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

SUMMARY OF PHASE B REPORT

In English

Kavala 2007

Summary of Phase B Technical Report
Summary

3.2. ICZM: Setting up of operational strategic studies for beach maintenance and reconstruction

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

During Phase A of the Beachmed-e subproject 3.2 ICZM-Med all partners involved, selected the pilot sites where they were going to work and described the current situation as regards the Integrated Coastal Zone Management (ICZM) aspects in all pilot sites. Moreover the methodology of each partner activities was given. Overall 4 pilot sites were selected in 3 countries (Greece: Nestos Delta coastal zone; Italy: Riccione on the coast of the Emilia-Romagna Region, Tarquinia beach in Region Lazio, Riviera del Beigua & Porto Venere in Region Liguria, France: Région Languedoc-Roussillon).

The Phase B of the Beachmed-e subproject 3.2 ICZM-Med was dedicated to the identification and use of the coastal state indicators to describe the state of the area, to establish management intervention criteria and to select tools (e.g. GIS, economic tools, etc.) that can be used in the Integrated Coastal Zone Management (ICZM) of the pilot sites selected during Phase A. The indicators or tools selected by each partner were mostly based on the expertise (biologic or economic) of each partner. However, common activities were also chosen in collaboration between all partners (e.g. common

questions in questionnaires) in order to see the perspective of the users and stakeholders of these areas on the coastal zone, its management and the impact of erosion.

During this phase, a preliminary GIS map was created by FRI, ICCOPS and BRL (partners 1, 6 and 8 respectively) that contain all the available information related to coastal zone management of the selected site in different layers. Questionnaire surveys were carried out by FRI, DISTART, DIPTERIS, ICCOPS and UNIMOT (partners 1, 2, 5, 6 and 7) in the selected areas in order to evaluate the stakeholders' perceptions of coastal erosion, ICZM Economic evaluation, public policies. Lastly, the study of beach use value and how beach protection policies could be financed and the social and economic benefits generated by the beach nourishment are investigated by DISTART, Litorale SPA, DECOS and UM1. Also the identification of critical locations as well as locations with high potential for sustainable development is investigated by ICCOPS. UM1 also defined the methodological tools regarding the research protocol and questionnaire survey. Finally the creation of coastal zone monitoring system in order to view easily knowledge elements to help the institutional managers in the Integrated Coastal Zone Management is essential.

2. Methodology

At the beginning of the project it was proposed that each partner should investigate different aspects of the beach management, such as ICZM perception, economic evaluation and benefits of beach nourishment projects. However, as mentioned before common activities for ICZM and coastal zone erosion perception was decided (Alexandroupoli, November 2006) and formulated in questionnaires in a meeting held in Genoa (February 2007) to be applied by all the partners of the 3.2 ICZM-Med subproject. In order to investigate the perception of ICZM and coastal zone erosion, questionnaires with common questions for all partners was decided to be applied to Beach Users and Public Stakeholders in each pilot site.

End-users' perception plays a pivotal role for a sound environmental planning and management and thus beach users analysis constitutes an important component in defining beach management policies (DAHM, 2003). Thus, it was decided that the questionnaires of all partners, regarding the beach users, will include 12 common questions related with the "perception" of different parameters related with ICZM and with the "Willingness To Pay" (WTP) aspect. The "perception" aspect will be described in 4 different sections: a) Coastal Zone perception, b) Integrated Coastal Zone Management perception, c) Coastal erosion perception and d) Coastal Defence Systems perception.

Some partners (P3, P4 and P5) already did it during summer 2006, each one with specific aims mainly related with local issues. During the Genova meeting, thus, it was decided that the questionnaires of all partners, regarding the beach users, will include 12 common questions related with the "perception" of different parameters related with ICZM and with the "Willingness To Pay" (WTP) aspect. The "perception" aspect will be described in 4 different sections: a) Coastal Zone perception, b) Integrated Coastal Zone Management perception, c) Coastal erosion perception and d) Coastal Defence Systems perception.

Regarding the Public Stakeholders it was decided that the questionnaire will also have the same sections, but the questions will be more detailed. Main goal of all partners was to apply a "pilot" stakeholders' questionnaire until the end of March in order to see the drawbacks of the methodology and of the questionnaires in order to correct them. The questionnaires will be used firstly in face-to-face interviews with people from the a) Region, b) Prefecture c) Municipality; if the necessary number of questionnaires

were not collected then the survey would be extended to other institutions such as Universities and Research Institutes. It was decided that each partner was going to apply a minimum number of stakeholders' questionnaires (20) till the end of Phase B, in order to present preliminary results. The rest of the questionnaires will be collected during Phase C.

