ICZM Training Course Module 5:

Overview of the management process

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ABSTRACT: The training module presented here constitutes one element of a general integrated coastal zone management (ICZM) curriculum and focuses on the management framework and the context for effective management. It provides an overview of planning and management processes that are encountered in current integrated coastal zone management programmes.

REFERENCES:

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Preface

Background

The training module presented here constitutes one element of a general integrated coastal zone management (ICZM) curriculum and focuses on the management framework and the context for effective management. It provides an overview of planning and management processes that are encountered in current integrated coastal zone management programmes.

Target Group
The module is primarily targeted at coastal zone management professionals with a number of years experience in Europe and developing countries as well as young professionals at RIKZ and other relevant Dutch institutions. What is aimed for is general, concise information focussing on the ICZM management process.

Purpose of the module
The module is based on existing ICZM guidance and literature and is designed to:

- provide guidance to ICZM practitioners regarding the management process, what actions and approaches are involved
- provide an insight into a variety of experiences and lessons learnt from recent and ongoing ICZM programmes and projects.
- highlight the more appropriate approaches and provide some guidance in selection of approaches
- highlight recent developments and practices

The module is not intended to provide detailed descriptions of approaches or methods that are well documented elsewhere. For these, references to some of the most relevant documentation is provided.

Delivery of modules
Ideally the module should be delivered within a more comprehensive ICZM training course. However, it is designed as stand alone module and can be delivered independently when the participants have sufficient knowledge and understanding of the marine and coastal environmental issues and their causes, and the social, environmental, legal and institutional context for ICZM.

When the module is delivered in another country, it is very essential that information and discussion on local issues and local examples support the module content. Specially designed group discussions and group activities focussing on local problems will undoubtedly improve the quality of training provided.

Related activities

RIKZ and partner organisations are currently engaged in a number of ICZM capacity building initiatives – Coast in Conflict, Coastlearn, Global Distance
Learning Network (GDLN) co-ordinated by the IHE (Delft) and other short courses. It is anticipated that this module together with the other modules that are already identified for elaboration will support this initiatives in the coming years.

Preparation of the module

The module has been prepared on the request of RIKZ, by Dianeetha Sadacharan with considerable support and contribution from Rinus Vis (Delft Hydraulics) and Marcel Marchand (Delft Hydraulics). The content is based on existing documents and the professional experience of the authors.
Module 5: Overview of the management process

1 Introduction

This module briefly examines the steps to be taken during the early planning phase and the institutional and legislative context for integrated coastal zone management (ICZM). It also examines some aspects that play a significant role during the planning phase such as information needs and sources. In addition, two planning tools used in ICZM viz. economic valuation and analysis of coastal resources and environmental impact assessment of coastal development are discussed.

ICZM efforts vary greatly in scope, duration and at which level it is being implemented. They could include programmes (generally at the national level or sometime at provincial level) or specific projects undertaken at district or local levels. Issues discussed below are general and cover both programmes and projects.

Terminology: ICZM (integrated coastal zone management) in these modules includes efforts designated as ICM (integrated coastal management), CZM (coastal zone management), IMCAM (integrated marine and coastal area management), ICAM integrated coastal area management.
2 Institutional and Legislative Context

2.1 Intergovernmental Aspects

An effective ICZM programme demands that both the national and sub-national (state, provincial and local levels) be involved. Both levels of government have responsibility for regulating use of land and water, for management and development of coastal resources and have technical expertise and data. Hence, an effective ICZM programme requires the partnership and support of all levels of government.

Implementation of ICZM is often made difficult by the fact that interests of the different levels of government do not match and are sometimes in conflict. This mismatch arises because they have different responsibilities and their goals and objectives, though broadly similar, often differ in detail and approach. Further, their constituencies are different and the priorities of the constituencies vary a great deal. Each level of government also brings in unique expertise and perspective into the ICZM process. Hence, the decision regarding where the major focus of the programme will be, needs careful consideration.

The impetus or the motivation for an ICZM programme or project may come at either level. But once the need is recognised, it is important that not only the different levels of government but also the private sector be brought into the process. In Sri Lanka for example, the impetus came from the national level with the recognition that coastal erosion has to be addressed on an urgent basis nationwide but in Tanzania it was a number of local level ICZM projects that motivated national action.

Considering the ongoing international ICZM efforts, in most nations, ICZM operate at national level (top-down) and at provincial and/or local levels (bottom-up). In general, where coastal communities are directly and significantly threatened by the depletion of marine resources, there is a greater focus on local level efforts. In countries with a federal system of government, relations between states and national governments over allocation of coastal and marine resources can be strained and leads to much negotiation among the different levels of government.

Decentralisation and the level of local level autonomy is a key factor in determining both the scale and scope of an ICZM project and the effectiveness of implementing measures. Without local acceptance and ownership of coastal management decisions, the national framework, no matter how well structured, is most unlikely to succeed in meeting the objectives of the local level.
There are both advantages and disadvantages of local level autonomy in decision-making for the management of coastal zones, for example, by autonomous municipalities as is the case in many Nordic countries.

**Advantages:**
- greater stakeholder involvement, public participation and ownership, which facilitates implementation and enforcement;
- better and direct knowledge of the local conditions and greater local accountability of decision-makers

**Disadvantages:**
- often limited capacity, resources and technical expertise
- the cumulative effect of frequent local decisions taken without an understanding of the wider repercussions at the regional and national scale;
- systems open to local misuse of influence and political manipulation, and
- local sectoral, economic, revenue and social pressures on politicians and other decision-makers creating a climate of factional power contradicting the intent of national environmental policy.

**Some Important considerations:**
- It is important to have an understanding of the political process including the degree of authority among national level organisations, the level of decentralisation and the division of authority (including financial authority) between national and sub-national levels, very early programme.
- Although it may be useful for countries to draw lessons from similar programmes in other countries, care should be taken to ensure that approaches adopted match the political and socio-economic setting in the country concerned.
- It is useful to optimise the benefits of partnership between national and sub-national levels by identifying and pursuing common interests (eg, reducing loss of life and property due to erosion and other coastal hazards) and identification and exchange of expertise and data.
- The level of decentralisation and effectiveness of and resources available within the decentralised arrangements determine to a large extent where the ICZM effort should be located.

### 2.2 Types of institutional arrangements

A fundamental part of most ICZM programmes is the institutional mechanism created to harmonise the various activities and programmes that affect coastal areas and its resources. There is a wide range of institutional arrangements for ICZM. Broadly, two distinctions can be made.

- Multisectoral integration.
  - This involves the translation of common goals and objectives into various independent sector and their planning efforts by co-ordinating the various agencies these sector agencies on the basis of a common policy. A co-

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1 Scialabba, Nadia (ed.) 1998. Integrated coastal area management and agriculture, forestry and fisheries. FAO guidelines
ordinating mechanism will be needed to bring together various concerned government agencies and stakeholders to work towards common goals by following mutually agreed strategies. (ex. Tanzania Coastal Management Partnership in Tanzania, ICZM Division in the Vietnam Environmental Protection Agency and the Project Development Office, PDO-ICZM in the Ministry of Water Resources in Bangladesh).

- Systemic integration.
  An entirely new, integrated institutional structure is created by placing management, development and policy initiatives within a single institution. (ex. Coast Conservation Department in Sri Lanka, Coastal Management Authority in Belize)

The first approach is often preferred since

- Line ministries are typically highly protective of their responsibilities as they are directly related to their power base and funding
- Creation of new institutions can lead to conflicts due to overlapping responsibilities
- Governments are often reluctant to create new institutions

Which ever approach is used, the proper functioning of the institutional mechanism is at the centre of a successful ICZM programme. To be effective, such a mechanism should have the following characteristics. ²

- It must be authoritative: must have appropriate legal authority
- It must be able to affect the activities of all agencies and levels of government that have decision making authority in the coastal zone
- It must be seen as a legitimate and appropriate part of the process
- It must be able to make informed decisions: must have access to appropriate scientific and technical expertise and data

2.3 The legal Framework ³

The long term sustainability of ICZM efforts will be seriously threatened if it is not based on a clear understanding of the legal and institutional arrangements governing coastal management and if appropriate legal mechanisms are not used to implement it.

A number of government institutions and organisations generally have legal authority over various aspects of management of the coastal areas. An initial assessment of existing regulatory frameworks will be necessary to evaluate the extent to which existing laws and institutional arrangements will promote or hinder the implementation of the ICZM programme. Some specific aspects that should be considered in reviewing existing or proposed legislation are indicated in Box 1.

³ For further reading : ibid
Implementing ICZM may involve changing the way existing institutions operate, create new institutions, change the rights of uses of coastal resources and introduce new mechanisms to regulate human activities within coastal areas and outside activities that may affect coastal areas. This may require repealing or amending existing legislation and in some cases enacting entirely new legislation.
Legislation normally provides the mandate for the institution(s) concerned and defines responsibilities, the geographic area within which ICZM will operate, and mechanisms for co-ordination. It also provides the legal basis for regulatory actions through which the programme is implemented by the authority or authorities concerned. There is increasing emphasis on non regulatory measures such as economic incentives, stakeholder and public participation and it is considered important that these are mandated by law, thus strengthening implementation.

While it is inappropriate to transplant a law from one legal system to another - particularly where the social context differs - principles used in one system can be adapted and applied in other legal systems. There are certain internationally accepted principles that support ICZM. These include the precautionary principle, the principle of preventive action, the polluter pays principle, the responsibility not to cause transboundary environmental damage, principles of equitable use of natural resources and public involvement.

In developing a legal framework for ICZM, it is important to ensure that another layer of bureaucracy and legal complexity is not added, the aim should be to reduce overlaps and produce a more streamlined and effective governance structure.

In the European context, most countries have not enacted special legislation for ICZM but make use of existing legislation and in general depend considerably on land use planning to manage coastal development. A recent study of policy instruments for ICZM in nine selected European countries (Denmark, England, Finland, Germany, Norway, Poland, Spain, Sweden and Turkey) revealed the considerable variation that exists in Europe in the generally very complex national approaches to coastal zone management (see Annex 1)

Legislative and institutional arrangements relevant to ICZM in selected countries are given in annex 2.

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4 For details see Scialabba, Nadia (ed.) 1998. Integrated coastal area management and agriculture, forestry and fisheries. FAO guidelines. (page 31)
2.4 Types of integration

Usually, a distinction is made among several types of management integration:

*Intergovernmental integration:* integration among different levels of government e.g. local, provincial and national government levels. This is also called "vertical integration". This integration has the objective of harmonising policy development by national with final implementation by the local governments.

*Intersectoral integration:* integration among different sectors e.g., the Ministry of Public Works, the Ministry of spatial planning and the Ministry of Tourism or among fisheries, coastal tourism development and port development. Intersectoral integration also includes integration among coastal and marine sectors and land-based sectors that affect the coastal environment such as agriculture, forestry and mining. This is also called "horizontal integration".

*Policy integration:* concerns the need to incorporate management policies, strategies and plans with development policies strategies and plans.

*Integration of science and management:* integration among the different disciplines that are important in coastal management (natural sciences, social sciences and engineering) and the management entities.

