maximum depth 27 m.

The Delta of River Nestos **(fig 3)** is sited in the East side of the Kavala Gulf, which is an area with many problems related to beach erosion. The whole North Aegean Sea coast has a southward orientation extending on an E–W axis. Thus, the coastal zone is affected by the winds blowing from south directions (SE, S, SW and W) and, the related to them, sea waves and currents (Xeidakis *et al.*, 2006).

The river Delta is a protected area (National park, Ramsar area, Natura 2000).The river Delta, with an extent of 550.000 acres, is a "Wetland of International Importance", according to the Ramsar treaty and it constitutes part of the National Park of Eastern Macedonia and Thrace which is extended from Nea Karvali until the Avdira and includes also lakes Vistonida and Ismarida. In the river delta is included also the riverside forest known as Big Forest, which during the 19th century exceeded the 125.000 acres, during the 50's reached the 72.000 acres and today it covers hardly 8.000 acres in total.

2.4. Erosion of Coastal Zone

The erosion in the Eastern side of the Kavala Gulf has already intense repercussions not only in the natural environment, but also in the human activities and manufactures. More intense is the phenomenon in the sandy islands that separates the lagoons from the sea, the width of which has decreased too much the last 30 years, but also in areas near to the estuary of River Nestos (Picture 5 and 6). In both cases the maintenance of manufactures, as the entrance orifices of lagoons, small road bridges etc, become with off-hand way, with inadequate materials and without planning.

2.5 Current and Future Activities

The activity carried out by N.AG.RE.F. – F.R.I. in the Phase A mainly consisted in the gathering of bibliographic information for the area of interest including scientific

papers, articles in national publications and books. There were contacts and meetings with local stakeholders in order to gather information relating the land use, information required for the preparation of the GIS map. Moreover there were contacts and meetings with local stakeholders such as in Municipality of Keramoti, Forest Inspection agency, Information Center of River Nestos Delta.

During the next phase of the project, a GIS map will be created that will contain all the available information related to coastal zone management of the selected site in different layers; the different coastal defense systems that can be used in the area will be evaluated and a questionnaire survey will be carried on in the selected area in order to evaluate the opinion of local people, users of the coastal zone (e.g. fishermen) and tourists about the different coastal defense systems to be used. Finally a selection of tools that can be used (according the PAP/RAC Protocol) and either apply them or describe how they can be applied in future projects.

3. Region Lazio (Italy)

3.1. General Information

Lazio Region appears at the Tyrrhenian Sea on the West, and borders Umbria, Toscana and (just with a little piece of land) Marche on the Nord, Abruzzi and Molise on the East, and Campania on the South. The Region has an extension of 17.227 km², accounting for 5.140.371 inhabitants. It is widely and densely populated, being the average density 304 persons per square kilometres.

Coastline is quite regular, low and sandy, especially North of Rome, despite of the presence of some cliffs such as “Capo Linaro, near Civitavecchia, and the mouth of the Tevere river, between Fiumicino and Rome. South of Rome there is a succession of high coastal lands, such as the cliffs of Anzio and Gaeta, the Circeo Mountain, which stacks isolated among sea and land, and the Gaeta cliff, near the Campania edge.

3.2. ICZM in the region & previous economic valuation of the pilot site

An analysis of direct and indirect economic effects, generated by beach tourism, is reported in the previous Beachmed project – phase C-, done by Eurobuilding srl and Nomisma in the 2004. It shows that average revenue for each bathing establishment was 58000 euros in that year, being the beach-related revenue 61% of the total, and the remainder quota of revenue stemming from bars and restaurants. The per square meter beach outcome is nearly 33 euros. The whole (direct and indirect) economic effects generated by tourism demand in Tarquinia Lido ranges from 98 million to 143 million euros. The direct revenue per square meter of beach domain has been estimated in 332 euros, while the direct and indirect outcome generated by beach tourism is 583 euros per square meter of beach, quite higher than that “made on the beach” (beach umbrella, deck-chairs rent, bar and restaurant service, etc. equal to 33 euros).

These economic figures may be susceptible to be varied after the nourishment made in 2003, even though past researches do not show certain relationship about presence, revenue and beach width (Bell, 1986). The nourishment project provided a new 200.000 square metres beach by adding 48500 cubic metes of marine sand and 5 groins were built to contain the littoral transport. The project cost was around 5,9 million euros.

The suspicion of a variation in the total revenue of each bathing establishment has been tested this summer through a direct interview with the business owner, aimed at investigating the “average use” of the establishment services. The survey, conducted on 4 establishments, has shown that total average revenue rose about 11000 euros

compared to the Nomisma survey, ranging from 62000 to 76000 euros. This means that the 2004 Nomisma estimation included the economic effect of the nourishment.

The survey has also shown that the revenue surplus generated by beach enlargement ranges between 28000-36000 euros, representing half of the total revenue of the establishments. Moreover it is noticeable that the total direct economic impact of all beach establishments (24) is estimated in the range 1,2-2,5 million euros.

3.3. Description of the pilot site

The pilot site chosen for testing the methodology above presented is the beach of Tarquinia Lido, along the Tyrrhenian coast of Lazio Region, 90 kilometres North of Rome. The city is part of the Municipality of Tarquinia localised 5 km landwards, famous for its Etruscan archaeological tombs (fig 4). The Tarquinia area is a strategic zone for testing the ICZM methodology. In fact it includes a series of elements that cover all the characteristics and issues involved in integrated management.

Figure 4: The beach of Tarquinia Lido, along the Tyrrhenian coast of Lazio Region

Lazio was one of the first Regions in Italy to apply the “integrated coastal zone management” methodology with the Integrated Action Programme (R.L. 01/01 – Action I.1.7), by setting up an ICZM Commission, consisting of the Lazio Region and the University of Tuscia, the University of Rome, the University of Cassino and Litorale S.p.A.. In 2005 the town councils of Tarquinia and Montalto di Castro were chosen by the ICZM Commission as one of the three pilot areas of the Lazio coastline in which to test and put into effect the ICZM methodology. This was brought about by setting up a permanent local Forum and by drawing up guidelines for starting integrated coastal management.

This choice allows us to fully understand how interesting this area is for testing ICZM. The strategic criteria for testing integrated coastal management are very clear in this part of the Lazio coastline: the extent to which the area is able to include or bring together various social and environmental issues; the relevance, that is the capacity or entity (based on specific indicators) of the area with respect to certain issues; the priority, that is the degree of urgency of the area with respect to the matters and questions being dealt with. This degree of urgency is also determined by the statistical frequency with which particular dynamics are repeated in the area.

These criteria are fully expressed in this zone, which points out the centrality of the coastal resources more and more, for a series of reasons: the identification of seaside tourism as a factor of economic development; the presence of a vast patrimony of natural zones (Tarquinia Saltpans); the strong intensification of erosion dynamics and of exceptional atmospheric events, which have led to a series of special actions by the Lazio Region regarding protection of the coastline; the presence of a national main road (SS. Aurelia), which causes serious mobility problems during the summer season.

The centrality of the coast and of the resources of the sea in the local community's choices can be seen in the approval by the town council and by the Lazio Region of the P.U.A. (Plan for Use of Beaches). This is a series of regulations that up to now only 12 local governments on the Lazio coast have adopted. The P.U.A. is of strategic importance because it carries out a series of planning functions: expectations of future use, involving the identification of the various types of use (bathing establishments, public beaches with facilities, public beaches, mooring points); coherence with the overall planning criteria; types of temporary and permanent structures on the beaches; use of eco-compatible materials; ease of access to the beaches by the general public (in particular the handicapped categories); correlation between the beaches and the town through coherence with town plans and plans regarding mobility (e.g. P.U.T).

