Working Papers

INTEGRATED

Coastal Area and River Basin Management

ICARM Technical Report Series No. 1

United Nations Environment Programme
Water Branch

UNEP

Priority Actions Programme
Regional Activity Centre

PRIORITY ACTIONS PROGRAMME

Save Our Seas
Oceans For Life on Earth

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Coastal Area and River Basin Management

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Contents

Preface

UNEP - Water Branch and the Priority Actions Programme Regional Activity Centre (PAP/RAC) of the Mediterranean Action Plan have been implementing, since 1993, a number of joint activities within the Regional Seas Programme. Most of those activities have been oriented towards the implementation of Integrated Coastal Area Management (ICAM), as a result of the application of the provisions of the Agenda 21 adopted at UNCED in Rio in 1991.

Since it was realized that the notion of a coastal area should be modified in order to reach further inland, especially with regard to environmental impacts, it was jointly concluded that the concept of ICAM be widened as to include the area of neighbouring river basins. This paper is the first of a series to be published presenting contributions by various experts regarding the activities on the implementation of Integrated Coastal Area and River Basin Management (ICARM).

Executive summary

The coastal zone is an essential part of a river basin. The two areas are linked through a number of natural and socio-economic processes:

- The cycle of water which affects water quality and quantity and ultimately seawater quality affecting coastal ecosystems and human activities on the coastal zone (fishing/aquaculture and tourism/recreation opportunities).

- Sediment transport which affects soil and coastal dynamics ultimately having an impact on coastal ecosystems and human activities on the coastal zone (fishing/ aquaculture, urban development, tourism, etc.)

- Human activities in the river basin might affect also coastal ecosystems and human activities in the coastal zone in a positive way providing food, water and energy or in a negative way through water retention for irrigation and other uses, waste effluents dumped in the river, etc.

The coastal zone is in many countries a critical zone as it concentrates a large number of human activities while at the same time it is a valuable ecological resource, a transitional zone of exchange between terrestrial and marine ecosystems.

The problems of river basins relate mostly to the availability and use of water resources (for natural ecosystems, agriculture, fishing/aquaculture, energy production, mineral and construction material extraction, industrial processing, domestic use and effluent recipient). Relating to these are problems of ecosystem conservation, forest protection, soil conservation, etc. In that sense river basin management is essentially resource management.

The problems of coastal areas relate mostly to the availability and intensive use of coastal resources particularly land (for urbanization, tourism, industrial and port development) and marine resources (for fishing/aquaculture, tourism/recreation) and the quality of seawater (recreation, fishing). Relating to these are problems of ecosystem conservation, marine resource protection, beach erosion/accretion, etc. in That sense integrated coastal zone management is essentially environmental planning

Both, river basin and coastal problems require a multisectoral approach although the emphasis changes as:

- River basin management is essentially multisectoral co-ordination with some elements of rural land use regulation.

- Coastal zone management is essentially physical planning and resource management with a strong emphasis on land-use regulation and physical interventions (project planning).

The geographic scale of river basin management is regional and often extends over national boundaries with a strong element of international conflicts while the scale of coastal zone management is often local/regional and national or occasionally international for specific issues (i.e., pollution of the sea).

Actions or policy tools and measures differ in both cases as:

- In river basin management the primary tools are resource management plans, regulation of water use and projects of exploiting water resources (irrigation, power production, industrial processing, drinking water supply systems) or protecting them (waste water treatment plants, recycling, etc.). Other measures include afforestation, agricultural practices, wetland preservation, etc.)

- In coastal area management the primary tools are integrated coastal area plans regulating land development, allocating land-uses and major facilities in anticipation of future development. Other measures include protection of the underground water and the quality of sea water through emission standards, installations for waste treatment, infrastructure development (ports, roads, etc.) wetland and dune conservation, ensuring public access to the coast, etc.

Coastal zone management concentrates on the problems of a dynamic zone which is ecologically sensitive and subject to pressures for intensive development, the coastal zone, and a wider zone or hinterland which influences coastal processes and can extend over the entire watershed which includes the river basin. Development opportunities in coastal areas depend to an extent on hinterland activities and such impacts are clearly recognized. The management of the coastal zone is linked to the management of resources in the hinterland through common key issues such as the equality and quantity of water flow and the transport of soil sediment or in general the impacts of development activities on these two important factors. However, the focus of managing the coast lies not only on regulating such processes, but on the integrated management of human activities in the context of sustainable development.