*International integration:* integration among countries that are adjacent or border enclosed or semi-enclosed seas in order to solve disputes over maritime boundaries, transboundary pollution disputes over fishing, passage of ships or others. Though the problem might have a regional character, it is at national government level that actions are needed.

Making the concept of integration operational is often difficult and depends on the existing institutional framework. Much of the coastal zone and the adjacent ocean are usually under public ownership. Therefore programmes to manage those resources and areas are operated by the government for the benefit of the population. Typically, particular government ministries, departments and/or agencies are responsible for particular resources or uses. These sectoral and specialised agencies will continue to implement their programmes at national and local levels and the challenge for the lead ICZM agency is to ensure co-ordination among the different sectoral interests and the objectives of the ICZM programme.

*Interagency co-ordinating mechanisms:*

Several institutional arrangements are possible to perform the task of interagency/or intersectoral co-ordination:

- Establishment of an interagency or inter-ministerial council
- Creation of a special co-ordinating commission or committee
- Formal designation by legislature of one of the existing agencies or ministries as the lead agency
- Formal establishment, by legislature, of a lead agency.
The main functions of the co-ordinating agency or mechanism is to:

- Promote and strengthen interagency and intersectoral collaboration
- Reduce interagency rivalry and conflicts
- Minimise duplication of functions of line agencies
- Provide a forum for conflict resolution among sectors
- Monitor and evaluate progress of ICZM projects and programmes

Choosing the optimal degree of integration:

It must be noted however that coastal management does not replace traditional sector-by-sector management but coastal management provides for an additional dimension to the governance process by examining and acting upon the interactions and interdependencies with other sectors and the coastal ecosystem processes. Worldwide experience shows that from a practical, political and operational point of view, more integration is not always better than less integration. This is further elaborated in Box 2.

Although co-ordinating mechanisms at the national level are important, co-ordination at district or local level, where much of the implementation decisions take place, can significantly contribute to the success of ICZM.

A coastal manager working at the district or local level can play an important role in ensuring inter-sectoral integration at the implementation level. This can be achieved by establishing dialogue and consultation with relevant sectoral projects being implemented at the local level, serving in co-ordinating committees appointed for implementation of sectoral project and by serving as a member in the provincial/district/local level planning committees.
Optimal Integration

Although integration is an essential aspect of coastal zone management, it must be recognized that integration is not an aim in itself, as the ultimate objective is to reach a sustainable coastal development. Because of the complexity of issues involved, a certain level of integration is needed in order to identify and implement measures that are appropriate, are supported by all sectors, have no significant negative side effects. An integrated approach to planning enables definition of solutions that are more acceptable and easy to implement because they have the support of key stakeholders. But how can this optimal level of integration be determined? In general one can say that too little integration can lead to:
- treatment of symptoms rather than causes;
- ignoring side effects;
- objections from some stakeholders that were not involved.

On the other hand, too much integration can lead to:
- time consuming studies
- data overload
- too many compromises
- delayed implementation

Just establishing a multi-disciplinary group of experts together is not a guarantee for success. Each of the experts thinks that his or her discipline is the most important. Much time is devoted to data collection and time consuming discussions and then there is no time left for a truly interdisciplinary analysis. Instead of looking at the problem from different disciplinary angles, a truly interdisciplinary approach should be adopted. This requires cross-cutting visions and ideas, lateral thinking and learning to understand each others language.

Hence, in order to work out the ideal level of integration a critical look at the issues and relations is needed. The following guidelines can be used to design a sound approach for an integrated study:
- its objective should be problem-solving oriented, rather than research driven.
- start with a problem analysis and scoping exercise, that should identify the most urgent problems and relevant linkages and relations. Beware at this stage that domain boundaries of different systems (e.g. physical, ecological, social and administrative) do not necessarily coincide;
- prepare and discuss with the relevant stakeholders and policymakers the criteria on which a decision should be judged. This will focus the need for information;
3 Management Process

3.1 Policy development framework

Developing, implementing and then operating an ICZM program can be
accomplished in different ways. Worldwide, many different ways of developing
ICZM programmes can be observed, reflecting each nation's particular physical,
socio-economic, cultural and political settings. However, an examination of
programmes indicates that the overall process usually involves five phases:
planning, programme preparation, adoption of programme, operation and
evaluation.

A policy cycle is often used to depict the steps and sequence of actions that
constitute the ICZM management process. GESAMP (1996) provides a version of
the public policy cycle as a framework for grouping the activities associated with
coastal management (Figure 1).

Cicin Sain 1998 provides a similar but a six stage process based on the
International Guidelines (1996) for ICZM of the World Bank (Fig.2). A close
examination reveals that the overall process is similar and both frameworks or
modifications of these frameworks are used in national ICZM programmes.

The policy cycle is a framework for assembling the inter-connected features of
coastal resource management and for improving program efficiency. This cycle has
five steps, with later iterations of the cycle building on the previous. The policy cycle
helps organize in a logical sequence the many complex actions of coastal resource
management. Together, the steps and actions of the policy cycle provide a "road
map" to the formulation of a continuous management effort.

A policy development framework ensures that science and other activities in
support of resource management throughout the policy cycle are management-
driven within a structure for solving problems. There are simply not enough
resources to do otherwise.

Such framework can be used for policy development at the national level as well
as for ICZM planning at the local level. Fig.3 indicates the management planning
process adapted for the Philippine local government.

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Figure 1: Policy Development Framework

Coastal policy development process in the Netherlands clearly demonstrates how the iterative and circular policy process works. It is noteworthy that different policy perspectives do play an important role in motivating policy redefinition. Evolution of the Dutch Coastal Policy since 1953 is summarised in Annex 3.
Much experience in coastal management has been gained through the EU Demonstration projects that were executed during the 90s of the last century in a number of member states. An example is the Atlantic Living Coastlines Project, which aim it was to produce an Integrated Coastal Zone Management Framework for Devon and Cornwall, and is described in Annex 4.

**Some important considerations:**

Although the process is depicted as a cycle of sequential actions, it is very important to recognise that the actions undertaken do not necessarily have to be implemented in a chronological order. Actions in more than one step will occur simultaneously, this is especially true for Steps 1 and 2.

Equally important to know is that the specific course of actions will vary greatly from one country to another. Even within a country, a project in one province may not follow the same sequence of actions as in another province. The issues at hand, the socio-economic context, availability of resources (human and financial) and political support are some aspects that will determine what course of actions will be taken.
Coastal resource management is so complex and potentially all-encompassing that a strategic focus on a limited set of carefully selected issues is essential to success. It is better to do a few things well than many things poorly. By focusing down on strategically selected management issues, the complexity of the problem is constrained so that solutions can be offered within a reasonable time frame. As the programme matures, larger number of issues are incorporated (incremental approach) as indicated in Fig.1.

Political attention is an important measure for the successful implementation of an ICZM programme as political attention determine the prospect of decisions and allocation of necessary resources (human and financial) and establishment of enabling conditions (legal provision). However, the political attention does not remain constant but grows and diminishes with time. Four phases can be recognised in the so called “policy life cycle”. First is the awareness and recognition phase, second is the policy formulation phase, third is the policy implementation phase and finally the management and control phase. Figure 4 indicates how the political attention increases and decreases over these phases. The message for the Coastal manager is that he needs to ensure that the ICZM programme phases are aligned properly so as to capture the benefits of high political attention at the right time.

The two separate curves in the first two phases depicts the initial disagreement in the political arena between decision makers. It is an important task of the policy analyst to close this gap during the policy formulation phase.

![Figure 4. Policy Life Cycle](image-url)
3.2 Priority activities during the different stages of the policy cycle

As mentioned above, the specific course of actions undertaken during the management process will vary a great deal from country to country and from project to project. However, regardless of the nature of the project it is essential that an ICZM programme or project decides on a framework to guide the management process and defines a set of priority actions to be focused on during the different phases. Such a framework developed in a participatory manner will significantly help to create a common perspective on the coastal management process. Joint identification of essential decision elements will promote the development of a shared perspective. The explicit elements of the framework will, subsequently, constitute a framework that scientists, coastal management team and policy makers can refer to. As a guide, Annex 5 provides a summary of activities that are normally required at each step.

3.3 Step 1: Issue identification and assessment

Priority Actions

- Assess the principal environmental, social and institutional issues and their implications
- Identify the major stakeholders and their interests
- Invite review of the assessment and communicate the results to the appropriate audiences
- Select the issues upon which the management initiative will focus its efforts

In this initial planning stage, considerable consultation with key agencies and stakeholders is needed to confirm the issues and their implication. Workshops are frequently used to promote consultation and participation.

In some countries, a ‘coastal profile’ is prepared to lead the consultations. While the document provides an overview of the current situation and the prevailing issues, the participatory process used for its preparation contributes extensively to bringing on board stakeholders and creating public awareness.

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3.4 Step 2: Programme Preparation

**Priority Actions**

- Establish a team to formulate the plan.
- Conduct scientific research targeted at selected management questions
- Select boundaries for the management effort
- Document baseline conditions
- Strengthen institutional capacity for implementation of the management plan
- Communicate the importance of coastal resource management and the ICM project at many levels of society
- Specify environmental goals and objectives
- Define strategies and test strategies at a pilot scale
- Develop the management or action plan together with key stakeholders
- Design appropriate monitoring and evaluation systems

This second step in the planning process usually results in a management plan (see Module 6 for management plan formulation). Usually an assessment of the institutional capacity and adequacy of the legislative framework is undertaken during this stage. The most critical task in this phase would be establishment of appropriate management boundaries and consideration of management measures.

It is important to note that the planning process does not always result in a management plan such. In the case of the implementation of the Dutch policy for shoreline management, once the policy is developed (ex. policy regarding 'dynamic preservation, see annex 3) and management strategies are identified, detailed operational guidelines are developed to facilitate implementation at the provincial level.

The selection of management strategies is critical and many approaches ranging from a series of issue focussed workshops to more structured approaches such as 'policy analysis' are carried out.

The actions leading to the preparation of a management plan is dealt with in module 6.
3.4.1 Policy analysis

Policy analysis is a systematic investigation of complex policy alternatives to assist decision-makers in choosing a preferred course of action in the public sector under uncertain conditions. Policy analysis is used during the planning stage, usually in stages 1 and 2 in the Policy Development Framework.

Policy Analysis is advantageous when social issues are involved, there are many contradictory interests and many non-comparable values must be compared. Policy analysis consists of the following steps:

- problem analysis
- establishing criteria
- identifying alternatives
- evaluating alternatives
- ranking alternatives

These activities can be implemented following a linear or a concentric approach. In the linear approach, the steps are done subsequently. In the concentric approach, the activities of the study are carried out parallel. This approach aims to get insight in the problem, its alternatives and their effects, after which a further specification is formulated.

In reality, a policy study is somewhere in between these two extremes. The starting point is the linear approach, but the remaining part of the process is usually not followed from the beginning to the end "according to the book". Mostly there are one or more iteration loops. For example, it can become apparent that during the generating of alternatives, more problems become important than was initially anticipated, or more alternatives are possible than foreseen in the beginning. Another aspect is that several phases may be split-up in various sub-phases.