So, in the case of Tarquinia the P.U.A. is fully authorised to act on the stretches beaches where the Region has carried out a vast and innovative beach nourishment project between Porto Clementino and the Foce del Marta, (General Programme for the Protection of the Coast and the Reconstruction of the Coastlines of Lazio). Excellent interaction between beach nourishment policies and beach management policies is therefore created and on the basis of this interaction one can expect the creation, with an innovative approach, of an economic and social environmental budget for the beaches that shows the costs and benefits of protecting the coast.

As regards social and economic indicators we can say that Tarquinia accounts for 15162 inhabitants spread on 279 square kilometres. The average per square kilometres population density is very law, just 54,19 (Istat, 2001). People lives preferably inside the historical centre (10603), while along the coast they are 1079. More precisely in Tarquinia Lido there are 551 residents (3.63% of the total). However during the summer population may be nearly thrice (nearly 35-40000; statistical office of Tarquinia, 2006- personal communication).

The economy is mainly based on the tertiary sector (66%), even though the quota of agriculturists is still high (15%) compared to other areas of Lazio Region. The secondary sector accounts for 18,4% of the total employees. Total employees in 2001 were 5412 (Istat, 2001).

Hotels represent 25% of the total receptive structures of the province. However since the middle 90s when arrivals and presences in the hotels were 17000 and 39000 respectively they dropped in the 2004 to 5720 and 19463 respectively. Recent statistics shows that hotels absorbs 80% of these presences (APT, 2006), and foreigners account for 16% of the arrivals and 10% of the presences. Nonetheless the majority of beds are localised in the “second houses”, which accounts for 64% of the total beds in Tarquinia (Viterbo Chamber of Commerce, 2000). Statistics since the 90s shows the phenomenon of the “second house” is very important representing 83,8% of the house not permanently occupied (Istat 1991, 2001). On the basis of the previous data the total number of beds in Tarquinia should be 2235, out of them 930 in hotels and the remnant quota in second houses.

Still according on the previous reference, Tarquinia has the most consistent quota of tourism expenses (nearly 20 million euros corresponding to 23% of that of Viterbo Province). Average per capita income in Tarquinia in the 2005 was 17600 euros.

An analysis of direct and indirect economic effects, generated by beach tourism, is reported in the previous Beachmed project – phase C-, done by Eurobuilding srl and Nomisma in the 2003. It shows that average revenue for each bathing establishment was 58000 euros in that year, being the beach-related revenue 61% of the total, and the remainder quota of revenue stemming from bars and restaurants. The per square meter beach outcome is nearly 33 euros. The whole (direct and indirect) economic effects generated by tourism demand in Tarquinia Lido ranges from 98 million to 143 million euros. The direct revenue per square meter of beach domain has been estimated in 332 euros, while the direct and indirect outcome generated by beach tourism is 583 euros per square meter of beach, quite higher than that “made on the beach” (beach umbrella, deck-chairs rent, bar and restaurant service, etc. equal to 33 euros).

These economic figures may be susceptible to be varied after the nourishment made in 2003, even though past researches do not show certain relationship about presence, revenue and beach width (Bell, 1986). The nourishment project provided a new 200.000 square metres beach by 48500 cubic metes of marine sand and 5 groins were built to contain the littoral transport. The project cost was around 5,9 million euros.

The suspicion of a variation in the total revenue of each bathing establishment rose has been tested this summer through a direct interview with the business owner, aimed at investigating the “average use” of the establishment services. The survey, conducted on 4 establishments, has shown that total average revenue rose about 11000 euros compared to the Nomisma survey, ranging from 62000 to 76000 euros. This means that the 2003 Nomisma estimation included the economic effect of the nourishment.

The survey has also shown that the revenue surplus generated by beach enlargement ranges between 28000-36000 euros, representing half of the total revenue of the establishments. Moreover it is noticeable that the total direct economic impact of all beach establishments (24) is estimated in the range 1,2-2,5 million euros. Further details about figures, survey and methodology employed will be better explained in the second report, phase B.

3.4. Current and Future Activities

The project, with particular reference to phase “A”, aimed to gather the impressions of the users, both residents and tourists by a direct survey. The questionnaire includes questions for understanding the degree of satisfaction of the users, but also for providing the necessary information in order to obtain the costs/benefits analysis of the beach system.

The other essential direction of this methodology is the knowledge of and the connection with the instruments for planning the beach system, the awareness of the P.U.A. (littoral management plan) and the proposal of a costs/benefits budget that allows policies for protecting the coast to interact with the way it is used.

About the economic assessment has the main goal to step further in the findings of the past Beachmed socio-economic research that pointed mainly on Cost Benefit Analysis (CBA) of different shoreline defence structures and on the economic impact generated by beach tourism. Here concern is on how to assess the net socioeconomic benefit of nourishment projects, in proposing practical tools for allowing public administration to transfer values (especially non-market values) and apply the proposed CBA framework to other sites.

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If economic efficiency is the best criterion to be reached, Cost Benefit Analysis may be the most suitable way to assess direct economic impacts of integration (assessing differences in economic performance of non- and integrated strategies) (Bower and Turner, 1998). In a broad sense CBA for societal projects, addressed in a integrated framework for coastal management, takes necessarily account of several perspectives, spanning social, economic, biological, institutional and legal conditions. Then CBA becomes a useful instrument of economic analysis in an integrated context.

Despite of its large use in project analysis, CBA is not yet a current economic practice for beach nourishment in Europe, whilst it is a common procedure in the

analysis done by US Army Corps of Engineers (USACE). The reason USACE promotes this approach is to determine primarily storm damage reduction benefits, and secondly recreation enhancement and regional economic development (NOAA,2006).

In the last years the use of CBA for shoreline management has been advised by the EU in the Eurosion project (EU, 2004b), where a so called social CBA is framed. A Societal cost and benefit framework considers not only non-market goods or services, on a broad time horizon (50 years), in the spatial scale of the sediment cell (area in which the sediment transport may be considered self-contained), but also external environmental costs of the project occurring into the cell. The latter costs are useful to identify where benefits are spread and to make policy of equity distribution on cost of construction and maintenance. However CBA focus is on the efficiency, underlying the Kaldor-Hick compensation test, and not if it should be separated from the issues of distributional incidence of costs and benefits (OECD, 2006).

Moreover CBA may be useful to improve policy actions and to move them into a new dimension of problems not yet addressed by classical nourishment design, such as those of habitat enhancement and cultural preservation. With reference to the main topic, the beach nourishment economic assessment, CBA determines the efficiency of the intervention not only on the economic ground of tourism and recreation, but also on the field of environmental management. The aim is to avoid discrepancies between different contrasting and incompatible problems, such as tourism development and nature conservation (Phillips, Jones, 2006).

The next planning steps to assess social dimension will require:

- bibliographic research with reference to projects regarding the integrated management and management of beaches, to end user satisfaction, to the indexes that can be applied within the planning analysis and to the planning instruments and management of existing beaches;
- formulation and distribution of questionnaires for the managers of the bathing establishments and for those who use the beaches; development of links with the local actors.

The next steps of the project include extending the bibliographic research on the basis of what emerged from the first analysis of the site, of the users of the beaches and of any national and foreign models similar to this project. This bibliographic research also has to become the basis of proposals for a series of indexes in order to achieve the definition of the costs/benefits budget of the beach system.

The economic framework proposed consists in defining costs and benefits according to relevant and updated guidelines found in the literature (EU Eurosion

project, - 2004b), and the most practical applications done by the NOAA (2006). Costs are relatively easy to define and regards constructions, monitoring, and maintenance of the beach, as well as mitigation and exploration of the marine sea bed. Main benefits for a defence work, such as nourishment, is the risk of loss due to erosion or flooding that is taken away from an area. This is the benefit NOAA attempts to define firstly, being the real estate defence the main policy concern of the federal policy, and that justifies federal subsides. However other important benefits have been recognized such as information, regulation and ecological functions (Eurosion project 2004). Although ecological function is not an easy task to be monetized and has not well studied, it is the main outcome of the environmental enhancement of the beach ecosystem. However problems may exist for birds and turtles nesting and for the buried infauna (French, 2001).

