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COMMITTEE FOR THE ACTIVITIES OF THE COUNCIL OF EUROPE IN THE FIELD OF BIOLOGICAL AND LANDSCAPE DIVERSITY

CO-DBP

3nd meeting

Geneva, 19 April 1999

European Code of Conduct for Coastal Zones

Document established by the Secretariat General
Direction of Environment
and Local Authorities

Expected Action by CO-DBP

1. The draft of the European Code of Conduct for Coastal Zones has been prepared in 1996 and 1997 by the Group of Specialists on Coastal Protection. It has been circulated to governments on several occasions. The Group of Specialists on Coastal Protection has taken account of the comments received ad integrated them.

The text is presented to governments "as a source of inspiration for their national legislation and practice".

2. Possible comments may by sent to the Council of Europe Secretariat before 15 February 1999 (Environment Conservation and Management and Regional Planning Division, Council of Europe, 67075 Strasbourg Cedex France, Fax 33 3 88 41 37 51, E-mail maguelonne.dejeant-pons @coe.fr).

3. The Committee for the Activities of the Council of Europe in the Field of Biological and Landscape Diversity (CO-DBP) is invited to :

– examine the Code of Conduct enclosed, and if appropriate, take note "as a source of inspiration for national legislation and practice";

– decide, if appropriate, on its publication.

CONTENTS

1. Background

The Council of Europe, which had considered the question of protecting coastal areas several times in the past, had decided to contribute to the implementation of Action Theme 5 of the Pan-European Biological and Landscape Diversity Strategy "Coastal and Marine ecosystems".

The Group of Specialists on Coastal Protection (PE-S-CO), set up in 1995, pursuant to a decision by the Committee of Ministers of the Council of Europe, had met for the first time on 6 and 7 June 1996. It noted that a great deal of technical and scientific research had been carried out in the field of coastal protection and that various principles and legal texts had been drawn up. It had also noted that all of the work undertaken highlighted the need for integrated management and planning of coastal areas, but that, despite all the efforts already made, the situation of coastal areas continued to deteriorate. The Group had acknowledged that this was due to difficulties in implementing the concept of "integrated management", and that it was becoming necessary to provide instruments which would make it easier to apply the principles of integrated coastal management and planning, which had to be pursued to ensure sustainable management of coastal areas. The Group had therefore proposed that the Council of Europe, in close co-operation with the European Union for Coastal Conservation (EUCC) and UNEP, take action on two fronts:

_ draft a code of conduct including precise recommendations, practical and realistic principles as well as rules of good practice for local, regional and national authorities, developers, coastal engineers and other users;

_ draft a Model Law on coastal protection which defines the concept of integrated management and planning, based on the principle of sustainable development, establishes the main guidelines and makes proposals with regard to the appropriate institutions, procedures and instruments for the implementation and application of integrated management and planning. It was believed that such a model law could be used by States either to amend existing legislation or to pass new laws.

The Group had proposed that the Council of Europe be responsible for drafting the model law and the EUCC for drawing up the code of conduct, in close co-operation with the organisation. This proposal was put to a meeting held by UNEP in September 1996 to discuss Action Theme No. 5 of the Strategy, then approved by the Executive Bureau for the Strategy in November 1996.

The Council of Europe Secretariat General had appointed two consultants to prepare the documents:

_ the Model Law had been drawn up by Professor Michel Prieur, Director of the *Centre de Recherches Interdisciplinaires en Droit de l'Environnement, de l'Aménagement et de l'Urbanisme* (CRIDEAU);

_ the Code of Conduct had been prepared by Ms Kelly Rigg of the European Union for Coastal Conservation (EUCC).

The Group of Specialists on Coastal Protection of the Council of Europe had met to examine these documents on three occasions:

_ in Strasbourg, on 26 and 27 June 1997,

_ in Helsinki, on 15-17 September 1997 (two of the days were run jointly with UNEP, which was holding the second co-ordination meeting of its Working Party on Strategy Action Theme No. 5,

_ in Strasbourg, on 18 and 19 December 1997.

On all these occasions the Group of Specialists had taken account of observations concerning the documents (doc. PE-S-CO (97) 13 rev.).

At the Group of Specialists's request, the Council of Europe General Secretariat had also consulted those taking part in the Council for the Pan-European Biological and Landscape Diversity Strategy (STRA-CO) meeting to ask them if they had any comments on the texts being drafted.

At the Fourth Pan-European Conference of Environment Ministers "An Environment for Europe" held in Aarhus (Denmark) from 23 to 25 June 1998, the Ministers of Environment endorsed a Resolution on biological and landscape diversity, which takes note of the progress made to develop a Pan-European Code of Conduct for coastal zones and a Model Law on sustainable Management of coastal zones as a source of inspiration for national legislation and practices. A second consultation of the participants in the meeting of the STRA-CO was made and the observations were taken into account. (doc. STRA-CO (98) 13). Concerning the draft Model Law, the words or sentences to suppress are crossed through and the words or sentences to add are in bold. Concerning the draft Code of Conduct, the modifications have already been made.

The Council of Europe Secretariat would like to thank particularly the members of the Group of Specialists on Coastal Protection and the observers which participated to its meetings, amongst which the Secretariats of international Conventions for their significant contribution to the work. The following participated in all or some of the meetings of governmental specialists: Mr Georgiades (Cyprus), Mr Nordberg (Finland), Mr Bos (Netherlands), MM. Warzocha and Cie lak (Poland), Mrs Davydok and Mr Domashlinets (Ukraine), the experts: Mr Prieur (France, CRIDEAU), Mrs Rigg and Mr Pickaver (European Union for Coastal Conservation – EUCC), Mr Amato (Italy), Mrs Stepanova (Russia), as well as the following observers: Mr Tofte (Denmark), Mr Machavariani (Georgia), Mr Glukhovstsev (Kazakhstan), Mrs Van Klaveren (Monaco, ACCOBAMS), Mr Shekhovtsov (Russia), MM. Jaakkola, Keckes and Galabov (PNUE), Mr Moretti (European Environment Agency – AEE), Mr Trumbic (Barcelona Convention), Mr Mamaev (Bucharest Convention), Mr Boedecker (Helsinki Convention), Mrs Jensen (ASCOBANS), Mr Coulombié (Association Droit Littoral et Mer). Significant contributions to the European Code of Conduct for Coastal Zones were also provided by: Mr Doody, Mr Huber, Mr Powell, Mr Ravenstijn, Mr Roche, Mr Salman, and Mr Zanen.

The Council of Europe Secretary would like to thank the Ministry of Agriculture, Nature Management and Fishing of the Netherlands for its financial support for the preparation of the Code of Conduct.

2. Introduction by Lauri Nordberg (Finland) Chairman of the Group of Specialists on Coastal Protection

The coast is one of the most valuable natural assets of our continent. This fact is clearly demonstrated by the millions of people who make their way to the coast for a longer or shorter time to enjoy the fresh sea breeze, the sun glittering on the waves, the special, often spectacular, nature of the coast and the delicate mix of natural, cultural and historical elements in the coastal environment. But the coast is also an essential element for many necessary economic activities, as can be seen for example at some of the big harbours on our continent.

The natural coast is a non-renewable resource. That truth lies behind the demand for sustainable use of the coast. Sustainable use means that our generation should use the coast in such a way that the natural and other values of the coast will also be available for our grandchildren. In other words, we should not exploit all the coast for our own selfish, economic interests.

The principle of sustainable use has been endorsed in many international documents adopted by all our governments. The list of resolutions and recommendations concerning the use of coastal resources is long and impressive. Despite all this, the exploitation of coastal areas, for example by urban encroachment, or summer houses all along the coastline, still continues, resulting in a loss of natural coast and valuable coastal habitats.

The assumption that the only reason for this is a lack of concertation between the different actors involved, such as landowners, developers, conservationists and local, regional and national authorities, is based on an incorrect analysis of the problem. There are huge economic interests involved in the coast. The value of a coastal area with development rights can be ten, or even a hundred times that of a natural coast with only agricultural value. Unanimity between the actors may never be found, however much you try.

For this reason, clear and easily applicable rules must be given in law to set some limits and restrictions on the use of the coast. Everybody must be treated equally. That is why a Model Law on Sustainable Management of Coastal Zones has now been prepared. We hope that this model will serve as a source of inspiration for those who are preparing an act, or amendments to an existing act, on coastal zones, land use planning, nature conservation or other issues with implications for the use of the coast. In particular, we hope that those states in transition which are in the process of reviewing their legislation would find this model useful.

However, the law can only give some general rules. Situations vary and the same problem can be solved in many different ways. That is why a European Code of Conduct for Coastal Zones has been prepared. It tries to give detailed guidance for authorities, developers, planners and others involved in the decision-making process in order to find good and environmentally sound solutions for practical problems. We hope that it will be widely applied

3. Draft decision of CO-DBP concerning the European Code of Conduct for coastal zones

The Committee to the activities of the Council of Europe in the field of Biological and Landscape of Diversity (CO-DBP):

Considering the objectives pursued by the Pan-European Biological and Landscape Diversity Strategy (Sofia, 1995), concerning in particular "The Coastal and Marine Ecosystems" (Action Theme n° 5),

Wishing to bring a contribution to the implementation of the objectives 5.2 and 5.3 of the Action Plan 1996-2000 of the Pan-European Strategy, which are to "Develop an integrated coastal zone management approach to land and sea utilisation, management and planning as one system, based on conservation considerations", and to "Develop a special Coastal Code of Conduct which provides clear recommendations and good practice to coastal authorities, project developers, coastal engineers and others",

Considering the Resolution on biological landscape and landscape diversity endorsed by the Fourth Pan-European Conference of Ministers of Environment held in Aarhus (Denmark), on 25 June 1998, which took note of the progress made to develop an European Code of Conduct for Coastal Zones and a Model Law on Sustainable Management of Coastal Zones as a source of inspiration for national legislations and practices,

With the objective of helping develop integrated management of coastal zones and providing States at pan-European level with practical instruments allowing decision-makers at international, national, regional and local level to respect conservation imperatives better, both in their daily work and in any plans to draft, amend or revise legislation or international instruments,

Aware that institutional implementation of truly integrated coastal zone management demands reliable data and thorough knowledge and may require complex administrative and institutional reforms,

Taking into account international and European initiatives such as:

_ the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971);

the International Convention for the Prevention of Pollution from Ships – MARPOL 73/78 (London 1973);

_ the Convention on the Conservation of Migratory Species and Wild Animals (Bonn 1979), and the Agreement on the Conservation of Seals in the Wadden Sea (Bonn, 1990) ; the Agreement on the Conservation of Small Cetaceans of the Baltic and North Sea (ASCOBANS) (New York, 1992); the Agreement of the Conservation of African-Eurasian Migration Waterbirds (AEWA) (The Hague, 1995); the Agreement of the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) (Monaco, 1996);

_ the Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979);

_ the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona, 1976) and its protocols, in particular the Protocol concerning Mediterranean Specially Protected Areas (Geneva, 1982), after amendments recorded as: the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona, 1995) and its protocols, in particular, the Protocol concerning Specially Protected

Areas and Biological Diversity in the Mediterranean (Barcelona, 1995);

_ the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki, 1992);

_ the Convention on the Protection of the Black Sea against Pollution (Bucharest, 1992);

_ the United Nations Convention on the Law of the Sea (Montego Bay, 1992);

_ the Convention for the Protection of the Marine Environment of the North-East Atlantic (Paris, 1992);

Having in mind:

_ the Mediterranean Commission on Sustainable Development (MCSD), created in 1995;

_ the Wadden Sea Plan (Stade, 1997),

Further taking into account Agenda 21 adopted by the United Nations Conference on Environment and Development (Rio de Janeiro, 1992), and Chapter 17 in particular, which calls on States to co-operate in the preparation of national guidelines for integrated coastal zone management and development, drawing on existing experience (section 17.11),

Noting the conclusions and recommendations of the first meeting of the Group of Experts on Marine and Coastal Biological Diversity of the Convention on Biological Diversity (Rio de Janeiro, 1992), in Jakarta in 1997,

Having regard to the OECD Council's Recommendation C (76) 16 (Final) on coastal zone management and Recommendation of 23 July 1992 on integrated coastal zone management,

Bearing in mind at European level:

_ Council of Europe instruments such as Resolution (69) 37 of the Committee of Ministers on sea pollution, Resolution (73) 29 of the Committee of Ministers on the protection of coastal areas, the Resolution adopted by the European Conference of Ministers responsible for Regional Planning (CEMAT) at Torremolinos in 1983, the Resolutions adopted by the 4th European Ministerial Conference on the Environment (Athens, 25-27 April 1984), the Resolution (87) 2 of the Committee of Ministers setting up a co-operation Group for the prevention of protection against, and organisation or relief in major and natural disasters, Committee of Ministers Recommendations (85) 16 on salt marshes and coastal dunes, (85) 18 on planning policies in maritime regions and (97) 9 on a policy for the development of sustainable environment-friendly tourism in coastal areas;

_ the European Coastal Charter adopted by the plenary Conference of Peripheral Maritime Regions of the EEC (Crete, 1981) and approved by a European Parliament Resolution on 18 June 1982;

_ the European Union demonstration programme on integrated coastal zone management, which is currently being set up;

Taking into account the diversity of States' legal systems and institutions;

Considering the work undertaken by the Group of Specialists on Coastal Protection the Committee for the Activities of the Council of Europe in the Field of Biological and Landscape

Diversity (CO-DBP):

– takes note of the Code of Conduct “as source of inspiration for national legislation and practice”,

– decide of its publication.]

EUROPEAN CODE OF CONDUCT FOR COASTAL ZONES

CONTENTS

CHAPTER I - INTRODUCTION

1.1. Coastal ecosystems are under threat, nowhere more so than in Europe. According to a recent study by the World Resources Institute 70% of European coastlines are highly threatened, the highest percentage of any region in the world, as indicated by the density of population, roads, pipelines, utilities, cities and major ports. Coastal ecosystems are highly productive and extremely sensitive to such development, and are valuable both ecologically and economically. Coastal waters are the nurseries for most commercial fish and shellfish stocks; coastal tourism is an important source of revenue; and healthy coastal wetlands provide a buffer zone against the impacts of climate change and rising sea levels. As populations continue to migrate from inland to coastal areas, and from rural to urban areas, irreversible impacts on coastlines will occur if we continue to ignore these phenomeous.

The concept of a Pan-European Code of Conduct for Coastal Zones was first proposed by the European Union for Coastal Conservation (EUCC) in 1993, as a means to provide practical guidance to public agencies, local authorities, coastal users, and others with regard to ecologically sustainable development in the coastal zone.

The proposal to develop such a Code of Conduct was formally adopted by European Environment Ministers in October, 1995, as part of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS). The Strategy is part of the European implementation of the Convention on Biological Diversity, agreed at the United Nations Conference on Environment and Development (UNCED) Earth Summit held in Rio in 1992. It is being promoted and co-ordinated by a variety of institutions, including the Council of Europe and the United Nations Environment Programme (UNEP) and with in particular the Word Conservation Union (IUCN), the Secretariat of the Ramsar Convention and the European Centre for Nature Conservation. Over the next 20 years, the Strategy will promote the integration of biological and landscape diversity considerations into social and economic sectors. The Strategy provides a framework for action on 11 different themes, including on Coastal and Marine Ecosystems (Action Theme 5). The Code of Conduct is part of the implementation plan for this Action Theme.

The Code of Conduct provides practical guidelines for the conservation of nature and biodiversity in coastal areas, fully recognising that socio-economic development in these regions will continue to occur. It covers both direct impacts (spatial developments and habitat destruction) as well as indirect impacts (habitat degradation and health impacts on wildlife and humans as a result of pollution).

It focuses primarily on the key socio-economic sectors identified in the PEBLDS Strategy, although some have less bearing on the coast than others, and with the addition of a section on coastal protection sector. These are:

- Nature Conservation and Biodiverstity
- Agriculture
- Coastal protection
- Military defence
- Energy
- Fisheries and Aquaculture
- Forest Management
- Industry
- Tourism and Recreation
- Transport
- Urbanisation
- Water Management

There are also many recommendations that apply to all sectors. These are included in the Chapters titled “Strategic Principles” and "Integrated Coastal Management".

Strategic Principles include guidelines relating to the protection of coastal system dynamics, and as such should be applied to all coastal development.

The Chapter "Integrated Coastal Management" provide insight into principles of integrated coastal zone management, environmental impact assessment, the use of financial instruments and incentives, and the encouragement of public participation in decision-making.

1.2. The following Code of Conduct represents an attempt at providing a basis for the further elaboration of the Code of Conduct on a regional level, through a consultative process involving organisations and individuals representative of each of the sectors. As such it attempts to bring together current thinking as expressed in existing codes, guidelines and action plans which relate to coastal management in general and specific economic sectors in particular. In the past, these have tended to be highly prescriptive and the present Code reflects this approach. However as the discussion evolves it is intended that a balance will be found between prescriptive guidelines and the presentation of existing best practice examples which make sense both economically and ecologically. The Code of Conduct is not intended to be a doctrine of "Thou Shalt Nots", but is meant to provide practical assistance and guidance in the achievement of sustainable development in coastal regions. It is intended that this approach will lead to a better dialogue within and between the sectors, and with those promoting a more integrated and sustainable form of coastal and marine management and use.

Ultimately, the Code of Conduct will need to be adapted to the specific circumstances pertaining to different types of coastal systems. Some of the guidelines that follow will most certainly not be applicable in all circumstances. It is anticipated that the users of the Code of Conduct will use their best judgement to determine which practices are and are not appropriate to the local environment. This holds particularly true in the case of coastal states, small island countries and islands in general which encounter special constraints. To this end, it is envisaged that individual Codes for the Baltic Sea Region, the Mediterranean, the Atlantic and so forth will be elaborated in the coming years. This document represents the first stage in a process which should stimulate further discussion and dialogue.

Throughout this Code of Conduct, a variety of terms relating to the coast are used. It is not the intent to precisely define such terms given the wide variety of definitions used in the literature, and particularly in the source reports used to draw up this Code of Conduct. For general purposes, however, the following definitions could be assumed:

- Coastline: the boundary between land and sea.

- Coastal Zone: an area including both land and sea, of indeterminate width, sometimes including river catchment areas, depending upon a wide variety of definitions currently in use. An area of a few kilometres can be assumed for general purposes.

- Coastal strip: a narrow strip of land bordering the coastline, extending a few hundred metres inland.

- Coastal area or region: a general term describing places that are influenced by their proximity to the sea.

Definitions of the Coastal Zone

"The coastal zone may be defined as the area where land and sea interact with its landward boundary defined by the limits of ocean influence on the land and the seaward limit being the limit of influence of land and freshwater on the coastal ocean, or put another way 'that part of the land affected by its proximity to the sea and that part of the ocean affected by its proximity to the land' (US Commission on Marine Science, Engineering and Resources, 1986). The inland and ocean boundaries are not however spatially fixed..." - IUCN

"The coastal zone is the interface where the land meets the ocean, encompassing shoreline environments as well as adjacent coastal waters… The limits of the coastal zone are often arbitrarily defined, differing widely among nations, and are often based on jurisdictional limits or demarcated by reasons of administrative ease… For practical planning purposes, the coastal zone is a special area, endowed with special characteristics, of which the boundaries are often determined by the specific problems to be tackled." - World Bank

"Coastal Zone (the subject of coastal zone management) is a geographically delineated area. It is distinctively characterized by the aggregation of interacting coastal environments and corresponding natural and man-made structural systems." - World Coast Conference

"… the coastal zone is defined as a strip of land and sea territory of varying width depending on the nature of the environment and management needs. It seldom corresponds to existing administrative or planning units. With regard to fisheries, it is common to limit the coastal zone to territorial waters as defined in the Convention on the Law of the Sea, although this limit does not correspond to any distinct biological or management unit. The natural coastal systems and the areas in which human activities involve the use of coastal resources may therefore extend well beyond the limit of territorial waters, and several kilometres inland." - European Commission

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CHAPTER II - STRAGEGIC PRINCIPLES FOR A PAN-EUROPEAN CODE OF CONDUCT FOR COASTAL ZONES

The Pan-European Biological and Landscape Diversity Strategy (PEBLDS advocates a series of strategic principles in order to achieve its goals. The Coastal Code of Conduct adopts these principles, and attempts to define some key elements which relate to development and management in the coastal zone.