Policy Analysis is described in detail in Coastlearn module on Policy Analysis ([www.coastlearn.org](http://www.coastlearn.org)), and will not be dealt with in detail.

3.5 Step 3: Formal adoption and funding

**Priority Actions**

- Obtain formal approval of the management plan
- Obtain funding for program implementation if required
- Staffing and required organisational changes are arranged
- Strengthen institutional frameworks and legal authority for management
- Establish or improve institutional frameworks and legal authority for management
3.5.1 Pre requisites for Plan adoption

Before the management plan can become fully operational, the following are required:

- Adoption of the plan and its strategies, objectives and goals
- Establishment of the interagency co-ordination mechanism
- Enactment, sometimes by legislation, of coastal zone management boundaries and zoning schemes
- Approval of staffing and organisational changes that may be required
- Approval of funding allocation for the ICZM programme.

3.5.2 Facilitating the adoption of the ICZM Plan

Securing the approval of an ICZM plan that contain strong policies, meaningful goals, and effective co-ordination mechanisms is not an easy task. Experience shows that the prospects for timely approval by government can be increased if the following are met:

- The proposed programme is described in clear and understandable language (What is it?, Why do we need it? What will it do?)
- The benefits (economic, environmental and social) that will be derived from the programme are described in tangible and meaningful terms
- The proposed programme is clearly endorsed by the users of the coastal resources and interested NGOs.
- Key leaders in the government have received periodic reports of the progress of ICZM programme formulation efforts from its inception.
- The costs (political, financial, administrative) of implementation of the proposed ICZM programme are clearly spelled out and ways to cover these costs are suggested.

Interest in the programme will gradually decline if the programmes' implementation is unduly delayed due to the legislative process. Hence laying the groundwork necessary for adoption by the government should start at the very initial stages and a deliberate effort made to keep the key government officials informed of the plan development process.

The plan should ideally define the plan adoption process. In Sri Lanka, the Coast Conservation Act stipulates the plan adoption process. The draft plan is made available to the public and the Coast Conservation Advisory Council for review, the Coast Conservation Department includes changes necessary and the Cabinet of Ministers formally approves it.
3.5.3 Funding

Crucial to the success and continued implementation of an ICZM programme is the ability to generate the financial resources that are necessary to sustain the management activities that are necessary to achieve the programme’s long term goals and objectives. A sustainable financing mechanism is essential to ensure measurable and positive effects of management and actions. The financial mechanism may take the form of a single financial arrangement or a combination of financial initiatives.

Options for direct financing include:

- Governmental funds – funds allocated for capital and operational costs by local, provincial or national budgets.
- Revolving loan funds – money allocated by government or international financial institutions as a loan.
- Dedicated funds – a percentage of tax revenues or fees collected (ex. entrance fee in marine parks) is allocated for ICZM.
- Donor funds – funding support provided by international or bilateral donor agencies.

Increasingly, there is emphasis towards seeking other sustainable sources of financing so that reliance on direct funds can be reduced.

3.6 Step 4: Implementation

Priority Actions

- Make new or revised regulatory programmes effective.
- Promote compliance with resource management policies
- Implement mechanisms for interagency co-ordination
- Strengthen program administration and management
- Catalyze the construction and maintenance of necessary physical infrastructure
- Sustain participation of key stakeholder groups and the program's priority on the public agenda
- Implement conflict resolution procedures
- Initiate the monitoring and evaluation system

Implementation involves a set of actions by which plans and projects are carried out. All activities identified in the management plan—adoption of regulations, zoning schemes, development control via permit procedures, enforcement of prohibition of destructive activities, establishment of marine protected areas—must be implemented in a timely manner if programme goals are to be achieved. These must be supported by adequate budgetary allocations, revenue generation and skilled personnel.
Implementation not only involves regulatory and enforcement decisions and activities undertaken by the government sector, but also the decisions and activities of NGOs, resource user groups and communities. The quality and effectiveness of the implementation phase are determined by the legal authority to manage, adequate resources for management, staff skills and commitment political support effective co-ordination arrangements and above all community support. Development of guidelines to promote sustainable forms of coastal industry (ex. tourism, aquaculture and mining) and guidelines to enhance capacity for planning, regulation and enforcement are common activities undertaken during the implementation stage. Establishing a monitoring and an evaluation system is a crucial activity during this phase.

### 3.7 Step 5: Evaluation

**Priority Actions**

- Monitor environmental trends and outcomes
- Conduct a formal evaluation to assess the program's impacts on the management issues being addressed
- Adapt the program to its own experience and to changing social and environmental conditions

Evaluation is an activity undertaken to determine the extent to which a given programme is meeting its goals. The evaluation activity may be continuous, ongoing process in which measures of programmes performance are obtained and systematically compared with programme goals and objectives or it may be undertaken periodically during the programme.

Evaluating a programme promotes adaptive management, improves project planning and promotes accountability. Evaluations should be seen as normal part of the management process. Adaptive management is based on a circular rather than a linear management process, which allows information about past to feed back into and improve the way management is conducted in the future.

Evaluation is a well established component of many environmental management programmes. Its application in planning has been well recognised, but much less so in ICZM. Designing an evaluation programme and associated indicators for ICZM is so recent that academics and practitioners are still experimenting on how to approach the problem.
3.7.1 Constraints

International experience reveal that only a very few ICZM programmes have gone through a regular structured evaluation. The reasons for programmes not being evaluated include:

- Programmes often have goals and objectives that are vague or general and are not easily measured.
- The design of coastal management initiatives rarely calls for documenting baseline conditions in sufficient detail so that evaluators can make quantifiable, rigorously objective assessments. Monitoring the effectiveness has not been incorporated as an element in the programme.
- Fear that objective evaluations will reveal weaknesses or inadequacies of programmes.
- Data to assess on-the-ground intermediate and end outcomes of ICZM programmes are insufficient;
- Rigorous impact evaluations are typically considered too complex and expensive. They require control groups, large data sets on a range of indicators, and substantial expertise in data manipulation and analysis;
- Non availability of convenient and straight forward evaluating frameworks and methodologies.

Where evaluations have been carried out they often focus on process related indicators that measure the effort. Effort or process related indicators do not provide a measurement of the performance of the programme.

3.7.2 Approaches to ICZM evaluation

There are many different approaches to evaluation. However, experience shows that existing evaluations of coastal management initiatives can be grouped into three major types

a) Performance Evaluations are designed to address the quality of the execution of an ICZM project or initiative and the degree to which the initiative meets the requirements of funding agencies. Here the measures are accountability and quality control.

b) Management Capacity Evaluations are designed to determine the adequacy of management structures and processes. The purpose is to improve project design and make adjustments to the internal workings of a project or programme.

c) Outcome Evaluations assess the impacts of an ICZM programme upon coastal resources and/or the associated human society. This type of evaluation will determine how effective the implementation of ICZM has been i.e. what effect there has been on the resources and socio-economic conditions, such as coastal erosion rates, water quality, and improvements in certain elements of the quality of life of coastal residents.
To monitor the effectiveness of the process of ICZM, including the development and eventual implementation, will require the design of an evaluation system that includes all three types of evaluation mentioned above. This will require different types of indicators to be developed. Some indicators, particularly those to be used to evaluate performance and management capacity, will be easier to develop as they will be monitoring areas of work for which clear objectives can be set. However, if a link is to be made between ICZM effort and its impact on the coast, then suitable outcome indicators are needed. This is more difficult to achieve as the development of outcome objectives is not straightforward.

### 3.7.3 Evaluation frameworks and their challenges

Development of frameworks to facilitate evaluation appears to be currently receiving great attention from the international ICZM community, however, they are facing various challenges in the design of a suitable framework. These include:

- There is no consensus on appropriate indicators for measuring specific outcomes;
- There is an absence of good quality baseline and time-series data on which to base indicators;
- The inherent difficulty in modelling many types of cause and effect relations;
- The number of years needed for the effects of human activities to become apparent;
- Determining causation (e.g. determining the extent to which ICZM, rather than other factors, caused the outcome being measured);
- The amount of time and money required to assess the performance;
- Absence of a structured approach to measure the effectiveness of an ICZM initiative;
- Case studies, surveys and anecdotal information are often the only means used to measure the effectiveness of an ICZM initiative;
- The non-rigorous and easily biased information produced by poor evaluations is having less and less impact upon decision-makers who ultimately determine the fate of an ICZM effort;
- Managers of ICZM initiatives are, on occasion, reluctant to being evaluated by independent institutions.

The major task of outcome evaluation is measuring change in outcome conditions and confidently attributing some or all of these changes to the ICZM initiative. For this specific ICZM indicators are required.

### 3.7.4 Indicators

Indicators are an important tool for understanding and evaluating the state of the environment as well as its management. Indicators lend themselves both to being widely reported in the media and to being recognized by the public. They are best considered as objective tools to help measure, monitor and report on progress towards sustainability and the state of the coastal environment, and to inform choices and action. In fact, they are indispensable for reducing the potentially
enormous amount of data that can be monitored to a shortlist of variables that provides meaningful information and is feasible to collect and process. Hence, the definition of a list of indicators should ideally be done at the earliest stage of data collection. Examples of indicators are:

- species richness of an ecosystem (as an indicator of biodiversity)
- abundance of key species of an ecosystem (as an indicator of ecosystem functioning)
- water quality parameters (as an indicator of water pollution)
- number of fish licenses (as an indicator of fishing pressure)
- Gini coefficient (as an indicator of economic equity)

3.7.5 Progress in ICZM Indicators

Outcome evaluations require indicators to measure performance and to determine what data needs to be collected to monitor performance. However, examples of indicators successfully developed for outcome evaluation of ICZM effort are limited. A review of world-wide progress in their development is presented in a report by the Central Research Unit of the Scottish Executive.\(^8\) Not all can be classed as 'true' ICZM outcome indicators, however, it does provide a snap-shot of experience gleaned over the last decade, and highlights best practice that could have applicability in other ICZM programmes.

They include:


It proposed 17 indicators to measure aspects of efforts to integrate the management of estuarine and marine ecosystems in order to achieve equity – both within and between generations – in the conservation and use of living and non-living resources of the estuaries and oceans

*In his review of lessons learnt from 30 years of ICZM experience within the US, Sorensen considers the use of indicators for assessing the success of ICZM (Sorensen 1997).*\(^9\) *Indicators suggested include:*

- The number of ICZM efforts initiated;
- The number of plans or strategies adopted or implemented;
- The willingness to pay for an initiative by partners;
- Measurable outputs – including publications, websites, conferences, meetings, education and training, guidelines, models, and management plans.

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Fry and Jones (2000)\textsuperscript{10}, have developed a series of indicators to evaluate Estuary Management Partnership (EMP) success in England and Wales. 27 indicators are proposed under four categories:

- Stakeholder Participation;
- Leverage and Long Term Funding;
- Steering Group Participation;
- Involvement in other Strategic Initiatives.

The USAID Agency and the University of Rhode Island Coastal Resources Centre have developed a series of "Coastal Management Indicators" as part of a performance monitoring plan to assess USAID funded IZCM work around the world (CRC, 1996. CRC, 1999).