In this work the most relevant issues assessed will be on storm damage reduction, recreational values and property asset valuation as well as economic analysis derived by direct and indirect impacts found in the literature, and updated by primary data recognition.

In addition, as a help for public administration, the methodology wants to propose a series of consideration and guidelines on how to address the choice of the exact economic lifespan of the project (beach nourishment), what might be the most appropriate discount rate (EU, 2003b), whether to use a constant or a decreasing rate (OECD, 2006), and to include in the CBA framework concepts of equity and sustainability (OECD, 2006) as well as what is the sensitivity of technical and economic parameters on the estimate of CBA indicators (benefit-cost ratio, net present values) (EU, 2003b).

Finally the quick assessment of the economic benefits by applying a benefit transfer function (EU, 2004a) allows decision makers to appraise a prompt CBA and to do a rapid forecasting of the real benefits of the project. Public administration can do assessment with relative credibility, without any external help, at least in those cases of no ambiguous findings of CBA indicators (a huge Benefit-Cost Ratio or a relevant Net Present Value). In case of doubtful results further research may be requested.

4. Region Liguria (Italy): Riviera del Beigua & Municipality of Porto Venere

4.1. General Information

The Ligurian Region is situated in the North-Western part of Italy. From a geological perspective it is like a 315 Km narrow bow, characterized by a high rocky coastline broken by promontories, bays, harbours and beaches. The Ligurian coastline can be divided in two main zones. In the first one, called Riviera di Levante, due to the main rocky coastline, beaches are mainly narrow and pebbly pocket beaches. The second one, called Riviera di Ponente, is mainly characterized by a flat coastal region, with wider sandy beaches.

Due to land scarcity, its population and human activities (agriculture, fishery, aquaculture, etc.) are mainly concentrated along the coastline and generate a high anthropic pressure for the coastal and marine environment. Particularly, tourism is the major economic activity in Liguria: its beaches and rocky coasts are known worldwide and attracts the 89,2 % of the total regional tourism, increasing environmental impacts on the coast. Within the coastal tourism industry, the yachting tourism plays a relevant role. The enlargement of existing marinas and the building of new ones to satisfy the increasing boating tourism demand represent a relevant pressure on the coastline.

Among the numerous impacts generated by the elevated anthropic pressure on the Ligurian coastal area (seawater contamination from industrial and sewage outfalls, habitat loss, landscape degradation, etc), physical erosion constitutes one of the major threats. Since the second half of the 19th century, human activities and inappropriate interventions in the coastline (i.e.: railroads and roads constructions, building of marinas, littoral defence works, etc) caused negative impacts on littoral dynamics, increasing the natural erosion rate of the coastline. To face this problem, soft shore protections and beach nourishment practices have been recently promoted.

4.2. ICZM in the region

The Ligurian Regional Government, recognising the central importance of an appropriate management of the coastal zone for the regional future development, is seriously involved in monitoring, protecting and managing its littoral (REGIONE LIGURIA-ARPAL, 2004). A distinctive and particular tool developed in the regional contest is represented by the Territorial Co-ordination Plan of the Coast (PTCC), strengthened by the Regional Council in 1999. The PTCC aims at achieving an improved quality of the coastal zone in its natural and anthropic components, considering the protection of the coastal environment and the recovery of the coastal

landscape together with the enhancement of economic activities in the Region. To this aims, the PTCC takes specifically into account four main themes: the protection of the coastline from the erosion, with particular attention to soft solutions (nourishment practices), the improvement of yachting tourism supply through the development of the regional marinas, the reclamation of the coastal areas interested by dismissed railway infrastructures and the improvement of the efficiency of the coastal viability.

The PTCC assumes an important reference for coastal management and constitutes the unique experience in this sense carried out at regional scale. Other relevant initiatives which can be included in the ICZM framework have been developed at a lower scale (district, Municipalities, etc.).

In this contest, the Riviera del Beigua can be considered an optimal pilot area in the path through the integrated coastal zone management. In fact, the dramatic event related to the oil tank Haven in 1991 brought the local communities to confront themselves with environmental problems. As a result, Local Authorities of the *Riviera del Beigua*, acquiring a common identity, have started to work together in order to define more sustainable scenarios and to pursue an integrated management of the whole area, looking forward to a new territorial development based on environmental quality. The choice of the local public authorities is thus devoted not only to the restoration of the environmental impacts but also to the creation of new basis for environmental issues, also considering the socio-economic development. As a first step the six Municipalities in 2002 decided to invest a share of the refund obtained for the damages from the oil spill to obtain the EMAS certification for the whole district. The common path through the environmental certification has guaranteed since 2002 the general framework to build an integrated planning strategy.

Considering the specific task of promoting a more sustainable tourism in the area, the *Riviera del Beigua* has promoted the adoption of a Quality Chart for bathing tourism activities (*Carta dei Servizi degli Stabilimenti Balneari*) that is intended to implement and improve communication and collaboration between public authorities and privates by mean of an agreement protocol signed by both subjects.

Adhering bathing tourism activities undertake to guarantee an acceptable level in services quality with particular attention devoted to environmental issues and towards a better environmental performance.

Among the initiatives connected with this general path, two in particular can be considered of interest in the contest of ICZM: the SABBIA project and the LIFE project PHAROS. The first one has been carried out by the DIP.TE.RIS. of Genova University and Fondazione Eni Enrico Mattei in collaboration with the Local Authorities, with the

aim of developing and applying a tool for the management of peri-urban resort beaches, in order to identify good practices, as well as to demonstrate the relevance of beach management in ICZM and sustainable tourism programmes (Fabiano et al., 2004). The PHAROS project, leaded by the Ligurian Region since 2004, aims at identifying a procedure for the EMAS registration of marinas and to propose good management practices, also considering the integration with the local environment management policies. In the context of PHAROS project an agreement protocol has been recently signed in order to integrate environmental management systems developed by private tourism structures and public authorities aiming to a common and more sustainable development.

4.3. Riviera del Beigua

4.3.1. Description of the pilot site

The pilot area individuated for the study is a coastal zone situated between the cities of Genova and Savona (W Liguria Region). This area, which in 2002 was defined as a territorial district named Riviera del Beigua, is made up of six Municipalities of small-medium size (fig. 5).

Figure 5: Image from the satellite of the Riviera del Beigua. Font: Google Earth.

Inland, the area is characterised by the near presence of one of the biggest regional protected areas, the Beigua Regional Park, which has been also recognized of particular interests at the European level both for ecological aspects (NATURA 2000 network) and for geological aspects (UNESCO Global Geoparks Network). The Riviera del Beigua and the adjacent areas are characterised by land scarcity, which results in a

high concentration of population and human activities along the coastline. Urban settlements, infrastructures, industries, commercial harbours and marinas, coastal defence works, fishery and tourism activity, constitute all together a major threat for the carrying capacity of this coastal area and the adjacent marine environment, leading to environmental problems such as coastal erosion, habitat loss and degradation and marine pollution.

For what refers to main geomorphological features, the coastline of the *Riviera del Beigua* is constituted approximately by 23 km of heterogeneous morphological features, where cliffs are alternated with sandy and sandy-gravel beaches and gravely-cobble pocket beaches (AA.VV., 1999; Ivaldi *et al*., 2004). In general terms, beaches in the area are characterised by a limited width and are often bounded by natural promontories or artificial defence works, diffusely spread in the area to face coastal erosion problems. The presence of artificial revetments, groynes and jetties in the whole Riviera contributes to the high littoralisation of the area (Ivaldi *et al*., 2004).

