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Wildlife Institute of India

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Curriculum on

Coastal and Marine Biodiversity and Protected Area Management

Module 3

Mainstreaming Coastal and Marine Biodiversity Into Overall Development and Environmental Planning

For Field-Level MPA Managers

Imprint

Training Resource Material:

Coastal and Marine Biodiversity and Protected Area Management for Field-Level MPA Managers

Module 1: An Introduction to Coastal and Marine Biodiversity and Ecosystem Services
Module 2: Coastal and Marine Biodiversity and Ecosystems Services in the Overall Environment and Development Context
Module 3: Mainstreaming Coastal and Marine Biodiversity into Overall Development and Environmental Planning
Module 4: Coastal and Marine Protected Areas and Sustainable Fisheries Management
Module 5: Governance, Law and Policies for Managing Coastal and Marine Ecosystems, Biodiversity and Protected Areas
Module 6: Assessment and Monitoring of Coastal and Marine Biodiversity and Relevant Issues
Module 7: Effective Management Planning of Coastal and Marine Protected Areas
Module 8: Communicating Coastal and Marine Biodiversity Conservation and Management Issues

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Module 3

Mainstreaming Coastal and Marine Biodiversity Into Overall Development and Environmental Planning

For Field-Level MPA Managers

Summary

This module provides the conceptual background and introduces the tool for mainstreaming biodiversity. To ensure that biodiversity-related issues and concerns become a part of the larger development planning process in the country, there is a need to incorporate it into policies, strategies and action plan. There is also a need to use science-based tools to understand the impact that projects can have on the environment and ensure that spatial planning incorporates measures for conservation of coastal and marine biodiversity.

Table of contents

Acronyms

CBD	Convention on Biological Diversity
CMS	Convention on Migratory Species
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
FAO	Food and Agriculture Organization
GCBA	Generational cost benefit analysis
MSP	Marine Spatial Planning
NBAP	National Biodiversity Action Plan
NEP	National Environment Policy
SEA	Strategic Environmental Assessment
SLEIAA	State Level Environmental Impact Assessment Authority

Learning outcomes

After completing this module, the participants are able to

- appraise the need for mainstreaming biodiversity in different sectors and development programmes
- demonstrate the use of tools such as Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA) and Marine Spatial Planning (MSP)
- critically analyse existing efforts and impacts of mainstreaming biodiversity concerns into sectoral and cross-sectoral strategies, plans and programmes
- prioritize sectors, based on their understanding, where mainstreaming of coastal and marine biodiversity is of utmost importance.

Key messages

- Current knowledge on the main drivers of biodiversity loss leads to the conclusion that most often the drivers of biodiversity loss are situated in the sectors outside the 'green sector'. Therefore, identifying and measuring the impact of these drivers at the national, regional, and global level will assist with mainstreaming biodiversity into all sectors
- At the core of the concept of 'mainstreaming' lies the fact that like any relationship, the interlinkage between biodiversity and other sectors and processes is also a two-way process, where biodiversity affects the activities of the other sectors and/or is affected by the activities of a particular sector. Whether the relationship will be positive or negative, depends on the degree to which the activities are carried out, keeping biodiversity in mind.
- Ideally, biodiversity policy should not be seen as independent of sectoral policies, but rather sectoral policies should be seen as an instrument to implement national biodiversity goals.
- To ensure that development is planned and implemented with biodiversity in mind, impact assessment is being used as an important tool. This include EIA, which is already a mandatory requirement in India supported by law, and SEA, which is still in its infancy and purely voluntary. These two differ in scales and objectives.
- There is a need to enhance the focus on developing impact prediction tools for biodiversity, which will not only standardize the impact prediction process for biodiversity but will also help the decision makers in making accurate decisions on the impacts of projects on biodiversity.
- Marine spatial planning (MSP) is a practical way to create and establish a more rational organization of the use of marine space and the interactions between its uses, to balance demands for development with the need to protect marine ecosystems, and to achieve social and economic objectives in an open and planned way.

Slogan of the CBD COP 11: "NATURE PROTECTS IF SHE IS PROTECTED" .....

Biodiversity can contribute to the development and necessary adaptation of the human societies, only when it is conserved and protected, and the drivers of biodiversity loss are addressed

3.1 What is 'mainstreaming'?

Traditionally, the subject of biodiversity was dealt with by the 'Green' ministries and departments of countries, and the most common tool was to designate specific areas as Protected Areas, inside which the habitats are managed for maximizing conservation. However, current knowledge on the main drivers of biodiversity loss leads to the conclusion that most often the drivers of biodiversity loss are situated in the sectors outside the 'green sector'.

For example, the main threats to the population of Olive Ridley turtles in India are from uncontrolled and unsustainable coastal tourism, industrial development in coastal zone such as the construction of ports, and pollution. A conservation strategy for this species may not bear fruits unless and until the tourism and industrial development is regulated, which has to be carried out by the tourism and industries sector. Therefore, mainstreaming biodiversity concerns into the tourism and industrial sector will be one of the important factors for a successful conservation plan for the Olive Ridley Turtle.