The indicators are intended to track progress in coastal management efforts over time and to assess the impact of the efforts and results achieved. They use 12 indicators, including:

- Improved Strategies and Policies
- New Institutional structures
- Stakeholder Participation
- Publications
- Improved and Effective Management
- Hands-on Experience
- Training Programmes
- Media Coverage
- Additional Field Support
- Leveraged Resources
- Additional USAID and International Support

The indicators are all used as part of a formal reporting system. Some of the indicators require the collection of numerous data sets, and need to be linked to a separate State of the Environment Reporting (SER) for the area of coast on which the assessment is being undertaken. No results from the use of this recently introduced system are currently available.

The indicators given are a mix of process, output and outcome types and are specific to developing country situations. Of note is the need for a baseline description of the conditions under which management is taking place. In addition, a monitoring programme must be in place to track any environmental change occurring at the management site.

**Europe: integration indicators**

The European Environment Agency (EEA) has recently undertaken work to look at integration indicators which could be used to measure the integration of the environment and sustainable development policy into various sectors of the economy, including energy, the Common Agricultural Policy and enterprise policy (Hertin et al. 2001\textsuperscript{11}. EEA 2000)\textsuperscript{12}.

Integration indicators are intended to evaluate the integration of sustainability considerations into policy, as well as the contribution of policy to the achievement of sustainable development. The need for these indicators is based on the assumption that sectoral policies tend to take insufficient account of sustainable development issues.


The EEA work developed a system of integration indicators that distinguishes between three categories of indicators. These are concerned with economic, social and environmental outcomes (headline indicators), identifying significant overlaps between policy and sustainability (integration indicators) and monitoring how policy processes take into account sustainability objectives (process indicators). Taken together, these indicators can provide a broad picture of the process and outcomes of the integration of sustainable development objectives into various sectors of the economy. These are shown in table 6.

Table 1. Categories of policy integration indicators

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headline Indicators</td>
<td>Headline indicators monitor key economic, social and environmental trends. They highlight favourable developments as well as unresolved problems in the area of sustainable development.</td>
</tr>
<tr>
<td>Integration Indicators</td>
<td>Integration indicators link economic objectives to social and environmental objectives. They assess whether policy is exploiting potential ‘win-win’ opportunities.</td>
</tr>
<tr>
<td>Process Indicators</td>
<td>Process indicators describe activities within businesses and policy-making institutions, which can improve the integration of sustainable development into policy.</td>
</tr>
</tbody>
</table>

Integration indicators and reporting mechanisms are intended to support learning within the policy-making process, aiming to open procedures to a wider set of social and environmental concerns. They are also intended to allow external stakeholders to monitor progress towards integration. These are all worthy aims that have applicability within the ICZM process.

The interactive process used by the EEA to develop these sectoral integration indicators represents a complex area of work and contributes significantly to the ongoing discussion regarding indicators for monitoring integration processes. At the moment this work is very sector specific. It concludes that there is a lack of a harmonised methodology that can be widely applied to many sectors. However, further recommendations have been made which, if pursued, may lead to applicability within the field of ICZM. These include the development of cross-sectoral integration indicators that would perhaps have more relevance to the more holistic and sectoral integration objectives of ICZM.
3.7.6 Recent developments in designing frameworks for ICZM evaluation.

1. **RIKZ framework for Assessment of ICZM Implementation Feasibility**

   The RIKZ/CZMC has initiated the development of a Methodology for Evaluation of ICZM Implementation Feasibility. This procedure is referred to as the ICZM Implementation Feasibility Evaluation Procedure (ICZM-IFEP).

   The approach is generic by nature and can be viewed as a checklist or guideline for actual applications. It is based on the assessment of the various phases in the ICZM process, using a system of qualitative and semi-quantitative scores. These scores explicitly take into account the relevant field of actors and their specific roles, mandates and capabilities. This procedure would allow the assessment of the implementation feasibility, in terms of the probability of success or failure of executing (implementing) the various steps in the ICZM process.

   The basic approach consists of five steps:
   1. General description of ICZM setting.
   3. Assessment of key ICZM implementation aspects.
   4. Overall interpretation of ICZM situation.
   5. Identification of options for ICZM support.

<table>
<thead>
<tr>
<th>ICZM phase</th>
<th>Implementation requirement categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ICZM mandate</td>
</tr>
<tr>
<td>Planning</td>
<td>Planning initiation</td>
</tr>
<tr>
<td></td>
<td>Planning/assignment of planning tasks</td>
</tr>
<tr>
<td></td>
<td>Data availability</td>
</tr>
<tr>
<td></td>
<td>Institutional analysis capacity</td>
</tr>
<tr>
<td></td>
<td>Integrated analysis capacity</td>
</tr>
<tr>
<td>Decision making</td>
<td>(Final) plan formulation</td>
</tr>
<tr>
<td></td>
<td>Plan adoption</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td>Technical design</td>
</tr>
<tr>
<td></td>
<td>Institutional design</td>
</tr>
<tr>
<td></td>
<td>Implementation and financing decisions</td>
</tr>
<tr>
<td></td>
<td>Enforcement decisions</td>
</tr>
<tr>
<td></td>
<td>Jurisdiction in coastal zone</td>
</tr>
</tbody>
</table>

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13 **RIKZ Report on Evaluation Procedure for Assessment of ICZM Implementation Feasibility.**
2. Coastal Resources Centre methods for evaluation of ICZM programmes

The Coastal Resources Centre, University of Rhode Island has invested much effort in developing a framework for evaluating ICZM programmes. Two frameworks are described in Olsen (2003)\textsuperscript{14}.

The first is the four Orders of Outcomes that group together the sequences of institutional, behavioural and social/environmental changes that can lead to more sustainable forms of coastal development. A framework for grouping the outcomes of ICM initiatives is given in Figure 3. The framework recognizes that ICM is a process for negotiating and implementing public policy to achieve sustainable coastal development goals. Indicators for each order of outcome is suggested.

**First Order** outcomes are the societal actions that are required when it commits to a plan of action designed to modify the course of events in a coastal system. At the national level, First Order outcomes are expressed as a formalised commitment to an ICZM programme and putting in place the ‘enabling conditions’ that are required if ICZM policies, plans and actions are to be successfully implemented.

**Second Order** outcomes are evidence of successful implementation of an ICZM programme. This includes evidence of new forms of collaborative action among institutions, the actions of state-civil society partnerships and the behavioural changes of resources users.

**Third Order** outcomes are socio-economic and environmental outcomes that mark physical evidence of progress towards sustainable forms of development.

**Fourth Order** outcomes would be the achievement of ultimate goal of sustainable development and remains an undefined ideal.

The second framework is a version of the more familiar ICM policy cycle and offers a set of “priority actions” for each of the five steps of the policy framework and then poses questions that are designed to probe how these steps and actions are being adapted to a given situation and whether they are being strategically linked as a program evolves.\(^{15}\)

4 Lessons from Worldwide ICZM experiences

Review of international ICZM experience provides several lessons and directions for ICZM programmes in the future. 16

- The public process by which policy is formulated and implemented is usually more challenging and more important to the ultimate success of a management initiative than sophistication of tools and regulatory procedures utilized in the programme. For example, a management plan is both a process and a product. As a process, it plays a very important role in establishing awareness and support for management and placing ICZM high on the political agenda.
- Skill in matching of management tools to a given situation are extremely important.
- Incremental approach – several programmes have demonstrated that the adoption of an incremental approach has many advantages. The approach of addressing a few priority issues during the first phase (or generation) of the programme and adding on more issue in the successive phases to achieve a higher level of performance and demonstrate benefits to the stakeholders. A higher performance can be achieved by addressing fewer issues and addressing them well than embracing an extended agenda and not being able to implement the programme. This approach also allows the programme to learn from experience and improve the later iterations.
- Structuring the programme in a way that there are national level activities as well as local level activities has proven to be an effective approach. This is often referred to as the 'twin track' approach or linking the top-down and bottom-up means of management.
- ICZM programmes and projects must demonstrate some solid progress in a reasonably short time. Although building an ICZM programme is a long-term process, some tangible outputs, outcomes and benefits to the local communities must be shown in a short time in order build a supportive constituency.
- ICZM project goals are often too narrow and need to be expanded to include zoning, minimisation of risks to vulnerable populations, increased capacity for disaster management, control of pollution in international waters, conflict management and empowerment of local stakeholders.
- ICZM projects must have greater focus on significant economic opportunities present in coastal areas which can be maximised through sound planning and management. Partnerships with the private sector, enhancing coastal livelihoods and investment in sustainable coastal tourism, sustainable mariculture, and well planned and managed industrial ventures could yield significant benefits at the local as well as national levels.
- A recent study led by the RIKZ has shown that although the Convention on Biological Diversity (CBD) recommends ICZM (IMCAM in CBD language) as an effective approach to implement the coastal and marine component of the CBD

(Jakarta Mandate), ongoing ICZM programmes and projects do not adequately incorporate CBD objectives.

5 Future opportunities identified for RIKZ/CZM

Based on an examination of the worldwide experiences, RIKZ/CZMC has recently defined (still to be finalised) six areas which offer opportunities for RIKZ/CZMC partnerships in ICZM\textsuperscript{17}. These are summarised below:

1. \textit{Emphasise on implementation}: focus on bridging the gap between planning and implementation by promoting tools that assist implementation such as IMVULRES.
2. \textit{Emphasise local community based ICZM}: For successful and efficient ICZM and to build a real participatory resource management, focus should be more on concrete local community based programmes and on linking these with the provincial and national levels. RIKZ has adopted a method developed by the Coastal Resources Center of the University of Rhode Island that focuses on behavioural change of stakeholders in order to improve the success of an ICZM policy or plan. This method is summarised in Annex 6.
3. \textit{Take sea and land together}: This calls for broad perspectives of ICZM for example the concept of ICARM (Integrated Coastal Area and River Basin Management).
4. \textit{Nested Governance}: Focus on governance related issues especially the need to integrate various sectors and incorporate resource economics and stakeholder analysis and participation.
5. \textit{Promote equity in ICZM}: This includes promoting artisinal forms of resource use, role of women in ICZM, poverty alleviation, and enhanced coastal livelihoods.
6. \textit{Emphasise learning based ICZM}: ICZM initiatives should be designed and executed to promote learning and evaluation. Programmes should use its results to adapt subsequent phases. Programmes should also learn from experiences of other projects and programmes.

\textsuperscript{17}RIKZ (2003): Integrated Coastal Management (ICM) and RIKZ/CZMC. Internal report of the RIKZ/CZMC.
6 Information needs, sources of information and decision support systems

It is clear that management of complex ecosystem subject to significant human pressures cannot occur in the absence of science. Natural sciences are vital to understanding ecosystem functioning and social sciences are essential to understand the origin of human-induced problems and in finding appropriate solutions.