Apart from the above common questionnaires, DISTART has created two specific questionnaires with the aim to collect data about the voluntarily willingness to contribute of beach visitors and sunbathing establishment managers for coastal defence projects (MARZETTI and LAMBERTI, 2003; POLOMÉ, MARZETTI and VAN DER VEEN, 2005; MARZETTI, 2007). This kind of survey is the first applied in the Region of Emilia - Romagna. Another innovation is the inclusion of specific questions about what beach visitors and sunbathing establishment managers know and think about the ICZM and its application in the Region. Through this methodology, the Region aims to collect information on the possibility to create a public fund for beach defence, and to understand what these stakeholders think and suggest about the implementation of coastal defence projects which also satisfy stakeholders' needs.

Another step in the project consists in the proposal and first application of specific indicators for the assessment of coastal state. Particularly, DIPTERIS applied two different approaches, one referred to specific indicators for beach management assessment and the other one focused on the environmental sustainability level of coastal municipalities and bathing activities.

As regards the indicators with local relevance ICCOPS is calculating them for the municipalities of the "enlarged" study area in order to allow a comparison. To better fit the specific features of the selected coastal area, some of the indicators have been customised, also introducing slight changes to the indicator's measurement.

In Fig 2.4.1 is an example of how an indicator has been calculated, trying fit the specific study area and at the same time to comply with the need to be applicable to different coastal areas. The indicators have been calculated with alternative geographic criteria in order to find the one most consistent with the geographic features and morphology of the examined area

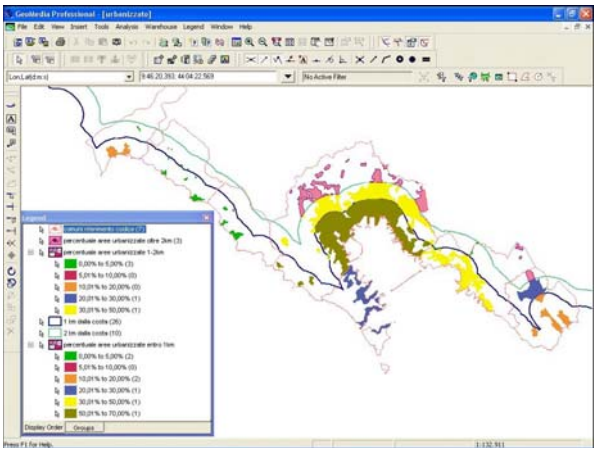

Figure 2.4.1. Example of how an indicator has been calculated for the Region Liguria

A methodology for value assessment related to the direct and indirect uses was applied by UM1. There was an effort to estimate to what extent the users, value the beaches, even though they are not aware of many indirect uses. The study is rather focused on coastal erosion perception and on public policies assessment as well as ICZM. In addition to the plurality of the functions and objectives to which public policies must answer, the trend of decentralization and governance stresses how the people must participate to improve decision-making. Only a few analyses, which deal with the assessment and the perception of coastal risks and vulnerability by the stakeholders, have been made. In France, within the framework of the National Program for Coastal Environment (PNEC), a methodological grid was designed in this direction making it possible to evaluate at the same time the risks and the stakes with regard to coastal pollution and erosion in terms of indices of vulnerability (MEUR-FÉREC *et al.*, 2002; MEUR-FÉREC and MOREL, 2004). In the same way, a few analyses study the

representations by the stakeholders and people of ICZM, and the assessment of public policies from an ICZM point of view. The aim of the current research is to validate and promote actions carried out to enhance coastal zone protection and planning: on the one hand, whilst improving the knowledge and the understanding of the local population and tourist of coastal erosion processes; on the other hand, whilst promoting long-term concerted actions.

3. Results: ICZM activities and Tools

3.1. ICZM – Coastal erosion –Defence system perception (Tools – questionnaires)

3.1.1. Institutional coastal stakeholders' survey

During the second phase (Phase B) of the project the stakeholders' survey was carried out by FRI during May – June 2007 using the common questionnaires that were formed during the meeting in Genoa. These questionnaires were addressed to key institutional stakeholders involved in coastal management and were focused on ICZM, coastal erosion and defence systems. Since it was difficult to find public servants to work especially on coastal zones, there was an effort to find people that are work on environmental and water resources issues. These stakeholders were identified in the three-tier administrative structure, based on "General Regional Secretariats" ("the Regions"), "Prefectural Authorities" ("the Prefectures") and the Municipalities. In general 7 people in the Region of East Macedonia and Thrace that are related to environmental and water resources issues (2 in the Department of Environment, 2 the Department of Fisheries and 2 in the Department of Water resources) were identified. In the Prefecture of Kavala 1 person was found in the Department of Environment and finally another 8 people in the Municipalities of Kavala, Chrisoupoli and Keramoti (2, 3 and 3 respectively). Unfortunately, not all of them were willing to be interviewed using the questionnaires (the request was forwarded from the FRI and not from the Region of East Macedonia & Thrace). In total 9 questionnaires were filled in, 8 from the Municipalities of Kavala, Chrisoupoli and Keramoti and 1 from the Region of East Macedonia and Thrace. As preliminary results the general impression is that the majority of the public servants knew in general what coastal zone and coastal erosion are, but on the other hand the majority of them don't know what ICZM is or which organization is working on ICZM and there is little knowledge on the existence of legislation relative to the ICZM. However they believe that there is a need to enact laws for the protection of the coastal zone. The majority believes that the lack of knowledge on the ICZM is due to the little or no acquaintance from organizations that work on coastal zones and there is the suggestion of a closer co-operation between the Municipalities, the Region and the Ministries. Finally everybody believed that there is a need for the installation of a Coastal Defense system in the area (Nestos Delta River).

