The Changing Coast
LITTORAL 2002
6th INTERNATIONAL SYMPOSIUM
PROCEEDINGS

A Multi-Disciplinary Symposium
on Coastal Zone Research, Management and Planning
Organized by EUROCOAST-Portugal Association
Porto, 22-26 September 2002

VOLUME I

EUROCOAST – European Coastal Zone Association for Science and Technology
&
EUCC – The Coastal Union

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2002
INTERNATIONAL SYMPOSIUM LITTORAL 2002
PORTO
SEPTEMBER 22-26, 2002

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Measuring, Monitoring and Managing Sustainability in Indian Coastal Areas: The Socioeconomic Dimension

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Abstract
Some of the most profound changes in the littoral have arisen from direct decisions by man concerning land use, and these have affected both the quality of environmental resources, such as soils and water and the sustainability of coastal ecosystems. Land use decisions in coastal areas are based on opportunities and constraints affected by both biophysical and socioeconomic drivers, being land use and land use changes one of the main issues integrating the large debate on sustainable development. The need to integrate natural and social sciences in order to identify questions and eventually find solutions, concerning measuring, monitoring and managing the development of coastal areas has been the main purpose of the interdisciplinary research project held in India: “Measuring, monitoring and managing sustainability: the coastal dimension”. The research was conducted in accordance with the Driver-Pressure-State-Impact-Response framework and the main drivers analysed were tourism, intensive agriculture/aquaculture and industry.

1. INTRODUCTION
In historical terms, coastal locations have been the favourite destination of population movements for defence, commercial and other economic reasons. About 20% of the population of India lives in coastal areas, a larger percentage of this being in coastal cities, such as Mumbai, Chennai and Calcutta. One of the major factors responsible for the degradation of coastal ecosystems is the growth in human population that requires space for settlement and other resources, like soil and water.

The need of Integrated Coastal Management in India is well known, on account of the growing population pressure due to accelerated urbanisation, itself fuelled by demographic growth and industrialisation. Fragile coastal ecosystems are simultaneously attacked by organic and chemical pollution and the degradation of natural resources is sometimes irreversible. In fact, coastal zones are vulnerable areas in different parts of the world, but in developing countries the impacts of degradation can be worse than in other countries.

Sustainable development demands an integrated and interactive approach that allows for the understanding of the complex relationship between society and nature, simultaneously respecting human rights and assuming that environment is a vital dimension of the future of the human kind. The need to consider equity, security and environment as key elements for the definition of sustainable development is defended by N. Lourenço (2001).

Moreover, the complex and conflicting interactions of social equity, human security and environmental sustainability within the social process of shaping and building development for present and future generations are important issues to address.

Scientific and technological knowledge can make a significant contribution to alleviate and eventually prevent the unsustainable use of natural resources, such as those of coastal zones. There is a need for research on how societal driving forces (social and demographic, political and institutional, economic and commercial, cultural and technological) affect the nature and distribution of human activities on coastal zones of India and its impacts on coastal ecosystems associated with the prevailing and possible alternative patterns of human activity.

2. THE NATURAL/SOCIAL SCIENCES INTEGRATED APPROACH IN COASTAL AREAS RESEARCH
Some considerations on integrated analysis of natural and social sciences in coastal areas are presented below, in search for a scientific expression of the political need to develop an integrated coastal zone management. Therefore, it is of great importance to establish the limits of what is considered to be coastal areas.

The authors of this paper are developing an integrated methodology to understand the nature/society interactions.

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For physical researchers, coastal areas are related to the influence of the presence of the sea. According to this conception, the coastal areas are regions with large variations in terms of limits which include the coastal plain, the coastal cliffs and the coastal plains. In the innermost area, the limits could also comprehend the continental shelves. Therefore, demarcation is deeply related to the influence (present or past) of the sea in shaping these areas.