PEBLDS PRINCIPLES	COASTAL PRINCIPLES AND KEY ELEMENTS FOR MANAGEMENT
Principle of Careful Decision Making Decisions relating to the Strategy are made on the basis of the best available information, and as far as possible and appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of biological and landscape diversity. **Principle of Avoidance** Introduction of appropriate procedures requiring environmental impact assessment of projects that are likely to have significant adverse effects on biological and landscape diversity, with a view to avoiding such effects and, where appropriate, allow for public participation in such procedures. This would include projects concerning introduction into the natural environment of exotic species, or of the release of genetically modified organisms. **Precautionary Principle** Action to introduce appropriate procedures to avoid or minimize potentially adverse impact of activities on biological and landscape diversity, ought not be postponed if the causal link between those activities and the impact has not yet been fully confirmed.	**Integrate Sectoral Development in Coastal Zone Management** Where possible opportunities should be taken to promote development of socio-economic sectors in an integrated way, taking careful account of the local carrying capacity. Such development should always be subject to comprehensive environmental impact assessment to ensure that the local carrying capacity will not be exceeded over the short or long term. In addition, activities within river catchment areas which affect the coastal zone should be incorporated into river catchment protection schemes. This applies in particular to activities which affect sediment transport and water quality and quantity, including activities which generate coastal litter. **Non-Development Zones** A non-development zone should be established in order to preserve undeveloped stretches of coasts for the use of present and future generations, and where necessary, to minimise the effects of flooding, sea level rise, and/or erosion. Such a zone should include all marine and interdital areas and coastal ecosystems and habitats, plus an additional protected zone for landscape protection and buffering from accelerated sea level rise generally from 100-300 meters from the mean high-tide mark (or within a prescribed contour within which elevated sea levels might be expected) and some distance seaward. Non-development zones should also be established within 50-100 meters of rivers (see also section on river catchments). New projects requiring major land reclamation, dredging or protection in the form of coastal defence engineering works should be minimised or avoided. **Protect Coastal Land- and Seascapes** Coastal landscapes and seascapes are amongst the more treasured and attractive landscapes in Europe. Much of this is derived from their natural or cultural character and those areas that remain should be protected from development which so dominates the scene that these values are destroyed. The most special areas should remain free from all but the most limited development required to make areas accessible and maintain their visual integrity. **Protect Human Lives and Settlements** In many countries coasts serve an important function in the protection of human lives and settlements. Coastal protection should therefore contribute to the safety of the people who live there. **Prevent the Introduction of Alien Species** The introduction of alien species for example through aquaculture, shipping, and stabilisation of sand dunes carries great risks to natural ecosystems and resources, and steps should be taken to prevent such introductions. Afforestations with alien species have caused particular problems to dune habitats, and where possible should be removed or converted to nature protective or recreational areas over time.

Principle of Translocation Those activities that are exceptionally harmful, and cannot be avoided, will, where possible or practicable, be relocated to areas where they will cause less impact.	**Only Coast-Dependent Activities in the Coastal Zone** The scale of activities in the coastal zone should be appropriate in relation to the natural, cultural and physical characteristics of the surrounding area and should ensure the preservation of the local cultural heritage. Many coastal zones are already highly developed and there has been a considerable loss of habitat while substantial areas continue to be put under great pressure. New development which do not absolutely depend on the coastal environment (physical, cultural, social) should be located outside of the coastal zone. Existing activities in sensitive coastal habitats which are harmful to coastal ecosystems should be phased out. Potential development sites in built-up areas should be reserved for future (sustainable) developments which require coastal locations.

Principle of Ecological and Compensation The harmful effects of physical changes in areas with high biological landscape diversity value which cannot be avoided, must be balanced by compensatory conservation measures by the user.	**Zero-Net-Loss of Coastal Habitat** Outstanding natural features and landscapes as well as important flora and fauna habitats should be afforded strict conservation status. When lee valuable sites are identified for development or use, however, another of like or larger size should be created and protected. Existing levels of coastal habitat therefore should be preserved, and where possible, increased.

Principle of Ecological Integrity The ecological processes responsible for the survival of species should be protected and the habitats on which their survival depends maintained.	**Maintain and Enhance Coastal Processes** Preservation of the natural character of dynamic systems, for example, sand dunes, beaches, and marshes, sea cliffs, deltas and estuaries, can enhance the resilience of the coastline against coastal erosion and accelerated sea level rise. Sediment transfer (from land to sea, from sea to coast, and along the coast) is a rejuvenating process and provides the basis for the development of the diversity of coastal systems. Physical barriers which impede these processes (ranging e.g. from a single tidal barrage to a row of hotels) not only destroy the natural dynamic value but also may cause unforeseen and costly damage to other features. When coastal protection is considered necessary, it is usually more effective to work with natural processes than against them; natural materials found locally should be used (e.g. sand, shingle) rather than hard structures. As far as possible there should be no further expansion of barriers directly or indirectly affecting particularly sensitive ecosystems. **Prevent Habitat Fragmentation** New developments in the coastal zone preferably should be located adjacent to (and landwards of) existing developments or where natural characteristics of the coast have already been compromised. Natural habitats, particularly dynamic habitats such as sand dunes and those which straddle both land and sea, should not be further fragmented.

	Create and Maintain Ecological Corridors Many mobile species require a series of habitats, or stepping stones, along a migration route, in essence forming links of a chain which may be of paramount importance to the survival of the species. Breaking these links could adversely affect the species leading ultimately in the worst cases to extinction. Aquatic animals (notably fish) move between river and marine habitats, and even between seas, sometimes over very great distances. Many marine mammals and seabirds rely on coastal habitats for breeding, and spend most of their live feeding and migrating between land and sea. Each of these involves the use of a corridor which can be discrete (a series of stepping stones) or continuous (such as a sea strait). Maintaining the natural integrity of corridors therefore is of paramount importance. In some cases, additional

	measures may need to be taken including restoration of degraded areas or restrictions on sectoral use. this requires an understanding of where corridors exist and how they operate.

Principle of Restoration and (Re)creation Where possible biological and landscape diversity should be restored and/or (re)created if it can be demonstrated by reference studies that the original state could be re-established where practicable, and thereby adopting measures for the recovery and rehabilitation of threatened species and for their reintroduction into their habitat under appropriate conditions.	**Coastal Habitat Re-creation** Habitat re-creation should be treated as a measure of last resort, given that new habitats are rarely as diverse as those they replace. Importance habitat sites therefore should be protected in land and marine area use. Where habitat re-creation is used as a compensatory mechanism for less valuable sites, however, new habitats should be created prior to the destruction of an existing habitat, and should be of similar or greater size and value than that which is being destroyed.

Principles of Best Available Technology and Best Environmental Practice As defined by the Paris Commission regarding activities that affect biological and landscape diversity, both access to and transfer of technology are essential elements for the attainment of the Strategy, and where possible to provide and/or facilitate access for, and transfer to others of, technologies that are relevant to the conservation and sustainable use of biological and landscape diversity.	**Contaminant-Free Construction and Reclamation** Materials used for coastal infrastructure should not include contaminants which might enter marine or coastal ecosystems. This applies not only to structures such as dykes, piers and sea walls, but to sand and soil used for the purposes of land reclamation or beach/foreshore nourishment. **Conservation of Water** The depletion of groundwater, particularly in the Mediterranean, is of increasing concern. Water for coastal habitats – wetlands, deltas, lagoons – is becoming increasingly scarce due to competition from agriculture, urbanisation, tourism and industry. Climate change is expected to worsen this situation. Water conservation should be primary concern in all development, with water saving technologies incorporated into all designs.

Polluter Pays Principle Costs of measures to prevent, control and reduce damage to biological and landscape diversity shall be borne by the responsible party, as far as possible and as appropriate.	**User Pays Principle** Prices charged for access to or use of coastal resources should reflect all short-term and long-term economic, environmental and social coasts associated with the use of those resources. If it is not possible to measure these costs their existence and relative importance should be taken into account. The cost of development in coastal areas, including infrastructure costs, the costs of environmental management and monitoring, and the costs of managing natural hazards, should be borne by development proponents.

Principles of Public Participation and Public Access to Information Creating sufficient and active public support for measures regarding biological and landscape diversity by involving public and private landowners, the scientific community, and other individuals and civic	**The Coastline as Public Domain** The coastline should be considered as a part of our natural heritage, and private ownership of the coastline should be avoided. In principle, the right of public access to the coast should be guaranteed but restricted as necessary to avoid conflict with the conservation of natural values. Decisions concerning coastal development should be taken with the full involvement of the public.

groups using land and sea resources in decision-making processes, through media, and the inclusion of these topics in education programmes.	

CHAPTER III - NATURE CONSERVATION AND BIOLOGICAL AND LANDSCAPE DIVERSITY

European marine and coastal nature conservation work requires that concrete and common guidelines and strategies are taken.

All European states shall individually and jointly take all appropriate measures with respect to their coastal and marine ecosystems to conserve natural habitats and biological diversity and to protect ecological processes.

Guidelines[1]

Coastal states should take action according to the following strategies and principles:

1. to review the national and general environmental situation, the state of exploitation of the sea and coasts, existing trends and damages within the marine and coastal environment;

1. to establish maps of coastal and marine sensitives zones;

3. to elaborate principles and goals for marine and coastal nature conservation and to review existing national legislation and other instruments to achieve the goals;

4. to prepare principles and goals for the conservation of marine and coastal species, e.g.:

   - elaboration of comprehensive (red) lists of threatened species of marine and coastal fauna and flora;
   - initiation of urgent measures for the protection of especially endangered species;

5. to prepare strategies and guidelines for the conservation of valuable marine and coastal landscapes and biotopes, e.g.:

   - elaboration of comprehensive (red) lists of threatened marine and coastal landscapes and biotopes;
   - initiation of urgent measures for the protection of especially endangered landscapes and biotopes;
   - to establish or to contribute to an international system of marine and coastal protected areas;
   - special protection of a coastal strip in order to ensure the maintenance and restoration of coastal dynamic processes;

6. to develop and improve marine and coastal monitoring programmes with respect to nature, conservation, e.g., macro-phytobenthos, macro-zoobenthos, fish, birds and the marine mammals;

7. to determine gaps and deficits in marine and coastal research relating to nature conservation.

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CHAPTER IV - AGRICULTURE

4.1. Status and Trends

Agriculture is amongst the most important land uses affecting coastal areas of Europe. Few coastal habitats are free from some form of human intervention and for many their nature conservation interest is determined or modified by farming activity. Historically, forest clearance and a pastoral economy with limited arable cultivation helped establish many heaths and coastal grasslands and modified sand dunes, lagoons and coastal grazing areas to help create the rich variety of habitats.

Today the agriculture sector is of undeniable importance in terms of land cover and economic production as a percentage of GDP, but as a source of employment it has declined significantly over the last 25 years. In 1970, agriculture was responsible for 13.5% of total employment in the European Economic Community; in 1992 this figure dropped to a mere 6%[2]. The drop in employment has generally been caused by increased productivity in the sector together with a rise in imports. This has been accompanied by a reduction of the area under cultivation. In all, the agricultural sector has undergone significant changes which are also due in part to the latest reform of the European Union's Common Agricultural Policy, with its tendency towards putting land out to fallow[3].

According to a study of the Northern Seaboard area, "The net effect of the trends observed in agriculture by the end of the century are likely to be:

- a general decline of the area of arable land under cultivation by at least 10-11% as a result of set-aside;
- a further 4 to 5% of arable land will be farmed less intensively, chiefly because of stricter environmental controls;
- farm productivity will increase on the remaining areas"[4].

4.2. Impacts

Agriculture, both crops and livestock, has traditionally occupied large land areas. Many of the areas around estuaries and deltas were originally derived from the enclosure of tidal land and marshes, from forest clearance and from forest fires. Today new areas of land claimed for agricultural use are much less evident, as productivity levels have increased to such an extent that in some areas over production is a problem. Moreover, cheap food imports have often replaced home produced foods. Grazing is an important use of many coastal areas and sand dunes, wetlands and coastal cliffs and cliff tops are all influenced by it. Natural grazers have probably always used these areas, but domestic stock have caused significant modifications in each. The area of sand dune grassland and heath has been, in temperate regions, extended and possibly enhanced by grazing. Whilst overgrazing at high stocking densities can result in serious erosion and loss of vegetation, a sudden removal of all grazers can be as equally harmful, resulting in over-stabilisation of the plant cover and the loss of large areas of the vegetation the habitat of many different species.

The use of synthetic fertilizers and pesticides causes surface and groundwater pollution and acid deposition. A number of phenomena linked to the relationship between coastal agricultural zones and pollution or eutrophication, such as run-off, deep percolation of chemicals and changes to hydrological systems, lead to the depletion of groundwater[5]. Irrigation can cause salinisation of the soil as salt rises from deep deposits so that the soil cannot be used for agriculture.

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2 European Commission, Europe 2000+, 1994

3 "Aménagement de l'espace européen", 1994.

4 European Commission, "The prospective development of the northern seaboard", 1995

5 EIW, 1992

The draining of wetlands for agricultural purposes and the wide dispersal of pollution from the spreading of some fertilizers and of residues of pesticides has often led to the destruction or degradation of important coastal habitats. Pollutants which reach the sea affect the marine ecosystem in two ways: through chemical, pollution or indirectly as a result of eutrophication[6].

Nutrients arising from the agriculture sector which cause eutrophication (and deep water oxygen depletion) and toxic algal blooms in turn, contain nitrogen and phosphorous which are found in manure, pesticides and fertilizers. They are introduced to the marine environment through percolation (as a result of improper application and/or storage), atmospheric emissions, and run-off. Nutrient concentration levels in estuaries are often particularly high because of their high productivity, and external sources serve to increase these natural levels. In addition, the agriculture sector is responsible for about 45% of the global emissions of methane, a powerful global warming gas produced by decomposing animal wastes[7].

The increasing industrialisation of the agriculture sector, if continued, poses a threat not only to natural areas but also to the diversity of cultural landscapes, as well as to the traditional small family farm[8].

4.3. Opportunities

A continuous shift towards more environmentally friendly agriculture may help ensure the sustainability of the sector over the long term. In addition, reforms to the Common Agricultural Policy (CAP) by the EU in particular are becoming more responsive to environment issues. Thus in recent years discussion on the CAP have begun to focus on the need to introduce a policy for the maintenance of farming income which is no longer based on production but takes more account of environmental issues. The Uruguay Round negotiations on agriculture (part of the GATT agreement) forced the issue. As a result a series of reforms were made to the CAP in 1992 which helped to secure the Marrakech agreements (WTO). These included a reduction in support prices (mainly for cereals and meat), set-aside and the implementation of agri-environmental measures. Some specific regulations with environmental concerns are:

- Regulation 2843/94 has provisions to aid investment in environmental protection;
- Support for conservation of semi-natural habitats under environmental regulation 2078/92;
- Article 11a of regulation No. 2052/88 has criteria which include "pressures on the environment and countryside"[9].

Further reform is likely and necessary, and provides a window of opportunity for influencing the way in which this change might benefit the environment. A fundamental change relates to the move away from concentration on production to a greater concern for more sustainable and environmentally friendly approaches to food production. Some new approaches have already been established. For example amongst the policies incorporated in the Maastricht Treaty is a package of general agricultural measures which encourage lower inputs of fertiliser, reduction in herd size and help with ecologically sound farming.

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6 Helsinki Commission, "Protected of the Baltic Sea - Results and experiences"

7 Greenpeace International, 1992

8 "European Spatial Planning", 1994

9 Doody, J. Pat, 1997

The removal of agricultural lands from production, if carefully planned, also presents important opportunities for enhancement of biodiversity, for example through habitat re-creation and improved environmental quality. Set aside provisions and management of Environmentally Sensitive Areas are amongst the mechanisms which are used to promote appropriate nature conservation in coastal areas. The latter of these can include the extension of semi-natural habitat onto former more intensively used land as for example on coastal cliff tops and adjacent to coastal grazing. In areas where development of the soil has transformed lagoons into arable land, a reversal of this process can be undertaken by setting back the line of sea defence and allowing the sea to flood the land. There should be further opportunities for the development of this approach particularly in areas of sea level rise where maintenance of sea walls is economically not justified.

Ecological Farming

In ecological agriculture the soil is cultivated with due respect for its inherent properties. The organic material and nutrients are circulated as much as possible and the use of only certain pesticides and synthetic fertilizers are allowed. Threats in the form of weeds, diseases, and noxious animals are impeded through crop rotation, other cultivation measures, and natural methods of defence. Pesticides are forbidden; instead the protection depends strongly on the natural equilibrium. The animals live on fodder mainly produced on the farm and have possibilities to follow their natural instincts. The use of fossil fuels and other non-renewable resources, and their harmful discharge to the surroundings, is minimised. Instead natural, local and renewable resources are used. In ecological agriculture closer bonds between the built-up areas and the rural areas are possible through recycling of the nutrients and collaboration in the production. The biological diversity among both plants and animals is increased. This maintains the soil structure and the balance of soil micro-organisms. It also reduces the leaching of minerals thanks to the larger amount of organic matter. – Ecotechnics Bulletin

In addition opportunities for more general environmental enhancement are also available. According to one report, the "plant cover" on land under set-aside locks up soil nitrogen, reducing the amount of nitrates released into streams and ultimately estuaries. Reduced tillage levels associated with less land under arable cultivation can result in lower levels of sedimentary run-off which may contribute to improvements in water quality. Improved water quality levels in estuaries benefit recreational users, fishermen and those who maintain the waterways as well as wildlife. Land-claim for agricultural purposes is less likely to occur as the potential returns are unlikely to cover the costs involved. Lower levels of agricultural chemical use and increased efficiency in their application will benefit wildlife"[10].

Loss of farming income has led some farmers to intensify activities to ecologically unsustainable levels. Other farmers, however, are reporting success through the diversification beyond traditional agricultural practices. In The Netherlands, for example, it is estimated that national farm income is supplemented by 440 million guilders annually through "multi-functional" farming, and this figure is expected to rise to 1165 million guilders per year over the next few years[11]. Supplementary activities include, amongst others, the provision of campsites and the opportunity to taste local specialities. This approach has been particularly successful in areas where agriculture has been in conflict with nature protection or is threatened by mainstream tourism development pressures. In general, it can be shown that farmers have an important role to play in maintaining existing traditional agricultural landscapes, satisfying demands for rural tourism and recreation (and thus alleviating pressure on nature areas), and serving as managers of the land.

[10] English Nature, "Strategy for the sustainable use of England's estuaries", 1993

[11] Joustra, 1997

4.4. Guidelines for Agriculture in Coastal Areas

Protection of hydrographic water basins

In some regions, within zones up to 50 km from the coast, the battle against erosion has already begun, either by traditional methods (crating terraces or banks) or as part of regional development projects.

Diversification

Agricultural practices that are compatible with environmental protection should be encouraged wherever possible, including through the provision of advice, support and conversion subsidies to farmers.

Farmers should be encouraged to support biodiversity by farming genetically varied plant species and animal breeds.

Farmers should consider the potential for diversifying activities and supplementing farm income, for example through agro-tourism and recreation.

Farmers should be encouraged to diversify farm landscapes, particularly along the margins of fields by the planting of hedgerows and trees and the creation of ponds. Where appropriate, farmers should take account of the needs of meadow birds (mainly on grassland in the spring) and wintering and migrating birds (on grassland and arable land in winter).

Grazing

Livestock density should be reduced in natural or semi-natural habitats. It should be based on traditional types of grazing and stocking capacities. Very few areas should be left totally ungrazed in the temperate regions. Reintroduction of grazing may be required where grazing has ceased as for example on former grazing saltmarshes and sand dunes. In other areas, livestock density may have to be reduced as highly intense grazing reduces the structure and diversity of the vegetation and, in dunes, can lead to extensive erosion, particularly in some Mediterranean regions. Seasonal grazing may need to take account of the presence of breeding species, notably birds.

Regeneration/Restoration

Set-aside agricultural lands offer a valuable opportunity for habitat recreation. Lands not suitable for or removed from agricultural use should therefore be allowed to produce a varied, natural plant cover where new wildlife habitats can develop, in particular by means of forestry. Land should not be left disused.

The creation of new cropping fields in coastal habitats (e.g. sand dunes, marshes, wetlands, maquis areas, forested areas, etc.) should be strongly discouraged. Opportunities to discontinue cropping in these (former) habitats and to restore natural values should be considered.

To this end, "development charts" or "land use charts" have to be drawn up. For coastal areas classed as "sensitive", a team comprising of agronomists, pedologists and phytosociologists or botanists could draw up a development plan involving agriculture, forestry and the conservation of flora and fauna.

Irrigation

The level of agricultural production should be adapted to conform with the availability of renewable water resources. New irrigation schemes which require extra groundwater supplies should be prohibited and should always be subject to an environmental impact assessment considering all possible ways of conserving groundwater.

The use of fossil groundwater for irrigation purposes should be strictly avoided. Surface irrigation, through the flooding of large areas, and corrugation irrigation should generally be avoided. The preferred irrigation technique is trickling, by a permanent system of tubes or movable rubber tubes, which can achieve a water-use efficiency of 90% and a high level of fertiliser absorption by plants. Irrigation of sloping land, if it is absolutely necessary, should avoid producing run-off as much as possible.

Pest Management

Fertilisation and integrated pest management should be planned as part of the crop rotation process.

Early detection of attacks, biological control of pests and mechanical as well as manual weeding must be included in integrated pest management programmes. The use of hazardous substances in the Agriculture sector should be phased out as a matter of high priority. It is particularly important to stop as quickly as possible the use in the open environment of organotin compounds, organophosphorous and organochlorine compounds, triazine, heavy metal compounds, synthetic pyrethroides and methyl bromide. At the same time, only a limited range of pesticides, with a determinated impact, should be used.

Fertilizers

Individual or co-operative farms should aim for balanced production. The amount of solid or liquid manure produced should not exceed that which the land can use in a healthy crop rotation system. This requires an analysis of soil, manure, standing crops and external potential nutrient sources in relation to local climate conditions, slope, irrigation and farming and land-use and agricultural practices. Pedological expertise may allow fertilisation to be adapted for use in agricultural basins.

The application of fertilizers should be done in such a way as to avoid nutrient loss:

- Pesticides should not be sprayed from aeroplanes, as this can cause the dispersal of chemicals over a wider area than necessary and destroy non-target species;
- Fertilizers should never be spread on soils that are frozen, water saturated, or snow-covered;
- Slurry should be applied to growing crops by means of direct injectors or other efficient equipment, such as hoses that can be pulled along. Solid manure should be incorporated shortly after application on bare soils, for example by limiting storage capacity to the amount needed for application only in conjunction with sowing or on growing crops

The floors of animal enclosures should be water proofed and resistant to damage by animals or tools. They should be designed to facilitate the drainage and collection of liquid manure.