6.1 Information is data in context

Data is the raw material from which information is produced. Information is a collection of data relevant to a recipient at a given point in time. Information is data in context: it has meaning, relevance and purpose.

\[ \text{Data} + \text{Context} = \text{Information} \]
\[ \text{Information} + \text{Analysis} = \text{Understanding} \]
\[ \text{Understanding} + \text{Management} = \text{Possibility of sustainable action} \]

In order to produce information from data the following steps need to be taken:

- **Observations** from the field, from surveys and inventories are first turned into raw data. Errors from all kinds of sources usually pollute these data (e.g. from monitoring equipment failures, typing errors etc.) and need to be cleaned through quality checks. Often the data has to be processed as well in order to filter out the signal from the natural variability. Once this has been done, the data can be interpreted by putting it into perspective using existing knowledge and accepted theories. Example methods used at this stage are trend analysis and comparisons with other data. This yields information that can be evaluated using criteria and policy objectives set by the manager. Processed data becomes indicators when they are tied to a specific problem or application (fig.5). If indicators are aggregated according to a specific formula, they become indices (e.g. Human development Index, Water Quality Index).
- Finally a judgement can be made whether or not the information calls for necessary action.
6.2 Role of information in decision making

- Informed decision making is only possible with the right kind of information, although correct decisions are not guaranteed. Decision making in the absence of appropriate information is not informed and runs the risk of being wrong (or at least not optimal).
- Decision making is incremental, it is reflected in gradual changes in policies as additional information is acquired.
- The real situation is that many decisions are based on incomplete or imperfect information (as opposed to the ideal).
- This imperfect situation leads to successive small and incremental changes (to minimise the impact of being wrong) because decision makers know that lack of information limits their ability to consider all options and evaluate consequences of their decisions.

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\(^{18}\) Scialabba, Nadia (ed.) 1998. Integrated coastal area management and agriculture, forestry and fisheries. FAO guidelines
6.3 Information needs

Given the differences that exist in the coastal management problems from country to country and the differences in the scope of projects, information needs can be defined only in a general manner. Information regarding biophysical and environmental aspects, social and economic aspects, institutional and legislative aspects, and opportunities for management interventions is required. Information is needed not only in the planning stages but information plays key role in the development of indicators, the implementation and monitoring phase and in the evaluation phase. As a rough guide Cicin-Sain (1998) provides a summary of information needed at the various stages in the ICZM cycle and for common areas of concern in ICZM.

Dealing with problems and aspects in an ICZM context requires the gathering and processing of vast amounts of information. A sound system analysis analyses and decomposes complex ICZM problems into separate problem areas, for each of which solutions are sought that together should solve the overall problem. Not all problems, however, are alike. There are four different situations in which an end user (in this respect a coastal zone manager) can find him- or herself in when dealing with a specific problem. These situations determine the information and kind of activities that is needed to gather this information. This is illustrated in Figure 6

<table>
<thead>
<tr>
<th>required knowledge</th>
<th>knowledge state end user</th>
<th>knowledge state specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>simple</td>
<td>adequate ( \text{self-sufficing} ) (A)</td>
<td>\text{adequate}</td>
</tr>
<tr>
<td>complex</td>
<td>lacking ( \text{learning} ) (Teach ← Study) (B)</td>
<td>lacking ( \text{knowledge development} ) (D)</td>
</tr>
<tr>
<td>consulting</td>
<td>( \text{consulting} ) (know how ↔ know what) (C)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6: knowledge transfer situations

A) In this situation the problem is relatively simple and the knowledge of the manager is sufficient to tackle the problem by him- or herself.
B) Situation B represents a ‘simple’ problem combined with a lacking knowledge state of the end user. In this case the transfer of existing knowledge could be enough to alter the state of knowledge to adequate and create a type A situation. In simple situations where the specialist’s state of knowledge is also lacking a study may need to be commissioned first to gather the required information.

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C) When the problem is more complex, again two situations may be distinguished. In situation C the state of knowledge of the end user is lacking, whereas the specialist’s state of knowledge is adequate. The required information may be not transferred easily, due to the complexity of the problem. A consultation may be needed to gather existing knowledge to solve the problem.

D) When the state of knowledge of the specialist is also lacking, it may be necessary to develop new knowledge. Research is needed to solve the problem at hand.

6.4 Data availability and accessibility

Having considered the range of subjects for which data may be needed, there are three attributes any data must have if it is to be converted to information appropriate for the current need.

- **Availability**: knowledge is required about what data exist;
- **Accessibility**: when relevant data are available it is essential to know how to gain access to them. The costs of acquisition and details of any institutional barriers to information exchange need to be understood. The data must also be in a form that can be used by the technologies available to the recipient;
- **Appropriateness**: when data are available and accessible, the recipient must have a good understanding of the nature, quality and validity (in time) of the data, so that data can be used appropriately.

6.5 Management oriented information

Much useful data and information concerning coastal resources already exists and obviously should be used in ICZM programmes. The challenge is to identify, locate and organise the information in a way that will make it accessible and usable in the ICZM decision making process. In recent years great advances have been made in procedures for collecting and handling information and data; these methodologies should be incorporated as fully as possible into ICZM programmes.

6.5.1 Some approaches to collecting primary information

- **Rapid or Participatory Rural Appraisal** - conducted over large areas in a short time to develop a general picture of conditions at community level through interviews and surveys. They are not entirely random and can yield accurate relatively inexpensive qualitative indications of local conditions. These methods are heavily used in local level ICZM efforts.
- **Systematic ground or aquatic surveys** - To collect more detailed information and to ground truth remote measurements (such as aerial photographs)
- **Remote sensing** - especially useful in collecting geographic type information, that is information that is spatially referenced.
**Meta Data**

Having identified the information need, and thereby recognised what data are needed, the process of tracking down actual data begins. The single most useful tool in this data location task is metadata. Metadata is simply information about what data are available, where they are kept and the custodians. A metadata system can be seen as a sign-posting mechanism that allows the user to find out where suitable data might exist. COASTBASE is an example of such a system. COASTBASE is the European virtual coastal and marine data warehouse for integrated, distributed information search, access and feedback.

6.5.2 Creating a local research agenda

The ICZM process is strengthened when scientific methods respond to local needs and knowledge. Unfortunately such an alliance is not common. Within many of the projects there is more often a disparity between research effort applied and the needs of local policy formulation and decision-taking. Research scientists usually have their own agenda that is dictated by the academic requirements of national (or sometimes international) funding bodies.

Creating a local research agenda with the active involvement of scientists and information users such as local fish farmers, fishermen and hotels may help overcome these misconceptions and help to establish, amongst other things:

- links between scientific study and the real needs of managers;
- common data collection protocols allied to information sharing;
- the identification of real as opposed to perceived data gaps;
- integration with local artisanal knowledge; and
- better access to the results.

6.5.3 Science–policy integration

A continuing challenge in ICZM lies in the science-policy interface. Experience shows that managers and policy makers have difficulty in motivating the scientific community to carry out research needed for management. At the same time, scientists experience difficulties in finding out what kinds of research questions relevant to policy needs to be undertaken.

Research is often determined on the basis of academic requirements rather than the need to solve practical issues on the ground. And even if the research addresses a practical problem, there is often a problem in making the understanding gained available in a form that is accessible to those non-academics who would benefit from it. Therefore, it can be difficult to apply the results of research studies to policy formulation and practical management.

*Political benefits of a good science base:* Decisions made as a part of a ICZM process have important impacts on coastal industry and businesses. And there is often pressure by the business community against such decisions. Decisions that cannot be defended on scientific ground may be overturned more easily than decisions that have a good scientific basis.
Overall there is a need to improve the effectiveness of the communication and integration across the scientist - policy maker interface. The issue of science policy integration and how science could be better linked with policy development is addressed in detail in Cicin-Sain (1998) and Konningsveld (2003)\(^\text{20}\).

### 6.6 Models and Decision Support Systems

**Models**

Models are abstractions of the real world and are, therefore, imperfect. They embody a single perspective on the studied system by ignoring those aspects considered irrelevant and simplifying those that remain. Models are of use when they can be applied to real situations.

Models derived from research studies may help our understanding of how systems work but it is important to recognise that what is relevant in one area may not be so in another. The LOIS project in the UK looked at land-ocean interactions across the east coast of England. In this area a large river and estuarine system provided the research area with fluxes of sediment between the land and sea, and this was one of the major subjects studied. Clearly this work will not have the same relevance in an essentially open, rocky coast where there is little sediment movement. This is not, however, an argument for a similar study to be undertaken on every type of coast zone.

The ultimate goal of many of the models is to provide mechanisms whereby the manager can create simulations, based on the underlying models, of the consequences of an action given an initial starting position. In this context the models may include methods for interpreting the results of the simulation.

**Decision Support Systems**

The management of natural resources requires the integration of often large volumes of disparate information from numerous sources; the coupling of this information with efficient tools for assessment and evaluation that enable broad, interactive participation in the planning, assessment, and decision making process; as well as effective methods to communicate results and findings of these processes to a broad audience.

Information technology, and in particular the integration of data base management systems, GIS, remote sensing and image processing, simulation models, multi-criteria evaluation tools, expert systems and computer graphics provide some of the tools which have been applied in the research and management of coastal zones in the last decade.

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Decision Support Systems (DSS) aim to integrate these tools and thereby provide an adequate scientific description of the system under study, as well as a discussion platform to reach a common perspective between scientists and managers for the comparison of different management measures and strategies. A summary of the Decision Support Systems developed under the auspices of RIKZ in the recent past are given in Annex 7.

As such a DSS is an important tool to:

- integrate research efforts in different scientific disciplines and translate the results to the management level
- increase the understanding at the management level of the relationships between users of the coastal zone and the natural systems themselves;
- provide different authorities with a common framework for the analysis and comparison of management decisions;
- facilitate the comparison of many different management options and measures;
- repeat the decision making process after additional or different information has become available.

The ultimate objective of a computer based decision support system for natural resource management is to improve the planning and decision making processes by providing useful and scientifically sound information to all the actors involved in these processes, including public officials, planners, scientists, and the general public.

An effective DSS must first of all provide a common, shared information basis, and a framework and language for dialogue and negotiation. The dialogue between the actors in the decision making process is extended to a dialogue with the DSS, which plays the role of a technical expert and bookkeeper, rather than the role of an arbiter.

A good DSS is based on more than good science and solid engineering, it requires an approach that takes psychological and institutional aspects into account as well. From a technical point of view the basic tools are available and the underlying concepts are well developed. New technologies, like internet based globally distributed client-server applications, multimedia and virtual reality and the access to large volumes of information, increase the potential use of the decision support systems.

Model based decision support systems have been advocated widely and for a considerable time. However, success stories of actual use in the public debate and policy making are rare. This is due to the fact that most DSSs have been prepared as academic exercises without much discussion or contact with the potential users. As a result these tools are often highly theoretical and hard to understand, let alone to work with. This calls for a new approach that supports a more open and participatory decision making process. Emphasis should not be on finding an optimal solution for a well defined problem, but on support during the various phases of the problem definition and problem solving process. This requires systems that are easy to understand and easy to use.

In the Netherlands this has led to the development of two-tiered DSS systems. Besides a complex system containing all the models and databases, simple systems are developed for use by the decision makers and the general public alike.
In these simple systems the results of all possible cases (a set of analysis conditions) are stored in a database. These ‘precooked’ DSS results are easily retrievable with a graphical user interface.