The coastal dimension analysis clearly implies the interaction between biophysical data with the socio-economic data type. In the framework of this kind of studies, coastal areas should be considered as land near the sea, where we can notice rapid and intense socio-economic and environmental changes. These sort of changes are requiring fast and appropriate policy responses, as well as acting as important driving forces over hinterland regions.

This approach to coastal areas reflects a distinctive way of understanding these areas. In articulation with the relationships studied by physical researchers, which give more importance to the land-sea interactions, these studies, which relate to the coast hinterland interactions, are emerging.

This complexity involves significant processes of population dynamics, which are expressed in population growth, demographic stress and in rapid changes in land uses (hinterland-coastal, rural areas-coastal areas).

The importance of these areas also involves complex land-use and land-cover dynamics. These processes are affected by different factors which allow us to see the importance of physical drivers (such as geomorphologic, extreme events and natural hazards) and social dimensions (population dynamics, industrialisation, external market forces, cultural and life style patterns and policies regulations).

Decisions regarding natural resources and land use are based on opportunities and constraints considered by both biophysical and socio-economic drivers. Thus, a more integrative approach is needed for human/environmental synthesis, which helps to create a better understanding of the biophysical and social driving forces. Besides, we need to understand the processes, behind the patterns of occupation of a territory and the use of resources.

3. A FRAMEWORK FOR COASTAL AREAS INTEGRATED ANALYSIS

The question is how integration is possible, and how it can be best achieved. This paper presents the results of the integration of disciplines, and it deals with the questions required in order to achieve a suitable integration.

The research used the Driver-Pressure-State-Impact-Response (DPSIR) framework as a means of understanding coastal interactions. The DPSIR framework, developed by the European Environment Agency, is being suggested as an advantageous method to define cause-effect relationships, highlighting the connection among the causes of environmental problems, their impact and the society's response to them, in an integrated way (EEA, 1999; Gentile, 1998).

However, it is criticised by some authors because its implied linear causality causes an oversimplification of reality. Furthermore, in terms of sustainability, which must take into account future courses of action concerning development, the fact that no actions are taken before situations deteriorate is criticised. In order to ensure knowledge and understanding of forward and backward linkages between the stock of natural resources, human activities and the consequences of those actions, the DPSIR framework requires very detailed statistics (Shah, 2000).

The DPSIR framework aims at analysing the cause-effect relationship among interacting components of complex social, economic and environmental systems and at organising the information flow between these components. It structures the environmental information in five groups connected by two types of links: a direct causal chain (Drivers, Pressures, State, Impact, Responses); links between the Responses and their targets (Drivers, Pressures, State and Impacts).

The five elements constituting the causal DPSIR chain are: Driving forces of environmental change, which constitute the underlying causes and origins of pressures on the environment; Pressures, which describe the variables which directly cause (or may cause) environmental problems; State, which shows environmental conditions; Impacts on population, economy and ecosystems, which describe the ultimate effects of changes of state in terms of damage caused; and Responses, which demonstrate how the society (e.g., politicians, decision-makers) deals with the problems.

The driving forces are represented by the social, demographic and economic activities in societies and the corresponding changes in lifestyles. They cause changes in overall levels of population and consumption, exerting pressures on the environment: excessive use of natural resources; changes in land use; and air, water and land emissions (of chemicals, waste, radiation, noise).

Drivers

Pressures

Impact

State

Responses

Figure 1: The DPSIR framework for reporting on environmental issues (EEA, 1999).

The pressure indicators describe information in quantitative and qualitative terms regarding emissions, application of chemical and biological agents and the use of land and other natural resources. The pressures exerted by society's patterns of production and consumption are subsequently transformed in a variety of natural processes that may result in changes in the state of the environment.

State indicators give information on the level, quality and/or quantity of physical phenomena, biological phenomena and chemical phenomena in a given area at a given point in time. They often change very slowly, and their changes may have environmental and economic impacts on ecosystems, on human health and on the economic and social welfare of a whole society.

Impact indicators refer to the consequence of an environmental state change. They are described as the last consequence (to humans and ecosystems) of the chain of reactions of environmental change. They are slower than state changes and can’t be directly changed by the response.