The survey about public stakeholders in the Emilia-Romagna Region was administrated by DISTART in May/June 2007. 20 interviews were made by a well-trained person. As preliminary results we highlight that the great majority of respondents know what ICZM is, and they are aware that a more adequate legislation (at national level too) on the topic is needed. A certain number of these respondents highlight the need of more coordination amongst the Emilia-Romagna Region and local policy-makers. In addition, about 40% of respondents state that private stakeholders could give monetary contributions, and about 30% state that private stakeholders, such as sunbathing establishment managers, should also contribute by doing some maintenance work.

About the stakeholders' questionnaire Litorale SPA (P3) and DECOS (P4) sent it to 20-30 relevant stakeholders in Lazio Region (Tarquinia beach) in April but the majority

of them considered it quite long and just 1-2 people answered it. The survey will be repeated during the period June – July 2007.

DIP.TE.RIS, in agreement with the other Italian partners, contacted key stakeholders survey of different administrative levels: the Ligurian Region (Departments of Territorial Planning, Environment, Tourism) the Regional Environmental Agency (ARPAL), the Coast Guard, the 4 Provinces and the 6 Municipalities of the pilot study area (Riviera del Beigua). According to the common schedule, 20 face-to-face interviews were carried out from April to June. As preliminary results is it possible to highlight an optimum level of knowledge and awareness about the topics investigated. All the respondents said to know what ICZM is, even if the definitions given vary a lot in terms of completeness and contents; to know what coastal erosion is and to be aware of the presence of problems caused by coastal erosion in their area and of the existence of methods to defend the beach from erosion. The majority of the respondents knew the existence of several laws and regulations concerning the management of different aspect of the coastal zone, but they often highlighted the need for a better coordination among different sectoral laws, suggesting sometimes a unique framework regulation. A lack of coordination between the stakeholders that work on the Coastal Zone Management has been highlighted by the great majority of the respondent, which also thought that the actions that have been taken in the area for the Coastal Zone Management as well as those that have been taken especially in the protection of the coastal from erosion are insufficient.

The stakeholders perception on ICZM and coastal erosion issues was applied in Portovenere by ICCOPS although the pilot site is characterized by a mostly high and rocky coast and where beach tourism, even if is an important issue, is not the main resource of local economy. The questionnaire is going to be submitted to public and private, commercial or not operators from the municipality of Portovenere or from its outskirts, without considering agencies or bodies with a larger territorial competence (Regione Liguria, Province of La Spezia, etc.). That because, dealing with a small and extremely peculiar area, they seemed the most suitable to supply a correct outline. At this regard, ICCOPS has asked the Portovenere local administration to supply a list of those stakeholders more interested in the issue and it is presently contacting the suggested people.

The survey carried out by UM1 tried to investigate public stakeholder awareness of coastal risks, and studies how public policies fall under the requirements of an Integrated Coastal Zone Management (ICZM). It was also the opportunity to collect stakeholder representations of coastal risks, ICZM and sustainable development. This survey was carried out with key stakeholders and public administration representatives of the Region Languedoc - Roussillon such as the State offices, local authorities, professionals, user representatives, etc. The stakeholders were questioned on various scales, i.e., local and regional. About ten or so stakeholders per site were surveyed and in addition ten more key stakeholders on the regional scale. For the stakeholders implied in the steering committees and operations, quantitative information on the costs and a retrospective assessment of the coastal defence structures were also collected. Moreover, the individual and the institutional position of the interviewee were also recorded. The questionnaires collected covered the following issues: the identification of the stakeholder; the analysis of the position and the stakes of the stakeholders' institution through the analysis of the public policy cycle, the meetings of the steering and technical committees, the scales of management, the consultation and the communication towards citizens; the analysis of the representations of coastal erosion processes and its management, beaches, sustainable development and ICZM; the assessment of public policies related to coastal erosion; the access and the level of

information with collected information, the sources of information and the indicators of management; the perspectives.