The marine environment has experienced in the last decades a general degradation due to the high local anthropic pressure. According to the Regional Coastal Plan the marine and coastal environment has been considered of medium-low natural value in the whole area, due to the poor degree of natural conservation of marine habitats and to the high rate of anthropic alterations, with the exclusion of a little sector of well conserved rocky coastline and the presence of two marine SCI (Regione Liguria, 1999, 2002). The sea of the Riviera del Beigua belongs to the Cetaceans' Sanctuary of the Mediterranean Sea, an area of approximately 100.000 Km2 situated within the internal waters and territorial seas of French, Italy and the Principality of Monaco, where the number of cetaceans is at least twice as high as anywhere else in the Mediterranean (Ambrose, 1999).

Considering coastal and marine pollution, besides the typical sources of impacts common to many Ligurian coastal areas (sewage outfalls, marinas, etc…), the environmental quality of the Riviera del Beigua has been specifically affected by two relevant episodes.

The first one was represented by the extensive and chronic pollution of heavy metals (mainly Cr) provoked by a chemical industrial plant situated in Cogoleto, which effects are still visible. Due to the relevant pollution caused by this industry, the marine area in front of it has been specifically included in the national monitoring program since 2001 and data of water, sediment and ecological quality are available at the website of the Italian Environmental Ministry (www.minambiente.it). After the closure of the industry, all the interested sites such the inland, beaches and marine sediments are now

subjected to a reclamation plan, as imposed by the national regulation ("*Programma nazionale di bonifica e ripristino ambientale*" - DM n. 468/2001). The second famous episode refers to the accidental pollution event of 1991, when the area was affected by one of the worst oil spills ever occurred in the Mediterranean caused by the sunk of the tanker Haven, which released 144.000 tons of oil (ICRAM, 1999). Besides the immediate considerable environmental impacts and the economic losses connected to the tourism sector, this episode also generated environmental long term impacts. In fact, after more than ten years, a considerable amount of oil is still contained in the relict and data obtained by the specific survey programme performed using bio-indicators revealed that, even if there are no more negative effects for the organisms in the water column, some benthonic species still show physiological alterations (Regione Liguria, 1999).

Tourism is the main economic activity in the *Riviera del Beigua* and revenues from recreational beach tourism and related activities play a key role in the local economy. Beaches in the *Riviera del Beigua* can be defined as resort type beaches sited within a peri-urban environment. Their main characteristic is to be strongly recreational oriented mainly managed as private beaches with fee entrance for bathing tourism. Both tourist demand and supply is essentially homogenous in terms of beach users' attitudes and preferences, socio-demographic factors and tourist facilities along the Riviera, even if some differences can be registered, mainly due to the peculiarities of each Municipality (Marin *et al*., 2004).

The tourist flow in the area is elevated, with more than 1 million total presences registered per year, and it is characterised by an unequally distribution in the six Municipalities. Seasonality is an evident characteristic of the tourism in the Riviera and in all the Municipalities more than half of the total presences are generally concentrated in the summer period, with a peak in July and August. Due to this feature, the ratio residents/tourists in the peak period is generally between 1:1 to 1:3, but values exceeding 1:5 has been registered (Marin *et al.,* 2004). Tourist presences in the whole area also grow massively during the week-end due the proximity to some Northern Italy's main cities (Genova, Milano, Torino, etc.), even if it is not possible to precisely estimate the extension of this relevant commuting phenomenon due to a lack of data.

Local bathing tourism is mostly domestic and family-oriented, composed by tourists from the bordering regions (Fabiano *et al.*, 2004) while the presence of foreign tourists is mainly registered in peak periods (July-August).

The predominance of bathing activities as a major attraction compared to other forms of tourism reflects a general characteristic of the Liguria Region, depending mainly on historical vocation but also to the scarcity of initiatives for creating alternative types of

tourism (i.e. scarce development of infrastructures for tourism in the hinterland). The main consequence is an unequal allocation of tourism resources, which generate a high concentration of uses directly and indirectly connected with tourism on the coastline and the beaches themselves (Fabiano *et al*., 2004). Furthermore, the strong tourism presence during the peak season often generates tensions due to the adjunctive pressure on local resources (water, sewage treatment plants, etc.) and facilities (i.e. parking, traffic, etc).

4.3.2. Current and Future Activities

The activity carried out by DIP.TE.RIS. in the Phase A mainly consisted in an extensive bibliographic research on the ICZM themes and on the methodologies that will be applied in the following phases. Furthermore, a general description of the coastal zone proposed as pilot study together with main bibliographic references for that area has been drawn up.

The Phase B foresees data collection in the study area, the complete definition and adaptation of the study methodologies and a first application to the specific pilot areas. Particularly, three methodologies for the assessment of the coastal area will be applied:

- *Beach users' perception analysis*

Analysis is carried out through questionnaire based survey and interviews. By this means, it is possible to obtain information about end-users' perception, opinions and preferences which can be used and divulged as a contribution to management strategies definition and discussed with local managers in order to be taken into account in the decision-making process

Beach users' survey can be usefully integrated with interview to managers and decision makers as well as the comparison of results with "objective" data can be a first step in order to contribute to the development of an integrated set of indicators for local beach management.

In July and August 2006 a beach users' survey has already been realised. In particular 600 questionnaires have been delivered in the six municipalities of the Riviera del Beigua. The survey aimed at investigating specific topics which play a key role in the framework of beach management at the local level

- *Environmental sustainable analysis (emergy analysis)*

Emergy analysis enables to compare even extremely different goods by the tracing of both natural and anthropic inputs under a single common base (the solar energy, expressed as solar emergy joule), through the application of conversion factors

(solar transformity). With the application of the emergy analysis it is also possible to obtain indices of sustainability and performance of the analysed system.

Application of emergy analysis to coastal issues has already been carried out. Particularly, international references concern the application of emergy analysis for acquaculture plants, lagoons, mangroves and marine protected areas and to wastewater treatment plants.

In the context of the project the emergy analysis could be applied at different levels: from the evaluation of the nourishment processes passing through the management of the bathing activities to the analysis of the whole municipal territory.

- *Proposal of an integrated evaluation tools for the assessment of the sustainability level in the coastal area*

The authors aim at analysing the possibility to integrate indicators from different disciplines in order to propose the definition of a composite index for the assessment of the level of sustainability of the considered coastal area. In particular, on the base of a review of existing indicator sets used for coastal management, the multiple specific indicators individuated by the application of the proposed methodologies will be integrated with traditional indicator sets, also by means of participatory methods.

Results obtained would furthermore be used in order to propose intervention activities specifically addressed to the considered pilot area, which will be submitted to the evaluation of local stakeholders.

4.4. Municipality of Porto Venere

4.4.1. Description of pilot site

4.4.1.1. General Information

Portovenere Regional Park lays in the eastern part of Liguria region, almost at the boundary with Toscana. It includes the three islands Palmaria, Tino and Tinetto, Portovenere promontory, from Punta della Castagna to S. Pietro, Castellana and Muzzerone cliffs; it also includes two small villages: Le Grazie and Fezzano; the park total extension is 279 hectares, of which around 174 ha on the Palmaria island (**Fig 6**).

The protection of this precious area of Eastern Liguria, entirely situated in the Municipality of Porto Venere, was decided in 1985 with Regional Decree n° 12.

With L.R. (Regional Decree) 30/2001 Regione Liguria has acknowledged the peculiarity of the protected area, by establishing the Portovenere Regional Park.

Figure 6: Map of the Liguria Region – Municipality of Porto Venere.