Response indicators describe the efforts made by the society (Government, institutions, groups of people and individuals) in order to prevent or reduce the negative effects of state changes. They should be very fast, as their aim is to change socio-economic systems so as to reduce the pressures causing negative environmental changes.

Responses may seek to change and/or redirect prevailing trends in consumption and production of goods and services, improve monitoring and control of pollutants or develop cleaner technologies. They can be structured in research; regulations; awareness; public investments; policy integration; co-operation with other levels of decision making; and socio-economic systems.

The responses can send feedback to all the other groups of DPSIR although, as far as sustainability is concerned, it is incorrect to consider the responses to the impacts: reacting against the illness is always worse (and less sustainable) than preventing the disease.

4. A RESEARCH PROJECT ON INDIAN COASTAL AREAS

This paper presents some results of an interdisciplinary joint-research project, involving Indian and European researchers and institutes entitled: Measuring, monitoring and managing sustainability in Indian coastal areas: the socioeconomic dimension (COASTIN).

The cross-disciplinary approach developed in the project aims at developing different coastal developments in India and at suggesting a more sustainable course of action for the future, giving particular attention to the societal driving forces which influence the development of coastal areas and modify the landscape by changing land use and land uses. Two main groups are considered in the analysis of the future of Indian coastal zones: the evidence that the demand of coastal resources for economic growth is increasing; and the recognition that coastal natural resources are limited in supply and their continuing healthy existence is crucial to the functioning of coastal zones.

Therefore, the purposes of the project were to identify and analyse, through an intensive study at three locations: how societal interactions impact coastal resources of India; which are the key variables affecting the use of coastal resources; what are the policy priorities by decision makers and the information requirements and decision-making instruments necessary for effective coastal management; what extent might changes under alternative scenarios of economic development and urbanisation affect coastal land use and land cover3.

The final goal was to develop a system for the integrated analysis of the economic, biological, hydro-geological, ecological and human dimensions of coastal use, to examine the policy and the institutional matrix, within which development in coastal areas occurs in the country and to develop a framework for decision-making regarding coastal management, which incorporates the concept of sustainability.

The methodology was developed in six phases:

(i) Analysis of the driving forces which modify the landscape by changing land uses, and a review of Indian policies (state and cross based) laws and rules which govern the use, obligations and management of coastal resources;

(ii) Analysis of the interactions between the socio-economic system and the coastal ecosystems in the selected locations;

(iii) Analysis of coastal land use policies in these locations with view to developing a methodology and software tools to describe the vegetation system at different levels and to use an indicator of the state of the environment and of

3 Land-cover refers to the pattern of occupation of a territory and land-use is the management of the processes of occupation. (Turner et al., 1995).
human and development pressure; (4) Analysis of coastal groundwater systems in the selected locations; (5) Research of intrasite groundwater vulnerability to pollution, atminising environmental risks posed to groundwater; and (6) Development of mathematical models and practices towards the optimisation of the existing groundwater resources; (5) Analysis of coastal environmental systems, with the purpose of collecting and evaluating data on coastal land and ground water use changes and pollution in the selected locations; (6) The integration of socio-economic data and information with biophysical data, focusing on how to project the conceptual model of the coastal system to a geographic information system.

4.1 Tourism, aquaculture and industry: the driving forces and the state of environment

The first objective of the COASTIN project was to understand how societal driving forces impact coastal areas and ecosystems and how these can be measured, monitored and managed in order to achieve sustainable development. The literature survey of what constitutes stressed and vulnerable environments enabled the development of indicators of ‘Relative Vulnerability’. These indicators were used to rank the coastal districts on the East and the West Coast of India into ‘hot spot districts’ based on a multiple regression analysis, using the pressure indicators (Teri, 2000).

From the five major societal driving forces affecting coastal ecosystems in India (urbanization, intensive aquaculture and agriculture, industrial activity, port activity and tourism) the research focused on three tourism, intensive aquaculture and agriculture, and industrial activity.