3.1.2. Beach Users' survey

Regarding the Beach Users' survey, a pilot survey with 10 questionnaires was conducted by FRI to students in order to check the questions. The purpose of this survey, which is not indicative of the pilot site, was to test the questionnaire wording and correct any error that was identified before the application of the survey in July – August 2007.

As preliminary results we could say that the majority of the students answered correct to the question what coastal zone is, while in contrast only the 40% of them knew what ICZM is giving also a correct definition of it, but everybody agreed that all the actions taken in the area for the Coastal Zone Management are not sufficient. Concerning the coastal erosion all the interviewee answered that they knew what it is giving also a correct or partial correct definition. As far as it concerns the coastal defence systems the 80% of the interviewees answered that they knew the various types of coastal defence systems that exist, but only the 50% believe that a coastal defence system is necessary for the protection of the area and showed a preference to the soft defence system, which include the beach nourishment and the Composite interventions (submerged breakwaters, groynes and nourishment).

Regarding the Willingness To Pay (WTP) of the beach visitors for the protection of the coast, the 80% of the of the interviewees consider that the protection of the coast is of high importance or even priority and the 90% of them were willing to contribute economically for protection systems from erosion. Also the majority of them believed that everyone must deal with this issue and the funds for beach protection have to remain public.

From January to May 2007 three pilot surveys for beach users' were administrated by DISTART to students (who are beach visitors) of the University of Bologna in order to test the questionnaire wording about beach visitors for the Riccione / Misano case-study. These tests suggested some modifications to the questionnaire. Even if the three samples of university students are not representative of the relevant population of beach visitors in Riccione/Misano, it is interesting to presents some results. As regards the first survey (21 students – Faculty of Sciences) and the second survey (38 students – Faculty of Economics), the majority of students are in favour of beach defence mainly for visiting the beach in the future (option value) and for future generations (bequest value). These two different groups of university students are on average willing to pay quite the same amount every 5 years. Their mean willingness to pay (WTP) for a beach defence project is 33 € in the first survey and 35 € in the second survey (6.6 € and 7 € per year). As regards the third pilot survey (40 students - Faculty of Economics), amongst the different defence structures the majority of students prefer composite intervention (nourishment, groynes and submerged breakwaters).The second most preferred structures is parallel breakwaters. In addition, the great majority of students stated that the beach defence costs are justified.

Regarding the Users' questionnaire, Litorale SPA and DECOS are focus on the economic benefits generated from beach nourishment (see chapter 3.5). the common questions of the questionnaire formulated in the Genoa meeting will be applied in the period from July to August 2007.

In order to assess beach users' perception, a questionnaire based survey was performed by DIPTERIS in July and August 2006 in the six municipalities of the Riviera del Beigua. The survey aimed at obtaining data on: users' profile (both residents and tourists); general perception and attitude about beaches; preferences and dislikes

factors; specific opinion on different aspects of local beaches; general perception and awareness about themes related to local beach management, such as coastal defence systems and nourishment practices, Blue Flag, environmental awards, waste recycling, resource saving, etc. The questionnaire was properly defined in order to be comparable with previous studies in the area (MARIN *et al.*, 2004). Data from the 600 questionnaires collected have been inserted in a specific database and treated with descriptive statistic. Results (reported in the PHASE B integral report) can be considered typical for big resort beaches, in accordance with specific literature, even if they also highlight specific features, confirming some findings of previous study in the area which are of great interest for beach managers. Results allowed obtaining a first clear picture on "subjective" issues and their integration with results coming from the other "expert knowledge" based analysis will support the definition of local beach management interventions. The new common questionnaire for beach users, which specifically focus on users' perception and level of awareness about ICZM, beach erosion, coastal defence systems and nourishment practices as well as users WTP will be applied in a new survey in the Riviera del Beigua by DIPTERIS during summer 2007.

As regards the Beach users' perception, the questionnaire that is applied by UM1 will provide information related to beach uses according to socioeconomic features, representations of coastal risks, ICZM and sustainable development, as well as the monetary amounts that people would be willing to pay to protect beaches. The questionnaire covers successively: the identification of the users with socioeconomic features; the type of residents by separating people as local residents from coastal municipalities, local residents from non-coastal municipalities / daily visitors, owners of second homes, and tourists; the representations associated with the coastal zone and the uses of the beaches, and goods and services associated with the beaches; the perception of coastal erosion processes; public policies dealing with coastal erosion processes; the Willingness to Pay (WTP) as the daily maximum amount that people would be willing to pay to protect the beaches or the maximum surplus of additional fees which they would be willing to pay. The beach users' questionnaires survey will be applied during July – August 2007 (Phase C).