Solid and liquid manure should be removed frequently from enclosures and properly stored outside. Solid manure should be kept on waterproof soil surrounded by walls. Liquid manure should not be stored in open lagoons. Where possible, methane should be recovered. Poultry droppings should be dried as quickly as possible after excretion.

Effluents from the preparation and storage of silage should be collected and added to storage areas for liquid manure.

The level of nutrients in excrement should be controlled through the use of high quality fodder (i.e.

optimized amino acid composition, balanced ratio between carbohydrates and protein, or enzymatically improved digestibility of the fodder) and/or advanced feeding systems.

Finally, and perhaps most importantly for the improvement of biodiversity, nutrient leaching should be reduced by establishing fallow zones between 5 and 20 meters wide along the banks of rivers and streams. These non-fertilised areas could be planted with bushes or trees.

Energy Conservation

Farmers should strive to conserve energy by phasing-out energy-inefficient farm equipment and utilising renewable energy produced on site.

Litter

Collection systems or other measures should be introduced to reduce sources of agriculture-related litter (pesticide packaging, etc.).

In areas where there is a high fire risk, agricultural waste (straw) should be buried rather than burned.

Run-off and Soil Erosion

Coastal zone management plans should ensure that agricultural lands are developed in a way which prevents soil erosion and the loss of nutrients, with a good balance of land used for forestry, agriculture, dry land farming, pasture, etc. as appropriate to local climate conditions.

During the winter, arable land in coastal regions should not be left open or newly ploughed. The planting of winter crops which absorb substantial quantities of nutrients is recommended. If pedological conditions allow, valley floors and vineyards should be permanently grassed over.

Crop residue should be retained during the off-season.

Wherever possible, the use of reduced or no tillage soil cultivation technologies should be utilised.

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CHAPTER V - COASTAL PROTECTION

5.1. Status and Trends

Coastal defence is the general term which covers all aspects of human initiated defence against coastal hazards such as flooding and erosion. Coastal defence efforts may be small scale involving relatively small structures or may involve extensive land claims, e.g. by establishing buffer zones. Coastal defence structures are generally concentrated on coastal plains around cities and harbours, tourist areas, industrial complexes and infrastructure. In other words, coastal defence is concerned primarily with the protection of economic interests rather than natural habitats.

> "The shore, where tides and waves pass over the land, is the natural defence against the sea. Coasts and estuaries stop waves by absorbing wave and tidal energy, principally by means of mobile sediments such as beaches and mudflats. The dynamic nature of the natural coast, continuously adjusting to changes in wind, tide or waves, is vital to both its physical survival and to the diversity of its biological habitats." – UK Ministry of Agriculture, Fisheries and Food

There are a wide range of engineering methods and techniques for coastal defence which operate in different parts of the shoreline. Offshore techniques operating away from the shoreline include offshore breakwaters, stable bays, and barrages and lately nourishment. Techniques operating on the lower shore between low and high tide include beach nourishment, groynes, revetments, and sedimentation polders. Sea walls, revetments and flood embankments are located at or just above high tide on the upper shore as is the landward extent of the managed retreat technique. Finally, supra shore techniques which operate at or above spring tides include dune building, cliff strengthening, and beach ridge restructuring[12].

> "Marine erosion is a natural process, and if it does not endanger values worth protecting, it should be accepted as a part of the landscape - especially since coastal defence structures can generate negative changes along neighbouring stretches of the coastline, and they may also be disporportionately costly in comparison with the value of the hinterland." – Draft Assumptions for the Development of the Polish Strategy of Coastal Protection

There are two main types of approaches to coastal defence;

Hard engineering: establishment of structures which aim to resist the energy of the waves and tides. Such structures include; breakwaters and seawalls designed to oppose wave energy inputs, groynes designed to increase sediment storage on the shore, and flood embankments and barrages designed as water tight barriers.

Soft engineering: establishment of elements which aims to work with nature by manipulating natural systems which can adjust to the energy of the waves, tides and wind. This approach has economic benefits while minimising the environmental impact of traditional engineering structures. The methods which can be used include artificial nourishment, the set back of structures and plantations of osier hedges and marram grass.

In practice most coastal defences incorporate aspects of both these approaches[13].

Current trends favour the concept of shoreline management, working with the dynamic nature of the coastal environment rather than fighting against the forces of the sea. This is best exemplified by the widespread move away from hard engineering methods of coastal defence which act to restrain coastal processes, towards soft engineering approaches which recognise the dynamic nature of the coastal environment by utilising these processes to advantage. Soft engineering methods usually have

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[12] Ministry of Agriculture Fisheries and Food, 1993.

[13] Ibid.

a lesser impact on the environment and may require less maintenance.

Present and forecast sea level rise, and an increase in the frequency and force of coastal storms resulting from climate change is likely to mean that coastal defence efforts will become increasingly necessary to protect against erosion and flooding. According to the 1995 Assessment of the Intergovernmental Panel on Climate Change (IPCC), global sea level has risen 10-25 cm over the last 100 years, and may rise an additional 15-95 cm (with a best estimate of 50 cm) by 2100.[14] The implications for shoreline management are clear. Shoreline retreat resulting from a 1 m rise in sea level has been estimated at 50-1000 m for some beaches in the United States for example.[15] UNEP predicts that "by the middle of the next century, damage to coastal settlements, harbours, coastal roads, and other infrastructural features could be considerable as most of these developments are only slightly above the present mean sea level." Given that approximately 30% of the EU member States beaches are already estimated to be eroding, serious attention to coastal defence strategies must be paid.

According to a 1994 ENVIREG report[16], "Millions of ECU are being set aside for coastal protection and sea defences but the traditional approach of erecting ever larger embankments is looking less viable. If the conventional engineering approach is adopted then the area of wetlands is expected to be further and dramatically reduced, caught between a rising sea and strengthened embankments." Whilst it will still be worth protecting built-up areas, the large Community surplus of agricultural land means that there is no longer a clear case for continuing a policy of land retention and reclamation. Alternatives, according to ENVIREG, include soft-engineering methods such as managed retreat (see below).

Coastal defence strategies vary according to the location. Where the cost-benefit analysis on coastal defence expenditure takes into account the potential to recreate natural wetlands, there will be places in which land will be allowed to return to its natural state, acting as a buffer zone. Wetlands provide effective natural storm defences, absorbing the energy of the waves and accumulating sediment that raises the level of the land. This idea of allowing certain agricultural areas to flood is under discussion in many countries in Europe, given the desired reduction in agricultural output and the high cost of traditional methods of coastal defence.

Artificial nourishment is another coastal defence technique which increase the volume of sand on a beach or in the foreshore by the importation and emplacement of sediment to form a new foreshore and/or beach profile[17]. Usually sediment is supplied directly from offshore through hydraulic pumping, but sand can also be derived from other sources such as dredging. Regular beach nourishment has been the main method to combat erosion of the Dutch coastline since 1991.[18]

5.2. Impacts

The impacts of coastal defences vary widely according to the techniques used, their specific design and the characteristics of the local environment. Some generalised impacts of coastal defences include[19]:

- Disturbances of natural ecosystem processes and biotope structures of beaches, dunes, cliffs and the nearshore zone by partial or complete modification of landforms and sedimentary processes both on a local and regional scale;
- Continuous loss of characteristic marine influenced ecosystems, such as episodically flooded

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14 IPCC, 1995.
15 Titus et al, 1993.
16 ENVIREG, 1994.
17 de Ruig, 1996.
18 Ibid.
19 HELCOM 16/17, Annex 6.

coastal and riverine wetlands, coastal wet-forests or active cliffs;
- An increasing threat to the biodiversity of coastal areas;
- Visual deterioration.

The impacts of hard engineering are usually more severe than soft engineering. Hard engineering generally results in long term changes in coastal morphology, particularly erosion, alongside protected areas. It also often leads to a reduction in the width of the shoreline as low-lying backshore areas are reclaimed behind defences. This leads to a decrease in the size of shore habitats, a phenomenon termed "coastal squeeze". Soft engineering is generally a more environmentally friendly approach which works towards providing a dynamic equilibrium at the coast whereby erosion and flooding are kept to a minimum. It also generally requires more space to be used, thereby reducing coastal squeeze.[20]

Defensive structures which are designed to reduce wave energy at the shore often result in the build up of sediment in the wave shadow of the structure. In some situations this may lead to covering or other changes to existing shoreline ecosystems. Hard defence techniques which reduce upper shore and cliff erosion also disrupt longshore sediment transport which often leads to the accelerated erosion of adjacent shorelines.[21]

Some structures can be visually intrusive or can limit access to the shore and sea. They often present serious navigational and/or safety hazards. Where low cost materials are used, such as motor cars, tyres or sunken ships, long-term breakdown presents pollution hazards.[22]

Defence techniques located in estuaries to protect against flooding such as barrages, tidal surge barriers and flood embankments can seriously disrupt the natural processes of these ecologically rich environments.[23]

Nourishment techniques, if not carefully designed and/or if improper fill material is used can result in increases in the turbidity of coastal waters, and the continued wash-out of fine material can have long term negative effects on adjacent benthic and inter-tidal ecosystems. Changes in beach grain distribution can lead to the incursion of coarse-grained material over supra-tidal ecosystems such as lower cliff or dune communities. Rapid sediment deposition can swamp inter-tidal invertebrate communities and have serious effects on feeding birds.[24]

Sea walls and other upper shore structures, if placed too close to the waterline, reduce the active width of the beach and dune during storms. This significantly disrupts the sediment balance and causes erosion especially along downdrift stretches of coastline. They also result in wave reflection leading to a lowering of the foreshore and sometimes to the undermining of the toe of the seawall, which may ultimately cause it to collapse. Sea walls prevent sediment transport between beach and dune resulting in the deterioration of these environments.[25]

Finally, afforestation of coastal dunes with non-native species, primarily for the purposes of coastal defence, has disturbed the natural dynamics of coastal systems. Impacts from such afforestation are discussed in the Chapter on "Forest Management".

5.3. Opportunities

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[20] Ministry of Agriculture Fisheries and Food, 1993.
[21] Ibid.
[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] Ibid.

With a rise in sea level, the width of the intertidal zone is reduced as low water levels rise and high water marks are held in place by hard defences. This results in a significant loss of habitats particularly salt marshes and mudflats, which in turn reduces the buffering protection afforded to hard defences such as sea walls. These then can become increasingly destabilised as the wall toe is exposed and undermined. This is increasingly likely to occur on a large scale and may require large capital expenditure in order to upgrade defensive works[26]. The increasing recognition that global sea level is rising combined with the recognition of the coastal squeeze phenomenon has led to the development of the concept of managed retreat.

Managed retreat involves setting back the line of actively maintained defence to a new line inland of the original, or preferably to rising ground, and promoting the creation of intertidal habitat on the land between the old and new defences. Depending on the situation and the requirements of the scheme the original front defence may be retained until it degrades naturally, or may be either wholly or partially removed. The intervening land then forms a new, wider intertidal profile which is more able to respond to coastal processes and reduces the effect of coastal squeeze[27]. Managed retreat is not a do-nothing option but requires active management. There are two main advantages of managed retreat. Firstly, set back defences have an additional element of wave absorption provided by the widened intertidal zone and therefore are of a lower specification and cost. Secondly, the creation of a widened intertidal zone reduces coastal squeeze. [28]

Environmental opportunities should be considered in all coastal defence schemes. Such schemes may provide opportunities to enhance the landscape and restore or create coastal habitats such as saltmarshes, brackish lagoons, and artificial reefs. Sympathetic engineering techniques for environmental improvement can be practised to provide a diversity of habitats. Even the most unpromising environments can often be improved, and apparently sterile habitats offer some of the greatest challenges.[29]

5.4. Guidelines for Coastal Defence

When considering coastal defence works the dynamic character and permanent change of the coast should be recognised and accepted as an integral factor of coastal zone management and planning. Natural processes should only be disrupted by coastal defence works when life or important assets are at risk. Development in areas at risk should take place only if it is accompanied by coastal defence programmes ensuring acceptable standards of safety. The whole project, i.e. the development and the coastal defence system together, should be subject to EIA and should be proven to be in the long term public interest.

A risk assessment of all coastal areas should be carried out to determine the impact of sea level rise and coastal retreat so that planning strategies and development zones can be determined. In accordance with the principles of sustainable development, coastal defence schemes should not tie future generations into expensive or inflexible options. Defence measures should be part of a strategic plan for the relevant coastal area in which all defence works are based on a scientific understanding of natural coastal and river processes.

Wherever possible coastal defence measures should be nationally or regionally incorporated into integrated coastal zone management plans which:

- are based on detailed knowledge of the coastal geomorphology and ecological processes;
- consider the relationships between physical, ecological and economic parameters;

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[26] English Nature, “Managed retreat: a practical guide,” 1995.
[27] Ibid.
[28] Ministry of Agriculture Fisheries and Food, 1993.
[29] Ibid.

- integrate these parameters into specific coastal development strategies;
- are founded on suitable administrative and legal structures.

It is advisable for a survey to be carried out prior to the selection of specific defence measures in order to establish an environmental baseline which can be used to assess potential options and against which environmental impacts (potential and actual) can be measured. All options should be considered and appraised, including the do-nothing option, risk management by improving warning systems and developing evacuation procedures, and sustaining current lines of defence through repairs or replenishment of mobile sediment.

Certain designated areas require special consideration when determining coastal defence strategies. New coastal defence measures not designed to protect settlements or other exceptional values should normally not be executed as they are of questionable economic value and may impose negative impacts on the environment. In fact it is often both economically and environmentally beneficial for coastal areas outside settlements that have been subject to episodic flooding before they were dyked for land use purposes only, to be restored as coastal wetlands through the removal or relocation of dykes further inland.

In order to avoid shifting the burden of coastal defence from one area to another it is important that cliffs as sediment supplier and natural coastal flood areas as potential nutrient traps, should not be subject to any new coastal defence measures.

Techniques

The managed retreat option should be considered in order to preserve coastal ecosystems, such as saltmarshes. Where coastal defences are necessary the use of natural materials such as stones, sand, soil, or wood is preferable to artificial materials such as concrete, asphalt, or plastic as these are foreign to the coastal landscape and may cause pollution upon disintegration. Soft engineering methods using natural materials are generally preferred over hard engineering methods as they typically have a lesser impact on the environment and better maintain the natural character of the coast. If hard measures are necessary, they should be located as far inland as possible.

For beach/foreshore nourishment marine sand with proper grain sizes should be used, containing only a minor content of fines so that natural sediment transport processes are not excessively disturbed and in order to reduce the turbidity of coastal waters during extraction and deposition thus maintaining coastal water standards. Where dredge sediments are used they must be tested for pollutants and should not be used if pollutant levels are detected. (See guidelines on sand extraction.) Beach nourishment should not be carried out annually; beach flora and fauna should be given ample time to recover.

Dune management techniques should encourage the preservation of dune slack areas and a diverse dune flora by avoiding planting regimes which concentrate on marram or trees where possible and allowing mobile sand areas to develop.

Project construction

The construction phase of any coastal defence scheme should be planned and carried out with special care and should include consideration of the:

- appropriate timing of works with regard to such factors as flowering and breeding seasons of plants and animals and to public usage of beaches;
- definition of work areas to avoid compaction and trampling of sensitive areas, particularly in upper shore areas such as saltmarshes or sand dunes.

Post-project appraisal

A post-project appraisal is a recommended practice as it encourages the mitigation of any reported and unforeseen environmental problems and aids in the improvement of the design and implementation of future schemes. Such an appraisal should include:

- a monitoring programme which addresses the efficacy of the coastal defence works and the impact of the scheme on the environment
- an environmental and engineering audit based on a comparison between the baseline survey and the monitoring programme, in order to identify any unforeseen effects
- a maintenance programme.

Dune Afforestations

Guidelines relating to dune afforestation for the purposes of coastal defence are located in the Chapter on "Forest Management".

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CHAPTER VI - MILITARY DEFENCE

6.1. Status and Trends

Since 1989 there have been major changes for military defence activities in Europe, especially in Eastern Europe where many military facilities were located. In recent years, there has been a marked decline in military activities, many military bases have been closed, and large numbers of nuclear weapons are being de-commissioned. In some cases, military sites have simply been abandoned, and given for coastal local or regional authorities to manage.

6.2. Impacts

A broad spectrum of activities related to military defence has implications for biological and landscape diversity in coastal regions. These include, for example:

- Naval manoeuvres;
- Harbours, military bases and training sites located in the coastal zone
- Disposal of arms and ammunition; and
- Presence of nuclear-powered submarines and weapons, some of which are presently in need of de-commissioning

However the opposite is also true. In the UK, for example, some of the most important coastal dunes and cliffs lie within areas "protected" by military use. The absence of intensive agriculture or industrial development has allowed large areas of habitat to survive.

Military requirements and procedures also have impacts on the environment as well as on public access to coastal and marine areas. Such requirements include:

- Land possession and occupation;
- Noise extension areas;
- Restricted or protected zones for firing ranges, training areas, or underwater explosions; and alternative shipping channels.[30]

The Case of Den Helder

The municipality of Den Helder in The Netherlands is coping with the 1991 abandonment of a naval wharf equivalent in size to its own city centre. The local authority is now facing a number of serious problems. Firstly, it must deal with problems of vandalism at the site. Secondly, the navy pullout resulted in the loss of 5,000 jobs. Thirdly, the site (both land and sea components) is apparently contaminated, but the Navy has failed to provide the necessary information to enable a clean-up. The local authority is now attempting to find solutions for these conflicts through the development of an integrated coastal policy.

Moreover, information on military defence is often classified for reasons of national security, and is one of the few sectors where the concepts of public participation and public access to information have not been recognised.

As the military have supremacy over any area they use, conflicts, particularly with the natural environment, are virtually unavoidable. For example, naval and air force exercises are allowed to proceed despite their potential impacts on nature, a result of low-altitude flying or underwater detonations. For this reason, long-term military use, given the variety of military operations and the sensitivity of natural areas, has led to significant impacts on the environment in some areas.

The specific impacts resulting from the activities described above are as varied as the activities themselves. Military activities create the same kind of polluting emissions that are caused by other

[30] Johansson, L., 1995.

socio-economic sectors,[31] but may in fact be worse because there is little or no environmental regulation of military activities in many European countries. Military defence activities have resulted in a number of environmental problems such as the destruction of landscapes, pollution of soil, water and air, and contamination of the environment with radioactive substances.

Some coastal sites that are used for military activities contain, or are close to, important moulting, roosting or breeding areas for endangered bird species. Such areas are often intensively used for target practice and training flights by helicopters and jets, which can cause considerable disturbance for the birds. The European populations of eight endangered bird species are predicted to suffer low impacts from this threat.[32]

Another serious problem is the existence of chemical weapons dumped at sea at the end of World War II. Precise information about the location of these weapons is often missing, and when it is available, it is often withheld from the public. As a result, fishermen are exposed to the danger of bringing corroded chemical weapons to the surface in their nets. The implications for marine life are also considerable.

The risk associated with the storage of ammunition may also have consequences for nature conservation,[33] particularly when military sites are established or expanded in the most vulnerable landscapes, such as coastal plains and sand dunes[34]. These areas are characterised by a high sensitivity to human impact and slow rates of regeneration.

6.3. Opportunities

Despite the impacts described above, military sites, especially the larger areas used for the training of troops, often contain significant natural values. Such landscapes may differ from surrounding lands characterised by roads, industry and other infrastructure.

The relinquishment of these sites is an increasing occurrence. There are major opportunities for conversion of these sites into land- and sea-based nature reserves or protected areas. Only in very limited areas should new development take place, and where it does development should be environmentally sustainable.

Many countries in Europe are grappling with similar problems posed by the abandonment and conversion of former military sites. These problems are not only environmental, but also economic and cultural. Opportunities therefore exist for the responsible authorities to co-operate in finding environmentally sustainable solutions

6.4. Guidelines for the Military Defence Sector in Coastal Areas

Military authorities should take responsibility for the environmental pollution and damage that they cause. The development of manuals and, if possible, Environmental Management Systems for military activities by European Defence Ministries will help avoid problems.

Consideration should be given to making military activities, at least during peacetime, comply with the same environmental regulations and considerations which would apply to civil activities.

Information about the effects of military activities on coastal and marine life or nearby inhabitants should be made available to the public.

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31 Coalition Clean Baltic, 1992.

32 Tucker, G., Kalejta-Summers, B., “Coastal habitats”, 1997, p. 17.

33 English Nature, “Estuary Management Plans”, 1993.

34 Coastline, 1996-2.

Military activities harmful to wildlife in protected nature conservation zones or parks, both land- and marine-based, should be prohibited. Minimising military defence manoeuvres and exercises will help minimise destruction of nature or disturbance of areas of importance for endangered or rare species.

Nature Conservation in (Former) Military Areas

Former military sites with important natural value or potential natural value can be converted into nature conservation areas.

Responsibility for any clean-up which may be necessary prior to relinquishing supervision of military sites should lie with the military authorities, but carried out in close co-operation with local or regional authorities. It will also be important to provide detailed information about previous uses of the site during the hand-over of responsibilities.

Radioactive Waste Disposal

Radioactive waste disposal in the marine or coastal environment, or where it may otherwise affect these environments, is not acceptable. It is best concentrated and contained, preferably on or near the site where it is generated, until safe, permanent disposal techniques are developed. Training and awareness of personnel handling such wastes should be considered a high priority.

Waste disposal

Civil authorities are paying increasing attention to handling wastes in an ecologically acceptable way, including "cradle-to-cradle" techniques. Military authorities should take a similar approach.

Arms and munitions: Disposal at Sea

A strategy is required to allow the cessation of the disposal of arms and at sea. Information on the past disposal of arms and munitions at sea by the military is required. This will require military authorities to establish and/or co-operate with efforts designed to collect and safely dispose of such wastes, including abandoned nuclear submarines.