Box 3

Example: DSS ICZM Andhra Pradesh (India)

The need for sustainable development of the 1,000 km long coastal zone of Andhra Pradesh and to reduce its vulnerability to cyclones prompted the Government of Andhra Pradesh to embark on a study on ICZM. As a part of this study a Decision Support System was developed that would assist in the formulating a policy for the AP coast. One of the innovative aspects to this DSS is the explicit links between economic development, environmental protection and flood vulnerability. The DSS has been developed for one of the major river deltas along the coast and comprises a large part of East and West Godavari Districts. At the basis of the model lies a description of the land use and its potential, using geographically defined Resource Development Units. These units are more or less uniform with regard land geomorphology, soils and water resources that determine both present and future land use. The DSS further consists of the following modules:

- **Land Use Module (LUM)** describes the present and future (scenario) landuse and all related activities (crops, labour demand, gross revenues etc.). This forms the basis for the spatial allocation of people, economic and environmental values. Linked to this all relevant data is included which is needed for the calculations in the other modules, like agricultural yields, labour demands, crop vulnerability etc. The LUM therefore produces important inputs for the SAM, EAM and FVM.

- **Socio-economic Assessment Module (SAM)** calculates the (per capita) income and income distribution in the coastal area (Gini coefficient), employment rate, regional income etc. Outputs are created for the FVM.

- **Resource Use and Waste generation Module (RWM)** calculates the use of resources (water, fuelwood, etc.) and the consequent transportation needs and pollution load based on the type and magnitude of the spatial activities. Outputs are generated for the EAM.

- **Environmental Assessment Module (EAM)** estimates the impact on the assimilative capacity of the coastal zone based on the information from the RWM, and together with information from the assimilative and supportive capacities from the LUM. This produces a picture of the environmental quality of the physical compartments and condition of the natural habitats.

- **Flooding Probability and severity Module (FPM)** deals with the geo-physical aspects of storm surge flooding. Probability depends on the hydraulic conditions and cyclone frequencies, and the characteristics of the geophysical units (elevation, rate of protection etc.). Severity is expressed in casualty rates and damage factors, inferred from the hydraulic characteristics of the flooding (water level, rate of water rise, flood duration). The FPM creates input for the FVM.

- **Flooding Vulnerability Module (FVM)** combines information from the LUM, SAM and FPM to calculate vulnerability. It regards aspects like people and capital at risk, expected damages and recovery factors.

The model distinguishes four income categories through which the economic wealth is distributed and calculates the vulnerability of each of these income classes to financial losses based on the spatially differentiated flood probability in the coastal zone. The rationale behind the DSS is that the land use activities (notably agricultural and industrial production) not only determine the regional and per capita income situation, but also influences the demands on land, water and energy resources, produces wastes and are to a greater or lesser extent vulnerable to cyclone disasters. It helps the decision maker to define an optimal mix of land uses (crops) that maximally contributes to the economic growth, is least vulnerable to flooding and requires a minimum of scarce environmental resources, such as fresh water.

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21 Developed by WL | Delft Hydraulics and BB&C
6.7 Some lessons

The key on-going problem in relation to the nature of information required for coastal zone management lies not so much in the provision or the content of information itself, but in the way it is presented to those who formulate and implement policy and take management decisions.

In 1998, European Environment Agency (EEA) undertook an information thematic study on Integrated Management in Coastal Zones aimed at establishing ‘the role of information in integrated coastal zone management’ as part of the EU Demonstration Programme. This study provides many insights to the discussion on information needs for ICZM. Although the study was focussed on European case studies, the conclusions are widely applicable and are presented below:

**Information raises awareness**
Information is vital in taking a proactive approach to awareness raising. Undertaken at an early stage, awareness raising helps to gather support for the ICZM effort. Those responsible for promoting ICZM must disseminate the understanding gained from the process both within the decision-making bodies and to the wider public.

**Information helps build participation**
Information is not only a key to problem-solving, it also provides a way of facilitating participation and thereby ownership of coastal management problems, issues and solutions. Use of data collection and collation as a means of nourishing the participatory process.

**Agree common protocols for information exchange**
The way in which existing data are shared is of crucial importance. Data converted to information provide a better knowledge base, the capacity for understanding, and the potential for an improved approach to policy formulation and decision-making. Establish an agreement to share data at the outset of a project.

**Build a strategic knowledge base**
Take stock of the resources within the area and the human impacts on these resources. Then establish a dialogue between the sectors to help reach an understanding of what can and cannot be done. The ‘knowledge base’ that results from a stock-take plays a major role at other levels of policy formulation and management.

**Create a local research agenda**
Whatever the current relationship between local scientists, managers and politicians, there is an increasing recognition amongst many of them that there is benefit in undertaking more applied research and to cater to local needs.

**Establish an information exchange network.**
Establish a facility, supported by local and regional groups, for the supply of relevant, reliable and timely information and advice.

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Understand the importance of context
It is important to recognise and understand the wider context within which management decisions are taken. Use aggregated data or other contextual data sources to help identify strategic issues and management options.

Use ‘state of the coast’ reports to provide contextual data
Collation of reports, such as the Coastal Directories series in the UK and the QSR prepared at the regional seas level, contribute to sustainable coastal and marine policy by providing the context in which local approaches to integrated management operate.

Monitoring and evaluation is an integral part of ICZM
Every stretch of coast, irrespective of its length, should be monitored and evaluated as to whether it is moving towards a more or less sustainable state, and at what speed. A set of sustainability indicators for coasts and seas, should be recommended to all local and regional authorities.

Be issue led, not data led
Care should be taken to ensure that data quality or availability does not predetermine the issues to be considered. Issues should be prioritised according to their importance, and not because of data availability.

Research proposals should be more user focused
Research proposals should show how potential users have been brought into the process of identifying research needs. They should include a clear statement of how the results will be applied to the problem under study and who will benefit. Any new research proposals should have a clear policy for disseminating the understanding gained to users, and provision for this should be made within the budget proposals.

Local and regional authorities must become more involved in specifying coastal and marine research
Over 90% of decisions taken about the European littoral are taken by local authorities. Yet rarely are local authorities involved in developing applied coastal and marine research. Where they exist, groups such as the National Coasts and Estuaries Advisory Group (of local authorities) in the UK, should be brought into the research programme development agenda at Member State and DG level at an early stage.

Dissemination of results should be part of project specification
More thought should be given to the method by which the understanding gained from a project is disseminated. Ideally the project specification should address this issue and an earlier dialogue with potential users is often very helpful.
7 Environmental Assessment of Coastal Development

7.1 Environmental assessment process

Environmental assessment is a widely used policy tool for reducing the negative environmental consequences of development activities and for promoting sustainable development. It covers both the assessment of individual development projects, often known as environmental impact assessment (EIA), and the appraisal of development policies, plans and programmes, which is generally referred to as strategic environmental assessment (SEA). In both cases the general purposes of the assessment are:

- To identify any potentially adverse environmental consequences of a development action, so that they may be avoided, reduced or otherwise taken into account during planning and design
- To ensure that any consequences are taken into account, both whilst planning and designing an action and when it is authorised
- To influence how it is subsequently managed during its implementation.

EA is potentially applicable to any type of development action, which may result in significant environmental impacts, in any part of the world. Its underlying principles are general but the circumstances in which it is applied and, therefore, the particular form it takes, vary considerably between different parts of the world. For details of the process see Lee and George (2000).23

7.2 Strategic environmental assessment (SEA)

The main objective of a SEA is to assist the sectoral agency responsible for a specific sector (e.g. tourism, aquaculture, port development etc.) and the environmental agency responsible for coastal environmental management to develop practical policy and strategy for the development and improve environmental performance of the sector. SEA also helps provide necessary technical information relating to the sector as an input to broader ICZM. SEA is also a means of facilitating public understanding of the nature of the sector development, the options available, and their technical, socio-economic and environmental characteristics and effects.

SEA process requires a high level of integration and liaison between the responsible agency and the other agencies and stakeholders. One of the practical benefits of SEA is its ability to assess cumulative benefits which is not possible with

EIA. UNEP GPA is calling for the conduct of SEA for the impacting sectors identified under the Physical Alteration and Destruction of Habitats programme.

7.3 Project level EIA

At the project level, an EIA:

- Assists the developer or the project proponent to design and implement a proposal in a way that eliminates or minimises the negative effects on the biophysical and the socio-economic environments and thus saving himself exorbitantly high mitigation costs
- Assists the public to understand the proposal and its impacts on the community and environment and to make an input into the decision making process.
- Assists the management or the regulatory agency to make a decision on the proposal and also provides a framework for monitoring the performance of the project

The procedure for the EIA process is indicated in Figure 7.
Figure 7. Simplified procedure of the EIA process
7.4 Benefits and costs of EA

The value of environmental assessment as an appraisal tool depends in the final analysis, on the relationship between the benefits and costs of its application.

**Benefits:**

- Environmental and other sustainability benefits, attributable to the EA system, resulting from modifications to actions prior to their approval and implementation.
- Projects that are socially, environmentally and economically unsound are much less likely to be implemented, resulting in cost saving and environmental protection.
- Savings in mitigation costs due to earlier detection of potential environmental problems and better designed corrective measures to deal with these problems.
- Savings in time in obtaining approval for new developments also due to the earlier detection and correction of environmental problems which reduce controversy and conflict during the authorization process.

**Costs:**

- Extra costs to the developer and the authorities in complying with EA study and procedural requirements.
- Losses of time where the EA system does not work efficiently and unjustified delays occur.

7.5 Legislative and institutional framework for coastal EIA in selected countries

**India**

The Ministry of environment and Forests (MoEF) is the Agency responsible for EIA. Environmental Impact Assessment (EIA) was made mandatory in 1994. The Environmental Impact Assessment Regulations of 1994 notification requires the project proponent to submit an EIA report, an environmental management plan, details of the public hearing and a project report to the impact assessment agency for clearance (here, the Ministry of Environment), with further review by a committee of experts in certain cases. A list of projects requiring environmental clearance from the Central Government is given in the Notification. *Decision making process:* The project proponent submits the EIA in the prescribed form and this is reviewed and accepted/rejected by the impact assessment agency (here, the MoEF).

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**Sri Lanka**
The Coast Conservation Department is responsible for implementing the EIA procedure for activities within the defined 'coastal Zone' under the framework of The Coast conservation Act which makes EIA mandatory for projects having significant impacts.

*Decision making process:* includes evaluation of the EIA by the Coast conservation Advisory Council (the interagency co-ordinating mechanism) and the public. If the project is allowed, the PAA must also decide under what conditions the project must be carried out. If approval is refused, reasons for doing so have to be provided.

Those projects outside the defined 'coastal zone' but having significant impacts on the coastal zone are covered by the National Environment Act, 1980 and Amendment, 1988. Lists of projects requiring EIA are identified.