3.2. Indicators

3.2.1. Identification of indicators for beach management assessment

Considering the central importance of indicators in ICZM, DIPTERIS identified a possible set of indicators to be specifically adopted for beach management assessment, selected on the basis of results from general coastal management literature (deeply analysed in Phase A) and previous local projects (PALMISANI *et al.*, 2004; MARIN, 2006). Particular attention has been given to indicators referring to management and planning activities, able to identify weaknesses and vulnerabilities in beach management, in order to support local policies. Data collection in the pilot area has been carried out for a first test of the indicators.

3.2.2. Environmental sustainable analysis

Coastal zones have to be evaluated in relation with their ability to maintain it in the long run. Thus every approach to the problem needs to be faced in term of sustainability, considering with a whole system approach, all the three basic pillars: economy, society and environment (CICIN-SAIN, 1993). The environmental sustainability of coastal zone has been faced by DIPTERIS by means of two different systemic methodologies: emergy analysis and ecological footprint. The former is based on the determination of the quantity and typology of exploited resources; the latter is a method able to assess the overexploitation of environment due to human activities.

Emergy analysis: The application of the emergy analysis to the coastal zone aiming to assess the importance of the sea in the sustainability of the coastal zone requested some modifications to the standard guidelines draught by ODUM (1996). In the six municipalities of the Riviera del Beigua demographic, economic, geographic and social information have been collected. Dataset analysis and treatment allowed assessing the main fluxes acting in the area. Quantification of these latter brought to the definition of a table for the calculation of the emergy values. For each line in the table an appropriate conversion factor has been identified to obtain the emergy value of each flux and the total emergy requested for the activities performed in the study area.

Ecological Footprint: The Ligurian coastal zone is subjected to high urbanization and high tourism pressure. This condition is reflected in the overexploitation of territory resources and in a overloading on the environment due to crossing of the carrying capacity threshold. The ecological footprint methodology allows calculating the amount of territory directly and un-directly needed in order to supply all the requested resources to the analyzed system (WACKERNAGEL & REES, 1994). This methodology has been applied for the first time to the coastal zone issues. In particular the analysis has been focused on a key sector of the economy of the Ligurian coast: the bathing establishment managements. The analysis has been applied to some establishment in the Riviera del Beigua. The data collection has been performed by means of a suitably developed questionnaire that has been given to the establishment managers.

3.3. Land planning and GIS

Ordinary maps, adapted by various public services, and orthophotomaps were used by FRI in order to represent the current status of the study area (Nestos River Delta with emphasis in the west part of the Delta). The GIS maps were digitized and several layers were created such as coastline, contour lines, River Nestos, lagoons, residence areas, municipality borders, roads, Natura 2000 and Ramsar Site zonation. A Greek coordinate system (Greek EGSA GRS 80) was used in order to register and digitize the maps.

An overview of the study area is presented in Figure 1. Two municipalities are located into the study area: Chrisoupoli and Keramoti. Nestos River is at the east boundary, while Nestos Delta Lagoons are at the south part of the study area. North Aegean Sea is the sea boundary of the region. A national road (Egnatia) goes across the study area.

The study area includes four proposed Natura 2000 Network Sites: GR1120004 and GR1150001 (SPA) and GR1120005 and GR11550010 (pSCI). These sites are presented in Figure 2. Moreover the study area is part of the ‘National Park of East Macedonia and Thrace ‘. Land use areas (3 zones and the airport) were determined by this legislation, which are presented in Figure 3.