UNESCO has also acknowledged it as World Heritage through the establishment of Parco Naturale Regionale di Porto Venere defining it as “a cultural site of outstanding value, representing the harmonious interaction between people and nature to produce a landscape of exceptional scenic quality that illustrates a traditional way of life that has existed for a thousand years and continues to play an important socio-economic role in the life of the community”. (UNESCO description)

Isola Palmaria

It’s the largest of the three islands, with a surface of 174 hectares; it’s a calcareous block almost shaped as a triangle, separated from Porto Venere by a strait 100m broad. The eastern side is slowly sloping in the sea, covered with rich Mediterranean vegetation; western side is made by 188m high steep cliff. Very special and interesting landscape and environmental value are the reason for the thousands of tourists that every year arrive on its beaches, to enjoy the clear water along the island. A Centre for environmental education was recently settled inside an old military structure.

Till around 30 years ago it was mostly used by militaries functions and for quarrying Portoro marble, just partly inhabited and cultivated; after the decay of military binds, a progressive process of deprivation affected the island, but the unique landscape and natural resources offer important opportunity for revitalizing the area.

Isola del Tino

It’s only 400m far from the Palmaria Island. Its surface is 12,7 hectares wide. A very high cliff on the western side makes it inaccessible. On the eastern side there’s a small harbour, the only docking point. On the top of the island stands a lighthouse, on the northern side an ancient monastery.

Isola del Tinetto

Completely bare island, it still preserves ancient evidences of religious communities: a small oratory on the western side (VI sec.) and a larger building - church

and monk's cells- probably destroyed by Saracens in the XI sec. It's also important the presence of the endemic reptile Pordacis muralis tinettoi.

4.4.1.2. Naturalistic characterization

Insularity and steep sloping morphology, together with thermo-pluviometric data, highlight the strong Mediterranean characters of the target area, which is also an exception in respect of the well-known Cinque Terre environment. Tino, Palmaria, Muzzerone and Castellana calcareous cliffs, in fact, surely represent the wildest environment, as the presence of interesting faunal species shows.

Even for phytogeographic aspects (presence of endemic and rare species, or species at the limit of their own areale) this area is very interesting and rich; on the vegetation side, only extreme environment still have a natural character; the rest is strongly characterized also by deprived area as the result of quarries, careless buildings, frequent fires, formerly cultivated areas. In spite of the present condition, there's quite a huge potential for natural recovering. This area represents the highest environmental value for the Province of la Spezia.

Rocky habitats on the cliffs are still in a good state, with many endemic species, as Pinus halepensis and many rare Orchids. Woods are mainly mixed mesophilic wood on the northern side in contrast with termoxerophillic communities on other sides; some areas characterized by Mediterranean scrub with Quercus ilex and Pinus pinaster, as the result of past fires.

The fires that periodically happen are surely a deprivation factor, but in some cases, as for the steppe and the cistetus, the habitat depends on the fire.

Previously assessed areas

Natura 2000 site: «Porto Venere - Riomaggiore - S. Benedetto»; «Isola Palmaria»; «Isole Tino-Tinetto».

National Park Cinque Terre

Principali aree carsiche di cui alla L.R. 14/90 «Lama della Spezia»

Surrounding areas with synergies

Physical contiguity: Cinque Terre - Tramonti; «Lama della Spezia».

Agrarian areas with landscape value: Terraced agrarian coastal landscape (Cinque Terre); Costa dei Pirati olive groves (from Fabiano to Porto Venere).

Naturalistic key issues

	Vegetation	Fauna
Palmaria	Endemic species *Centaurea veneris,* (especially important for its very narrow areale) *Festuca veneris, Iberis umbellata var. linifolia,* Species at the north eastern limit of their own area *Ampelodesmos mauritanica, Brassica oleracea subsp. robertiana, Campanula medium* Around 20 different protected orchids species	Around 70 birds species of european interest, some even rare on regional and national level *Apus pallidus, Falco peregrinus.*
Tino	Mediterranean species growing on the rocks: *Crithmum marittimum, Senecio Cineraria, Euphorbia dendroides, Glacium flavum, Spartium junceum, Carpobrotus acinaciformis, Centaurea veneris, Centranthus ruber, Ruta graveolens.* *Aromatic plants: Thimus vulgaris, Myrtus communis, Rosmarinus officinalis, ampelodesma mauritanica.* Most common specie: *Quercus Ilex* (Most of the trees on the island were planted after the second WW, in order to mitigate the result of the cut made during the conflict. Species growing on faleises: *Pinus halepensis, Pistacia lentiscus, Rhamnus alaternus, Arbutus unedo.* Species growing in the inner parts: *Fraxinus ornus, Alnus glutinosa, Quercus pubescens, Pinus pinaster.*	Birds: The loneliness of the environment, makes the island a perfect place for birds reproduction (100 couples of *Larus cachinnans* in 2002); On the cliffs *Falco pellegrinus* builds its nest. The island is also a rest place for migratory species Reptiles: *Podarcis muralis, Tarantola mauritanica, Coluber viridiflavus, Phyllodactylus europaeus*: very rare and not very well known, it's the smallest European reptile, and it found on the Tino's Island its perfect habitat. (protected by Habitat Directives)
Tinetto		Endemic sub-species Podarcis muralis tinettoi,

4.4.1.3. Anthropic characterization

Human presence

In some caves prehistoric traces were visible: in the Grotta dei Colombi evidence from Paleolith (30.000 – 10.000 B.C.), were discovered by the geologist G. Cappellini nel 1869.

During the Neolith (5.000 – 3.000 B.C.) hunters and stockbreeders were probably using the caves; afterwards, during Metal Age (3.000 – 2.000 B.C.) when the islands were already separated from the dry land, caves were used also as graves.

During IV and V century A.C., presence of monasteries is documented, as the S. Giovanni del Tino Monastery.

On Tinetto Island the first monastery was built around VI sec and afterwards it expanded on Tino and on Palmaria islands, after Saracens attacks in XI cent.

Palmaria's history is linked to Portovenere's one: military buildings as Torre Scuola, built by Genoese people in 1606 on a rock in the sea on the eastern side of the island, and fortification as Cavour's and Umberto I are the heritage of this bond. The military function, by forbidding entrance, preserved the original wild nature on the island. (**Fig. 7**)

Figure 7: The Municipality of Porto Venere. (a) a very strong tourism pressure is applied on the coastal area and (b) insularity and steep sloping morphology highlight the strong Mediterranean characters of the target area.

Built heritage

Porto Venere: The Church of San Pietro, erected in the Arpaia promontory between the 4th and the 5th century over the rests of a pagan temple, dominates Portovenere village. The church of San Lorenzo, the house of the Doria and the castle (beginning of works in 1161 and completed in the 16th century). In Le Grazie village there's the archaeological site of the "Villa Romana del Varignano", built between 80 and 85. A special role has the 19th century military built heritage: a system of abandoned and abandonable military fortifications, mainly standing on the ridges of the Gulf's hills, reached by ancient military roads, offers really good opportunities of different fruition in the future.

Description of the area

Administrative bodies and institutions	Liguria Region Province of La Spezia Portovenere Municipality
Total extension	279 ha
Main activities	Commerce and services, free professionals, offices Tourism: ports and related services Industry: SNAM (company which owns and manages the natural gas transportation network in Italy) dock for liquid natural gas unloading. Most of residents are outliers.
Inhabitants (year 2001):	Total Residents 4.032 - Le Grazie 1.910 - Fezzano 906 - Porto Venere 1.163 - Isola Palmaria 53
Military zones and infrastructures	Le Grazie - Varignano, special Italian navy group headquarters Cadimare, Italian aviation airport Isola del Tino: military zone, the island is guarded and protected, access not possible. Panigaglia: Police harbour and Snam Company dock for liquid natural gas unloading.