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CHAPTER VII - ENERGY

7.1. Status and Trends

The dominant fuel used in countries of the European Union is oil. Solid fuels (coal, lignite) are most prevalent in central Europe, and the former Soviet states are primarily dependent upon gas and oil.[35] The rate of growth in the use of nuclear power has slowed.[36] There are around 200 nuclear power plants operating in Europe, many of which are located in coastal regions or along rivers.

Nordic countries are the leaders in the use of renewable energy sources. Iceland, for example, obtains nearly a third of its electricity from geothermal sources, and more than a third from hydropower. Denmark's success with windpower is well documented, and Norway gets virtually all of its electricity from hydropower.[37]

Over the long term, an increase in the use of renewable energy sources looks very promising economically as well as environmentally. According to one recent study, "the prospects are excellent that a wide range of new renewable energy technologies will become fully competitive with conventional sources of energy during the next several decades."[38] The rate at which renewables become competitive, however, will largely depend upon the extent to which they are supported by subsidies and tax incentives, as conventional sources currently enjoy. Certainly the adoption of full cost accounting procedures for conventional sources of energy (as recommended by the OECD among others) would make renewables more attractive by comparison.

In the shorter term, however, conventional sources of energy will continue to be exploited as renewables gain momentum. In all regions of Europe, the use of natural gas is on the rise.[39] It is projected that gas production in Europe will decline slowly, with two thirds of the current potential supply depleted by 2050.[40]

7.2. Impacts

Mining and drilling, power generation and fuel storage, refining, transport and use all have major impacts on environmental quality. Power stations fuelled by conventional sources are often sited in coastal areas due to their extensive water requirements for cooling and/or fuel supply.

Specific impacts of conventional energy production include water pollution (oil, thermal, radioactive discharges), air pollution (CO_2, NO_x, SO_2), land subsidence, and damage to habitats through the construction of access roads, use of heavy equipment, drilling and mining, all of which are harmful to biodiversity and landscapes in coastal regions. More serious damage may occur from accidents such as blowouts (oil and gas drilling), oil tanker accidents, or nuclear catastrophes. Conventional energy installations also occupy significant space in land-scarce coastal areas.

The nuclear industry poses a special threat to coastal and marine ecosystems due to the sheer scale of damage that is likely to result from a major nuclear accident. Nuclear power plants are frequently located in coastal areas or near rivers due to the large volume of cooling water needed, and radioactive wastes are regularly transported across European seas for reprocessing in France, England and Scotland. Even in the absence of major accidents, coastal and marine ecosystems are threatened

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35 Stanners and Bourdeau, 1995.
36 Ibid.
37 Ibid.
38 Johansson et al, 1993.
39 Stanners and Bourdeau, 1995.
40 Johansson et al, 1993.

by operational discharges of radioactive waste.

Global climate change also represents a major threat to coastal and marine regions over the long term. The most prevalent greenhouse gas is carbon dioxide (CO_2), with emissions arising from both natural and man-made sources. Of man-made sources, the burning of fossil fuels is the greatest source of emissions. According to the 1995 Assessment of the Intergovernmental Panel on Climate Change (IPCC), global sea level has risen 10-25 cm over the last 100 years, and may rise an additional 15-95 cm (with a best estimate of 50 cm) by 2100. Even if the concentrations of greenhouse gases in the atmosphere were to stabilise by that time, sea level would continue to rise at a similar rate beyond this date and long into the future. It is also important to note that these estimates refer to global averages; changes in regional sea levels may significantly differ.[41]

For these reasons, the development of renewable energy sources is preferable to continued investment in conventional energy supplies. However, renewables are not without their impacts, particularly at the local level, and it is essential that prior to any large-scale development, environmental impact assessments must be carried out. It must be stressed, however, that in comparison with conventional energy sources, these impacts are small (with the exception of large-scale hydropower schemes).[42] In coastal areas, renewable energy developments may cause changes in sediment transport and deposition (tidal barrages),[43] obstruction of migration routes (tidal barrages, dams), disturbance and to some extent, mortality of bird (wind power) and other impacts associated with all types of coastal engineering works.

Of all renewable energy sources, wind power is considered to be the most economically feasible for further development in Europe generally. Windpower may be generated by a single turbine, or by a group of turbines which together form a wind farm. The environmental impacts of a wind farm are greater than those arising from a single turbine.[44] Wind farms tend to require large amounts of land, dictated by the needs for a minimum space between each turbine. They also have aesthetic impacts and there is often concern about noise disturbance.

Tidal power may also have significant impacts in nearby coastal areas. Tidal barriers may result in changes to tidal volumes, levels and velocities, which affect salinity, sediment transport and deposition, with significant impacts in saltmarsh and intertidal zones.[45]

7.3. Opportunities

Renewable energy sources, by reducing our reliance on non-renewable energy supplies (such as oil and gas which contribute to global climate change and air pollution) and avoiding the need to use nuclear power, contribute to a more sustainable and environmentally friendly means of energy production. They provide also a safer alternative to nuclear power, avoiding the need for the use, storage, transport, and/or disposal of dangerous radioactive materials.

Important opportunities to develop specific renewable energy sources include:

- Solar: solar-generated heating is particularly attractive in the sunnier regions of southern Europe. In very remote areas, solar photo-voltaic plants are economically competitive.[46]
- Wind: warm coastal areas may provide ideal conditions for generating windpower due to

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41 IPCC, 1995.
42 Stanners and Bourdeau, 1995.
43 English Nature, 1993 (est man plans).
44 Aspinwall and Company, 1994.
45 Ibid.
46 Johansson et al, 1993.

high wind speeds at low altitudes with low turbulence[47] and because seasonal and daily wind patterns in coastal areas often coincide with the demand for electricity.[48]

- Wave: onshore facilities are probably most useful on a small-scale in remote coastal areas. Offshore installations are not economically feasible at present.
- Tidal: generating tidal power is only feasible in macrotidal estuaries or inlets.
- Anaerobic digestion (sewage) for electricity generation: sewage digestors are generally most viable in large urban sewage plants, with the benefit of reducing sludge volume and improving effluent quality[49]
- Bio-fuels: set-aside agricultural land is an attractive location for producing biomass for fuel.
- Landfill gas: the exploitation of landfills for electricity generation is generally feasible in cities and towns

Any strategy to increase the use of renewables will require close co-ordination with other sectors, particularly agriculture and forestry (biomass), transport (automobile design) and urban planning (landfill gas, sewage digesters).

7.4. Guidelines for Energy Development in Coastal Areas

Energy Conservation

Utilising opportunities to save energy through conservation and efficiency programmes is an essential element in reducing CO_2 emissions. Such options should be thoroughly considered prior to the construction of new energy facilities.

Air Pollution

Proposals for new energy facilities should include an audit of their contribution to global warming and air quality problems. Problematic emissions will be reduced if new plants run on the cleanest possible fuels (natural gas, renewables), and those running on dirty fuels (nuclear, coal, lignite, oil-shale and oil) are phased out.

Applying strict emission standards for NO_x, SO_2, CO_2 and methane to all plants throughout Europe will also help reduce pollution effects. Wherever possible, CO_2 should be removed from fuel feedstocks.

Siting of Buildings and Infrastructure

Guidelines on the siting of buildings and infrastructure can be found in the Chapter on "Urbanisation".

7.4.1. Conventional Energy Sources

Offshore oil and gas development

There are many environmental arguments in favour of a ban on exploration for new sources of oil and gas, for reasons of climate change or to protect ecologically sensitive areas such as the Wadden Sea or the Baltic Sea. At a minimum, stringent environmental impact assessments should be carried out prior to any new development, and application of the precautionary principle would dictate that offshore activities should not proceed if it cannot be shown that they will not cause significant harm to coastal and marine ecosystems. All of these arguments should be thoroughly considered before

[47] Aspinwall and Company, 1994.
[48] Johansson et al, 1993.
[49] Aspinwall and Company, 1994.

deciding to open new areas for exploration and/or development.

Implementation of integrated Environmental Management Systems[50] will help industry meet increasingly stringent environmental standards for existing operations.

Drilling muds and cuttings, particularly those which are oil-based, and polluted production water should not be discharged to the sea. Diesel oil-based muds should not be used anymore.

Alternative options for the disposal of decommissioned offshore installations at sea are required.

(See the Chapter on "Transport", section on oil spills, for further information related to oil development.)

Onshore Oil and Gas Exploration and Development

Techniques such as deviated and horizontal drilling can be used to avoid impacts on sensitive natural areas.

Siltation from run-off waters and pollution from discharges and drilling muds can be environmentally damaging and should be avoided.

Site restoration is more effective if during site preparation, leaf litter, topsoil and subsoil are reserved.

As with offshore oil and gas development, an effective contingency plan will help mitigate the impact of oil spills.

Nuclear power

Many safety issues are unresolved, and a number of existing plants pose a serious risk to the environment (particularly the Chernobyl-type reactors in Ignalina, Sosnovy Bor and on the Kola Peninsula). Resolving these issues should be a precondition for the further construction of new nuclear plants.

Radioactive Waste Disposal

Radioactive waste should not be disposed of in the marine or coastal environment, or where it may otherwise affect these environments. Rather, it should be concentrated and contained, preferably on or near the site where it is generated, until safe, permanent disposal techniques are developed.

7.4.2. Renewable Sources

Wind

Windpower should be developed where possible alongside or within existing coastal developments (e.g. industrial sites, power stations, harbours) or on agricultural lands, set back from the coastline.

Wind farms located in sensitive wildlife habitats, or on seaside cliff or headland sites, where the highest concentration of birds may be found, can have major effects on the wildlife. In addition, they

[50] An Environmental Management System (EMS) is a tool whereby businesses attempt to integrate environmentally sound practices into daily operations. An EMS generally incorporates policy guidelines with practical implementation initiatives, and includes provisions for environmental assessment as well as monitoring and evaluating performance.

may be considered a nuisance near residential areas.

Once wind turbines have been installed, local authorities should ensure their optimal function, for example by preventing the construction of buildings or other tall structures in the surrounding area which could reduce local wind speeds.

In especially sensitive areas, machines designed for noise reduction can be employed. For example, turbines with two-speed operation allow the use of the lower speed during quieter periods of low wind, and the higher speed during noisier periods of high wind.

Solar energy

Solar energy should be developed as extensively as possible and habitat and architecture should be planned to that effect.

Tidal Power

Tidal barriers provide both threats and opportunities for redistribution and settlement of coastal sediments. New habitat can be created, though a full understanding of the nature of the geomorphological system is essential.

Tidal barrages should be equipped with fish passes for migratory species.

Hydroelectric Power

New hydroelectric power stations can cause erosion of the shoreline as sediment delivery to the coast is restricted. They may have the greatest impact on virgin river systems in coastal drainage areas. When siting hydroelectric stations areas which are sensitive to such impacts should be avoided.

Hydroelectric dams can be equipped with fish ladders to allow migrating fish to pass. Such fish passes should remain operable even when river flow is low. Screening turbine intakes and outfalls will help ensure reduced fish kill.

Reduction in sediment supply as a result of dams, for example, not only reduces the ability of habitats such as sand dunes and saltmarshes to continue to grow but may also reduce sediment availability for beach nourishment. In turn this can, and often does, lead to coastal erosion and can have severe impacts on coastal urbanisation as is the case on the Nile Delta amongst a number of other important deltas in the Mediterranean. Dams should be fitted with sediment bypasses to prevent damage to coastal wetlands, especially in river deltas.

Zero-flow regimes, where water diversion leaves dry stretches of river, will result in major losses of plants and animals.

Biomass

Biomass plantations are less diverse than natural ecosystems. Therefore, they should only be established on degraded or set-aside agricultural lands. Equal amounts of set-aside land should preferably be allowed to return to a natural state in order to promote biodiversity.

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CHAPTER VIII - FISHERIES AND AQUACULTURE

8.1. Status and Trends

Coastal waters serve as important nursery, feeding and spawning areas for the world's fisheries, and much of the global marine fish catch comes from important habitats in nearshore waters, inter-tidal areas, estuaries and bays. Europe supports an intensive fishing industry. In the North Sea, for example, each year 50-60% of the total biomass of the main commercial fish stocks is removed.[51]

The contribution of fishing to the GDP of European countries (usually less than 1%[52]) belies the importance of its role in the economies of coastal communities, both directly and indirectly. It is estimated that for every job at sea, there are four or five on shore in fishing-related industries.[53]

Serious depletion of fish stocks (from overfishing and discarding bycatch, improved fishing methods, climatic change and pollution) has led to the forced reduction in catches and decreased employment opportunities.[54, 55, 56]Fishing fleets now tend to concentrate in fewer and larger ports, and the smaller ports are suffering, particularly where there are few alternatives to the fishing and fish processing industries.[57, 58]The Atlantic Arc region, which has few large ports, is especially likely to suffer in the face of these trends. Indeed, the significant reduction in fleets as a result of EU regulations is already having an impact here.[59] In general, the decline in offshore fisheries has led to increased pressure on coastal fisheries.[60] In the Mediterranean, for example, high seas trawlers have been forced to move closer to shore, competing with inshore artisanal trawling and other activities.[61] Unless stricter policy measures are implemented, the decline in fishing is likely to continue.

There is an increasing trend towards fish farming, however, with particular interest in shellfish.[62] In the European Union, for example, farmed fish and shellfish account for around 7% of aquaculture output worldwide, providing employment for more than 80,000 people in coastal areas.[63] The continued growth of the industry will depend in part on its ability to overcome environmental problems and avoid increased production costs.[64] If successful, the industry can provide new sources of employment, and reduce Europe's dependence on imported fish.

8.2. Impacts

Environmental impacts of fishing include overfishing of commercial fish stocks, damage to the marine ecosystem as a result of loss or discarded fishing gear, the incidental take of non-target species (including marine mammals), oil pollution and litter from fishing vessels, and pollution from fish processing plants. These impacts, combined with problems of coastal and marine habitat destruction, land and marine-based pollution, and the introduction of alien species, have serious consequences for aquatic diversity, and ultimately for the health of fish stocks themselves.[65]
Impacts from aquaculture are also a serious concern, particularly if a larger industry develops. The

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64 European Commission, “The prospective development of the northern seaboard,” 1995.
65 Intermediate Technology, “Fisherfolk safeguarding Aquatic Diversity through their Fishing Techniques,”1996.

discharge of wastes (which may include alien species, anti-fouling pesticides, antibiotics and other pharmaceuticals, organic matter and nutrients) to the surrounding sea can affect local fish populations, contribute to eutrophication and upset the ecological balance, particularly in semi-enclosed coastal areas.[66, 67, 68, 69] In oligotrophic environments such as the Mediterranean, aquaculture may displace fishing grounds, attract dolphins and compete with traditional fisheries. Moreover, there are concerns that biotechnology and/or breeding techniques could have negative impacts on wild species in the event that genetically altered species escape and interbreed.[70] In some cases, (e.g. salmon farming) aquaculture may be a resource intensive enterprise. According to one expert, "Salmon farming in cages requires lots of resources collected by fishing vessels operating over vast marine ecosystems. The marine water surface area required to produce the food given to the salmon in the cages is about 1 km² per ton of salmon. This area is similar independently of whether a salmon is caged farmed or caught out in the sea. The ecological footprint of the salmon farm is as much as about 50 000 times larger than the areas of the cages."[71]

8.3. Opportunities

> "The conservation of aquatic biodiversity *in situ* has always been central to the strategies of *nurture fisheries*. These strategies adopted by artisanal fishing communities over millennia differ markedly from the modern industrial approach to fishing, using *capture fishery* strategies. *Nurture fishery* technologies are necessarily selective, passive, low-energy and ecologically efficient. They may not bring in the biggest catch in the short term, but they ensure the sustainability of the fishery through their harmonious interaction with the dynamics of the ecosystem, on which depends the aquatic biodiversity…" - Intermediate Technology

As a follow-up to the first Earth Summit in 1992 and the subsequent UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, FAO undertook the development of a global Code of Conduct for Responsible Fisheries. An extensive process of consultation was conducted, and was unanimously approved in October, 1995 by the FAO Conference. The Code is directed toward "members and non-members of FAO, fishing entities, subregional, regional and global organizations, whether governmental or non-governmental, and all persons concerned with the conservation of fishery resources and management and development of fisheries, such as fishers, those engaged in processing and marketing of fish and fishery products and other users of the aquatic environment in relation to fisheries.[72]"

The Code is broad in scope, covering fisheries management and operations, aquaculture, integration of fisheries into coastal area management, post-harvest practices and trade, and fisheries research. Its measures relate not only to technical issues, but also to social issues such as the fair and equitable treatment of fishworkers. If it is widely implemented, the Code will represent a major step forward in the conservation of marine biodiversity.

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66 UNEP, "Guidelines for Integrated Management of Coastal and Marine Areas," 1995.
67 FAO, 1994 .
68 Helsinki Commission, JCP, 1993.
69 UNEP, "State of the Marine and Coastal Environment in the Mediterranean Region," 1996.
70 Ibid.
71 Folke, Carl,1995.
72 FAO, 1995.

"Multi-species aquaculture or 'polyculture' is based on the harmonious stocking of different varieties of fish species at different levels of population, using an understanding of the production cycle and energy flow through the pond. There are planktonic feeders (at the pond surface and in mid-water) which feed directly off the 'phytoplankton' and 'zooplankton' produced by the natural productivity of the pond. The faeces they produce further enhance the productivity of the pond, as does pond manuring (with agricultural and household residues). Fish species which feed on larger organisms in mid-water (small fish, insects, etc.) and the pond bottom (snails, worms, etc.) are also stocked. The result is that energy flow and transformation are extremely efficient. If this method of conservation *in situ* is to be sustained by traditional aquaculture, then attention needs to be focused on decentralized production, using diverse, environmentally sensitive techniques. Protection from introduced species and diseases is also required." – Intermediate Technology

8.4. Guidelines for Fisheries and Aquaculture

The 1995 FAO Code of Conduct for Responsible Fisheries, particularly Article 10 on the Integration of Fisheries into Coastal Area Management, should be implemented by all coastal states and fishing communities. The UN Agreement for Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (New York, 1995) should also be implemented as quickly as possible.

Fisheries management should adopt a precautionary approach in which the fundamental health of coastal and marine ecosystems is maintained. A lack of adequate data should not be considered grounds for postponing effective conservation measures. The optimum sustainable yield should be considered as a replacement for the maximum sustainable yield of any given fishery.

Wherever possible, capture fishery strategies should be replaced by nurture fishery strategies managed by fishing communities. Capture methods which seriously damage or degrade coastal and marine ecosystems should be phased out, with priority given to environmentally safe fishing methods.

The development and use of increasingly selective fishing gear and methods should be encouraged for both target and non-target species. By-catch, discards and waste should be minimised to the maximum extent possible. Large-scale pelagic driftnet fishing should be ceased in accordance with the United Nations Resolution on this subject.

For stocks which are currently over-exploited, particularly where spawning stocks are depleted or where the ecosystem has been seriously damaged, fishing efforts should be reduced or ceased until stocks have recovered.

Aquaculture

Greenpeace Principles for Ecologically Responsible, Low Impact Fisheries

To minimize the risk of irreversible damage, the intensity of fishing should not substantially or permanently distort the character of the ecosystem. To achieve this, target stocks should be maintained at a high proportion of the biomass that would occur in the absence of fishing.

As a rule, a fishery must not jeopardize the ability of any species to withstand natural or human induced fluctuations in the environment.

A fishery must not endanger any species or population, nor inhibit the recovery of any that are depleted, threatened or endangered.

The catch of non-target species or undersized fish (bycatch) in fishing operations must be reduced to levels approaching zero. Any remaining bycatch should not be discarded, but instead brought to shore, unless it can be returned to the sea alive and in a healthy condition.

The destructive impacts of a fishing activity on habitats must be eliminated (e.g. damage to coral reefs, seagrass beds, bottom substrate).

Wasteful forms of fish production and fishing for wasteful purposes, such as those which involve only a lethal harvest of roe, must be eliminated.

Industrial reduction fisheries must be treated with particular caution because of the potential for serious food web impacts caused by removal of such large amounts of the marine biomass at critical trophic levels.

Toxic, persistent, or bioaccumulative substances must not be part of the production process. Compounds which are not hazardous should be either recycled, reused or reprocessed.

Total energy consumption of the product cycle, including fisheries operations transport, processing and distribution, must be minimized.

CFCs, HCFCs, HFCs and other ozone depleting substances and refrigerants, as well as substances that contribute to global warming must be eliminated from the production cycle wherever alternatives exist.

Packaging must be minimized in the first instance and should be reusable or recyclable.

Aquaculture can be developed in ways which do not degrade coastal and marine biodiversity. Integrated systems will be more sustainable than monocultures, for example by the combined culturing of seaweeds, mussels and salmon.

Due to their extensive space and water requirements, hatcheries will have fewer impacts on the surrounding environment if they are located within developed areas of the coast and where road access already exists. If possible, they should be contained within existing buildings.

Contamination problems can be significantly reduced by locating large-scale production units in exposed or semi-exposed locations in the sea, in water depths of at least 40 metres. However, special attention must then be paid to the increased risks of farmed fish escaping to the wild. In any event, such units should be located away from sea grass communities or other sensitive habitats, as well as recreational and fishing areas. Support facilities should be located onshore in previously developed sites. Fish packing and/or processing units should be located onshore, perhaps in existing industrial sites.

Small-scale production units should be located onshore, set back from the beach, in areas with good road access. Fish tanks should be set in the ground, with pipelines and services buried underground.