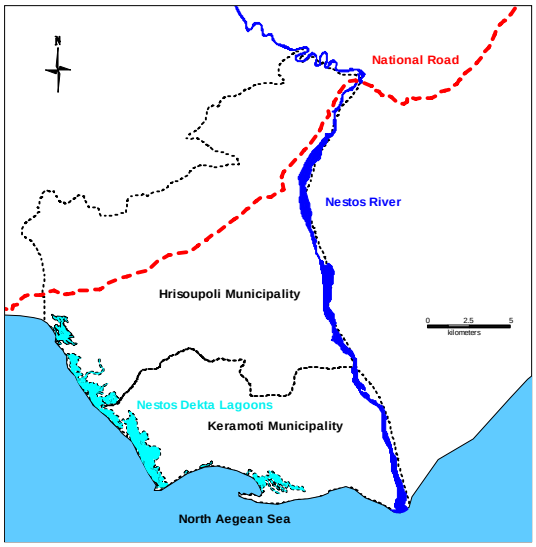

Figure 3.3.1. Overview of the study area

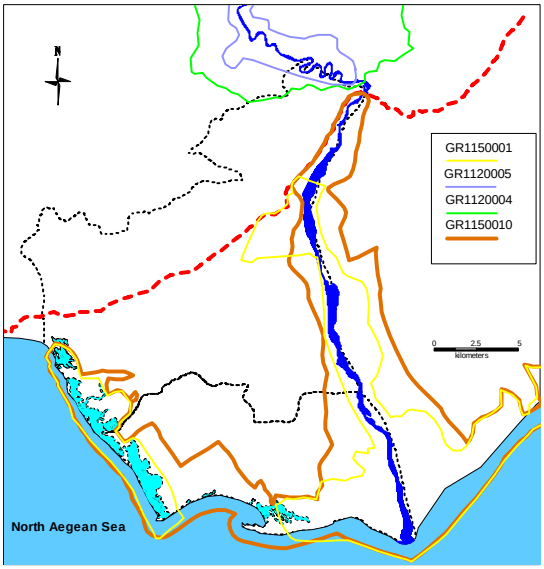

Figure 3.3.2. Natura 2000 sites

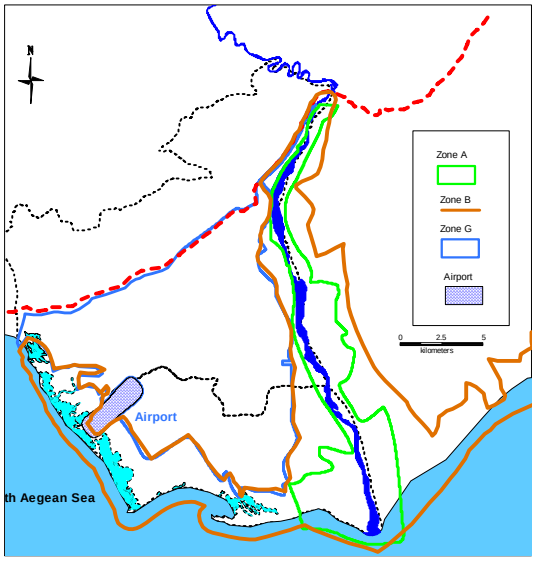

Figure 3.3.3. Land use areas according to Greek legislation

Another study area that was chosen to use GIS for land planning by ICCOPS is the Regional Park of Portovenere, Palmaria, Tino and Tinetto, within the Municipality of Portovenere (Italy). However, in order to have a clear view / understanding of the actual issues it is necessary to extend the analysis to a larger area. Whilst in territorial planning administrative boundaries are usually the base units for interventions, in ICZM more general criteria are needed in order to delimitate the intervention areas. Geomorphological, ecological and human features were considered and boundaries drafted, according with catchment basins, altimetry, ridges, coastal ecosystems (natural and semi-natural), coastal settlements, administrative boundaries and maritime jurisdictional boundaries.

In order to facilitate the visualisation and comparison of the acquired information, a GIS has been set up, using the software Geomedia Professional by Intergraph. Such decision has been taken also to conform this work to the information system used by the Regione Liguria administration, and to support the subsequent use and diffusion, also via web, of the project's results. The delimitation of the study area has been set up

mostly using shareware data downloaded from the internet and some already available materials. In such a way, a general framework base has been created, on which to tune the acquisition of more specific data and materials from the owner agencies. This part of the analysis refers basically to the scale 1:100k.

Analysis methodology: A lot of information relevant to coastal issues is already available: then, a survey of available data banks about the study area has been led to organise the existing materials according with the provisions of ICZM and the European Landscape Convention. Three types of land use have been identified and mapped: urbanised areas (residential settlements, industrial areas and services), farm and rural areas, areas mainly characterised by low human pressure (e.g. protected or, more generally, non urbanised areas). It is important to point out that due to agriculture abandon there are many "transitional" areas, where the original wood is taking back its place.

At this stage, most of land use information has been drawn from Lacoast and Corine maps (1:100k), actually a small scale -errors are possible in results- which however allow comparing land use in 1975, 1992 and 2000. For update and detailed view of the study area land use the 1:10k map by Regione Liguria is used in the subsequent step. Meanwhile the acquisition of general data continued, to enlarge the base where to integrate the specific materials.

Statistic data have been collected for different aggregations and linked to cartographic data. The data have been visualized through thematic maps whenever possible and on such base, the data to complete the detailed analysis (1:25k and 1:10k) have been identified and required; their acquisition and GIS upload is in course.

Some analysis ambits have been already defined, to which refer to identify the more critical situations and the best potentialities; they refer to natural features, human activities, cultural aspects, planning. The detailed analysis is expected to restrict the addressed area to focus the main one (Portovenere Regional Park). Finally the information processed by GIS will be synthesised to identify situations for a management intervention, with the related context. In its end the work is expected to suggest some ways for of implementing the existing planning tools and making them as consistent as possible with the ICZM.

If in the first part of the research information has been collected "from outside" in order to outline an as objective as possible panorama; in the final one view "from inside" becomes necessary to identify the action fields for a management action. At this regard the Municipality of Portovenere (the Agency charged of the Portovenere Regional Park management) has been contacted for validation and supply of local data very important for the project.