1. Introduction

Human civilization since antiquity has flourished in river basins and along the seacoasts. The development of human activity in such areas was not always harmonious or symbiotic but has often led to significant alterations and conflicts over the use of resources which in some cases had adverse effects on people themselves. Mitigating the impacts of human activity on natural ecosystems has shifted from an early anthropocentric view to an ecocentric one. Following the 1992 Rio WCED coastal zone management and river basin management have been oriented towards a sustainable development approach recognizing the need for equal importance to the goals of economic efficiency, environmental conservation and social equity.

This paper intends to explore the relationship of integrated coastal zone management and river basin management. To achieve this it is necessary to investigate the characteristics if coastal areas and river basins and their functional relationships. In this context the policy responses to the management of coastal zones and river basins is investigated in terms of process and content with a view to identify opportunities and limitations of policy integration in these two types of geographical areas. Finally, a tentative structure of guidelines is proposed for integrated management of coastal zones and river basins.

2. Coastal areas and river basins

2.1 Characteristics

2.1.1 Coastal areas

Coastal areas are the interface of land and marine ecosystems. Their extent is defined on the basis of functional interaction between natural and human ecosystems on both sides (landward and seaward) of the coastline or the intertidal zone, They can extend far into the sea up to the limits of the continental shelf or even the Exclusive Economic Zone and to the landward side up to the boundaries of the water drainage basin, although in most cases a physical or administrative boundary far closer to the coastline is selected. The choice of limits of the coastal area depends on their geomorphologic, functional and technical characteristics or the legal extent of administrative jurisdictions.

Coastal areas are extremely valuable as they concentrate a rich diversity of natural habitat areas and a large variety of natural resources. As the interface area between terrestrial and marine ecosystems, coastal areas are extremely important and fragile from an ecological perspective and should be carefully managed.

Coastal areas, at the same time provide opportunities for development of a wide range of human activities either exploiting coastal resources (i.e. fishing, recreation, etc.) or taking advantage of favourable locations (i.e. mild climate, break of bulk transport and access to sea routes, etc.). As a result there is increasing concentration of economic activities and population in coastal areas.

Such concentration of population and activities presents considerable threats to coastal ecosystems and resources but also leads to use conflicts. Four types of impacts can be identified:

- On the *structure and function of natural ecosystems* as a result of the construction and operation of facilities for human activities and the associated development, either directly (through loss of vital habitat areas or pollution) or indirectly (for example through noise or the presence of people).

- On the *quality and quantity of natural resources* (forests, soil, water, etc.) as a result of increasing concentration of people and activities adding to the demand for their use and exploitation and disposal of waste.

- On the *use of the territory*, the spatial organization and function of the area as a consequence of the development of human activities and associated facilities, infrastructure and urban development.

- On the *natural and man-made landscape* as a result of the size and scale of facilities and associated development. The landscape is often a major source of attraction in a place.

Environmental deterioration can have a significant impact on development prospects of coastal areas. Conflicts on the use of coastal resources, threats to natural habitat areas, pollution and resource degradation affect seriously the potential of coastal areas for the support of human activities. The long-term future of coastal areas depends on a rational management of coastal resources within the framework of ecologically sustainable economic development.

2.1.2 River basins

River basins are physical geographical units structured on the basis of a river (or river system). They may extend to the boundaries of the water drainage basin.

River basins are also important areas from the point of view of natural ecosystems particularly on the basis of the presence of water and its support for the flora and fauna in the area. The riparian parts of the basin - around bodies of water - can be extremely valuable as areas of high ecological productivity. Some parts of the basin might be also valuable from a natural resource perspective, particularly the river and other water bodies but also the areas of replenishment and water exchange with groundwater resources.

River basins present advantages for the development of economic activities. The presence of water can support agriculture and animal husbandry but also fishing and industry as input to production processes. Water might be also used for transport of materials and trade providing opportunities for location of certain human activities which require access to such transport routes. In addition water provides opportunities for recreation and tourism. As a result of these advantages human settlements often grow along rivers.

The potential offered by rivers for the development of human activities often results in conflicts over the use of water and other resources. The major types of impacts from the development of human activities in rivers basins are:

- On the *structure and function of natural ecosystems* as a result of the human activities and associated developments, either directly (through loss of vital habitat areas or pollution) or indirectly (for example through the presence of people).

- On the *quality and quantity of natural resources* (forests, soil, water, etc.) as a result of the demand for their use and exploitation and disposal of wastes.