Birds or wild fish should be deterred from intrusion through the use of nets.

All steps should be taken to prevent escapes of farmed species and interactions with wild species. Site-specific contingency plans will help minimise the impacts of an escape of a significant number of fish.

Biosafety measures can be applied to minimise the effects and transfers and introductions of alien species, including prior impact analysis, quarantine, and when and where necessary, eradication measures or operations closure. The International Council for the Exploration of the Sea (ICES) Code of Practice on the Introductions and Transfers of Marine Organisms (1994) provides important guidelines on this subject.

The control and prevention of diseases and parasites should be carefully considered. Techniques include vaccination, dietary measures, frequent and detailed health inspections, optimal stocking densities, careful handling and avoidance of unnecessary disturbance of fish, disinfection of transportation equipment and the use of foot baths at production facilities. In addition, fallowing of sites should be considered where possible to minimise outbreaks of disease and/or parasites and to allow the recovery of benthic areas. Any diseased stock should be treated or removed, and under no circumstances be allowed to enter the marine environment.

Dead or dying fish should be removed as quickly as possible and safely disposed of.

Fish farms can minimise nutrient discharges and losses by developing and utilising appropriate feeding methods and fish feed (predominantly dry).

Special treatment plants can be an effective way to eliminate solid wastes, chemical and pharmaceutical additives, and nutrients from effluents or other discharges to the sea. Discharge pipe outlets should not be located near intake pipes of other installations. In some cases, treated effluent water from fish farms can be used for agricultural irrigation.

The use of toxic chemicals at fish farms should be banned. Net cages can be washed or dried in place of the use of toxic anti-fouling compounds.

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CHAPTER IX - FOREST MANAGEMENT

9.1. Status and Trends

Only in the northern countries of Europe is forestry an important economic factor in coastal regions. Along other European coasts, most forests are planted primarily for the purposes of sand dune stabilisation, tourism and prevention of soil erosion. The economic profits of forestry within the coastal strip are generally marginal because of the influence of the sea. This has led to decreased attention to coastal forestry as a source of wood. Forests have important economic value, however, as attractors of tourism and recreational activities.

9.2. Impacts

The presence of native forests is clearly a benefit to the environment, including the coastal environment. They provide important habitats for plants and animals, including many endangered species. They also act as a critical sink for carbon, thereby reducing levels of carbon dioxide in the atmosphere. The impacts of other sectors on the health and biodiversity of forest ecosystems are far greater than the impacts of forestry on other sectors. Intensive forestry, however, can have negative impacts on water systems, and ultimately the coastal and marine environment. It can cause nutrients, chemical fertilisers and pesticides, and other substances to reach coastal waterways, and the planting of monoculture systems[73] can reduce the biodiversity of forest ecosystems.

Afforestation of coastal dunes with non-native species, primarily for the purposes of coastal defence, has disturbed the natural dynamics of coastal systems. Dune fields which have been cultivated or overgrazed often suffer from wind erosion and begin to wander, sometimes towards inhabited areas or important agricultural land. Dunes were therefore often stabilised through afforestation with alien tree species (primarily pines).[74] This practice still continues today in many areas. The most significant environmental impacts of afforestation in the coastal zone include the loss of natural vegetation and the lowering of groundwater tables. Eucalyptus plantations are even more damaging due to intensive bark production, which is harmful to the soil and prevents the development of natural undergrowth. Planted forests, especially on coastal plains, also change visual aspects of the landscape.

In the Mediterranean, forest fires represent a major threat to coastal forests, with consequent impacts on the coastal environment. According to UNEP, "...forests and woodlands lost to fire in nine countries of the northern and eastern Mediterranean in 1988 exceeded 570,000 ha, accounting for an annual loss of US $500 million. Due to low productivity and insufficiently exploited economic possibilities of coastal forests, the local population is rarely interested in their protection. Forest fires can have other consequences, such as ecosystem damage, threat to biodiversity, and degradation of vegetation cover, and may contribute to an acceleration of erosion process leading to the eventual loss of the soil layer."[75]

9.3. Opportunities

Rehabilitation of forests on dunes including scrub and tree removal is an option. However in many areas the forests are now mature and have developed their own nature conservation interest. These should be reviewed with a view to management which seeks to reinstate semi-natural woodland, a habitat which on sand dunes at least is very rare. Coastal woodlands are also favoured areas for recreational pursuits particularly in the Mediterranean where they provide opportunities to picnic in the outdoors in the relative shade of the woodland. When combined with development of open

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[73] Coalition Clean Baltic, 1992

[74] van der Meulen and Salman, 1996.

[75] UNEP, 1995.

woodland composed of native trees, these attributes could provide a means of increasing the size of habitats in some coastal areas where they have been destroyed. Efforts to conserve or regenerate natural or semi-natural coastal forests, and to create greater variation in forests or plantations where there is little biological diversity, could provide a valuable contribution to the development of the Pan-European Coastal and Marine Ecological Network (PECMEN).

9.4. Guidelines for Forestry in Coastal Areas

Site adapted forest management plans which are incorporated into integrated coastal management plans will improve their environmental sensitivity.

Coastal forests can be designed and managed in a way which ensures the conservation of wildlife and the environment, including through the conservation of water, soil and natural processes. Protection should also be afforded to landscape, natural and cultural historical and recreational values of coastal forests.

Native forests are especially valuable and should be protected as much as possible from conversion to other uses.

Planting native species is to be encouraged along with natural regeneration where possible.

Maintaining natural cycles in the forest ecosystem will help sustain the local influence of forest ecosystems on atmospheric humidity, temperature and wind velocity. In commercially managed woodlands, a permanent vegetative cover should be maintained through selection cutting, group-selection, shelter-wood or under-planting during regeneration.

The adaptability of forests to a wide range of natural and human-induced threats can be increased by planting site-adapted tree species and through the development of varied forest structures and cultivation systems.

The application of pesticides and nitrogen fertilisers in forests should be avoided. Where this is not possible, measures should be taken to prevent the leaching of nitrogen and other pollutants.

Forest drainage should not take place within the coastal strip, except on sand dunes. Clear felling should be avoided altogether. Where felling takes place, environmentally favourable machinery and technologies should be used to minimise damage to forest ecosystems. Wetland areas should be increased as much as possible. Wetlands should not be drained for the purposes of establishing new forest plantations. For all drainage operations, sedimentation ponds should be constructed for humus and other substances.

Significant quantities of dying and dead wood should be left standing or lying on the forest floor, to support birds, mammals and fungi, including endangered species.

Forest Fires

Fire can be both damaging and regenerating. Fire prevention and forest protection, including the use of firebreaks, can form part of a plan to determine appropriate management.

Dune Afforestations

Dune afforestations should have no wood production function, and in principle the planting of trees on a large scale should not be carried out in dune areas. Where previous afforestations have been removed, the soil should be left undisturbed to allow species from old wood habitats to colonise these stands.

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CHAPTER X - INDUSTRY

10.1. Status and Trends

Significant parts of European coastlines are industrialised, particularly near river mouths. The most intensely developed areas include large estuaries such as the Po, Humber, Thames, Rhine, Scheldt, and Eems.

In many regions of Europe, heavy industry is generally in decline as a result of increased competition,[76, 77, 78] although in some cases, heavy manufacturing industries have been, or are expected to be replaced by high-technology industries.[79, 80]

There are some indications that the decline in heavy industry may be stabilising[81] although the likelihood that production will return to previous levels is remote, at least in the European Union.[82] The extent to which this trend is relevant to coastal areas is not clear, as this will depend at least in part on the further development of the combined transport network, particularly as it affects the viability of ports and their connection to industrial centres in the hinterland.

Obligations in Europe and internationally require increasing safeguards for the coastal and marine environment. For example, States bordering the North Sea the Mediterranean and the Baltic have committed themselves to phasing out discharges of substances which are toxic, persistent and liable to bioaccumulate, including endocrine disrupters, (in the case of the North Sea, and Baltic within one generation, i.e. 25 years). The same phase-out commitment, by the year 2020, is likely to be adopted in July 1998 for the entire Northeast Atlantic, from Gibraltar to the Arctic, at the OSPAR ministerial conference. It is clear that coastal industries will need to further decrease their environmental impacts. Those industries which have made progress in this respect often report that improvements in plant design and product substitution have generated positive economic impacts as well.

10.2. Impacts

Industrial production is highly dependent upon the availability of water, and in many industrial countries is the greatest water consumer. According to UNIDO, industry in Eastern Europe accounts for as much as 80% of total water use.[83] Inappropriate siting of industrial activities in sensitive areas has led to the loss of coastal wetlands and habitat in every European coastal region.

Industrial discharges of hazardous substances into coastal waters can have both lethal and sub-lethal effects on animals and humans. Even when located inland, industry can have significant impacts on coastal regions. When rivers or coastal aquifers are used to receive industrial wastes, for example, pollution impacts continue to occur far downstream.

Land used for production, fuel supply, storage and waste disposal as well as the surrounding area (land, fresh water, and sea) degraded by pollution, is generally rendered unsuitable for other uses. Industrial construction causes significant harm to the landscape of the site and surrounding area, and spoils the visual perception of the landscape.

Sand and gravel excavation for the construction industry, for nourishment, and dredging for

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76 European Commission, Europe 2000+, 1994.
77 Iribane and Jacques.
78 Grenon and Batisse, 1989.
79 European Commission, Europe 2000+, 1994.
80 Grenon and Batisse, 1989.
81 European Commission, Europe 2000+, 1994.
82 Molle and Verkennis, 1993.
83 UNIDO, 1994.

navigation channels and harbours, may damage coastal ecosystems in a variety of ways. Excavation and dredging is particularly damaging in shallow, near-shore areas, causing alterations in sediment transport mechanisms and erosion. Dumping of dredge spoils at sea can smother benthic flora and fauna, alter local hydrological regimes, and release toxic contaminants to the marine environment. There is concern also that the dumping of dredge spoils may be used to circumvent the prohibition of the dumping of industrial wastes at sea. In this regard the parties to the London International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) should be encouraged to adopt guidelines which would prevent such abuse.

Under certain circumstances, however, the deposition of dredged material (e.g. for beach nourishment or habitat re-creation) may be beneficial for coastal ecosystems. In these cases, it is essential that materials have been stripped of any potential pollutants.

10.3. Opportunities

Sustainable industrial development is increasingly being approached through the application of clean production techniques at the design stage of products and production processes. Although considerable progress has been made with "cradle to grave" approaches to the utilisation of resources and reduction of waste streams, attention is increasingly being paid to "cradle to cradle" approaches. In other words, products should be designed so that they can be reused again and again, with component parts replaced or upgraded as necessary. This form of waste minimisation is showing enormous scope for cost savings to business and for the prevention of pollution.

Clean Production

"Cleaner production is an integrated preventative strategy applied to processes, products and services to increase efficiency and reduce the risks to humans and the environment. For processes, cleaner production includes the efficient use of raw materials, water and energy, the elimination of toxic or dangerous materials, water and the reduction of emissions and wastes at the source. For products, the strategy focuses on reducing impacts along the entire life cycle of the products and services, from design and use to the ultimate disposal. Experience with cleaner production shows that many improvements can be made in the industrial process at no cost or very little cost, increasing the profit of the process." - *UNIDO/UNEP National Cleaner Production Centre Programme*

10.4. Guidelines for Industry in Coastal Areas

Industries operating within the coastal zone have a special obligation to ensure their activities have minimal impact on the marine and coastal environment. The potential for adopting cleaner production approaches to production processes, with an emphasis on prevention of pollution and other impacts at the source should be fully investigated.

Siting of Buildings and Infrastructure

Guidelines can be found in the Chapter on "Urbanisation".

Energy Conservation and Air Pollution

Industries should strive for energy efficiency and conservation throughout their entire lifecycle, from the design and construction of plants through the packaging and delivery of end products, and ultimately through the re-use and/or recycling of wastes. Products which are no longer in use should be taken back by the manufacturer, and component parts should be re-used or recycled to the maximum extent possible.

New industrial plants can be designed to run on the cleanest possible fuels. The strictest emission standards for NO_2, SO_2, CO_2 and methane should be applied to all plants throughout Europe.

Direct Discharges

European Governments have recognised the need to eliminate marine pollution from land-based sources, and have committed themselves to taking far reaching measures in the North Sea, the Baltic and the Mediterranean. Specifically, the discharge and emission of hazardous substances (currently defined as those that are toxic, persistent and liable to bioaccumulate, including endocrine disrupters) is to be phased out. Industry and coastal managers should take account of these commitments by adopting the "cradle to cradle" approach to product design, utilising clean technology and techniques, substituting where necessary the use of hazardous substances with non-hazardous substances, and designing closed-loop production processes to avoid discharges and emissions to the environment. As a matter of highest priority, the production and use of organohalogen substances (including chlorine and chlorinated substances) should cease.

Industrial Symbiosis

"The industrial symbiosis in the Kalundborg district is built up as a network co-operation between four industrial enterprises…In this symbiosis, the four enterprises: Asnaes Power Station, the plasterboard manufacturer GUPROC, the pharmaceutical and biotechnology company Novo Nordisk and the STATOIL refinery trade by-products because the waste of each is a valuable raw material to one or more of the others. The result is a reduction of both resource consumption and environmental impacts.

"The four business partners also gain financially from the co-operation because all contracts within the symbiosis are based on sound commercial principles." – Kalundborg Center for Industrial Symbiosis

No new permits should be granted for the discharge of hazardous substances, and existing permits should be phased out to comply with the commitment described above. No new hazardous substances should be introduced to the environment.

In the interim, facilities for collecting and disposing of hazardous wastes as safely as possible (outside of the coastal zone) should be established.

Sand and Gravel Excavation and Dredging

Sand or gravel extraction should only take place in coastal water at a depth where coastal processes are not compromised (i.e. below the so-called active profile of the coastal zone), and never in ecologically sensitive areas. However while this depth is generally appropriate in relation to the influence of normal tides and storms, evidence suggests that sediment can be moved at lower levels by long period waves, residual tidal movement and gradiental currents. The impact of this on adjacent coastal areas which rely on sea borne sediment for their continued development is an important and often overlooked issue.

Extraction activities should be timed to avoid conflict with seasonal events such as fish or bird migration.

Turbidity plumes should be minimised by utilisation of the best available technology and practices.

Extraction should be as "dry" as possible, and working and sailing speed should be regulated so as to reduce environmental impacts. When aggregates with a high content of fines are extracted, equipment with the capacity of retaining very fine particles should be used, if appropriate in conjunction with silt curtains.

The excavation site should be limited in order to facilitate later recolonisation. Complete removal of the bottom sediment should be avoided.

Consideration should be given to make better use of harbour and other dredging. Care should be taken with dredge spoils contaminated with hazardous substances which should not be dumped at sea or used for nourishment.

Industrial tie-ins

The recycling of grey water or treated sewage for other purposes (irrigation, fertilisation, etc.) implies that industrial inputs of contaminated wastewater to municipal sewage treatment systems should be discontinued as soon as possible.

Where closed loop production systems have not yet been established, pollution and environmental degradation will continue unless all industrial effluents are treated for nitrogen and phosphorus prior to discharge.

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CHAPTER XI - TOURISM AND RECREATION

11.1. Status and Trends

The tourism industry is the world's fastest growing industry, and has been an important part of the economic development of many of the poorer areas of Europe, especially in the South. The growth rate for tourism in Europe is 3.7% per year, projected to continue through 2000.[84] It has, however, been losing market share to Eastern Asia and the Pacific[85] and an additional 10% loss in market share is forecast for 2000, which could lead to a fall in the average growth rate.[86] The Mediterranean is the leading tourist destination world-wide and 90% of the tourists travelling to the Mediterranean are heading for French, Spanish and Italian coasts.[87] Even here the industry is suffering from increased competition and a decline in quality due to the impacts of mass tourism.[88]

Trends indicate that tourists are becoming increasingly interested in higher quality tourism experiences with particular interest in cultural, historic, and natural sites.[89, 90, 91]

11.2. Impacts

The sheer speed and scale of tourism development has had a major impact on the environment. In addition although many local people have benefited from the increase in prosperity which tourism brings, the social and cultural effects are significant. In addition over-development and environmental degradation have led to many areas losing their appeal. As tourist numbers drop off the ability to maintain the infrastructure becomes more difficult. Where erosion has become a problem, as has happened in many areas where development has occurred in vulnerable zones, the cost of maintenance can be particularly high and often has to be borne by the local tax-payer. Developments which take environmental consideration into account are likely to be more sustainable in the long term and less costly to maintain.

The impacts of tourism in coastal areas arise from the construction of infrastructure (e.g. hotels, marinas, transport, waste treatment facilities, groynes) and from recreation (golf courses, water sports, thematic parks, beach access and parking, etc.). The problems in this sector differ from other economic sectors in that the degradation of the environment results in the degradation of the industry itself with knock-on effects in other industries. As one expert has noted, "If the coastal areas damage their appeal for example, by water pollution, their main source of income dies, and this also destroys the opportunities for attracting other activities besides tourism. The coastal areas lose their strong point and with it their value to important networks. Other networks for tourism, for example, overseas, would gain further in importance. The negative economic and social consequences could not be compensated even by large transfer payments."[92]

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84 European Commission, D.G. XXIII, “Consultation on the basis of the Green Paper: A step further towards recognition of Community action to assist tourism,” 1995.

85 European Commission, “The role of the Union in the field of tourism: Commission Green Paper,” 1995.

86 European Commission, D.G. XXIII, “Consultation on the basis of the Green Paper: A step further towards recognition of Community action to assist tourism,” 1995.

87 German Federal Agency for Nature Conservation, 1997.

88 Fraga Iribarne and Jacques.

89 Ibid.

90 COAST, 1995.

91 Roos and Tromp, 1994.

92 Maurer, 1995.

Infrastructure

> "Many of the coasts of the European region are of outstanding significance in regard to biodiversity. At the same time, touristic pressure on Europe's coasts is disproportionately high, so that there is a conflict potential which would be ranked around mid-scale by global standards. With a share of 59.3% of international tourism, the European region accounts for about two thirds of global tourism. One consequence of this is that the biological diversity of European states is steadily declining. A drop in species diversity and a loss of intact, i.e., "functioning" habitats, from an ecological standpoint, may be observed everywhere in Europe." – German Federal Agency for Nature Conservation

Massive tourist facilities, particularly hotels and apartment complexes, were constructed on European dunes, beaches and cliffs from the 1960s to the 1980s. As a result of this sea-front development, large-scale beach and dune erosion occurred. This is not only an ecological problem but an economic one: facilities sited on beaches are susceptible to storm damage and the effects of accelerated sea level rise. Governments have been forced to compensate for coastal erosion and flooding risks through large-scale beach nourishment projects and the construction of dykes and have even constructed hard coastal defence structures to create beaches where none previously existed.

The construction of marinas consumes a great deal of land, and often causes significant harm to coastal systems due to their preferred siting in areas protected from the open sea, e.g. on shallow coasts or lagoons which may require dredging.[93] They can also have a devastating impact on coastal processes on the down drift side of the construction leading in many cases to severe erosion and loss of beaches, and threats to hotels and other facilities.

Tourism also has impacts on environmental quality – the treatment and disposal of solid and/or liquid wastes, particularly during peak tourist seasons, may be inadequate or at worst non-existent. A large quantity of water is consumed not only for drinking but for showers, laundry, swimming pools and the maintenance of golf courses, which can be a major problem in regions where freshwater resources are limited. Air pollution from aeroplanes, cars and buses transporting tourists to and from their destinations is a problem which extends far beyond the local tourism site. Given that coastal regions are primary tourist destinations, sensitive marine and coastal environments and coastal communities suffer dramatically.

Recreation

The impact of recreational activities may be associated with intensive tourist development or non-tourist recreational pressures in urban and/or rural areas. Noise from motor boats and jet skis, cars and buses, nightlife and other activities is one of the more significant problems arising from recreation.

Golf courses have a long association with coastal areas. In many areas, long-established links courses are an integral part of the local economy and many of them have helped to conserve valuable fragments of dune habitat from encroaching urbanisation and agriculture. In southern European countries golf course development is a more recent occurrence primarily 1960s to early 1990s. The main areas involved are Portugal (Algarve), Spain and the French Riviera. These are resort destinations, and the golf courses are normally associated with substantial real estate development, hotels and related facilities. The impacts of such developments have included modification of dune soils, loss of natural vegetation, disturbance of sensitive wildlife and extra demands on limited water resources. In some cases, however, the golf course element of these developments have had a beneficial effect on wildlife, serving as sanctuaries from hunting and grazing pressures for example.

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[93] German Federal Agency for Nature Conservation, 1997.

Such potential benefits are negated when the density of built development encroaches significantly onto the greenspace of the golf course areas, or where the original design and construction did not allow for adequate retention of natural habitat.[94]

11.3. Opportunities

The erosion of beaches and consequent loss of recreational areas due to the construction of tourist facilities on the coast has led a number of countries to adopt coastal laws or strengthen existing laws which include non-development zones of between 100 and 300 meters outside urbanised areas.[95] This has slowed the process of development in the coastal strip. If these and other measures (e.g. those listed below) succeed in the development of a sustainable tourist industry, there are numerous opportunities for nature conservation. Given the increasing interest in high quality natural and cultural experiences, nature conservation can only help to reverse the decline in market share of European coastal destinations.

Tourism also provides important opportunities for strengthening local industries such as agriculture and fisheries, traditional crafts, and so forth. Where industries are in decline, tourism ventures can help supplement declining income.