3.3.1. Development of the coastal zone monitoring system

The main objective of BRL is the creation of a coastal zone monitoring system in the Region of Languedoc – Roussillon in order to assist the institutional managers of the Region towards the implementation of an Integrated Coastal Zone Management. Thus it is an innovative decision support tool which will include all the available information for coastal zone in the Region. Data collected in phase A by BRL were synthesized in a grid to estimate the cover set of themes and geographical glaze. In function, missing data were seized, collected and also digitized in the SIG. These data were harmonized geographically and in their structure: file format, file projection, etc. for a full integration in ArcGis.

The coastal zone monitoring system was created with the following properties:

• The GIS database is a “géodatabase” ArcGis structured in several topics. All the geographical data (125 layers) are described in a data dictionary: date, source, geographical influence, description of the data assignees, cartographic projection.
• ICZM documentation base was developed starting from a bibliographical study which counts all the studies, the organizations, people resources and data sources on ICZM in Languedoc Roussillon. 11 main strategic ICZM trends were formalized like menus unrolling in the observatory: land policy and littoral urbanization, maritime public domain and regulation, methodology for the ICZM, littoral tourism, maritime economy, economy of the littoral, littoral inheritance, quality of water, resource water, natural and technological disasters, displacements. These menus make possible to consult all the dependent collected documents.

Functionalities were developed in the language Visual Basic 6; they appear like drop-down menus in the GIS ArcGis and exploit the geodatabase developed for this project. The developed drop-down menus are:

• Themes of the physical environment, human, naturalness which makes it possible to display 125 cartographic layers and its associated information,
• Alphanumeric documentation base which makes it possible to consult topics GIZC starting from introductory form (HTML) which link studies, institutional photographs, measurements, contacts in .doc, .xls, .pdf, .zip, .jpg format.
• Localization drop-down menu was developed to make zooms centered on administrative entities (county, town) or physicals entities (sedimentary cells, sectors),
• “Tools” drop-down menu allow the user to create his own set of themes and to add it in the drop-down menus.

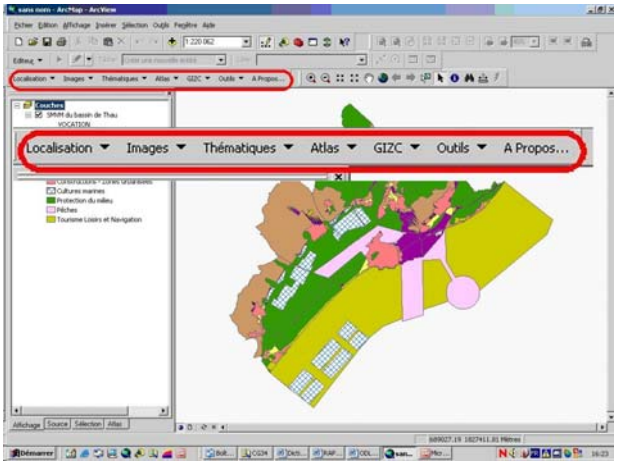

Fig.3.3.1. The coastal observatory developed in ArcGis take the form of a toolbar

Fig.3.3.2. A sample of the ICZM database integrated to the coastal zone monitoring system

3.4. Economic values: benefits generated from beach nourishment

Litorale SPA and DECOS were involved in the estimation of the benefits generated by a nourishment project by using Economic values.

Of particular relevance are the following values related to the nourishment project:

1. producer surplus of hotels;
2. producer surplus of bathing establishments (Eurobuilding and Nomisma, 2004);
3. indirect benefits stemming from erosion damage reduction (present value of the damage avoided) (Defra, 2005);
4. indirect use value of the beach; two values are assessed: one refers to the beach access (by use of the travel cost method) (Parson, 2003; Bell and Leeworthy,

1990); the others to the willingness to pay for maintaining the beach at an extension giving the maximum utility to the consumers (Bell, 1986).

As regards the methodology, economic values described in the following paragraph reflect individuals' willingness to pay for direct and indirect benefits. Therefore the economic valuation does not refer to an exchange of money or to a price, but its goal is to convert "utility" or "well being" into a money.

The social-economic analysis is completed by the Litorale spa investigation of the plan for the use of the Tarquinia Lido littoral domain (PUA). This contribution aims at defining:

1. Analysis of the P.U.A. regulation;
2. Net Value State property parameters;
3. P.U.A. load capacity;
4. Blue Flag Parameters;
5. Perception by end users and customers of satisfaction level.

3.4.1 Results of the economic analysis

The three main benefits achieved through direct and indirect economic techniques are:

1. the bathing establishment producer surplus;
2. the prevention of loss of assets (fixed asset on the beach);
3. the consumer surplus of the beach access and the WTP to maintain a wide beach.