- On the *use of the territory*, the spatial organization and function of the area as a consequence of the development of human activities and associated facilities, infrastructure and rural or urban development.

- On the *natural and man-made landscape* as a result of the extent and intensity of the development of human activities. The landscape is often a major source of attraction in a place.

Environmental deterioration can have an adverse effect on human activities in the river basin to the extent that such activities depend on the availability of water for drinking, irrigation, processing, transport or recreation. In addition, rivers occasionally present risks of flooding threatening human activities and associated infrastructures. As a result, river basins require careful management.

Coastal areas and river basins can be considered as similar from the perspective of the *structure* of the basic feature: the land/water front or interface which as already mentioned is important for both natural and human ecosystems:

The transition zone between the land and water - sea in the case of coasts - provides habitat and spawning and breeding areas for a variety of species of terrestrial or aquatic (marine) flora and fauna, endemic or migrating. Such interface is characterized by a delicate interaction between terrestrial and aquatic (marine) ecosystems which is in a state of dynamic equilibrium. Disturbance in such areas could affect seriously the interdependent ecosystems.

- The availability of resources attracts in both cases human activities particularly the presence of water as an essential input or a course for transport but also as a potential recipient for waste. As a result there might be similarities in terms of environmental pressures on water (the sea), soil, vegetation and land as well as other ecosystem components. Such similarities suggest similar frameworks for rational management focusing on protecting the function of natural ecosystems, allocating resources for human use, controlling wastes etc.

Similarities might be also sought in terms of the *formal* characteristics of the basic feature: a linear, more or less, strip of interaction between land and water/sea. Such linear front is strongly dependent on a broader zone which influences it as sort of a "hinterland".

The linkages of the hinterland with the strip (or zone) are evidenced in terms of key structuring *processes*: water, energy and material flow which support both natural and human ecosystems. Erosion and deposition (accretion) can be evidenced in both rivers and coastlines although they might be shaped by different factors (water flow or wave action)

To some extent similarities might be attributed to the fact that river basins and coastal areas may share part of the territory they cover: the coastal front can be always considered as part of a river basin.

Certain types of areas are extremely valuable both from a river basin and a coastal zone management perspective. This is particularly evidenced in the case of river deltas and estuaries which are critical interlocking parts of both the coastal area and the river.

However, coastal areas and river basins have also important differences.

A basic difference is in terms of the *types* of ecosystems supported (fresh water or sea dependent) although they are occasionally common in transitional zones such as coastal lagoons and wetlands or river estuaries.

Another difference is in terms of the *scale* of the territory they cover as river basins are often much larger units than coastal areas. The scale of the territory determines the focus on processes which are relevant.

There might be also differences in terms of the *time* of processes in river basins or coastal areas. Therefore changes and impacts can be evidenced at different time periods. Some river/stream areas are subject to periodic (seasonal) flows as well as some coastal areas which can be subject to daily periodic influences (i.e. tide).

The *boundary conditions* present also important differences. While river basins are identifiable physical geographical units coastal areas are not always as discrete in spatial terms both in terms of the inland boundary and seawards.

Due to differences in geographic scale there are differences in the processes which structure both areas as well as differences in temporal expression of such processes.

2.2 Functional relationships

Coastal areas have a terrestrial and a marine part. River basins are considered as extending usually over the landward side only. River basins may include coastal areas if located near a coast. Of course generalisations tend to simplify situations which are complex and dynamic in nature.

- At a macro-level (continent or sub-continent) all coastal areas can be considered from a physical geography point of view as parts of large river basins, as eventually most rivers end to the sea.
- At a meso-scale (regional) though some river basins may be considered as linked with their coastal areas.
- At a micro-scale (local) there is a variety of situations where a coastal area may be directly, indirectly or not related to its river basin.

Therefore, there may be important functional relationships between river basins and coastal areas and one may influence the other. These are structured on the basis of key *natural processes*:

- Water flow;
- Material transfer; and
- Energy.

but also conditioned by the *human activities* in the region which may have an impact on natural processes:

- Urban development;
- Rural activities (forestry, animal husbandry, fishing, etc.);
- Technical infrastructure (irrigation, dams, etc.); and

- Waste and pollution,

or on the basis of geographical *features* or *areas* which may be important sub-units ("ecotones" or transition areas) of both the river basin and the coastal area:

- River estuary;
- River delta; and
- Wetland.