Coastal management local policies

PTR- Regional Territorial Plan – Regione Liguria (2003)

Piano territoriale di Coordinamento della Costa – Coastal Coordination plan (Regione Liguria) (2000)

PRT - Regional Plan for tourism (2002)

PUD – Plan for land grant use

PTC - Provincial Territorial Plan - Provincia di Spezia (2005)

PUC – General Masterplan – Municipality of Portovenere (2002)

PST- Plan for tourism development Province of La Spezia

Social frame: Participation process on going

"GULF'S LANDS" (Le terre del Golfo): participating the landscape

An experimental research leaded by University of Firenze, together with local Municipalities provides interesting results in term of contents, identity and social cohesion. This research began with participated action in schools and afterwards with residents, in order to collect impressions, conflicts and pictures. The result of these interviews generates the idea that the fragile balance of this area is strongly related to the relationship between the gulf and its hills and hinterland.

A not suitable development model could break the balance that today settles the everyday life of the village, especially under external pressing conditions (a new port, or the gentrification ongoing process); it can also creates new destinies for the area, completely different and far away from the past ones. The research also showed a very strong affect and deep bond between inhabitants and their territory, the sea, the gulf, but also hills and inner parts.

This awareness of the landscape as a resource is also interesting in the opposite sense, as most of the residents acknowledge their belonging to the territory, as inhabited natural system.

4.4.1.4. Conflicts and Threads

In a very small space high naturalistic values of islands and cliffs live together with historical and archaeological heritage, deprived and abandoned areas, quarries and huge buildings.

- A very strong tourism pressure is working on the coastal area, even on the cliffs, actually used by climbers without rules. Access to the islands is actually possible only for Palmaria.
- A strong unbalance between limited available physical spaces and growing request of space, both on the land (houses, parking lots, areas for any kind of activities) and on the sea (Boat lots, moorings, mariculture zones) generates consequent social and economical imbalances.
- A big conflict is generated by the co-presence of boat tourism + intensive beach tourism and abandoned rural villages in the hinterland.
- Tourist pressure brings also the need of facing urgently topics as pollution, the introduction of alternative energy sources, waste disposal and draining of water.
- Military zones contribute to keep the environmental risk low, but these areas cannot be used and often not even seen
- The Park's hills : Rural villages, castles and agrarian landscapes, Hiking tracks system
- The Park's coast (nautical pole, Muzzerone Climbing wall, Portovenere case study)
- The Park's islands (Palmaria, Tino, Tinetto)
- The Park's sea
- Historical/cultural valorisation (military built heritage, recovering the relation with the sea in historical sea villages, historical and architectonic highlights, archaeological sites)

4.4.1.5. Bibliography and methodology

The bibliographic research focuses on official documents regarding sustainable tourism, ICZM and environmental sustainability, from international, national, regional and local sources, in particular, to point out how sustainable tourism, landscape management and beach management are dealt within Integrated Coastal Management. The first part regards an overview on the international context; a special part regards the relationship between environment and architecture, and the role of landscape as cultural heritage. The last part focuses on regional laws and documents, and on the ongoing coastal management regional policies. The link to the original document is provided, when accessible;

Hereby the bibliography index (full content below in the document):

- International official documents: conferences and agreements
- EU official documents
- Italian official documents and conferences
- Architecture and environment: cultural heritage
- Local documents and laws

An inventory of Best Practices and operational guidelines has been set up, in order to find out the most suitable scales to face such issues, the methodologies and the tools to use, either in the analysis, in the planning stage or in the management. The inventory has been subdivided into two chapters

- ICZM IMPLEMENTATIONS – experiences of local coastal partnerships in European coastal zones
- GEOPORTALS, WEB MAPPING AND DATAS

A repertory of the information required has been drafted and compared with the present situation, in order to assess, from the very beginning of the project, the actual data availability and quality, the sources and the eventual costs for their acquisition and adjustment (in terms of money, time, required skills, software, etc.).

4.4.2. Future Activities

With reference to the materials sorted out during the bibliographic research, ICCOPS will establish the criteria for the precise delimitation of the study area. If possible, different criteria will be adopted (i.e. administrative boundaries + physical-environmental aspects + infrastructures development + tourism pressure, etc.), in order to set the basis for an actually integrated approach.

Following, a data bank, both cartographic and not, will be set up to gather and organise the information agreed in the previous phase and that includes different data access and updating options, according with the different users. Once the necessary information is collected, the study areas will be accurately defined. Here, the most critical features, as well as those with higher potentialities will pointed out and, in the following phase, they will be object of specific intervention strategies.

5. The Emilia-Romagna Region (italy)

5.1. General information

The Emilia-Romagna region has an extension of 22,123 Km^2, about 4 million inhabitants and 400,000 enterprises. Main economic activities are food industry, mechanical engineering, industrial machinery, coastal tourism. Regional gross product per capita is about € 23,000, 29% more than the national average. Its coast on the North West Adriatic sea is about 130 Km long, mainly light sandy beaches. Beaches are wide, and attract numerous visitors, tourists and day-visitors. This justifies the fact that the regional tourist industry is one of the most important in Europe. Foreigners are numerous, mainly from the North of Europe.

Nevertheless, the strong seasonal increase (Spring/Summer) of the population has altered the natural equilibrium and the environmental coastal system. Increase of subsidence, reduction of sand from rivers, building of beach defence structures, are causes of the present beach erosion in many areas of the Emilia-Romagna coast.

5.2. ICZM in the Emilia-Romagna Region

The ICZM project about the Emilia-Romagna coastal areas is one of the most important regional projects, because the ICZM constitutes a political response to sustainable coastal development. The coastal areas are considered as a whole system, where different human uses are interdependent.

According to the EU objectives of the ICZM (2000), the project started in 2002. An Institutional Committee, composed by the local territorial representatives, was created in order to establish the guidelines for the future coastal management. In 2005 the Regional Government published the Guidelines for the ICZM (Law No. 645, 20/01/2005).

The implementation of the first public investments according to those Guidelines started in 2006. 13 investments for € 7,8 million will be financed by the Piano di Azione Ambientale. Their main characteristic is the integration of the different aspects of the coast in multidisciplinary projects (physical aspects, erosion, biodiversity, pollution, traditional economic activities such as fishery, tourism, public facilities, and so on).

In BEACHMED some economic aspects of the ICZM is specifically analysed. The main focus is on the estimate in money terms of the sandy beach benefits of a defence project from erosion, in order to obtain data for the CBA. In particular, the Riccione

beach is considered as case-study. More specifically, as regards this Region, the aims are:

- As regards beach visitors, to collect information on the indirect use value, option value and non-use values - that the market does not furnishes - for the Cost-benefit analysis of an artificial defense project about the Riccione beach;
- As regards sunbathing establishment managers, to collect information on their willingness to contribute to the yearly beach maintenance, in particular through specific maintenance works.

5.3. Description of the study site.

Riccione is a well-developed tourist resort on the North-West Adriatic sea near Rimini (figure 8a). Residents are about 34.800.

(a)


(b)

Fig. 8: Riccione beach on the Emilia-Romagna Coast

The beach is of light fine sand. Its direct use value is justified by the well-developed local tourist sector, which is based on the recreational activities on the beach mainly in spring/summer. Its indirect use value is justified by its storm protection and flood control. While option use and non-use values are justified in order to preserve it for future use, future generations and because its exists, respectively. From the recreational point of view, this beach area has the usual traits of beaches in the Emilia-Romagna region, where sunbathing facilities are available on the beach (**Fig. 8b**). Those who visit this beach for 'sun and sea' activities mainly rent sun umbrellas and loungers, and uses bar services.