Incremented economic value of the bathing establishments induced by the nourishment: For the whole Lido (26 establishments) nearly 1 million euros (€ 1,000,000) may be considered the average producer surplus generated by the project. The value per square metre of the beach is close to € 20, as already assessed by Nomisma for the summer season 2003-2004. *Methodology used: producer surplus*

*Storm damage reduction and coastal erosion benefits arising from the nourishment:*The damage avoided by the nourishment project is 9-16 million euros, according to three nourishment scenarios, delaying the erosion 13, 26, and 39 years, respectively.

Incremental value of the beach for consumers – access value of the beach: Consumer surplus is (CS) is € 23.85 for overnights and € 5.53 for daily visitors, respectively. The access value for the whole beach is € 3,100,00, according to our beach presences estimate. *Methodology used: travel cost method.*

Willingness To Pay and preference for the beach nourishment: The optimal beach enlargement which gives utility to the consumer is 54 metres. The consumer surplus per person per season is € 36.83, while the CS per day is € 1.05. Methodology used: stated preference method.

Summing up the present value of the producer and consumer surplus gives a total benefit of 49-80 million euros, for a nourishment project lasting 15-45 years. The discount rate used is 6%. Conversely, in the analysis of the various indicators concerning the "Demanio" beach assets, it is interesting to note that the average concession cost is equal to 4,88 euros per square metre per year. The concessions for establishments (58), during 2005, have created a total income of 86.222,53 euros. This figure, if compared to the producer and consumer surplus estimate of the bathing

establishments, highlights a situation in which the amount of State property royalty is paltry compared to the productivity of bathing establishment. This calls for thought at a time in which costs for nourishment are increasing.

3.4.2 Social and economic analysis of the P.U.A. regulation

The introduction by Lazio Region of regulation D.G.R. 2816/1999 contains the code for the management of beaches (Plans for the Use of beaches, hereinafter "P.U.A."). The regulation highlights its nature as a planning and socio-economic instrument (Comune di Tarquinia, 2004; Dipartimento territorio regione lazio, 2006;)

The Tarquinia P.U.A. consists of 18,70 kilometres of coast, out of them 2,63 in domain concession. The concessions for establishments are 58 and during 2005 they have created a domain income of 86.222,53 euro. In the analysis of the various indicators concerning the "Demanio" beach assets it is interesting to note that the average concession cost per square metre is equal to 4,88 euros per year.

At the moment the total gross load capacity (1.11) is very low; this fact is substantially influenced by the great extension of the coast and the low number of inhabitants (15.162). One must in fact remember that the Municipal district of Tarquinia is one of the largest in Italy and the tourist movement is not completely consolidated, as shown by a drop in arrivals. The net capacity (7.93) calculated for coasts in concession increases more than proportionally with respect to the gross capacity, but it is always less than in other Lazio coast resorts. All this can represent a good starting point for the implementation of integrated coastal management policies. It must be noted that in the gross and the net capacity the movement of day-trippers is not included in the computation (it can only be obtained through estimates.

In order to achieve the aims set by the project, it is important to implement, within the instrument for the planning of beaches (P.U.A.), the parameters for obtaining the Blue Flag. The blue flag awards for the Tarquinia beach would represent a first indication of the implementation of the methodology of integrated coastal management policies.

The analysis highlights that the system of beach concessionaries has a greater observance of the Blue Flag parameters than public beaches. The local administration has to reinforce the system of sustainable mobility in the territory, including the coastlines and consolidate the safety and the right to use the public beaches according to the existing P.U.A.

3.4.3 Perception by end users and customers of satisfaction level

During the summer 2006 "Litorale spa" carried out a survey in the Tarquinia area, with regards both to concessionaries and to tourists. The survey aims at disclosing the level of satisfaction of both residents and tourists with regards to policies for the use and the nourishment of shores. The survey, which was carried out during the months of July and August, has highlighted problems and critical points.

Level of preference for beaches. The analysis of the interviews highlights a trend which points preferences towards beaches with facilities, both by tourists and locals, the latter having a higher propensity towards public beaches.

Level of beach facilities. More than 66,66% of respondents find the level of facilities to be good or excellent and only 10% find the facilities unsatisfactory

Level of perception of inconvenience factors. According to the survey, the main factors of inconvenience perceived by beach users, are mainly concerned with two variables: the cost of services and the lack of entertainment offer

Degree of knowledge concerning beaches. The survey indicates a high degree of ignorance concerning the methods of beach use and relative applicable laws both in tourists and residents.

4. Future activities

During Phase C the work will be finalised to meet the actual needs of each area. The main activities of the ICZM-MED partners will be: users' face-to-face interview with common questionnaires in summer 2007 in the pilot area; identification of a common methodology for data treatment of the results from both users' and stakeholders survey; designation of a common contribution for the definition of a specific indicators on ICZM performance and for general guidelines for beach management, with the support of PAP/RAC. Results will be divulged and discussed with key local stakeholders in order to identify future policies and possible management interventions.

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