3. Integrated management of coastal areas and river basins

3.1 Rationale and principles

Human action in coastal areas as well as rivers dates back since the times people needed access to the sea or river resources (fish, salt, sand, etc.), facilities for transport, water (for drinking or irrigation) but also protection from natural forces and hazards (floods, wave action, etc.). So early "management" was basically related to satisfying economic and convenience/safety goals and consisted of highly localized physical interventions (piers, harbours, dams, flood channels, etc.) in the spirit of "taming nature" through technology. In some cases though human intervention was far more extensive in spatial terms as in the case of irrigation schemes or navigational channels but still strongly physical/engineering type of interventions. For many centuries such interventions in general ignored the dynamic nature of both rivers and coasts.

Experience with human interventions in such dynamic systems led to the necessity to extend the scope and area of intervention to entire river basins or extending on both sides of the coastline. Often though such efforts were still focused over a single purpose as for example managing water resources or marine resources In recent periods, human intervention in both rivers and coasts became increasingly multisectoral covering a range of economic and social goals still based on a rationale of better exploitation of natural resources for human needs. The conflicting demands on natural resources brought the need for a "comprehensive" approach to the management of rivers and coasts introducing multiple objectives and bringing the necessity for a broader (in terms of geographic area) scope.

The rise of environmental concerns at the forefront of public policy brought in a wider perspective which would include environmental concerns as priority issues along with socio-economic objectives. The emphasis on the protection of the environment shifted the objective focus from resource management to ecosystem management. This "integrated" perspective considers rivers and coasts as dynamic systems consisting of interacting natural and human ecosystems which require rational management.

The "eco-systemic" perspective brought forward also the question of the relationship of coastal management to river basin management. This would require a more detailed analysis which follows.

The *goals* of river basin management and coastal management fall within the scope of sustainable development where economic efficiency and social equity goals are linked to environmental conservation ones. The *general objectives* stem from the need to express such goals in terms of long-range considerations and

medium- or short-range needs, allocating resources to various users ensuring at the same time the proper function of natural ecosystems.

There are certain basic *principles* which are common in river basin management and coastal management:

- Rationality. Rational management perspective linking problems, conflicts and opportunities to goals and objectives which are in turn linked to policy measures deriving from the set goals and objectives.
- Anticipation. Providing early measures for allocating future needs preventing undesirable impacts, conflicts or externalities.
- Optimization of resource use. Efficient allocation of the use of resources among competing interests mitigating externalities.
- Process orientation. Focusing on management as a cyclical process providing an adaptive guidance system for conflict resolution and priority setting rather than as a once-for-all optimal allocation.
- Participation. Including all "actors" (stakeholders) and users early in the decision-making process as a mechanism of consensus building on management objectives and measures but also as a safeguard for implementation.
- Action oriented. Placing emphasis on implementation of measures.

Beyond such common elements there are important differences among river basin management and coastal management as they focus on different processes and spatio-temporal scales. These are evidenced in terms of the area, the context (physical, social, economic and cultural framework), the content (specific objectives and strategies), the process and policy tools employed.

The basic *principles of integrated* coastal zone management and river basin management in the context of sustainable development include:

- Respect the integrity of the river basin or coastal ecosystem accepting limits on the use of resources.
- Ensure the strategic importance of renewable resources for socioeconomic development.
- Allow for the multiple use of resources integrating complementary activities and regulating/separating conflicting ones.
- Ensure multi-sectoral and multi-level integration in decision making linking broad scale management to local level interventions.
- Allow for participation of all actors) particularly local population in the planning process to assure effective management.

3.1.1 Area

The area of consideration is linked to the purposes of management and in general objectives and policy measures are differentiated within the area in response to variations of natural and human ecosystem conditions.

River Basin

The spatial delimitation of river basins is a function of physical geographical (geomorphology, hydrology, etc.) characteristics encompassing the water drainage basin. In that sense it is usually quite extensive. Often though the interest is focused on a narrower strip along the river. The definition of such strip is a function of natural ecosystems but also human use factors. In general one can discern:

- A *strip* extending just over the river banks usually identifiable on the basis of river related flora and fauna.
- A *riparian zone* extending over a few hundred meters which is delineated on the basis of administrative or physical (natural or technical) boundaries reflecting river related human uses with influence on the strip.
- The *drainage basin* which influences the river in terms of water, material and energy flows.