Tourists mainly stay in hotels. In 2004, the total tourist arrivals were just over 600,000 with a peak in July and August. They stay on average 6 days. Day-visitors are

not officially recorded, but they are numerous, mainly during the week-end. Foreigners are also numerous, mainly from Germany, France, Switzerland and ex-URSS (http://regione.emilia-romagna.it, Osservatorio turistico regionale).

(a)   b)

Figure 9: Riccione beach before (a) and after (b) erosion

The Riccione beach is under erosion and needs to be artificially defended. Renourishment is frequently needed to maintain the sandy beach. Figure 9a shows the beach before erosion, and Figure 9b shows the beach after erosion.

5.4 Present and Future Activities

As regards present activities, we are concluding the bibliographical research. Four countries mainly provide data on non-marketable components of the Total Economic Value (TEV) of beaches: the UK, the US and, in Europe, the Netherlands and Italy. As regards the beach direct use for visitors, data about the UK, the Netherlands and the US range from € 1 to € 92 in Euros of 2001 (Polomé, Marzetti, van der Veen, 2005). In particular, as regards Mediterranean Regions data on coastal use and non-use values are only available for Italy. In particular, within the EU Research 'Environmental Design of Low Crested Coastal Defence Structures' (DELOS), 2000-03, four CVM surveys were carried out in 2002 in some Italian coastal sites: Lido di Dante (Ravenna), Barcola (Trieste), Ostia (Rome) and Pellestrina (Venice) (Marzetti, 2003; Marzetti and Zanuttigh, 2003; Marzetti and Lamberti, 2004; Marzetti, 2006). Data range from € 5 to € 27 Euro 2002 (Marzetti, 2003). In addition, a Benefit Function Transfer (BFT) exists for beach direct use value. For a new site, the BFT uses benefits transferred from other studies (Polomé, Marzetti, van der Veen, 2005). As regards the option value and non-use values, data about Italian beaches does not exist. Goodman et al. (1993 and 1999) estimated non-use values for the quality conservation of the British coast.

With regards to future activities, two surveys by questionnaire will be carried out in Riccione in order to estimate the option value and non-use values of the beach. The economic method used is the CVM. The basic idea under these CVM surveys is: if the benefits in money terms (indirect use value, option value, and non-use values) for a re-nourishment project against beach erosion have to be estimated, the best thing is to ask beach visitors and sunbathing establishment managers to express these non-marketable values by means of a survey. The CVM is applied in the willingness to pay (WTP) version.

Phase B) - From July 2006 to June 2007 two questionnaires (survey designs) will be created according to the research objectives and the characteristics of the tourist site. In particular, as regards the sunbathing establishment managers' survey, specific questions about beach maintenance works will be added to the CVM questionnaire. Two pilot surveys will be carried out in order to test the questionnaire wordings (questionnaire preliminary drafts).

Phase C) - According to the sampling designs, from July 2007 to December 2007, the two main surveys will be carried out by using the final questionnaires. The descriptive statistics and the aggregate values will be computed. The coefficients of the explanatory variables of the willingness to pay will be estimated through regression analysis. Conclusions will be drawn about the survey results, and suggestions about coastal policy-making will be presented.

The results will be: i) original data about the willingness to pay (WTP) for the project, and the main motives of the WTP; ii) original data about the beach maintenance works (such as beach nourishment, defense structures and footpaths from the beach to the asphalted roads) that sunbathing establishment managers are willing to do. As regards the local beach management, data about point i) will be useful for the CBA about the specific project; while data about point ii) will be useful for the organization of the yearly beach maintenance works. As regards Mediterranean beach management in general, the data about the indirect use-value, option value and non-use values could be used for very similar sites to those considered as case-study, and they may contribute to the estimate of a Benefit Function Transfer (BTF) for this kind of non-marketable values.

6. Région Languedoc-Roussillon (France)

6.1. General Information

The littoral frontage of Languedoc-Roussillon consists of a linear total of approximately 200 kilometers and relates to 4 departments and 30 communes. Montpellier, Béziers, Narbonne and Perpignan are the 4 great agglomerations of the area which are located at ten kilometers of the sea. The influence of these agglomerations is notable particularly in terms of density of population. Indeed, 40% of the regional population lived in the littoral communes in 1990; this figure is 55% today. The share of the littoral of the artificialized area is approximately 10%. This increase in the population generates requests increasing for use of natural and rural spaces with a reinforcement of this artificialisation coupled with the character multi-use of the littoral. According to the demographic projections carried out by INSEE, this demographic pressure will be amplified in the years to come with 400000 people moreover by 2015.

The Languedoc-Roussillon littoral was primarily arranged in the years 1950 to 1980. At this period, the sedimentary contributions of the rivers were still important and the natural character of the littoral supported sedimentological a correct operation of the system. Since, the anthropisation of the rivers and littoral, (harbour dammings up, piers, etc) the urbanization of the dune cords, on-frequentation of certain sectors, broke this fragile balance. Although very unequally distributed, retreat of the feature of East coast today quasi-general. This phenomenon is still worsened by the climatic changes (reheating of planet, increase in the number and the violence of the storms) and on a geological time scale by the tectonic evolutions (depression of the delta of the Rhone). In the current state of science, it is not possible to define the exact participation of each one of these factors in erosion, nor to determine their future evolution. However, it is generally allowed that coastal erosion should even continue to be accentuated in the years to come.

Following the awakening of the implications of a ICZM and with the recent impulse given by the EU with the recommendations to the Member States for the adoption of strategies national (the European Parliament and the Council of Europe, 2002; DIACT and SGMer, 2006), the will to register the public policies of the littoral from this point of view materialized by several legislative and lawful evolutions in France (Lozachmeur, 2005). The Interdepartmental Committee of Installation and Development of Territory (CIADT) of July 9, 2001 was thus the first place of reference of a GIZC at the national level (DIACT and SGMer, 2006) and promoted logics of projects and

partnerships which exceed the policies based on the regulations. In addition, a subparagraph relating to the ICZM was added to the L322-1 article of the Code of the Environment. In February 2004, the State finally adopted a “new framework for the policy of the littoral, based on an approach of ICZM which aims at supplementing the inciting and lawful approach controlled by the State by a partnership and contractual approach largely associating the actors concerned and privileging the integrated local projects” (DATAR, 2004; Lozachmor, 2005); logic is that “of a territory, a project, a contract”. From an operational point of view, the CIADT of September 14, 2004, in bond with CIMer of April 29, 2003 and February 16, 2004, launched the call to projects for a balanced development of the littoral territories by a ICZM. This call to projects is from now on effective with 25 projects in progress giving place to experiments and transfers of good practices. Lastly, the law of January 23, 2005 on the Development of the Rural Territories (DTR) created the Littoral National Council (CNL), which was installed on July 13, 2006, and whose framework of action is explicitly that of the ICZM.

The French strategy of definite ICZM is a strategy on three levels, i.e., national, regional and local, by developing with each level of governorship a coherent vision for the coordination of perceptions and waitings of the actors as well as their actions. The committed process is that of the territorialisation (DIACT and SGMer, 2006). The governorship associates all the actors all the levels. It is a question “of thinking integrated, of acting sectoriellement” with shared diagnoses, action plans defined jointly, structures of coordination as well on the level of the decision as to that of the actions, and a representation adapted of the actors to each level of governorship. Nevertheless, Interdepartmental Management with the Installation and the Competitiveness of Territories (DIACT) and the Secretariat General of the Sea (SGMer) (DIACT, 2006; DIACT and SGMer, 2006) stress that the culture of the governorship implies a not very familiar pedagogy with the administrative and centralized tradition French.

6.2. ICZM in the region

National program of ICZM on the bearable development of the coastal territories (DIACT and SGMer, 2006), 2 projects are currently in hand in the Languedoc-Roussillon area, C. - with-D., the site of pilot of lagoon of Thau and the regional normal park of “Narbonnese”.