The identification and distribution analysis of the societal driving forces was used as a starting point to select the case study areas for a deeper understanding of the social and natural processes. The three drivers were analysed in three case study areas in which tourism, intensive agriculture/aquaculture and industry have a stronger influence on change: tourism in North Goa, intensive agriculture/aquaculture in East Godavari and industry in Thane (Figure 2).

Within the three selected coastal districts, the villages situated around the coastal regulation zone were used to actually select the regions that would be intensively studied in order to study the interrelationships among population, development and environment. These locations were the sites for an integrated primary data collection, study and analysis, and for the preparation of intervention options for economic and social development.

However, more important than the above factors are the three basic components that make up a tourism industry: territory, tourism and the coastal system itself which comprises the environmental system (Teri, 2000).

Coastal areas are being increasingly used for the development of tourism. Tourism has been growing in India, and there has been a large increase in terms of tourist infrastructures along various parts of the coast. These activities disturb traditional fishing activities and fisheries interfere with marine life and cause degradation of near-shore habitats. One of the major impacts has been on the quantity and quality of groundwater resources, mainly due to increased salt intrusion in consequence of the heavy quantities of water pumped by hotels or other tourism infrastructures located in coastal areas.

Tourism can also result in spreading of urbanisation in coastal areas, which will increase the density of population, as well as the growth of ports (recreational or not) and of intensive agriculture and aquaculture. The shift of people from the primary and secondary sectors to the tertiary sector has been the result of the labour demand in tourist services, which also fulfils people’s aim to find non-farm employment.

This stage is characterised by improvements in terms of infrastructures, such as accommodation and road facilities. The construction of tourist facilities is conducted at a rapid pace, resulting in chaotic and unstructured development. Large-scale growth continues without adequate regulations and the degradation of resources becomes a major concern. In India, the emphasis of policy has been largely placed on how to increase the number of tourists without any corresponding measures designed to enhance environmental ability to support tourists in the long run.

4.1.2 Agriculture and aquaculture activities

A number of coastal areas and ecosystems in India are under stress due to growing aquaculture and agriculture activities.

Agricultural development in India underwent two phases: until the mid-sixties, production increased on account of the expansion of the area dedicated to crop production; during and after the mid-sixties, emphasis has been laid on increasing productivity through increased input use.

High yielding varieties of crops, which were highly responsive to fertilisers and irrigation, were introduced in Indian agriculture in a process that came to be known as the Green Revolution. The Green Revolution led to increased crop production, increased food production and food security and saved forest and land resources by improving productivity, creating direct and indirect employment opportunities and improving the agrarian economic structure and that of the poor, while at the same time increasing land productivity and reducing the need for chemical inputs and water. Among the coastal states of India, rise in water table, groundwater depletion and soil salinity are reported in different areas (Teri, 2000).

Water resources are depleted and genetic resources are lost. Although irrigation makes arid land productive, the soil becomes saline and alkaline. Similarly, fertilisers and pesticides increase agricultural production, but their intensive use can create harmful effects.

There are negative impacts on human health because of agricultural inputs such as fertilisers and pesticides. Although enhancing agricultural production is important for maintaining food security, the maintenance and protection of the environment is particularly important (Teri, 1995).

Intensive aquaculture, as an activity located in coastal areas, also has an impact on coastal ecosystems. This activity, as well as intensive agriculture, depend heavily on inputs. With the increasing demand for fish due to expanding population, the world has to depend on aquaculture to meet the demand-supply gap for future years. Out of a total fish production of 4.95 million tonnes in India, aquaculture contributes with over 1.6 million tonnes. From 1984 to 1994, the production has increased by 215% (Teri, 2000). Aquaculture provides an inexhaustible source of nutrition to the local, foreign exchange earning potential, increasing employment and employment opportunities offered to the economically deprived and weaker sections of the society.