Coastal Zone

The definition and spatial delimitation of coastal areas depends on physical geographical (geomorphology, hydrology, etc.) and ecological factors (terrestrial and marine ecosystems), human activities and uses of land (type and intensity of development) as well as on institutional factors (administrative and legal framework regulating development and use of space).

From a management perspective depending on the physical, ecological, human activity and development characteristics there are several spatial dimensions which can be identified in coastal areas:

- a critical zone or a narrow band of land and sea a few hundred meters wide, adjacent to the shoreline, usually of highest ecological value and subject to intense pressures for development;
- a dynamic zone which may extend inland and seaward, usually a few kilometers wide, where there is strong dependence and/or influence of human activities and natural processes on coastal features and resources; and
- a *wider zone of influence*, often several kilometers wide which influences in part, directly or indirectly the other two zones.

3.1.2 Context

The basic processes which are important from a river basin management perspective are the transport of water and sediments. Energy potential from water flow is in some cases also quite important. In this context vegetation cover and structure (types), geomorphology (slopes), soil structure, hydrography, rural land-use and rural management practices become important factors in determining resource use conflicts in the river basin. Pollution from urban, industrial or agricultural waste can be also an important problem in regard to the quality of water. Water quality and quantity as well as sedimentation may be important issues at a micro-scale for example for dams, irrigation channels, etc. but also for significant areas from an ecological point of view which may lie downstream such as wetlands or river deltas and estuaries.

In coastal areas often the basic processes deal with coastline dynamics (erosion and accretion), sea water pollution and in many places urbanization of the coast as a result of the concentration of population and economic activities in the coastal zone. Additional common problems include conflicts over the use of marine resources and the loss of areas of high ecological value. In this context pollution of the sea and conflicts over the use of coastal land become central issues.

Broader processes in the wider zone of influence or upstream may be of significance for coastal management and in this respect river basin management issues can be linked to coastal zone management. These interests revolve around the issues of the quantity and quality of water in the wider zone of influence and the transport of sediment which may affect beach formation. Certain special interest areas (wetlands, estuaries and river deltas) in the coastal zone may strongly depend on river basin processes.

3.1.3 Content

River basin management stems from a water resource management perspective. From an early consideration of the river as a hazard, the water flowing to the sea as wasteful and the shallows as obstruction to navigation there was a recognition of ecological and landscape values. This has brought a "holistic" approach to river management placing emphasis on the management of water quantity and quality and sediment flows.

River basin management is essentially a multi-sectoral coordination with some elements of land-use regulation.

Coastal management stems from two traditions a marine resource management perspective and a land-use planning one. The former is based on managing the living organisms at sea and to the extent that they may be threatened from land-based activities and waste the interest of the management scheme extends to the landward side. The latter is strongly based on the tradition of planning focusing on a rational allocation of land-use (including sea-use) to human activities (tourism, industry, urban development, etc.). To the extent that such activities affect the coastal narrow strip planning may extend over the sea side as well. The strong impetus for environmental protection has brought forward the need for an integrated approach to coastal management emerging the concerns of the two traditions but also extending the interests of coastal management to broader issues such as pollution from land-based sources, etc.

Coastal zone management is essentially physical planning and resource management with a strong emphasis on land-use regulation and physical interventions.

River basin management and coastal management are directly linked through their focus on:

- controlling key processes especially water and material flows;
- controlling waste; and
- protecting areas of high ecological value of mutual interest such as wetlands, river deltas and estuaries.

3.1.4 Process

As both coastal area management and river basin management fall within the scope of special area management the process followed in both cases for policy development follows the same basic steps of environmental planning:

- Analysis of existing situation

  This step involves essentially a reconnaissance survey of basic characteristics in terms of the structure and dynamics of natural and human ecosystems. Therefore it deals with the critical processes and factors, their extent and spatial distribution, etc.

- Identification of conflicts/opportunities

  This step deals with the interaction between natural and human ecosystems at present and anticipated in the future. It includes the analysis of needs and pressures of the basic actors which influence decision making in development and environmental management.

- Identification of goals and alternative courses for action

  This step involves an analysis of basic management goals and objectives on the basis of critical factors and processes, conflicts and opportunities in the context of sustainable development principles.

- Development of strategy

  A selection is made, in the context of public policy making, among alternative strategies identified above in order to specify the goals and objectives into targets and policy measures with the aim to develop a guidance system for environmental management. This step involves commitments in mobilization of resources and priorities in the form of a programme of action

- Implementation

  This phase involves the actual implementation of the programme of action and is strongly linked to the next one.