Mainly Sandy, the coastal zone of Languedoc-Roussillon of area is prone to coastal erosion because of the human pressure which took place in years 1960: the creation of the sedimentary cells independent decreasing the passage of the sediments, damming up to the top of the littoral rivers, pillars lodge, the urbanization of the dune

cords, to visit beaches. Until 1990, the response to coastal erosion was local by the tools for protection which only made to defer the erosion moreover. It is fundamental to control the coastal erosion in an integrated way. This stage passes by management sciences shared by all actors of the littoral. In 2001, the French government decided to reinforce his participation by creating an agency of planning MIAL-LR (in Area Languedoc-Roussillon d' Interministérielle of Installation of the Littoral of mission), a tool for association of reflexion, the coordination and the support of coastal planning and management. MIAL-LR had a triple objective: to federate the actors of the littoral around a bearable programme of development of coastal zone; to facilitate the execution of the plan; to bring a response to the identified stakes. 27.8 million budget of € was assigned for the execution of the bearable programme of development of coastal zone between 2000 and 2006.

6.3. Description of the pilot site

The pilot sites of the study are localised in the Department of Herault. These sites should in particular be those of: (A) Lido de Sète with Marseillan, (b) Littoral of Orb to the Aude, (c) Gulf the Acute ones Died, (D) Lido of Villeneuve-lès-Maguelone with Frontignan Peyrade. However, of the meetings must very quickly take place with the Council General of Herault to fix these sites definitively.

Figure 10: The pilot sites located in the Region Languedoc-Roussillon.

6.4. Future Activities

For the University of Montpellier 1, Phase A of the project gave place to the preliminary bibliographical analyses aiming refining the positioning of the study, identifying the theoretical tools being able to be mobilized and at specifying the methodological step in order to establish a methodology common to the various countries (Phase B). This first stage covers three axes with work: the characterization of the physical processes of erosion; the regional inventory of fixtures of the needs and installations; and, the synthesis of bibliographical work in the field of the economic evaluation applied to erosion and concerning the implementation of the ICZM.

The principal results reveal that:

- The erosion of the beaches concretely results from the joint action of the winds, the swell, the tides and the storms, mechanisms which must be apprehended on a scale broader than the beach to integrate storage and the destocking sections of sand located upstream (before dune) or downstream (left immersed) of the beach. The taking into account of these multiple interactions results in denouncing the interventions carried out within a purely administrative framework (Paskoff (2001), quoting Costa (1997)) and to define a perimeter of physical management called “sedimentary cell”. The taking into account of the sedimentary cells makes it possible to take account of the direction of the currents of the littoral drift related on the dominant winds and the configuration of the cord (presence of rock courses or harbour works creating of the accretion zones) and to cut out the littoral in relatively autonomous compartments from the point of view of erosion. A sedimentary cell can thus be defined like “a homogeneous cell from the point of view of the nature of the natural phenomena of operation of the mediums” (Richard, 2005). In Area Languedoc-Roussillon (LR), fifteen cells were defined on the basis of scientific study of dynamic sedimentary. A cartography connecting the types of erosion and the levels of stakes per sedimentary cell was established within the framework of the strategic study of coastal erosion in Area LR (MIAL-LR, 2003). This work made it possible to identify fifteen sedimentary cells (including seven for Herault (five of sandy type and two of rock type)) and eleven priority sectors;
- About the economic value of the beaches, those being regarded as natural credits, very many work concern the relations between the forms of property and the effectiveness of the policies and the management tools which are implemented. Compared to the potential conflicts which can intervene according to the appropriation of the resources, Brennan (1998) thus offers to us a typology of

synthesis of perceptions of the whole of the recipients. As Bower and Turner (1998) point out it, the analysis of degradations of the coastal zones falls under the logic of the environmental economics and can be interpreted like the consequence of a failure of the market or public intervention. The review of the literature made it possible to identify a certain number of work making it possible to go further with the level of methodologies from analysis from the value from the littorals and or from the beaches (Whitmarsh and Al, 1993; Daniel and Abkowitz, 2003; Fabiano and Al, 2004; Micallef and Williams ((1) and (2), 2004);

- Concerning the policies of management of coastal erosion, we can distinguish two great phases in traditional management from the phenomenon of erosion. Let us stress that this division partly covers a more general partition observed for the environmental policies, with the passage of (I) political aiming at controlling the effects (some speaking about symptoms (Larrue, 2000)) and being characterized by the measurements partitioned with (II the) political ones relating to the causes or sources of the dysfunctions which result in reformulating the problems to apprehend the whole of the mechanisms in a systemic logic. This second wave of policies is at the origin of the appearance of the concept of integrated management. Among the alternative methods, Phillips and Jones (2006) evoke the breezes blades immersed which reduce the force of the waves, the ear fields which support the deposit of sediments but especially the techniques of nourrissement of the beaches, of which they propose multiple examples of successes resulting from the literature, the such rehabilitation of the beach of Miami which had practically disappeared in the Sixties ten described by Houston (2002). This review makes it possible to show that the adaptation of the size of the sediments brought constitutes a factor of success;
- The development and the implementation of the policies of management of coastal erosion evolved/moved under the influence of the generalization of the approaches claiming GIZC. Among work treating of the GIZC (OECD, 1993; COI - UNESCO, 1997 and 2001; Dauvin, 2002; UICN, 2004; DATAR, 2004; CESR Brittany, 2004; PNUE, 2003) very few are those which approach explicitly and in a detailed way the question of coastal erosion. The question of erosion when it is evoked intervenes especially on the level of the reports as for degradations observed. On the other hand, it quasi totality of recent work on the policies of management of erosion (and the risks of immersion navy) evoke the interest of the policies of GIZC of which they are claimed to preach an evolution of the approaches of the management of coastal erosion. Several entries or stakes are privileged according to cases': the implementation of the GIZC in a logic of anticipation of the effects of the change

climatic (Brown and Al, 2006; Hansom and Al, 2004); the implementation of the GIZC in order to reconcile tourism and protection (Phillips and Jones, 2006); the implementation of the GIZC centered on the synergy of methodologies in order to apprehend the interactions (Koutrakis, 2002; Koutrakis and Al, 2003; Lamberti and Zanuttigh, 2005);

- Contributions for the development of a protocol of GIZC centered on the coastal erosion and floods. Part of the study supposes to evaluate the last policies and to work out a protocol of implementation of the policies of management of the coastal erosion which satisfies the spirit and in the conditions of the GIZC. In addition to methodological work relating to the GIZC which was studied above, two bibliographical research orientations were privileged: interactions between uses and conservation to answer the logic of conciliation between tourism and erosion (AFIT, 2000); and experiments of development of the indicators of durable development which cause possible transposition and teaching for the indicators of GIZC (Villalba and Al, 2005; Boutaud, 2005).

The next phase must give place to the definition of a common methodology with several partners of measurement 3.2 in order to evaluate the perception of the risk related to coastal erosion and perception associated with the mechanisms of defence against coastal erosion. Surveys of ground will be carried out into the pilot sites and of the indicators of GIZC will be defined and tested.

For (BRL), the following activities during Phase A, were:

- The inventory of the data available with four sources of information were identified : regional numerical data, data resulting from regional documents of planning and general studies, data resulting from studies local sets of themes, the construction of an important bibliographical data base on the ICZM in Languedoc Roussillon.
- A reflexion on the classification and the synthesis of the was created considering the functional objectives of the final tools. Possibilities of interrogation will be geographical, by themes (physicall and human themes), and will treat about ICZM themes. On this last point, themes would make it possible to answer littoral actors problematics.
- Exchanges and meetings with the General Council of Hérault and the University of Montpellier 1 were carried out for the definition of indicators on the economic value of the beaches, where several relevant topics were identified: beach attendance, the beach management unit, the ground added value.

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