Coastal aquaculture has been identified as one of the potential food producing sectors in India. Governmental interest and support is encouraging this activity, but during the last years some problems have been raised in order to study the interrelationships among population, development and environment. These locations were the sites for an integrated primary data collection, study and analysis, and for the preparation of intervention options for economic and social development.
Socio-economic effects of aquaculture are mainly due to the conversion of land that was previously used for other purposes and provided food and employment to a large number of people. Mangrove forests are being replaced on a large scale by aquaculture farms. Coastal dwellers depend on mangrove forest for their daily needs of fuel wood, food, etc. Even agricultural lands are being lost because of aquaculture farms (Teri, 2000). The increasing need of coastal land for aquaculture led to a dramatic rise in land prices in many areas. While local farmers can no longer afford to purchase the land, the landholders are tempted to sell their land, thereby losing their only source of livelihood. Aquaculture thus created massive unemployment.

4.1.3 Industry

Industries remain one of the major competitors for the use of coastal areas. For industries, the major advantages of the location on the coast are transportation, water use and waste disposal.

The importance of the industrial sector in the Indian economy has risen over the years. The contribution of industries to the gross domestic product has improved, along with a rise in the share of employment in the secondary sector. The New Economic Policy, with its package of globalisation, liberalisation and privatisation, changed the entire scenario of the Indian industrial sector. These policies gave encouragement to the industrial sector. A sharp rise in foreign investment was also witnessed.

Thus the coastal states together represented 55% of the foreign investment in India during this period. In India, industrial activity has concentrated in certain specific areas, causing a regional imbalance. Maharashtra and West Bengal were the most industrialised states even before independence. Cities like Mumbai, Ahmedabad, Chennai and Calcutta had large-scale industrialisation during the colonial period.

Since the industrial policy of 1956, the Central Government has also promoted an industrial policy with a strong regional component (Teri, 2000). The effects of industrial activity on the environment, which have been found in the literature review, are summarised in Figure 6. Many of the highly polluting industries are located in the coastal areas. Dumping industrial waste is common in many parts of those areas. Some of the industrial effluents are toxic and can remain in the sea for a long time and accumulate in the organisms. Several pollutants have detrimental effects on most life forms and affect their breeding, growth, reproduction and survival.

Industrial and port activity tend to affect coastal ecosystems due to a number of reasons: wrong location can be the most obvious reason; choice of technology that is not environmentally friendly; no preventative approach to pollution in place, the tendency is always to look for end of pipe solutions; poor enforcement of standards and rules and sometimes poor ability to judge whether they comply to norms.

The coastal areas attract an increasing number of industrial investments, resulting in an increase in terms of economic activity. Industries draw foreign exchange, improve the standard of living and create employment. However, the adverse impacts of industries on the coastal ecosystems cannot be neglected. Adequate legal structure for coastal zones and strict implementation of the existing laws are required to collect the benefits without compromising ecology.

5. MANAGING SUSTAINABILITY ON COASTAL AREAS

The coastal zone and its resources bring about multidimensional problems for the management of the various systems and subsystems in action. Understanding these complexities requires a thorough understanding of the issues and constraints involved – human, sociological, environmental, physical and economic, as well as local needs and aims – and policy-making for coastal areas is difficult due to the conditions of uncertainty, complexity, and scale of ecosystems.

Coastal areas are undergoing a high human pressure. Anthropogenic activities have a growing impact on these areas, and the degree of impact varies according to the degree of use of natural resources and environmental loads. The multiple uses of coastal zones pose excessive and competing demands on the limited resources. Fundamentally, two types of conflicts can be observed: those between the natural and the socio-economic systems; and those within the economy itself, in terms of conflicts among the users of the limited available coastal resources, as in the case of traditional and modern fishermen, small shack owners and large hoteliers as they compete for tourism; and between sectors, as in the case of allocating coastal land for setting power plants or reserving it for residential and tourist use.

The COASTIN project had to deal with different aspects of the complex and conflicting interaction between social and environmental sustainability within the social process of shaping and building development for present and future generations.