A number of programmes are being carried out in Europe which are designed to encourage sustainable tourism and recreation. The European "Blue Flag Campaign", for example, rewards communities which meet strict environmental and safety criteria in managing beaches and marinas. Another example is the "Committed to Green" programme of the European Golf Association Ecology Unit, which is developing environmental principles for managing golf courses. These kinds of programmes should be encouraged as well as international initiatives for sustainable tourism which are now being developed on the basis of decision IV/15 § 14, on Tourism and biological diversity, adopted by the Fourth meeting of the Conference of Parties to the Convention Biological Diversity.

11.4. Guidelines for Tourism Development in Coastal Areas

Tourist development should be carried out in such a way as to ensure that the environmental, cultural, and social diversity of the area is protected and enhanced. First and foremost, it needs to meet the needs of the local host community without compromising the natural or cultural values which are attractive to tourists in the first place, or the economic viability of existing sustainable commercial activities. Local communities can be supported, for example, by the use and promotion of locally produced food, wines, souvenirs.

The attitudes of local communities and civil society in general should be incorporated into development plans at the earliest stages, well before planners become wedded to any particular decision. In addition, it should be determined whether the carrying capacity of the local environment can sustain a new tourism development, adhering to the Precautionary Principle, before further planning is allowed to proceed. Inland attractions should be promoted to relieve pressures on coastal beaches.

Zoning of coastal lands for specific recreational uses, seasons, or for nature and wildlife conservation should be encouraged, and allow for the possibility of establishing disturbance-free zones in the habitats of threatened or endangered species.

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[94] Stubbs, David, 1997.

[95] Nordberg, 1995.

Siting of Buildings and Infrastructure

Development in coastal regions which does not require a coastal location can be concentrated outside of the coastal strip. Guidelines related to the siting of buildings and infrastructure can be found in the Chapter on "Urbanisation".

Design and Planning

The possibility of refurbishing existing buildings and facilities should be fully explored before any new construction is considered. In some areas care should be taken where older buildings may be the refuge of breeding birds or bats.

Where new facilities are considered necessary, they should be compatible with the architecture and environment of the surrounding area. Large buildings which impair quality of scenic views should be avoided. Innovative designs, technologies and construction techniques should be encouraged and supported.

During the planning stage, past use of the site should be investigated to determine whether digging will uncover contaminated land, as this will require special treatment.

Facilities should be designed to avoid changes in near-shore sediment transport patterns, the geomorphology of the coastline, and/or water quality. Before any coastal installation is built in or near to a coastal location, a thorough study of the geomorphological regime is essential. This will reveal the way in which sedimentary patterns affect existing habitat development and provide a basis for assessing the likely changes to sedimentary transport systems consequent upon erecting any structures.

The construction of traditional shoreline promenades should be avoided, as these will disturb coastal dynamics in much the same way that roads, rows of hotels, and other such barriers do. Alternative designs which can be integrated into the natural environment should be considered.

Interference with natural run-off patterns should also be avoided. Activities which increase the volume or toxicity of run-off and which should be avoided include: extensive paving (roads, parking lots), destruction of vegetation and the use of fertilizer and/or pesticides (e.g. for maintaining golf courses).

Designs should ensure that natural vegetation is left intact as much as possible. Where this is not possible, indigenous species should be used for landscaping. Landscaping should be planned so as to avoid the need for excessive watering (and appropriately treated effluent should be used for watering vegetation).

Buildings should be positioned and designed in such a way as to save energy, by reducing the need for artificial lighting, heating, cooling or ventilation and making use of renewable energy technologies (e.g. solar).

Construction

Construction materials should be environmentally friendly and conducive to re-use or recycling. The use of toxic building materials such as certain plastics (particularly PVC), and chemicals harmful to climate and the atmosphere (e.g. CFCs, HFCs, HCFCs) should be avoided. Materials which require minimal energy inputs are also favoured (e.g. unfired bricks, wood instead of aluminium). The use of glue (e.g. for connecting prefabricated housing units) should be avoided where possible, because of both its fumes and its permanence - glue prevents materials from being re-used at a later time.

Finishing wood with natural oils and paints (based on linseed oil and pigmented with iron oxide, for example) is preferable to the use of permanent paints (normal latex or oil-based). The use of traditional lime mortar will permit the re-use of bricks when a building is eventually torn down: modern mortars are stronger than bricks so that when brick buildings are demolished, the bricks break before the mortar.

During construction, all efforts should be made to avoid trampling or otherwise damaging vegetation, dunes and the beach. Materials should be stored in designated places, preferably on elevated platforms. Fuel and chemicals should be stored on an impervious structure. Leaking or empty oil drums should be removed immediately, and soils which may have absorbed spills should be removed.

Dust should be damped down to avoid covering sensitive habitats. Polluted wastewater should be collected and removed, and under no circumstances should be allowed to enter the natural drainage system, including ponds or marshes. The use of concrete should be carefully controlled to minimise the chance of leakage into watercourses.

Once facilities are built, efforts should be made to monitor impacts on the coastal environment. If unforeseen impacts arise, activities should be modified to minimise or mitigate environmental impacts.

Energy Conservation

Wasteful energy practices should be discontinued. For example the installation of energy saving devices such as compact fluorescent lighting should be promoted while the installation of energy wasters such as electric hand and hair dryers in toilets and bathrooms should be avoided. Tourists should be reminded to conserve energy, for instance by switching off lights when they leave the room.

Wastewater Treatment

Adequate wastewater treatment is an essential component of tourism development. Guidelines can be found in the Chapter on "Water Management".

Solid Waste Treatment

Provisions for the handling and treatment of solid waste generated by tourist facilities should be arranged prior to their development in close co-operation with municipal authorities where relevant. Guidelines on solid waste treatment are included in the Chapter on "Urbanisation".

Litter

Coastal and marine waste management strategies should form an integral part of coastal zone and/or tourism management plans. A "deposit on return" system for drinks containers and plastic carrier bags should be considered as part of such a plan.

Provisions should be made to keep beaches clean and free from litter, by providing adequate waste receptacles, sanitary facilities, carrying out beach clean-ups, etc. "Sharps" boxes should be provided for the disposal of glass, needles and similar items.

Shops, restaurants, hotels and other businesses located near the seafront should adopt proper waste management practices, including reducing their wastes and preventing it from escaping into the marine environment. They should also make efforts to reduce litter generated by their customers, including by providing sufficient waste receptacles. Efforts to recycle should be encouraged by making make waste separation receptacles conveniently available to guests.

Businesses should be encouraged to avoid the use of disposable products (plates, utensils, table cloths, cups, toiletries). When disposable products are used, they should be made of recyclable materials. Recycled and non-chlorine bleached paper should be used whenever paper products are provided.

Checklist for Tourists

Tourists should be provided with a behaviour code - by travel agents, tour operators, and/or hotel owners. Codes will vary depending on the type of area being visited, but the following checklist should be applied to behaviour codes in coastal zones:

- Have respect for land, water, cultural or historic sites and host communities;
- Observe and respect signs and information boards;
- Remain on pathways and/or marked trails and avoid disturbing or harassing local flora and fauna or their habitats, particularly near nesting areas or where erosion (e.g. dunes) may be a problem;
- Respect off-limits areas, e.g. during the breeding season;
- No graffiti or engraving on rocks, trees, or buildings;
- Visit sensitive natural sites in groups of ten or fewer to minimise disturbance;
- Keep distance from wildlife, no feeding or touching;
- Keep pets under control, and remove droppings from beaches and paths;
- Avoid making unnecessary noise;
- Do not take or buy corals, shells or other natural souvenirs;
- Do not make fires on the beach, or in any other area not specifically designated for that use;
- Hook and line fishing should only be done where permitted and not in marine reserves;
- Avoid buying products which are excessively packaged or are sold in non-returnable containers;
- Buy food and other products which are produced locally, and avoid exotic foods or products that may be locally endangered;
- Use garbage or recycling receptacles provided, or take garbage away for proper disposal later;
- Walk or cycle, or use environmentally-friendly public transport;
- Avoid excessive water consumption, e.g. by taking brief showers, turning off the tap while brushing teeth, and reporting any water leakages to the management;
- Use bio-degradable soaps and shampoos, and ensure that sunscreens, lotions and insect repellents are environmentally friendly;
- In selecting accommodations, seek opportunities to stay in small, locally-owned hotels or guest-houses.

Water Conservation

The size of any tourism project should be commensurate with the potential for the local hydrologic cycle to sustain it without depleting groundwater reserves.

It should be anticipated that tourists (particularly those from developed countries) are likely to use more water than local populations in areas where water resources are scarce. Water saving toilets, shower heads and faucets (e.g. those that release water only when the user's hands are present) can be installed, towels and linens can be changed only when necessary. Tourists should be informed about the need to conserve water (see checklist for tourists).

Transport and Tourism:

Tourist facilities should be designed in such a way as to make walking and cycling attractive to tourists. However, especially in the coastal strip, tourist movement should be organised and enforced in such a way that deterioration caused by trampling is avoided. Facilities to rent and/or store bicycles should be conveniently located. Free or low-cost shuttle buses which run on clean fuels should provide a viable alternative to the use of private automobiles. Hotels and resorts should provide walking/cycling path maps for tourists upon arrival. Additional guidelines related to Transport and Tourism can be found in the Chapter on "Transport".

Air Transport

Guidelines on air transport are included in the Chapter on"Transport"

Education

Informing tourists, tour operators, and staff about ways to reduce environmental impacts should be an integral component of tourism development plans. Coastal visitor centres should be made interesting and attractive to encourage tourists to make use of them. Educational materials and exhibits emphasising respect for the local environment and culture should be provided by all major hotel establishments.

Prior to leaving their home countries, tourists should be encouraged to learn about the customs and traditions of the destination areas. In addition, tourists should be encouraged to choose tour operators that have a written policy favouring environmental protection.

Recreational Activities

Access to previously undeveloped coastal areas for recreational purposes should only be permitted if the nature and/or character of the area will not be harmed.

Facilities for sports which attract large numbers of spectators should not be sited on the coast.

Beach Maintenance

The indiscriminate mechanised cleaning of beaches should be ceased. Such practices destroy dunes and may impede revegetation. Dune regeneration and beach revegetation should be addressed as a matter of priority where appropriate.

Golf Courses

In general, new golf courses should not be located in sand dunes, coastal meadows, or other natural or semi-natural habitat within the coastal zone. Alternative sites should be considered, for example in set-aside or unproductive agricultural lands. Groundwater resources or water resources used for (sustainable) agricultural production should not be used to support new golf courses in coastal areas. In the design and construction of new golf courses, natural vegetation should be left intact as much as possible.

Comprehensive Environmental Management Programmes should be implemented for all golf courses, covering the following areas:

- nature conservation;
- landscape and cultural heritage;
- water resource management;
- turfgrass (including pest) management;
- waste management;
- energy efficiency and purchasing policies;
- education and the working environment;
- communications and public awareness.

A complete Environmental Management Programme should cover the entire property under the golf club management, including the golf course, club house, ancillary buildings and related facilities restaurant, pro-shop etc.

Water Conservation on Golf Courses

Golf courses should avoid depleting groundwater reserves. In choosing turfgrass varieties, careful account should be taken of local climatic conditions.

Where irrigation is necessary, the Environmental Management Programme should ensure, inter alia:

- efficient, seasonally adjusted irrigation systems which are properly maintained and utilised;
- limitation of areas to be irrigated
- storage and use of recycled grey water, rain water, snow melt, or other alternative water supplies

Use of Pesticides and Fertilisers on Golf Courses

Integrated turf management embraces the concepts of appropriate fertilisation and pest management.

Water Sports

Speed limits of no more than five knots should be established for all motorised vessels travelling through shallow coastal waters. Reduced speeds are also necessary in or near sensitive areas such as bird sanctuaries, seal reserves, and inner archipelago areas.

Checklist for Boaters

Codes of practice for recreational boaters should include the following conservation measures:

- Don't dump, spill, or allow materials to blow overboard - especially chemicals or plastic products such as pack beverage rings or fishing gear which endanger wildlife;
- Use onshore toilet facilities if possible;
- Chemical toilets should be emptied only at specifically designated facilities on shore;
- Don't discard unused fish bait on shore;
- Observe speed limits;
- Watch for and avoid a close approach to marine mammals, turtles or other wildlife; no chasing animals.

Jet skis or other loud motorised vessels or vehicles should not be permitted in or near sensitive wildlife areas, or areas where people have come specifically to enjoy the calm and quiet of nature. Corridors for water sports should be established.

Scuba divers should not be permitted to collect coral, sponges, or other rare or sensitive plants or animals.

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CHAPTER XII - TRANSPORT

12.1. Status and Trends

Within the European Union, demand in the transport sector has been growing steadily since the 1970s, usually running parallel to the growth of GDP.[96] Similar trends can be seen elsewhere in Europe. The transport of goods has increased by about 50% over the last 20 years, with road transport making up the lion's share - road transport now accounts for 70% of the total transport of goods. In contrast, the transport of goods by rail decreased by 15%. Maritime transport of goods increased by 35% between 1975 and 1985 but has since levelled off.[97] Passengers also prefer to travel by road - passenger transport has increased by 85% in the last 20 years, primarily by private car. Rail transport increased by 25% and bus by 45%, but in both cases, their relative share decreased. Air transport is growing at the fastest rate, having quadrupled in volume during this time.[98]

Without new policies, the trends of the last 20 years are likely to continue. Road traffic is expected to increase by 30% in 2000 over 1985 levels, accompanied by a 10-15% increase in rail traffic. Air traffic is also expected to increase significantly.[99,100,101] The existing road network will not be sufficient to accommodate such growth, and attention is being paid to the development of a more efficient and diverse transport network, combining different maritime and terrestrial modes of transport along coastlines.[102,103]

According to one observer, the lack of attention to maritime transport in the European Common Transport Policy until recently appears to have inhibited the expansion of the maritime transport sector. "A major handicap which acts as a brake on the development of the ports of the inner and outer peripheries, both in the field of intra-European trade and trade with major continental ports, resides in the virtual hegemony of land transport, in particular, road haulage, which has radically transformed the European landscape since the beginning of European integration."[104] As a result, many small and medium-sized ports in the peripheral maritime regions have been in decline over the last 20-30 years.[105]

12.2. Impacts

Railroads, highways and roads occupy long stretches of land and form barriers which lead to the fragmentation and/or isolation of habitats. The wider (and more heavily trafficked) the road, the greater the barrier it represents to animals. Road transport is the most land intensive: for example, the EU road network uses 1.3% of the total land area, as compared to 0.03% for rail.[106] In addition, the expanding network of roads and highways has provided access to once-remote, and consequently semi-protected, coastal areas. Greater access to remote coastal areas almost by definition results in less protection, a problem which is likely to increase given the increasing urbanisation of coastal areas. Finally, the impacts of motorways are also social, contributing to the break-up of community structures and causing significant noise pollution.

Transport infrastructure may cause changes in hydrology (both groundwater and streams) causing

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96 European Commission, “The future development of the common transport policy,” 1993.
97 Ibid.
98 Ibid.
99 Ibid.
100 European Commission, Europe 2000+, 1994.
101 Fraga Iribarne and Jacques, after EC Transport white paper.
102 UNEP, “State Of The Marine And Coastal Environment In The Mediterranean Region,” 1996 after Reynaud, at
103 “European Spatial Planning,” 1994.
104 Fraga Iribarne and Jacques.
105 Ibid.
106 European Commission, “The future development of the common transport policy,” 1993.

erosion and sedimentation. As the Blue Plan notes with regard to the Mediterranean (although this is equally true for other regions), "the road and rail transport infrastructure located in the vicinity of the coast inhibits the natural processes of shore formation and development and can cause significant coastal erosion, one of the feedback effects of which may be the destruction of the infrastructure itself, as has been the case with many railway lines in Italy."[107]

There are additional land requirements for transport support facilities (petrol stations, parking lots, garages, railway stations, airports etc.), and land surrounding all modes of transport is degraded by air, noise and water pollution.[108]

In addition to the impacts on land, air pollution generated by the transport sector (especially cars, trucks and aeroplanes) is not only a threat to health, but has significant implications for other sectors. Acid rain has impacts on forests and fish stocks, eutrophication has impacts on coastal fisheries, and climate change is expected to have major land use implications, especially along the coast, over the long term. Air pollution and heavy vibrations are also causing the decay of historical buildings and other sites of historical interest - sites which are essential to continued tourist attraction. Heavy vibrations can also disrupt the stability of cliff slopes. However it was possible to some extent to achieve considerable improvements of air quality, in particular in the cities, by introducing strict limit values for motor vehicle emissions and by enhancing fuel quality.

Maritime transport is considered to be one of the most environmentally friendly modes of transport, but with an increased emphasis on high-speed travel, fuel consumption is likely to increase dramatically per kilometre travelled.[109] In addition, routine pollution from ships - both oil and litter - can sometimes be significant, and the transfer of alien organisms via ballast waters has caused serious and widespread problems.

The environmental impact of large ports is also significant, including problems of erosion of adjacent shoreline, loss of intertidal habitat, and damage to coastal ecosystems caused by the dredging and filling of wetlands during construction. Ports are also major sources of pollution as a result of discharges of waste, bilge washing, and the use of toxic chemicals and paints.

Special mention should also be made of the transport of hazardous materials at sea. Spills of such materials (oil spills being the best well known), can cause significant environmental damage with implications for economy (e.g. tourism, fisheries, agriculture) ecology, and health.

12.3. Opportunities

Despite opportunities and efforts to shift the burden of transport away from roads and the air towards railways and the sea, it is clear that lorries, buses and private automobiles will continue to transport the vast majority of goods and people. A new generation of automobile promises to decrease their environmental burden. Fully battery-operated vehicles and cars equipped with hydrogen fuel cells are also on the market or under development. The reduction in emissions from such vehicles can certainly contribute to an improvement in urban air quality. Depending on the power source used to generate the electricity or hydrogen fuel, they may also contribute to significant reductions in the generation of greenhouse gases.

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[107] Grenon and Batisse, 1989.

[108] UNEP, “Guidelines for Integrated Management of Coastal and Marine Areas,” 1995.

[109] Rosemarin, 1996.

12.4. Guidelines for Transport Development in Coastal Zones

For transport systems to be sustainable, they should be based as much as possible on renewable fuels, and should encourage environment-friendly modes of public transport. In general, the transport network should be diversified, with a shift in emphasis from road and air to rail and maritime modes of transport for freight and travel.

Airships are clean, quick and safe

The Dutch office of Friends of the Earth is increasingly promoting the use of airships as an alternative transport mode. Modern airships are filled with helium (which does not burn), divided between a number of compartments so that in the event of a leak in one compartment the others will keep the ship aloft.

With a speed of 140 kilometres per hour, airships are competitive with high speed rail in terms of time. Airships, however, do not require the same sorts of investments in infrastructure, as they can be moored on poles in existing airfields or stations. This is better for the environment, and 1/10th the cost of laying high speed rails.

For long distances, the airship is not yet competetive with conventional air flights in terms of time or costs. Until and unless environmental costs are factored into the cost of a conventional flight (e.g. through a tax on kerosene), it will remain the cheaper alternative. Nonetheless, for charter flights, vacation destinations within Europe, and excursions and day tours, the airship is a clean and not overly expensive alternative to cars, busses and other conventional modes of transport. - Summarised and translated from Duurzame Wereld, the publication of the Dutch National Committee for Sustainable Development

Roads

All too often, roads are constructed on the basis of extending existing routes in a piecemeal approach. Routes should be planned as a whole, well in advance of constructing any particular segment, to ensure that sites of high natural value can be avoided. Future needs for road-widening should also be considered. Such planning should take account of the need to protect ecological networks or corridors from isolation.

The planning of new roads or highway networks which might affect areas of high natural value requires at least one full year of ecological study, allowing potentially valuable areas to be identified during their peak seasons. Such research may indicate areas which should be avoided altogether, or the means for mitigating potential impacts should construction proceed. Identifying concerns at the earliest possible stage of planning will help ensure that the most cost-effective solutions can be found.

Research into the relationship between the hydrology and ecology of an area should also be carried out prior to planning new routes. Important areas where road construction would damage this relationship should be avoided. Disruption of hydrology patterns as well as local ecology and migration patterns in the vicinity of the road should be minimised by the best state of the art engineering solutions.

Major roads or highways running parallel to the coast should be sited well inland. Access to the coast can be facilitated by small spur roads in areas of lowest environmental sensitivity. Raised, fenced pathways from parking areas to beaches can prevent trampling of vegetation.

Destruction, fragmentation or isolation of important habitats can be avoided by the use of bridges and tunnels in the design of the project.

Where habitat re-creation is used as a mitigation measure for a road construction project, the new habitat should be greater than or equal to the habitat which is destroyed. If the road dissects a habitat, new habitats should be created on both sides of the road, each of which should approximate the size

of the original habitat. If possible, new habitat should provide links to other habitats of the same type.

Pollutants from road run-off should be treated before they are able to contaminate important habitats. A variety of natural treatment systems may be employed, such as the use of lagoon or reed bed systems which act as buffer zones, absorbing pollutants.

Long distance road haulage should be avoided in areas where adequate rail or shipping facilities exist. Major new projects which encourage road transport should be replaced with investments in rail or shipping networks.

Air Pollution

Smaller or low-emission vehicles can make a substantial contribution to the reduction of air pollution in coastal areas.

Hedges, shrubs or trees can be densely planted near major roads and highways for the purposes of absorbing air pollutants. Species should be selected on the basis of their pollution filtering capacities, the local soil type, and water availability. However, care should be taken to avoid the use of species which might be likely to colonise nearby habitats.

The use of leaded fuel should cease where it has not already been phased-out, and the sulphur content of petrol should be reduced as much as possible.