**Bangladesh**
The Department of Environment is responsible for EIA. EIA is stipulated in the Environmental Conservation Rules 1997, framed under EPA 1995; industries and projects are categorized into four groups based on level of pollution. Guidelines for specific categories of industries are to yet be developed and most guidelines currently use World Bank Guidelines for inspiration.

*Decision making process:* The proponent initiates the procedure. EIA is necessary for the environmental clearance of a project and is granted by the DoE. The procedures are different, depending upon the categorization of the proposed intervention. The two most stringent classes, orange/amber B and red, are required to have an Initial Environmental Examination (IEE), with an Environmental Management Plan (EMP). Once the Department of Environment approves these documents, a Site Clearance Certificate is issued, provided the developer has obtained a ‘No Objection Certificate’ from the local authority.

### 7.6 Some Lessons:

- In administering the EIA process, care must be taken to see that the assessment does not get too detailed or technical. Project proponents should be required to provide understandable clearly written assessments that emphasise the most pressing adverse effects and provide a serious consideration of realistic alternatives.
- Although EIA should be part of the ICZM process, it is not a good tool for comprehensive areawide planning or for assessment of cumulative effects.
- The effectiveness of EIA greatly depends upon its successful integration, from an early stage within the project cycle (see Figure 4).
- Adequate institutional capacity within state agencies is needed to implement the EIA process and more importantly to monitor the environmental performance of approved projects. Regulatory authorities should regularly monitor the implementation of the environmental management plan submitted by the developer as a part of the EIA.
8 Economic valuation and analysis

Economic valuation and analysis involves the determination of the monetary value of all direct and indirect (marketed and non-marketed) goods and services, non-use attributes of coastal ecosystems and off-site benefits, in a way that different scenarios of resources use can be analysed and optimal resources use activities over the long-term can be defined.

Marketed goods are tangible items that can be enumerated and have a price. Nonmarketed goods and environmental or ecosystem services are less tangible, difficult to enumerate and are often overlooked or their importance is played down when coastal development decisions are made. The inability of market prices to reflect accurately the value of goods and services lead to market failure. Mangrove forests are often undervalued when traded because the prices do not reflect ecological and environmental values. Economic valuation and analysis aims at preventing or minimising market failure.

8.1 Assessing the economic value of environmental functions

The economic value of nature can be defined as the total amount of welfare that nature generates for society. Nature generates welfare by means of use and non-use functions. The concept of functions of nature has been elaborated by several authors, including Van der Maarel & Dauvellier (1978)\textsuperscript{25}, De Groot (1992)\textsuperscript{26} and Costanza et al. (1997)\textsuperscript{27}. These functions are usually classified in terms of:

• production functions
• regulation functions
• carrier functions, and
• information functions.

A well known production function is the harvesting of goods from nature, such as fish, wood, fruits etc. and can be relatively easily monetized. Regulation functions include the protection of soils from erosion, the maintenance of a micro-clime through certain vegetation and the assimilative capacity of waterbodies. These functions are more difficult to quantify and usually a shadow price method is used for the work done by nature. Carrier functions include the provision of space and substrate for human use and is often reflected in the price value of land.

Information functions relate to a great variety of values that are often difficult to put

\textsuperscript{25} Maarel, E. Van der & P.L. Dauvellier (1978), Naar een Globaal Ecologisch Model voor de ruimtelijke ontwikkeling van Nederland. Staatsuitgeverij Sdu, Den Haag


a price on. It includes recreational value and landscape amenity, existence value and the like.

There is a wide range of valuation methods available for assessing the economic or welfare value of environmental functions. Some of the well known are listed below (Ruijgrok, 2000)²⁸:

- the Contingent Valuation Method (CVM): this is a survey method in which respondents are asked how much they are willing to pay for the use or conservation of natural goods.
- the Hedonic Pricing Method (HPM): this method is based on the idea that market goods are often traded at prices in which amenities are internalized. For example, the price of a house in a quiet and beautiful surroundings is likely to be higher than the price of the same kind of house next to a smelly factory.
- the Travel Cost Method (TCM): this method relies on the assumption that people make repeated trips to recreational sites until the marginal utility from a trip equals the marginal costs (i.e. time and transportation costs) of a trip.

All of these methods have their weaknesses and biases and usually require a lot of effort to use. They are very much context-dependent, i.e. the way people value a certain natural aspect differs from place to place and from culture to culture. Therefore the economic valuation of nature and its environment is often limited to the more tangible functions such as production and carrier functions.

Annex 1.

**Key features of national coastal zone management frameworks in selected European countries**

There are 10 key points that can be drawn from the analysis of national frameworks for ICZM in nine European countries (Denmark, England, Finland, Germany, Norway, Poland, Spain, Sweden and Turkey).

1. None of the countries have enacted overarching national legislation specifically for the integrated management of coastal zones.

2. Land-use planning is the chief mechanism for management of the coastal zone.

3. Many countries have different legislative arrangements for their terrestrial and marine areas.

4. Few, if any countries, have a precise or legal definition of the coastal zone.

5. The seaward extent of terrestrial legislation varies between countries, with most delimitations crossing parts of the naturally-functioning coastal systems.

6. For most countries terrestrial planning powers cease at the land-sea interface.

7. The importance of public participation in the planning process is now recognised in many countries.

8. Most countries recognise the importance of cross-border co-operation, both at the local and international level, although few have mechanisms in place to facilitate this.

9. Management of the coastal zone has to work within existing national and local institutional and political structures.

10. The diversity of different national approaches to set-back lines mirrors the diversity of overall ICZM approaches.

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*Source: EUCC Services Policy Instruments for ICZM in Selected European Countries*
Annex 2.

Institutional and legislative frameworks for ICZM in selected countries

Bangladesh

In December 1999, the Ministry of Water Resources announced the Government’s intention to develop an Integrated Coastal Zone Management (ICZM) policy (ICZMP1). A team of senior officials produced a Policy Paper entitled “Integrated Coastal Management: Concepts and Issues”. This was later approved as the Policy Note on ICZM of the Government of Bangladesh. A Project Development Office (PDO) has been set up in the Ministry of Water Resources. The PDO-ICZM is constituted as a separate and independent unit under the mandate of Inter-Ministerial Steering Committee and Technical Committee. The Ministry of Water Resources is the lead Ministry.

PDO-ICZM is responsible for:

• Developing a common vision for the coastal zone and a strategy to achieve this.
• Preparing a framework for a comprehensive and multi-sectoral ICZM Program.
• Identification, formulation and appraisal of activities as building blocks for the CZMP.
• Pro-actively interacting with activities along with harmonization where needed.
• Initiating a stakeholders consultation and the set up of a coastal resources database.
• Co-ordination and facilitation of the exchange of data and information.
• Generating and integrating relevant information into the ICZM Program.

The PDO-ICZM is financed by the Governments of The Netherlands and Bangladesh. The Policy Note described the coastal zone to be an area of transition where terrestrial and marine environments interact to form unique environmental conditions.

India

The Ministry of Environment and Forests (MoEF), New Delhi and Department of Ocean Development are responsible for decision-making in the area of oceans and seas. The management of resources in high seas is with Department of Ocean Development, while management of resources in the Coastal Waters lies with the MoEF.

To specifically address integrated coastal zone management and sustainable development, the Coastal Regulation Zone Notification was made in 1991 under the Environment Protection Act 1986.

Coastal Zone Management Plans identifying and classifying the CRZ areas within their respective territories in accordance with the guidelines given in Annexure I and II of the Notification have been prepared by the coastal states and union territories and approved by the MEF. Within the framework of such approved plans, all

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Sri Lanka Coastal Zone management Plan 1997
development and activities within the CRZ other than those covered earlier are regulated by the State Government, Union Territory Administration or the local authority as the case may be in accordance with the guidelines given in Annexure I and II of the notification. Section 6 defines four types of zones based on their ecological quality.

**Sri Lanka**

*Coast Conservation Act No. 57 of 1981.*

This act was to make provision for a survey of the coastal zone and the preparation of a Coastal Zone Management Plan, to regulate and control development activities within the coastal zone and to make provision for the formulation and execution of schemes of work for coast conservation within the coastal zone.

The Act provides for the appointment of a Director of Coast Conservation. The Act also establishes an interagency Coast Conservation Advisory Council which would advise the Minister on all development Activities to be commenced in the Coastal Zone, review the CZMP and furnish recommendations, review EIA and make comments, inform the Director of the need for schemes of work within the Coastal Zone, whenever such need arises and advise the Minister/Director on any other matter relating to coast conservation. The Act calls for a survey of the coastal Zone by the CCD and prepare a Coastal Zone Management Plan to be revised every four years. It also establishes a permit procedure to regulate all development activities within the defined ‘coastal zone’.

**Tanzania**

The Tanzania National Integrated Coastal Management Strategy was approved by the Cabinet in December 2002. The Government opted for a Strategy rather than a Policy because it felt that the existing Environmental Policy provides a framework for dealing with environmental issues in the whole country.

To carry out the National ICM Strategy, a three tiered institutional structure is created:

- Steering Committee on Integrated Coastal Management (NSC-ICM)
- Integrated Coastal Management Unit (ICMU)
- Intersectoral working groups

The NSC-ICM will provide policy oversight and guidance on the overall vision of the ICM activities. The Permanent Secretary responsible for Environment shall appoint members to the NSC-ICM AND shall serve as its Chair.

The Integrated Coastal Management Unit placed within the National Environmental Management Council (NEMC) will serve as the secretariat to the NSC-ICM, coordinate and facilitate the implementation of the national strategy and advise the Director General of the (NEMC), during the formulation and review of initiatives related to integrated coastal management.
Three inter-sectoral working groups - Core Technical Working Group, Issue-Specific Working Group(s) (ISWG) and Science and Technical Working Group (STWG) - will provide technical assistance to the districts in the preparation of district level ICZM plans, develop issue specific guidelines and provide the necessary scientific input for the implementation of the national strategy.

**Vietnam**

A new Ministry of Natural Resources and Environment was established in 2002 reflecting the stronger attention of Vietnam to improved management of its natural resources and environment protection towards sustainable development of the country. Under this Ministry the Vietnam Environmental Protection Agency (VEPA) was formed and this includes a special division on ICZM.

ICZM Division has the function of assisting the Director General of VEPA to implement the State management mandate in the field of integrated management and environment protection of the coastal zone. Other functions include:

- Participate in setting up policies, legal documents, strategies and national programs on environment protection and the sustainable utilization of the coastal zone.
- Develop and implement the National Strategy on environment protection and sustainable utilization of the coastal zone
- Exercise environmental monitoring, management and implementation and environmental analysis at monitoring stations
- Set up, control and implement the projects on ICZM, which are of experimental and demonstration nature, at some special places.
- Carry out and coordinate research, apply the achievements of science; train and disseminate experiences in integrated coastal zone management
- Implement and co-ordinate international cooperation activities such as International Treaties, multilateral and bilateral cooperation projects

Regular national government tasks related to policy and strategy development and planning take place through the preparation and approval of socio-economic development plans and ministerial policies, strategies and multi-annual development plans. Implementation is normally left to the provincial government.
Annex 3

Coastal Policy in the Netherlands: Changes in policy perspective and policy development process

Coastal policy development process in the Netherlands clearly demonstrates how the iterative and circular policy process works. It is noteworthy that different policy perspectives do play an important role in motivating policy redefinition.