Figure 4: Environmental effects of intensive agriculture

Aquaculture farms require large areas of land. It makes land, which is unfit for any other agricultural purposes, productive (Teri, 2000). Development of aquaculture in the coastal areas has led to the destruction of vast areas of mangroves. In India, 32,000 hectares of land of the world’s largest mangrove forest has developed into extensive shrimp farms (Teri, 2000).

Further, the life cycle of an intensive shrimp farm is 5-10 years, after which it is abandoned. Abandoned ponds can no longer be used for any other alternative purpose of livelihood like agriculture (Teri, 2000). These effects, which have been found in the literature review, are summarised in Figure 5. The environmental impacts of aquaculture in turn affect the social and economic life of local communities.
Figure 6: Environmental effects of industry

It was assumed that sustainable development requires an integrated and interactive approach that allows for the understanding of the complex relationship between society and nature, simultaneously respecting human rights, and assuming that environment is a vital dimension of sustainability.

While environmental sustainability is concerned with the biophysical limits of social activities, social sustainability is related to the internal organization of individual societies as well as of the world community as a whole.

5.1 The definition of scenarios: the example of tourism activity in Goa

The alternative scenarios developed by the socio-economic analysis in Goa are presented below. The presentation of the scenarios is organised in two parts: description of the present situation and definition of three alternative scenarios.

More than any other sector, tourism depends on a healthy natural environment to sustain it. Goa is a region, which has natural and cultural assets - its beaches and exotic life - to attract visitors and generate tourist income. Local communities and state and national governments all stand to benefit from an increase in global tourism. However, there is also a potential loss. Too rapid, unplanned, or uncontrolled development all have the potential to create associated environmental degradation on the long term, eroding the quality of the very assets on which such development is based.

Tourism activity in the area is based on a fragile offer and demand, i.e., the infrastructures offer a deficient quality and the demand is searching for low prices. The absence of sewage systems and the deficient waste management has important impacts on the water quality. Besides, the non-existence of water treatment and distribution infrastructure is preventing the assurance of water quality for public use. These are apparently the cause for the spread of diseases and health problems among inhabitants and eventually tourists.

The type of tourism enterprises existent in the area doesn't have financial capacity to build the appropriate equipment for environmental protection. In fact, these units have a low or even inexistent capacity of investment; therefore, they have a limited ability to invest in sewage systems and waste treatment. As a matter of fact, future investments in general are strongly limited by the low income and its fluctuation.

Landscape deterioration is also a characteristic of the area that can jeopardise its attractiveness for tourists. The pressure for building constructions is increasing and the vegetated areas are decreasing. The traditional aesthetic value of some of these areas is in danger. The cultural and historic features of Goa are not being developed and the identity values are vanishing.

In view of the degradation of the type of tourist offer, the advantages of Goa are not competitive with other regions. The vulnerability to external drivers is higher.

From the point of view of social sustainability, the situation of local families is not guaranteed. Income is low, and the unqualified, unskilled investment in small activities are low and capability to react to change is also limited. Besides, administration (local and regional) gives little support and quality of life is bad.

From environmental sustainability perspective, a common point is highlighted in the alternative scenarios: the need to invest in sewage infrastructures, waste treatment and management, public water supply system, roads and transport networks. There are already urgent needs in terms of environmental protection. Even in the present, the situation is not environmentally sustainable. Improved use and management of the resources is a priority in any scenario.

(a) A Business as Usual scenario (A)

The maintenance of this situation will lead to a high impact over natural resources and environment in general. In the same way, negative impacts over the domestic units will increase. Income will become lower because the supply of services to tourists will increase, maintaining a bad quality level.

(b) An Economic-Growth scenario (B)

The main characteristic of scenario B is based on the support and development of the private sector. Public intervention will promote the interests of private enterprises. The need of public investment would be lower and the return would be quicker, as private economic agents would do and/or pay for these investments. Private support investment for sewage infrastructures, waste treatment and management, public water supply system, roads and transport networks transfer among the enterprises will decrease public investment; however, in future, the income will be in the hands of the private sector. The public sector will possibly offer good investment opportunities and the area will be able to attract big companies by having privileges in the access to the coastal areas and exploitation of natural resources. The labour force will have to be trained by the enterprises on-and, depending on the cost benefits analysis, it could be imported from outside the region. This can contribute to an increase in population flow, mainly of inhabitants who are better prepared for tourism activities.