Urban Transport

Alternatives to the use of the private automobile can be made attractive and convenient. Bicycle use can be encouraged through the creation of an extensive network of bicycle lanes throughout the city, and motorists should be trained to take careful account of cyclists.

Transport and Tourism

No roads should be built or reconstructed in the coastal strip (300 meters) parallel to the coastline, nor through coastal habitats; main roads should be located several miles inland, with coastal access roads running perpendicular to the coast at specific locations. Off-road vehicles should not be permitted in dune areas or beaches or in other sensitive habitats, and parking should be limited to designated parking areas. In general, a traffic management plan should be considered during the environmental impact assessment process.

The use of private automobiles in the coastal strip can also be discouraged by locating parking garages and fuel stations outside of the area, with good links to the public transport facilities described above. Illegally parked cars can be towed away to discourage haphazard parking in natural areas. Off-road vehicles should be prohibited within the no-development zone or other environmentally sensitive coastal areas.

Air Transport

A major expansion of air traffic and infrastructure in coastal regions is not advisable. A careful evaluation of the ways in which environment-friendly alternatives can be promoted should be carried out instead. The most polluting and noisy aircraft should be phased out as quickly as possible.

Shipping

Harbours

Before constructing new harbour facilities, all opportunities to refurbish existing facilities should be considered. Where new facilities are needed, previously degraded sites should be considered first.

Waste Disposal in Ports

Port reception facilities should be introduced immediately, where they do not already exist. Once introduced, facilities should be properly maintained. Charges for disposal of garbage and oil at port facilities can be included in harbour fees. Port authorities should produce waste management plans in consultation with all interested parties.

Regulations should be introduced making it mandatory for ships to deliver all garbage and wastes to a port reception facility before leaving port, taking into account the special situations of ferries and other boats which make frequent departures.

Pressure can be exerted through Port State Control.[110] The Dutch Promotion in Ports of Marpol (PPM) system provides an excellent example which could be implemented in ports throughout Europe.[111]

Waste disposal at Sea

All wastes from ships should be subject to the introduction of a zero discharge regime. Until such a system is in place, surveys of the amount of waste generated on various types of vessels should be conducted and measures developed for the prevention and reduction of waste generation, and for recycling and closed loop processes in the conduct of shipping operations.

Waste management should be an integral part of maritime training programmes, including the certification process. Ships should contain sufficient onboard space and facilities to store waste until it can be disposed of properly onshore. All ships should maintain a 'waste log'.

There should be increased surveillance to detect the illegal discharge of waste from ships and leisure craft.

Ships: Oil use and discharge

Routine discharges of oil are responsible for the vast majority of marine oil pollution. London (MARPOL 73/78), Paris (OSPAR), Helsinki (HELCOM) and Barcelona Conventions should be fully implemented and enforced, and a particular attention should be given to the relevant annexes of MARPOL on pollution from shipping.

The development of a chemical marking system for ballast and oil wastes should be vigorously pursued.

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[110] 18 European countries have signed on to a the Memorandum of Understanding (MOU) on Port State Control. The MOU is meant to coordinate and harmonize efforts particularly in relation to ensuring ships' compliance with international standards such as on the prevention of marine pollution.

[111] The PPM system is a four-step system: 1) ships which report to waste reception facilities are not inspected; 2) those which do not are inspected and information about wastes is communicated to their next port of call; 3) ships are inspected at their next port of call and 4) if waste is missing, lengthy, detailed inspections are conducted.

When necessary, a system of routing for navigation should be established, according with rules of the International Maritime Organisation (IMO).

Air Pollution

All new vessels should be fitted with state of the art combustion and No_x removal technology.

The use of low-sulphur fuels is recommended.

Anti-Fouling Paints

Only paints containing alternatives to tributyl tin compounds (TBT) should be used; the use of TBT-based paints should be prohibited.

Oil spills

Oil spills can and will happen anywhere, and coastal state authorities should be ready to respond. Detailed contingency plans should be developed in advance, and devised and carried out in co-operation with all relevant agencies and neighbouring authorities.

New permits for offshore oil activities (including for terminals and pipelines) should not be granted until oil spill contingency plans have been approved, and sufficient capacity exists to combat any oil spills which may occur.

The tanker industry should replace single hulled with double hulled tankers or other ships which provide equivalent protection. Incentives for making these replacements could include the imposition of higher insurance rates and harbour dues for single hulled vessels. In addition, ships using segregated ballast tanks should be offered lower harbour rates.

Mandatory insurance systems, in accordance with the relevant International Conventions – International Convention on Civil Liability for Oil Pollution Damage (Brussels, 1969), and its Protocol (London, 1992) and International Convention on Liability and Compensation for Damage in connection with the Carriage of Hazardous and Noxious Substances by Sea (London, 1996) – should be enforced to ensure that adequate compensation for damages is available.

Adequate, prompt and effective compensation should be available to those, who suffer damage caused by incidents in connection with the carriage by sea of oil or other hazardous and noxious substances. To this end:

- States, that have not done so, should become parties to the International Convention on Civil Liability for Oil Pollution Damage (Brussels, 1969); International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Brussels, 1971) ; Protocol to amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (London, 1992), and Protocol to amend the International Convention on civil Liability for Oil Pollution Damage (London 1992);

- States should undertake all necessary steps for the promotion of the entry into force of the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (London, 1996).

Ships can be routed so as to avoid unnecessary risks, including special protection for coastlines where fragile ecosystems or economies depend upon a pristine environment.

There should be greater duplication of ships equipment, particularly including twin engines, preferably twin screws with twin rudders and separate steering systems on al new tankers and other vessels carrying dangerous or polluting cargoes. In addition, transponders should be installed on all ships.

Harbour tugs are not an adequate alternative for offshore salvage capability. Salvage tugs should be positioned at strategic points on the European coastal water to provide emergency towing capacity. States should always assume control and direction of a salvage operation when there is a threat to the environment.

In the aftermath of an oil spill, an environmental evaluation is necessary to ensure that lessons are learned with regard to preventing future accidents and clean-up measures which cause unnecessary additional damage to stressed ecosystems.

Radioactive Waste Transport

Radioactive waste, including spent nuclear fuel, plutonium and high-level radioactive wastes, should not be transported at sea in accordance with international agreements as well as the International Maritime Dangerous Goods Code (IMDP Code) and the Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium and High-Level Radioactivite Wastes in Flasks on Boards Ships (INF Code).

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CHAPTER XIII - URBANISATION

13.1. Status and Trends

Urbanisation claims large expanses of coastline in European countries, and urban sprawl is a problem in all coastal regions.Approximately 200 million people live within 50 km of Europe's coasts - well over a third of the total population.[112] Populations continue to migrate from inland to coastal areas, and from rural to urban areas in search of economic opportunity, recreational facilities, and/or better climate.[113]

In the Mediterranean, for example, the Blue Plan reports that in 1985 almost 90% of urbanised land in the Mediterranean was located in the coastal zones of Spain, France, Greece, Italy and former Yugoslavia. By 2025, the percentage of the population of these countries living in coastal cities is projected to be more than 85% on average, and as high as 96% in Spain.[114] Along the French Mediterranean coast, the population is growing three times faster than the European Community average, and an average population growth of approximately 50% is expected between 1991 and 2001 in coastal areas from Languedoc-Rousillon to Andalucia.[115] More than 70% of the seafront from Barcelona to Naples has been developed, and few natural areas remain. This trend is continuing in other Mediterranean regions.[116]

13.2. Impacts

The process of urbanisation leads to major impacts on land, air, water and landscape quality. Such impacts include the depletion and pollution of groundwater, air and noise pollution from urban traffic, occupation of sensitive habitats, landscapes, and/or prime agricultural lands, reduction of space needed for natural coastal dynamics, and visual disturbance.

Urbanisation in coastal regions causes additional problems, as surrounding seas are often used as a repository for waste discharges of all kinds, which degrades coastal and marine habitats and has consequences for tourism, fishing, and/or agriculture. Discharges of industrial wastes to municipal sewage systems compound this problem. Not only do such discharges pose a threat to health, they are also a major source of litter. Even with primary or secondary treatment, municipal sewage systems are responsible for the discharge of nutrients which may result in toxic blooms of phytoplankton and cause major problems for fisheries.[117] Finally, the expansion of coastal cities and suburbs is often accompanied by shoreline modification projects which cause further disturbance.

Urbanisation also has important secondary effects. For example, quarrying of sand and mineral aggregates for the construction of urban dwellings represents approximately 20% of the total land lost to urbanisation.[118] The process of urbanisation often results in the loss of fishing space and/or rights for the fishing community where traditional fishing grounds and small ports give way to other developments.[119]

The environmental impact of large ports is also significant, including problems of erosion of adjacent shoreline, loss of intertidal habitat, and damage to coastal ecosystems caused by the dredging and filling of wetlands during construction. Ports are also major sources of pollution as a result of

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112 Stanners and Bourdeau, 1995.
113 ENVIREG, 1994.
114 Stanners and Bourdeau, 1995.
115 ENVIREG, 1994 after CEC 1991.
116 UNEP, “State of the Marine and Coastal Environment in the Mediterranean Region,” 1996.
117 Ibid.
118 UNIDO, 1994.
119 Food and Agriculture Organization of the United Nations (FAO) 1994.

discharges of waste, bilge washing, and the use of toxic chemicals and paints.

Inland urbanisation may also have impacts on coastal regions. For example, the depletion of groundwater may have an impact on river, and ultimately coastal, systems and can lead to salt water intrusion into underground aquifers.

Innovation in design and construction, in housing, industry, transport and other urban facilities, can help create environmentally sustainable cities.

"…The most characteristic detail of the Ecover factory is the grass roof. It insulates, preserves the biodiversity in the surrounding ecosystem and absorbs carbon dioxide. In general the grass roof retains about as much carbon dioxide as three Ecover workers produce annually when commuting. The roof also absorbs rain, i.e. the Ecover factory contributes less to the surface runoff than do factories with hardened roofs.

"Economics and recycling guide all Ecover policies. The water cycle of the factory is just short of being a closed system. Both process and sanitary water are treated in a constructed wetland containing about 20 large water plants, such as reeds, irises, and rushes. After the water has been disinfected with the help of ozone, it is used in the factory for cleaning the machines, floors, and sanitary fittings and for watering the grass roof. Another flow is that of paper. Paper is used a second time before being selectively collected. Only recycled paper is used in the offices: unbleached except for a small amount of non-chlorine bleached. Cardboard and unusable pallets are burned in the multi-burner. The computer network used for internal communication helps save paper. Furthermore, three tons of polyethylene waste are sent yearly to a recycling manufacturer. The kling film which the pallets with cardboard boxes are wrapped in is of polyethylene. The film is however modified with vinyl acetate and is therefore difficult to recycle." -Andreas Englund, writing in the Ecotechnics Bulletin

13.3. Opportunities

13.4. Guidelines for Urban Development in Coastal Areas

Public access to the coast - preferably by cycle, foot, or clean public transport - is a fundamental principle of coastal development. Coastal urban planners should recognise the desire of residents to have access to the coast for a variety of different purposes which may or may not be compatible (e.g. recreation vs. the quiet appreciation of nature). Coastal industries also compete for access to the coast and coastal resources. Potentially conflicting values and uses can be partially avoided by the utilisation of a zoning system designed to accommodate the diversity of uses. At the same time, the fragility and scarcity of natural coastal habitats should be recognised. Special protection measures may be needed for some areas, including restricted human access.

Urban growth and the planning of new cities in coastal regions should be approached from an environmental perspective. Damage to coastal systems should be minimised through the prevention of urban sprawl. The concentration of buildings and infrastructure also has benefits for public transport and energy conservation. Further urban development should be directed towards the hinterland. An extensive network of green spaces of significant natural value should be maintained in urban and adjacent areas.

It is recognised that decisions on land use distribution by necessity also have to take into account in addition to the environment other locational, social, economic and legal considerations.

Siting of Buildings and Infrastructure

Development in coastal regions should be concentrated outside of the coastal strip. Where development is dependent upon access to the sea, problems can be avoided by establishing a set-back

zone for construction 100-300 meters landward of the marine high water line, and a few kilometres seaward of the marine low water line. This distance is somewhat arbitrary and serves only as a general guide; attention should also be paid to the nature of the geomorphological context of the area and the type of effect which may occur. Buildings located on or near a sedimentary system of recent origin may be threatened by erosional forces. Placement of infrastructure or facilities in dune areas, saltmarshes, shingle structures, beaches, caves, cliffs and other natural habitats or nearby important cultural monuments will destroy these areas, with potentially major safety and environmental repercussions.

Similarly, development in (or likely to affect) wetlands or other sensitive habitats can be very damaging and should not be permitted.

Design and Planning

New urban development in coastal areas can be designed and planned to avoid or at least significantly reduce harmful impacts on the coastal and marine environment. Guidelines on design and planning can be found in "Tourism".

Construction

Guidelines on environmentally-friendly construction materials and practices are included in the section on "Tourism".

Water Conservation

Guidelines on water conservation can be found in "Water Management".

Wastewater Treatment

Guidelines on wastewater treatment are shown in "Water Management".

Solid Waste Treatment

Waste segregation is a key component of sustainable waste treatment. Materials that can be recycled (e.g. paper, glass, aluminium) should be collected separately, by placing receptacles at convenient locations. Receptacles should be emptied regularly (before they are completely full) and recovery/recycling of materials should be guaranteed in order to increase user confidence.

Composting of organic materials at the source should be encouraged where feasible, if necessary by providing inexpensive composting units. Composting reduces the quantity of waste to be disposed of, and provides valuable material for improving soil quality. Where composting at source is not practical, municipalities should consider large-scale collection of organic wastes for centralised composting.

Materials which cannot be recycled or composted must be disposed of by landfilling or incineration. Landfills should be located outside the coastal strip. Existing intertidal, seashore and riverbank landfills should be closed as soon as possible. New landfills should meet the strictest environmental standards, including the lining of all sites.

Direct Discharges of Municipal Waste to the Marine Environment

Guidelines on direct discharges of industrial waste can be found in the Chapter on "Industry". These guidelines are generally relevant to municipal discharges as well.

Litter

Urban development and recreation generates substantial quantities of litter, causing enormous problems for Local Authorities and the marine and coastal environment. Guidelines for reducing litter are found in the Chapter on "Tourism".

> "Nearly three-fourths of the world's population live within 100 km of a sea-coast or lake shore, where their physical as well as economic well-being depends on such activities as fishing, shipping, tourism, and recreation. The ongoing degradation of coastal waters constitutes a major threat to the global quality of life. Some 80 per cent of the pollutants responsible for this degradation originate from land-based human activities in the drainage basins of rivers that discharge into coastal bays, estuaries, fjords and inland seas. The growing demand for fresh water places increasing burdens on its supply, replenishment, and quality as provided by coastal aquifers and reservoirs. Maintaining this supply can lead to large-scale management projects that may alter water movement through the drainage basin and threaten the health of both tidal and non-tidal wetlands." - Stockholm Water Company

Urban Transport

Alternatives to the use of the private automobile should be made attractive and convenient. Bicycle use should be encouraged through the creation of an extensive network of bicycle lanes throughout the city, and motorists should be trained to take careful account of cyclists.

Waterfront Re-development

Abandoned buildings and derelict areas often represent sites of historic interest and can be refurbished for the purposes of private residential use, cultural activities, tourism or recreation. In coastal regions, such development could assist in the diversification of tourism, leading to decreased pressure in natural coastal areas.

Public access to waterfront re-development sites (e.g. by extension of public transport lines), combined with efforts to encourage public interest in visiting these areas (e.g. developing public gardens and promenades, museums) will help to promote their viability.

Harbours and Port Development and Pollution Control

Guidelines can be found in the shipping the Chapter on "Transport".

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CHAPTER XIV - WATER MANAGEMENT

14.1. Status and Trends

All phases of water management • from reducing water demand and ensuring a stable supply of fresh drinking water to the appropriate disposal of wastewater - are central to sustainable development. Water is an essential resource for agriculture, industry, energy production, tourism, urban life, nature, and wildlife. The transboundary nature of water resources makes it at the same time one of the most difficult resources to manage sustainably. In some areas, such as the Mediterranean, water is also a scarce and very valuable resource.

Water management is a broad term reflecting a variety of resources and issues. Water resources include both ground and surface waters, the latter encompassing both sweet (rivers and lakes) and salt (seas) water. Issues include both the quality and quantity of water, with implications for development, health, and nature conservation.

The European Union has made considerable progress with a wide range of Directives covering water quality, i.e. the Council of the European Communities Directive 76/160/EEC concerning the quality of bathing water, the Council of the European Communities Directive 79/923/EEC of 30 October 1979 on quality required of the shellfish waters, and the Council of the European Communities Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment. There is scope for approaches to be rationalised and harmonised to make them more effective and cover a wider range of waters. The harmonisation of directives within a new Water Resources Framework Directive should lead to a clearer, more unified and effective means of protecting the coastal environment.

14.2. Impacts

The volume and quality of water reaching coastal estuaries and ecosystems has important ramifications for biodiversity. Poor water quality, as indicated by the presence of viruses, bacteria and toxic chemicals is harmful to humans and wildlife. The concentration of harmful substances, and hence their potential to cause damage, is partly affected by the volume of water flowing into the system. The flow of water is also an important factor in sedimentation patterns and hence the existence and resilience of sedimentary coastal systems (e.g. dunes, saltmarshes, mudflats and deltas).

Water quality and volume is affected by a range of human activities: excessive demand, overpumping, pollution from sewage outfalls or direct discharges (including by industry); thermal pollution from power stations; run-off from agricultural lands or roadways; construction of dams and reservoirs; irrigation; and operational discharges from vessels at sea, to name just a few.

The depletion of groundwater is detrimental to coastal systems in a variety of ways. It can cause saltwater intrusion into aquifers, soil erosion and land subsidence and salinisation, to name a few.[120,121]

Beaches throughout Europe are littered with materials which have been flushed into sewage systems, many of which still provide primary treatment only. Pollution may be generated from within a given country, by neighbouring countries, or even from sewage discharges thousands of miles away. Damage to coastal ecosystems occurs not only from the discharge of sewage, but from a host of other materials which find their way into sewage systems: industrial and other hazardous wastes (e.g. hospital wastes), plastics, sanitary products, and so forth. Combined Sewer Overflows are probably the single greatest cause of sewage related pollution. Litter is a major problem for coastal areas, because of its potential impact on wildlife and human health and because of the high costs to local communities which must foot the bill for clean-up or bear the costs in loss of tourist revenues.

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[120] UNEP, 1995.

[121] Helsinki Commission, “Protection of the Baltic Sea - results and experiences”.

Mechanical cleaning of beaches is also a threat in and of itself, as habitat for small animals and plants are destroyed by the cleaning action of the machines.

14.3. Opportunities

There is increasing attention to preventing and controlling problems arising from water management and pollution at the source. Interest in the use of alternative water treatment technologies particularly for small and medium-sized sources is growing. In the Baltic region, for example, ecological engineering technologies are showing promise as cost-effective, energy-saving and environmentally sustainable alternatives to conventional systems.[122] Ecological engineering technologies utilise, create or re-create natural systems such as wetlands, soil, and reed beds which act as filters for pollutants or nutrients, and absorb storm water run-off.

14.4. Guidelines for Water Management in Coastal Zones

14.4.1. Water Quantity

Authorities responsible for water management should take account of natural rather than artificial boundaries; management therefore should be approached at a catchment level, and should consider solutions on both a large- and small-scale.

No new groundwater catchments should be established for coastal zones. Water supplies should be taken from surface waters, in quantities which can be replenished by annual rainfall. Rain-fed sources of groundwater, which are stored in natural sand dune systems, should not be exploited without a thorough examination of environmental implications.

Rain water collection systems for households can contribute to a reduction in the need for centrally supplied water.

Water Conservation

Recycling of wastewater wherever possible (e.g. for irrigation or industrial use) will help to conserve fresh water. The installation of low/no water or composting toilets throughout coastal communities will also help conserve water supplies.

In some areas, water consumption is being reduced by charging fees for the disposal of wastewater. Likewise, when water consumption is metered, consumer habits can be modified through effective pricing policies.

Water pipeline leakage is a significant source of water loss. Leakage can be prevented through the careful design of waterworks. In selecting materials, for example, local soil and climate conditions as well as the temperature of the water to be distributed should be taken into account. Proper selection of materials can also help prevent the need for over-flushing of sewers.

Irrigation

Guidelines on conserving groundwater through the limitation of agricultural irrigation are found in "Agriculture".

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[122] Coalition Clean Baltic, 1996.

Dune Afforestations

The relationship of dune afforestations and water conservation is covered in "Forest Management".

14.4.2. Water Quality

Wastewater Treatment

Wastewater and/or storm run-off should not be discharged to enclosed water bodies or other areas where water circulation is minimal.

Discharge systems can be (re)designed and managed to prevent pollution from storm overflows and to ensure that effluents are effectively screened. Tertiary treatment (or equivalent alternative technology) of all sewage discharges into European coastal waters is recommended.

Discharge outfalls should be located down-current from bathing areas, water intakes, shellfish beds, lagoons, and other areas which are likely to be harmed by exposure to contaminants.

Local authorities can maintain inventories of private sewers, manure-treatment plants, and other sources of nutrient discharge in order to ascertain the volume of untreated waste entering coastal systems. For small- or medium-sized sources, the potential for using environmental engineering technologies should be investigated and encouraged where appropriate.