- Monitoring and evaluation

  This provides for administrative procedures and mechanisms to periodically review the progress towards the achievement of goals and objectives through assessments of the state of the environment and policy implementation

This process is cyclical in both cases allowing for periodic review, assessment and revision of goals, strategies and policy priorities and measures.

The above steps are indicative and outline a typical process which has to be adjusted on the basis of the specific situation at stake.

The basic difference between river basin management and coastal management lies in the environmental conditions and factors, the natural processes, the human activity characteristics and pressures, the basic actors and their needs, the institutional context but also the interventions (policy tools) employed.

3.1.5 Policy tools

The policy tools employed in river basin management reflect the nature of processes and problems addressed to, the spatial scale involved, the nature of actors considered and the institutional framework in place.

In both river basin and coastal management these include:

- *area planning* in the form of spatially-wide specific policy interventions allocating the use of resources in spatial terms; and
- *project planning* in the form of localized interventions.

Interventions can be:

- *regulatory* over the use of key resources dealing with extraction, permitted uses, disposal etc. including traditional land-use controls, use permits, emission or ambient standards, etc.
- *physical* in the form of infrastructure projects for irrigation, water storage and distribution, flood and erosion protection, power production, waste treatment, etc.
- *economic/financial* in the form of taxation, user fees, incentives, etc. or
- *procedural* targeted to coordination among competent authorities, concertation mechanisms, public review and participation provisions, assessment procedures (EIA), information dissemination and awareness, etc.

River basin management interventions are essentially resource management plans, in most cases strongly water resource related, complemented with measures for forest and agricultural management and environmental management of special interest areas.

Coastal zone management interventions are essentially integrated coastal area management plans focusing on land-use and other land development controls, infrastructure development but also complemented with marine resource management and environmental protection measures, wetland and dune conservation, public access provision etc.

3.1.6 Analytical tools

The methodological tools often employed in river basin management and coastal zone management draw from the same list of typical environmental analysis and include:

- Reconnaisance surveys;
- Remote sensing (aerial and satellite photo interpretation);
- Geographic Information Systems;
- Soil capability analysis;
- Carrying capacity analysis;
- Impact assessment;
- etc.

3.2 Guidelines

The following Table summarizes the stages, elements and themes of river basin management and coastal management for comparative purposes as a first step towards the development of guidelines for integrated coastal and river basin management.

STAGES	ELEMENTS	THEMES	
		COASTAL AREAS	RIVER BASINS
Problem Identification	Processes	Coastal dynamics Water cycle Ecosystem dynamics Concentration of activities	Sediment transfer Water cycle Ecosystem dynamics
	Factors	Water quantity and quality Biodiversity Population growth Economic growth	Water quantity and quality Biodiversity Soil quality
	Critical Issues/ Problems	Beach erosion/accretion Ecosystem degradation Sea pollution Water degradation Resource use conflicts Land use conflicts Human activity concentration Urbanization Waste disposal	River mouth shifts Ecosystem degradation River pollution Water degradation Soil degradation Deforestation Waste disposal
	Opportunities	Economic development Fishing/aquaculture Material extraction [Agriculture] Industry Tourism Transport Urban development	Resource development Fishing/aquaculture Material extraction Agriculture Animal Husbandry Power generation [Transport] Drinking water [Recreation] Forestry
Plan Formulation	Interest groups (actors)	Fishermen Industry Land developers Planning Agencies Port Authorities/Military Utilities/sewage Tourists Environmental groups	[Fishermen] Farmers Forestry/husbandry Industry/Energy Utilities/sewage/water [Tourists] Regional/local authorities Environmental groups

(continued)

STAGES	ELEMENTS	THEMES	
		COASTAL AREAS	RIVER BASINS
Implementation	Policy responses		
	Scale/ responsibility	Local/Regional	Regional/National International
	Rationale	Spatial Planning	Multisectoral coordination
	Instruments/ tools	Physical plans and resource management plans	Resource management plans
	Regulation	Land development controls Emmission standards Sea use regulation EIA for projects	Water use Emmission standards Agricultural practices control EIA for large scale projects
	Economic instruments	Land taxation [Incentives]	Incentives [User charges]
	Physical interventions	Infrastructure development ports beach protection wastewater treatment roads for access to coast ...	Infrastructure development power plants irrigation channels wastewater treatment water treatment ...

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