In terms of social sustainability, this alternative scenario could bring about some problems. The withdrawal of local population from tourism activity and the absence of support to the local domestic economy could lead to a lower income and worse living conditions among the population. The cultural and historic characteristics of the region could be "sold" like a tourist product by the private sector or, alternatively, these companies might introduce other entertainment facilities, not necessarily related with the cultural values of Goa. This being the case, tourism in Goa would become equal to other sea and sun destinations and its vulnerability would increase in comparison to the national and international fluctuations. Exploitation of natural resources would be free and more vulnerable to private economy interests.

(c) Socio-Economic Sustainability scenario (C)

The main orientation of this scenario is based on the criteria inherent to creating a strong public intervention by regional and local governmental structures. In this scenario, public investment would lead the interventions in different directions: support to domestic economy with the reinforcement of its investment capacity, income and professional qualification. The domestic units would receive financial support to develop tourism facilities and training on management and financial innovation; public investment for sewage infrastructures, waste treatment and management, public water supply system, roads and transport networks; reinforcement of the cultural and historic characteristics of Goa. For example, renewal of Portuguese houses and ancient blocks, monuments, etc; the infrastructures' improvement would attract quality international tourism agents, not only tourism operators but also investors with better offers in terms of tourism.

Scenario C is based on a double objective: to improve the domestic units offer and, simultaneously, to promote the development and birth of high quality tourism units, by improving public investments. This scenario will lead to social and economic sustainability in the future, i.e. it is not a scenario with immediate results, because its effects will be visible only in the future when the potential for attractiveness of the region increases. The biggest disadvantage of this scenario is the need for a large public investment in the present to avoid environmental problems and to increase the income of the population. An important advantage would be the social sustainability with the obvious improvement of life conditions for the population. The guarantee that the family economic units would participate actively in the development of tourism would lead to a better situation for the inhabitants and increase benefits for the families.

A common characteristic of scenarios B and C is the need to improve public investment in basic infrastructures, but scenario B defends that the private economic agents must pay a significant part of this investment. In a way, this condition can help the public sector to bear the costs. On the other hand, this can lead to a lower income and worse living conditions among the population. Additionally, an important part of the profits generated in Goa by these big tourism operators would benefit their own regions or countries.
To achieve a level of tourist development appropriate and suitable to local resources, it is important to identify the carrying capacities that enable implementation of preventive management control and maintenance policies. In the scenarios, it is important to consider the performance of local entrepreneurs that holds the key to strengthening and spreading the benefits from tourism. Recent studies favour tourism policies that encourage a bottom-up development strategy. This should be able to bring in economic benefits to the locals, encourage local socio-economic activities and encourage their participation at all levels and in a greater degree.

Integration is the base for the success of the policy-making process, as well as it supports the definition of relevant research priorities in terms of policy decisions. Furthermore, this process needs to involve the stakeholders operating on the landscape: for example, landowners and agricultural managers, local and national regulators, planners and governments, local and national pressure groups, the private and entrepreneurial sector, and the wider public. The scientific basis of this perspective is the belief that integrating physical and socio-economic approaches in the study of coastal areas represents a conceptually correct means of addressing the unifying issue of economic and environmental sustainability.

ACKNOWLEDGEMENTS

The research project “Measuring, monitoring and managing sustainability: the coastal dimension” was funded by the European Union, INCO-DC 1997. The project began in 1998 and the research teams were Tata Energy Research Institute (India), Goa University (India), National Institute of Oceanography (India), Trieste University (Italy), Socio/Universidade Nova de Lisboa (Portugal), Laboratório Nacional de Engenharia Civil (Portugal), Institute Cartographic of Catalunya (Spain).

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