First stage

Ensuring safety from flooding
Traditionally, coastal policy in the Netherlands concerned safety from flooding. After the storm surge disaster of 1953, coastal policy was dominated by the objective to bring all sea defences to a predefined safety level; the so-called delta strength. Implementation took place in the Delta Project.

Implementation: During the 60’s, 70’s and 80’s of the last century, dikes and dunes were strengthened and tidal inlets in SW Netherlands were closed by dams.

From the mid 70’s the policy perspective of the Delta Project gradually widened. Ecological arguments were included in decision making. As a result, closure of the Eastern Scheldt tidal inlet in 1986 -climax of the Delta Project-, was decided to be an open storm surge barrier. Similarly, during the 80’s the scope of coastal policy gradually extended towards other functions.

Evaluation: Once the Delta safety levels had been established along the coast, structural coastal erosion problems received increasing attention. The need to maintain structural integrity of the coast in order to ensure sustainability of all coastal functions, called for a new coastal policy.

Second stage

Dynamic preservation of the coastline
In order to stop any further structural recession of the coastline the Dutch government initiated the development of a new coastal policy, at the end of the 80’s. To arrive at different policy options and to enable rational decision making a large study was commissioned, involving many of the Dutch coastal researchers. Based on this study, the Dutch Government adopted in 1990 the national policy of “Dynamic Preservation”

The strategic objective of this policy was to:

guarantee a sustainable safety level and sustainable preservation of values and functions in the dune area.

The operational objective was to maintain the coastline at its position in the year 1990( the basal coastline).

The specification of a set of operational aspects promoted an easy implementation. The name “Dynamic Preservation”, refers to the preferred approach to achieve the policy objectives. Dynamic Preservation implies the goal to make optimal use of natural processes. Consequently, the principal intervention procedure is sand nourishment.

Implementation: Sand nourishment over the last decade has become an accepted practice in coastal management worldwide. During the period 1991 to 2000, the beaches have been nourished with an yearly average of 6 Mm3 of sand.

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This is based on a paper tilted ‘Sustainable Coastal Policy Developments in the Netherlands. A Systematic Approach Revealed’ by M. van Koningsveld and J.P.M. Mulder. Submitted to J. of Coastal Research.
Evaluation: Since 1990, several evaluations, of single nourishment events and the coastline policy as a whole have been carried out. Considering the operational objective to preserve the coastline at its 1990 position, a quantitative evaluation led to a clear conclusion: “Dynamic Preservation” has been successful over the period of 1991 - 2000. With a yearly average of 6 Mm$^3$ of sand nourishments over the last decade, it has been found that there is no more coastal retreat and the number of transects exceeding the BCL is decreasing yearly.
Annex 4. The Atlantic Living Coastlines Project

The Atlantic Living Coastlines project was one of the six EU Demonstration Projects of the Coastlink network. Its aim was to produce an Integrated Coastal Zone Management Framework for Devon and Cornwall based on the wealth of experience and knowledge available in the area. This Framework is a non-statutory document which aims to complement and inform other coastal zone management plans and concentrates on generic issues of relevance to coastal zone management at a regional level.

The importance of the coast to Devon and Cornwall's economy has long been recognised by those who live and work in the region, and as such, efforts have been and continue to be made to ensure that the coastal area remains a healthy and thriving environment for wildlife and humans alike. A large number of initiatives concerned with management of the coastal zone already exist in both counties. These range from statutory plans such as Local Authority Structure and Local Plans through to voluntary initiatives such as Estuary Management Plans (EMPs) and Voluntary Marine Conservation Areas (VMCAs).

The Framework addresses a large number of issues including:
- assessment of the integration of current plans and initiatives and current collaborative arrangements;
- assessment of coastal participation techniques;
- development of an integrated coastal zone management information system;
- development of indicators for sustainable development on the coast

Four focus groups were established to undertake detailed aspects of the project work programme. They consisted of a multi-sectoral representation of specialists to tackle specific issues under the following themes, i.e.: Coastal Participation, European Union Policy, Coastal Information and Environmental Sustainability Indicators.

http://www.alc.plymouth.ac.uk/
Annex 5

Priority Actions Step 1

- Assess the principal environmental, social and institutional issues and their implications
- Identify the major stakeholders and their interests
- Invite review of the assessment and communicate the results to the appropriate audiences
- Select the issues upon which the management initiative will focus its efforts

Priority Actions Step 2

- Establish a team to formulate the plan.
- Conduct scientific research targeted at selected management questions
- Select boundaries for the management effort
- Document baseline conditions
- Strengthen institutional capacity for implementation of the management plan
- Communicate the importance of coastal resource management and the ICM project at many levels of society
- Specify environmental goals and objectives
- Define strategies and test strategies at a pilot scale
- Develop the management or action plan together with key stakeholders
- Design appropriate monitoring and evaluation systems

Priority Actions Step 3

- Obtain formal approval of the management plan
- Obtain funding for program implementation if required
- Staffing and required organisational changes are arranged
- Strengthen institutional frameworks and legal authority for management
- Establish or improve institutional frameworks and legal authority for management are established or improved

Priority Actions Step 4

- New or revised regulatory programmes come into effect.
- Promote compliance with resource management policies
- Implement mechanisms for interagency co-ordination
- Strengthen program administration and management
- Catalyze the construction and maintenance of necessary physical infrastructure
- Sustain participation of key stakeholder groups and the program's priority on the public agenda
- Implement conflict resolution procedures
- Initiate the monitoring and evaluation system
**Priority Actions Step 5**

- Monitor environmental trends and outcomes
- Conduct a formal evaluation to assess the program's impacts on the management issues being addressed
- Adapt the program to its own experience and to changing social and environmental conditions
Stakeholder analysis often reveals differences in opinion, attitude and behaviour of those involved in coastal management issues. As a logical sequence to this assessment the question arises how to influence stakeholders so that policy development and implementation is enhanced and conflicts are resolved. RIKZ has adopted a method developed by the Coastal Resources Center of the University of Rhode Island that focuses on behavioural change of stakeholders in order to improve the success of an ICZM policy or plan. It consists of 8 steps including elements of policy formulation as well as descriptions of needed changes in stakeholders behaviour:

1. historical evaluation
2. vision formulation and mission definition
3. assessment of the issues/problems
4. identification of the directly involved stakeholders
5. definition of the objectives and approaches on how to tackle the problems
6. description of the desired changes in stakeholders behaviour, needed to solve the problem and meet the objectives
7. description of the desired behaviour in terms of goals on three different levels of ambition.
8. definition of the actions necessary within the own organization in order to influence and stimulate the change in behaviour of the stakeholder(s)

The three levels of ambition (the outcome challenge) are formulated in terms of ‘Expect to see’, ‘Like to see’ and ‘Love to see’. Expect to see is the minimum of change that can be expected through a passive participation in the ICZM programme. A more active and committed attitude should result in changes that one Likes to see. And finally the level of Love to see is the ideal situation in which a substantial change in behaviour is reached. Once the explicit targets are formulated at each of these three levels, one can monitor at different intervals how successful the programme is.

An important element in this procedure is step 8: what should your own organization do or change in order to reach the outcome challenge by the others. These vary from measures to support stakeholders to actions geared at persuasion and finally, more coercive forms like regulations and enforcements.

In a nutshell the steps are visualized below:

<table>
<thead>
<tr>
<th>(3) issue</th>
<th>(4) partner now</th>
<th>(6) outcome challenge: desired change in behaviour (7) progress markers</th>
<th>future outcome goal</th>
<th>(5) goal situation in future</th>
</tr>
</thead>
<tbody>
<tr>
<td>situation now</td>
<td>now</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>own institute now</td>
<td>(8) strategic action matrix (what should you do to influence partner?)</td>
<td>future</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Annex 7

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32 Source: RIKZ internal report
## Decision Support systems related to ICZM

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAMCO</td>
<td>RamCo (Rapid Assessment Module Coastal Zone Management) is a generic Decision Support Environment for the Integral (or Rapid) Assessment of Coastal Zone Management problems.</td>
<td>Decision Support System / simulation / DSS / GIS / Rapid Assessment / Coastal Zone Management</td>
</tr>
<tr>
<td>COZMIS</td>
<td>COZMIS (Coastal Zone Management Information System) is a tool, where GIS based information can be combined with documents and images. Information can be retrieved from the database by spatial and criteria queries.</td>
<td>GIS / coastal zone management / information / database</td>
</tr>
<tr>
<td>COSMO-BIO</td>
<td>The COSMO-BIO model demonstrates the main steps in Coastal Zone Management planning, with special attention to biodiversity and sea level rise.</td>
<td>simulation model / coastal zone management / biodiversity / sea level rise</td>
</tr>
<tr>
<td>STREAM</td>
<td>STREAM (Spatial Tool for River basins, Environment and Analysis of Management options) is both a systematic (policy analysis) approach for river basin management and corresponding generic Management Support System (MSS) which will be used as simulation and communication instrument between stakeholders / end users.</td>
<td>decision support systems / DSS / MSS / policy analysis / GIS / Remote Sensing</td>
</tr>
<tr>
<td>COSMO</td>
<td>COSMO (COastal zone Simulation MOdel) is a tool to demonstrate the main steps in the preparation, analysis and evaluation of Coastal Zone Management (CZM) plans.</td>
<td>simulation model / coastal zone management</td>
</tr>
<tr>
<td>WADBOS</td>
<td>WADBOS is a Decision Support System featuring an integrated model representing the ecological and (socio-)economic functions of the sea and adjoining coasts.</td>
<td>decision support systems / DSS / ecology / economy</td>
</tr>
<tr>
<td>IMVULRES</td>
<td>IMVULRES is a methodology that supports governments of vulnerable coastal nations and international organisations to assess their coastal vulnerabilities and to identify adaptive response measures to retreat, accommodate and protect coastal zones</td>
<td>Vulnerable coastal nation adaptation and mitigation, climate change and seal level rise</td>
</tr>
</tbody>
</table>

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**NETCOAST**
Literature cited:


Coast In Conflict : An Interdisciplinary introduction to Coastal Zone management.

Coastlearn: module on Policy analysis (www.coastlearn.org)

Scialabba, Nadia (ed.) 1998. Integrated coastal area management and agriculture, forestry and fisheries. FAO guidelines


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GESAMP ( Joint Group of Experts on the Scientific Aspects of Marine Environment Protection ) 1966. The Contribution of Science to Integrated Coastal Management. GESAMP Reports and Studies No.61


RIKZ (2003): *Integrated Coastal Management (ICM) and RIKZ/CZMC. Internal report of the RIKZ/CZMC.*


* Sri Lanka Coastal Zone management Plan 1997. Coast Conservation Department, Sri Lanka*

*UNEP/GPA (2003). Comparative study of Coastal Legislation in South Asia*

**Further reading:**


*Council of Europe, Pan-European Code of Conduct for Coastal Zones (Strasbourg, 1998)*


UNEP : Global Programme of Action for the Protection of the Marine Environment from Land based Activities


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