Public awareness programmes regarding consumption and disposal habits are also important and should be initiated. The basic tenets of such programmes should include:

- purchase products with re-usable and/or re-fillable packaging, and little or no throw-away packaging
- avoid purchasing products containing toxic chemicals or compounds such as chlorine (including PVC products)
- avoid the use of unnecessary chemicals in general, for example toilet and air fresheners
- separate wastes for composting or recycling purposes
- purchase household products (e.g. detergents) which are low in nitrogen, phosphorus, or other harmful substances (such as chlorine bleach)
- Conserve water by installing water saving devices for showers and toilets, turning off water when not in use, collecting rainwater for watering plants, etc. and discouraging new water-consuming activities in water-scarce areas.

Industrial tie-ins

The recycling of grey water or treated sewage for other purposes (irrigation, fertilisation, etc.) implies that industrial inputs of contaminated wastewater to municipal sewage treatment systems should be discontinued as soon as possible.

Drinking Water

Alternative methods of disinfection can be considered to replace current chlorine-reliant technology where feasible. Research into the use of UV and biological treatment technologies should be supported.

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CHAPTER XV - SUSTAINABLE MANAGEMENT OF COASTAL ZONES

15.1. Environmental Impact Assessment

15.1.1. The notion of Assessing Environmental Impacts

The process of environmental impact assessment (EIA) is one of the most important steps in the coastal planning process. It is a procedure designed to identify the potential consequences for nature and the environment arising from development. This information is then used by decision-makers to assess whether or in what form proposed activities should go forward. Some assessments can be carried out on a broad scale in order to evaluate the consequences of an entire policy or programme consisting of many individual projects (known as Strategic Environmental Assessment), or on a smaller scale to evaluate potential impacts from the individual projects themselves.

EIA is now practised in many countries around the world, including all EU states following the Council of the European Union Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. Specific EIA procedures vary between countries but there are certain core elements from which common issues arise. These include:

- Screening: the procedure for determining whether a particular proposed activity (project) will require a full EIA or a less rigorous environmental assessment procedure.
- Scoping: the procedure for determining which issues are likely to be important and should be examined in an EIA.
- Production of an Environmental Impact Assessment or Statement: the document which describes the potential environmental impacts of a proposed activity. It should also contain a discussion of possible alternative courses of development, including a non-development option, along with an analysis of their potential environmental impacts. In addition, the EIA/EIS should describe how eventual impacts will be monitored and any mitigation techniques that will be applied.
- Baseline Studies: a detailed description of present environmental and socio-economic conditions against which subsequent changes can be assessed.
- Review: a review of the EIA/EIS is undertaken and its acceptability assessed.
- Decision: a decision is made regarding whether or in what form a proposed activity can proceed.

Information, consultation and public participation and the transparency of decisions are integral to the process of environmental impact assessment. When vigorously pursued, and begun at the earliest stages of a project, the benefits of public information, consultation and participation can be significant. For example, if controversies are discussed early in the process, while there is still time to alter plans and mitigate possible damages, there is a greater likelihood of eventual public commitment to or acceptance of decisions. This may help to reduce costly delays later in the process. In this respect, it is important to refer to the provisions of the Convention an Access to Information, Public Participation in Decision-Making and Acces to Justice in Environmental Matters (Aarhus, 1998).

15.1.2 The implementation of the Environmental Impact Assessment

The unique problems and pressures on the coastal zone should be recognised when deciding which developments require an Environmental Impact Assessment (EIA). Development inland might be considered benign whereas the same activities, if carried out in the coastal zone, may be likely to have severe impacts. A precautionary approach should be taken in the EIA screening process whereby if there are doubts about the potential for a proposed activity or programme to cause significant impact, an EIA should be undertaken.

Habitat Creation and Translocation

Habitat creation or re-creation is often carried out as a mitigation measure when natural areas are destroyed as a result of development. For important natural sites, however, such measures should be avoided as they contain complex and often poorly understood ecosystems which have evolved over a long time frame. New habitats are rarely as diverse as the habitats they replace. As a general principle in coastal areas where geomorphological forces of wind, tides, river flows and sediment movement are the main determinants of the nature of the coastal and nearshore marine areas, the larger the area for rehabilitation the better. This should enable these natural forces to reassert themselves and in so doing develop a more resilient ecosystem which mirrors the original and natural habitats.

Habitat Translocation

Habitat translocation or transferral may be slightly more successful than habitat creation, as it involves the re-use of components of the original ecosystem, such as soils, plants, and perhaps wildlife. While certain methods of translocation work better than others, as with habitat creation these measures are not likely to fully compensate for the loss of a high value site.

Important nature conservation areas therefore should be avoided when considering development. For less valuable sites identified for unavoidable development, however, habitat re-creation or translocation (or some combination of the two) are important mitigating measures which should be carried out by or in consultation with trained ecologists familiar with the local habitats and ecosystems. New habitats should be created prior to the destruction of an existing habitat and should be equal or greater in size. However, re-created or translocated habitats should not displace existing high quality habitat.

Habitat re-creation and translocation (and ultimately destruction) should be timed seasonally to ensure minimal disruption of breeding animals.

– Summarised from the English Nature Publication "Roads and Nature Conservation".

Alternatives to the preferred activity as described in an EIA/EIS should differ significantly. For example, alternatives should not only consider different locations of the same activity.

The cumulative effects of development in the coastal zone should be considered in the EIA process. The EIA/EIS should demonstrate how the proposed activity fits with coastal policies, programs and plans by international, national, regional and local governments or governmental bodies.

Public participation in the EIA process should be vigorously pursued at all stages of project planning:

- When specific new projects are planned, public hearings should be held to solicit views at the earliest possible stage (i.e. scoping), before vested interests take hold and certainly prior to taking any decision about whether to proceed;
- If needed, funds should be provided in order to allow affected groups to participate;
- Public opinion should be incorporated into the plans, and a mechanism for appeal should be available where this has not occurred;
- For particularly controversial decisions, a public referendum should be considered;
- Make all consultants reports, feasibility studies, safety studies, cost reports, etc. publicly and conveniently available;

Publish regular reports to keep people informed about the latest developments;

- Establish public advisory groups to allow continued involvement while the project is being carried out, or designate public representatives on formal committees.

15.2 Integrated Management of Coastal zones

15.2.1. The notion of Integrated Coastal Management

Definitions of Integrated Coastal Zone Management (ICZM)

"ICZM is a continuous process of administration the general aim of which is to put into practice sustainable development and conservation in coastal zones and to maintain their biodiversity. To this end, ICZM seeks, through more efficient management, to establish and maintain the best use and sustainable levels of development and activity (use) in the coastal zone, and, over time, to improve the physical status of the coastal environment in accordance with certain commonly held and agreed norms."- European Commission

"Integrated Coastal Zone Management (ICZM) is a governmental process and consists of the legal and institutional framework necessary to ensure that development and management plans for coastal zones are integrated with environmental (including social) goals and are made with the participation of those affected." - World Bank

"Integrated Coastal Area Management (ICAM) is defined as an adaptive process of resource management for sustainable development in coastal areas. Sustainable development requires that the quantity and quality of coastal resources are safeguarded in order that they not only satisfy the present needs but provide a sustained yield of economic and environmental services for future generations." - UNEP

"The concept of Integrated Coastal Zone Management – ICZM – aims to build a platform for different authorities, sectors, interests and communities, to focus on the interaction between various activities and demands for natural resources in coastal zones, with the common objective to achieve an ecologically sustainable development within a specific geographical area."-HELCOM

Integrated Coastal Management (ICM) is increasingly used as a tool to sustainably manage development in coastal regions. There are various terms used to describe this process (such as Integrated Coastal Zone Management (ICZM), Integrated Coastal Area Management (ICAM) and so forth), each of which is defined or approached somewhat differently.[123] For the purposes of the present Code of Conduct, the term Integrated Coastal Management (ICM) will be used generically to refer to the full range of approaches pertaining to both planning and management, as applied to both land and sea components of the coastal zone.

The ICM approach is meant to enhance development and planning models which treat single issues separately, or are implemented by individual administrative units. It is a continuous process, active before, during and after sectoral planning. The concept of integration therefore encompasses a wide variety of factors:

- Integration of planning and development by the full range of socio-economic sectors;
- Integration of approaches between different levels of government at the international, national, regional and local levels, and/or administrative units;
- Integration of economic, environmental and social issues.
- Integration of planning management across geographic components of the coastal zone, encompassing land and sea areas as well as inland areas which have a significant influence on processes, and taking account of different coastal landscapes and habitats;
- Integration of planning and approaches across various time scales from long- (50 years and more) to short-term (e.g. annual). Integration of the knowledge, understanding and views of different scientific disciplines, NGOs, and the public.

In other words the process is meant to combine physical, biological and human elements into a single management framework encompassing both land and marine coastal area, and ensure that the most

[123] Sorensen, 1997

important issues receive the highest priority of attention.[124]. At its best, it also takes account of the coastal ecosystem as a whole, regardless of differing administration or jurisdictional units. With regard to sectoral integration, it is important to note that ICM is not a substitute for sectoral planning, but avoids fragmentation by focusing on the linkages between different sectors.[125,126]

General Prerequisites for the Establishment of an Integrated Coastal Management System

The introduction of an ICM system requires certain conditions to be met. The political will to solve conflicts in the coastal zone must be present. A legislative, administrative, and regulatory basis for making and implementing decisions must be in place. Enforcement mechanisms must be available to ensure compliance.

The Benefits of Integrated Coastal Management

The benefits of the ICM approach are not always simple to define, primarily because relatively few such initiatives have progressed from planning to implementation[127,128] and for those that have, a longer time-scale will be necessary to judge their effectiveness. It is easier to describe the problems that have arisen in the absence of ICM, including:

- Unnecessarily reactive management (responding after the fact to problems which should have been anticipated and avoided);
- Cumulative impacts (where the many small decisions made by different levels of government add up to major problems for the coastal environment);
- Transfer of problems from one sector to another;
- Predominance of short-term economic interests (often at the expense of nature and the environment, and in many cases having a negative long-term economic or social impact);
- Fragmented geographical planning (lack of co-ordination between managers of land and marine areas, managers of different economic activities, or neighbouring communities bordering a single coastal ecosystem).

In short, it can be argued that a lack of integrated planning and management will almost surely result in the degradation of the coastal environment and in negative economic trends in the longer term. The converse is not necessarily the case, however: ICM will only promote sustainable coastal management if this is an express goal of the planning process. If this goal sits at the top of the agenda, ICM can be a useful way of avoiding the problems described above.

Developing Coastal Management Plans

There is a series of steps generally considered to be essential in developing ICM plans, all of which require extensive consultation and co-operation amongst government agencies, Local Authorities, sectoral planners, NGOs, and others[129,130,131]:

- Preparation of detailed and appropriate baseline information about the physical environment, coastal processes and ecosystems, cultural features, and establishing the geographical scope of the plan;

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124 HELCOM PTIF MLW, 1995
125 HELCOM PITF MLW, 1995.
126 UNEP, 1995.
127 OECD (draft), 1996.
128 Sorensen, 1997.
129 OECD, 1993.
130 UNEP, 1995.
131 World Bank, 1993.

- Establishing a mechanism to ensure public participation in the process;
- Assessment of the role of past and present management in moulding the existing coastal landscape, and analysing the feasibility and desirability of new development;
- Assessment of existing management and legal structures and establishing the necessary institutional, legal and administrative framework for integrated management;
- Undertaking an audit of good and bad elements within the natural/human matrix and identifying priority issues;
- Setting clear objectives and priorities for planning and management as well as for all sectoral activities;
- Drawing up the initial plan and proposed projects, including proposed regulatory measures (including an enforcement system) and economic incentives to ensure wise use of resources;
- Environmental and strategic impact assessment of the proposed plan and projects;
- Public comment on the proposals, based on information which is made freely available throughout the process;
- Revision of proposals;
- Implementation of the plan;
- Monitoring and evaluation of the outcome;
- In-built mechanisms for response during emergencies arising between the various phases;
- Review and revision of plans as results become available, or as new circumstances arise which require changes in the plan.

Social and Cultural Goals to Ensure Durable Sustainability

Promoting socially and economically sustainable livelihoods for the local population is necessary for the long-term maintenance of coastal areas. In developing coastal management plans, there is a need to encourage innovative, low-impact economic activity. It must also be recognised that new sources of financing are often needed to cover the costs of switching to lower impact activities or to compensate local communities.

Classification and Vulnerability of Coastal Landscapes

For the purposes of management and planning, coastal landscapes can be divided into two major groups.[132] The first consists of cliffed and rocky coasts, and the second can be described as coastal plains. The tidal range of coastal waters is another important factor in describing the nature of coastal landscapes. All coastal areas are vulnerable to development which affects natural habitat and/or interferes with natural processes. Generally coastal plains have been most heavily affected as they are often associated with rivers, estuaries and deltas where settlement by ports and harbours and other touristic and urban developments have been concentrated. Enclosure of tidal lands in these areas has greatly reduced the area of the zone and with it their natural resilience by introducing artificial barriers which may aggravate coastal erosion and other problems. Although when left to themselves dynamic habitats in most coasts are able to withstand perturbations in the environment such as storms and sea level rise. They are less resilient when constrained by human activities and uses.

The speed and volume of water exchange across the tidal zone is also important. In macro-tidal areas (>4 m tidal range) estuaries are subject to sometimes rapid flushing and as a consequence pollutants can be relatively rapidly washed out of the system. By contrast in micro-tidal areas (1-2 m) flushing rates are lower and there is a much greater risk of a build up of pollutants. This may be aggravated in areas where river flows are reduced because of damming, water abstraction and irrigation.

In general, it can be said that coastal plains are more vulnerable to environmental impacts than rocky coasts, and that coasts with micro-tidal regimes are generally more vulnerable than meso- and macro-

[132] Rigg, et al, 1997.

tidal areas, particularly in relation to pollution and changes in hydrology of surface or groundwater.[133] For the purposes of developing the Coastal Code of Conduct, it was not possible to tailor guidelines to specific coastal landscape types; such specific guidelines perhaps could be developed as part of future efforts to develop regional Codes of Conducts for European seas.

Economic Instruments and Incentives

The proper application of economic instruments and incentives can be an effective and economically efficient means to promote environmentally sustainable development in the coastal zone. They encourage rather than coerce changes in behaviour and they exert continuous pressure over time. However, there are many theoretical and practical limitations to this approach that policy makers should consider before deciding upon this approach or upon which instruments to apply. A few of the most important difficulties include: how to value nature and other non-monetary benefits derived from coastal areas; how to avoid a disproportionate impact on lower income groups; how to avoid undesirable market distortions and impacts on competitiveness; and how to incorporate the value of coastal resources to future generations.

Nevertheless, the use of economic instruments and incentives can help to internalise external costs such as damage to the environment, and induce companies or individuals to achieve environmental goals in a cost-effective manner. They are of special interest where regulatory instruments may not be applicable or deemed to be particularly harsh in certain cases. They may also spur innovative approaches to environmental problems. Finally, the potential for such instruments to raise revenues for re-investment into further measures to reduce environmental impacts and the loss of biodiversity should not be overlooked.

A range of economic tools are now in use, including:

- Eco-taxes: polluters are required to pay a tax on each unit of pollution emitted in order to raise the cost of polluting to the level of the social costs incurred as a result of these emissions.
- User charges: users of services and products (or nature areas) are charged a fee that covers the full cost of using that service or product.
- Subsidies: companies or individuals are given cash rewards for producing or using products or services which are beneficial (or less harmful) to the environment.
- Rights based instruments (e.g. emissions trading): rights to use or pollute environmental resources are provided up to a pre-determined limited. Excess rights can then be traded or sold.
- Tax incentives/Green investments: green investments are directed at raising investment funds for projects that are defined by the government as being environmentally friendly. Governments can encourage such investments by making approved investments tax-free.

In sum, one of the most important aspects of integrated coastal management is that it is forward looking. Many economic sectors focus far too heavily on short- or medium-term economic profit in place of the longer-term perspective required for the sustainable management of coastal resources. A good ICM plan will examine the potential consequences of development over the long term. Secondly, the importance of public participation in coastal planning cannot be overstated. All those with a legitimate interest in the management of the area should have the opportunity to be involved in the identification of key issues and the development of policies designed to resolve conflict. In one sense the process whereby any plan is produced is as important as the plan itself.

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[133] Rigg, et al, 1997.

15.2.2. Guidelines on Integrated Coastal Management

Coastal areas are characterised by natural processes (biological, physical, chemical), socio-economic developments and long term environmental changes such as accelerated sea level rise and increasing frequency of storms. The management of coastal areas should be focused on these processes and developments in an integrated manner.

The process of integrated coastal management requires an effective legal and administrative framework. In countries where these are not yet established, their development should be considered a high priority. The Model Law on Sustainable Management for Coastal Zones is in this respect a reference document

Before any plan is produced it is important to agree which issues will be addressed, and at what level of priority, through a process of discussion between the relevant sectors. The mechanism used to undertake this will be important since everyone with an interest should feel that their concerns have been taken into account. One method of achieving this is to use the data gathering process as a means of bringing the sectors together in a neutral forum which may help overcome the normal institutional barriers to meaningful dialogue.

National, regional and local authorities should ensure that all development occurs within the context of an integrated coastal management plan, in which areas are designated for certain kinds of development or as areas to be left free from development altogether (although even development-free areas may require some degree of managing). A zoning system designed to accommodate a diversity of uses could be helpful in this regard.

ICM Plans should attempt to establish the carrying capacity of the coastal and marine environment, taking into account the vulnerability of coastal landscape types and habitats, and ensure that development is not allowed to exceed this capacity. Techniques for assessing carrying capacity have been developed in recent years by UNEP in the Mediterranean. These techniques should be considered for use in other regions of Europe. ICM plans should specifically recognise the need to conserve nature as a precondition for all development, as this is the only way to ensure that development is truly sustainable. The principles for coastal development as described previously in the Chapter "Strategic Principles", should provide a fundamental basis for all coastal zone management plans.

The geographical scope of ICM plans should be large enough to encompass the ecosystem as a whole since one or a few municipal units is clearly not enough. Involvement and co-operation between neighbouring communities and countries should be encouraged, recognising the transboundary nature of most environmental issues. Co-operation and information exchange between coastal areas facing comparable threats should also be encouraged.

Public Participation in Coastal Management

Sustainable development and management of coastal region requires a combination of top-down and bottom-up approaches; public participation in the process is essential. In order to ensure adequate public participation in coastal planning, decision-making and management, authorities should:

- Make sure that the decision-making process is consultative and open to all parties who want to or should be involved, and encourage such parties to do so;
- Make funds available to those who would otherwise be unable to take part;
- Establish along the coast coastal forums for ongoing discussions;
- Ensure that all opportunities for public involvement are well publicised;
- Support education and mobilisation programmes in schools and universities and other community programmes;
- Hold community workshops and/or public meetings;
- Involve the public in solution-oriented activities and events;
- Involve the public in monitoring human activities along the coast, impacts on the coastline, and implementation of laws, agreements, or other decisions;
- Involve local businesses in programmes, and work with them to advertise the issues in their outlets;
- Using public service advertisements and other media outreach;
- Use innovative techniques for reaching different audiences and age groups, (e.g. Internet-based projects, displays and exhibitions, artistic events).

Measures to promote sustainable use of coastal and marine resources and to prevent/reduce degradation of the marine environment

a. Best available techniques and best environmental practices, including substitution of substances or processes entailing significant adverse effects;

b. Introduction of clean production practices, including efficient use of energy and water in all economic and social sectors;

c. Application of best management practices;

d. Use of appropriate, environmentally sound and efficient technologies;

e. Product substitution.

Global Programme of Action for the Protection of the Marine Environment From Land-Based Activities.

Techniques that can be used to assess public opinion include:

- Questionnaires and surveys
- Telephone hot lines
- Internet-based bulletin boards
- Citizens'Advisory Committees
- Public hearings and inquiries

Economic Instruments and Incentives

The use of economic instruments and incentives to protect coastal resources should be incorporated into ICM plans. The effectiveness of such instruments should be regularly reviewed, and adapted as necessary to achieve the desired goals.

In setting values for the non-monetary benefits of coastal conservation, long-term considerations such as the potential for coastal ecosystems to act as a buffer zone from accelerated sea level rise and as a sink for nutrients, should be taken into account.

Emissions and products taxes should be set high enough to serve as a disincentive to buy or use products or services that are destructive to coastal ecosystems.

Existing subsidies for activities that are detrimental to the conservation of biological and landscape diversity should be earmarked and removed.

Revenues raised as a result of the application of economic instruments should be re-invested in activities that will promote the conservation of biological and landscape diversity. The establishment of a Coastal Zone Fund could be considered, for example. Green investments should be encouraged by making profits on such investments tax-free.

Any impacts on lower income groups that result from the use of economic instruments should be offset by a decrease in taxes or provision of subsidies for activities that benefit biodiversity.

Coastal and Marine Protected Areas

Establishing coastal and marine protected areas is an integral component of coastal management programmes. While the primary purpose of a protected area is to conserve natural resources, it does not necessarily require the cessation of all human activities within the area. A variety of uses may be permissible within a protected area, provided that sufficient controls exist to ensure sustainable use of resources.

The success of a protected area designation depends upon a variety of factors, including: definition of the area so that it can be managed as a unit; acceptance by local inhabitants; and the existence of appropriate legal, administrative and enforcement frameworks.

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- County Secretary, Donegal County Council
- Anton Aramburu, Bask Government, Environment Department
- Albert Serratosa, Generalitat de Cataluña
- Aidan Winder, Devon County Council, Environment Department
- Ferglis Dillon, Kerry County Council
- M.H. Denton-Thompson, Hampshire County Council, Planning Department
- Rafael Silva López, Junta de Andalucia, Consejeria de Medio Ambiente
- Brian Shipman, Cornwall County Council, Environment Section, Planning-Directorate

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