According to the CBD, “Mainstreaming” means integrating or including actions related to conservation and sustainable use of biodiversity in sectoral strategies relating to production sectors (such as agriculture, fisheries, forestry and mining), in national plans and programmes (such as poverty reduction plans and national sustainable development plans).

At the core of the concept of ‘mainstreaming’ lies the fact that like any relationship, the interlinkage between biodiversity and other sectors and processes is also a two-way process, where biodiversity affects the activities of the other sectors and/or is affected by the activities of a particular sector. Whether the relationship will be positive or negative, depends on the degree to which the activities are carried out, keeping biodiversity in mind.

Ideally, biodiversity policy should not be seen as independent of sectoral policies, but rather sectoral policies should be seen as an instrument to implement national biodiversity goals.

If biodiversity concerns are integrated in the overall development planning, sectoral strategies and legal frameworks, there will be a two-fold impact:

1. Negative impacts of the activities/ strategies/ policies of the other sectors can be minimized, leading to conservation of biodiversity, for example urban development and agriculture.
2. Conservation of biodiversity may significantly increase sustainability of certain sectors, viz, poverty alleviation, climate change adaptation.

Aichi targets also emphasize the need for mainstreaming biodiversity by placing this issue as one of the strategic goals with four targets:

Aichi Biodiversity Targets/ Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

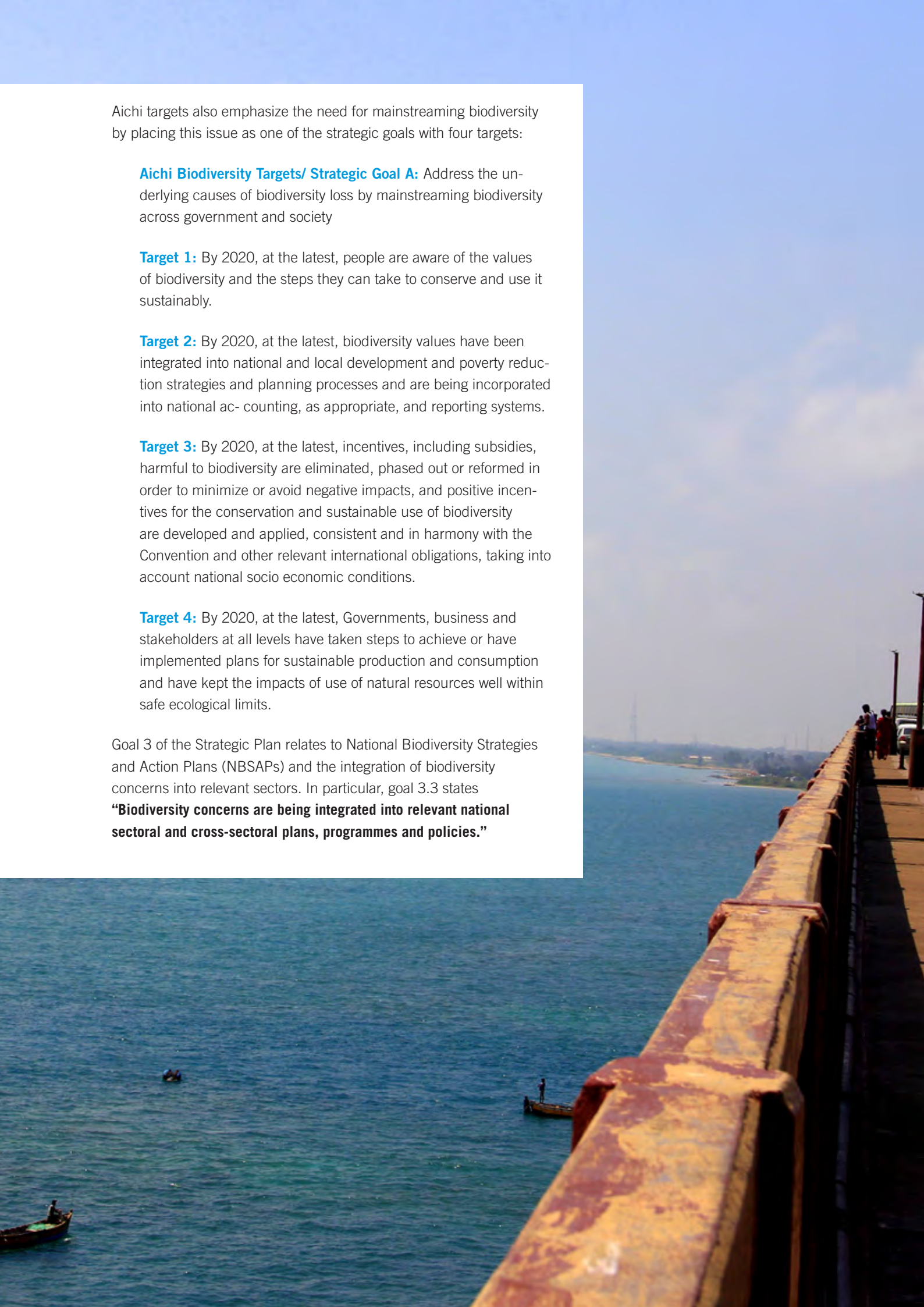
Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national ac- counting, as appropriate, and reporting systems.

Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Goal 3 of the Strategic Plan relates to National Biodiversity Strategies and Action Plans (NBSAPs) and the integration of biodiversity concerns into relevant sectors. In particular, goal 3.3 states **"Biodiversity concerns are being integrated into relevant national sectoral and cross-sectoral plans, programmes and policies."**



Ecosystem Approach: A paradigm shift……

From To :

Preservation	Adaptive Management
Sectoral	Integrated
Scientific	Multifaceted Knowledge
Environmental	People and Environment
Top Dow	Both directions
Nationa	Appropriate Level
Conservationist	all stakeholders
Nature	Social and Environmental well-being

"Many of the main drivers of biodiversity loss such as climate change, loss and degradation of habitat, overexploitation of fisheries and marine resources, invasive alien species, and illegal trade in wildlife are directly related to specific sectors of government such as forestry, fisheries, transport, energy, etc. Therefore, identifying and measuring the impact of these drivers at the national, regional, and global level will assist with mainstreaming biodiversity into all sectors."

The ecosystem approach

The "ecosystem approach" of the CBD- for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way- is also a strategy used for mainstreaming biodiversity.

It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.

The following 10 principles of an Ecosystem Approach are complementary and inter-linked:

Principle 1: The objectives of management of land, water and living resources are a matter of societal choice involving all relevant sectors of society.

Different sectors of society view ecosystems in terms of their own economic, cultural and societal needs. Indigenous peoples and other local communities living on the land are important stakeholders and their rights and interests should be recognised. Both cultural and biological diversity are central components of the ecosystem approach. Management should take this into account and involve all relevant stakeholders at the local, national, regional and international level, as appropriate. Management of natural resources, according to the ecosystem approach, calls for increased inter-sectoral communication and co-operation at a range of levels (government ministries, management agencies, etc.). This might be promoted through, for example, the formation of inter-ministerial bodies within the government or the creation of networks for sharing information and experience. In this view the ecosystem approach should be fully taken into account in developing and reviewing national biodiversity strategies and action plans, and thus be integrated into agriculture, fisheries, forestry and other production systems that have an effect on biodiversity. Societal choices should be expressed as clearly as possible.

Principle 2: The ecosystem approach should seek the appropriate balance between, and integration of,conservation and sustainable use of biological diversity as well as the fair and equitable sharing of benefits.

Biological diversity is critical both for its intrinsic value and because of the key role it plays in providing the ecosystem and other services upon which we all ultimately depend. There has been a tendency in the past to manage components of biological diversity either as protected or non-protected. There is a need for a shift to more flexible situations, where conservation and use are seen in context and the full range of measures is applied in a continuum from strictly protected to human-made ecosystems.

Ecosystems should be managed for their intrinsic values and for the tangible or intangible benefits for humans, in a fair and equitable way. Benefits that flow from the array of functions provided by biological diversity at the ecosystem level provide the basis of human environmental security and sustainability. The ecosystem approach seeks that the benefits derived from these functions are maintained or restored. In particular, these functions should benefit the stakeholders responsible for their production and management. This requires, inter alia: capacity-building, especially at the level of local communities managing biological diversity in ecosystems; the proper valuation of ecosystem goods and services; the removal of perverse incentives that devalue ecosystem goods and services; and, consistent with the provisions of the Convention on Biological Diversity, where appropriate, their replacement with local incentives for good management practices.

Principle 3: Ecosystem management must ensure the sustainable provision of ecosystem goods and services. In considering the likelihood or ease of attaining the management objectives, attention should be given to the environmental conditions that limit natural productivity, ecosystem structure, functioning and diversity, which in turn provide the basis of human environmental security and sustainability. The limits to ecosystem functioning may be affected to different degrees by temporary, unpredictable or artificially maintained conditions and, accordingly, management should be appropriately cautious.

Principle 4: In order to maintain the provision of ecosystem goods and services, the conservation of ecosystem structure and functioning is a priority target

Ecosystem functioning and resilience depends on a dynamic relationship within species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within the environment. Although these interactions are not always well understood, ecosystem management has to be carried out even in the absence of the full knowledge of functional biodiversity. A much better knowledge of ecosystem functions and structure, and the roles of the components of biological diversity in ecosystems, is required [, especially to understand: (i) ecosystem resilience and the effects of biodiversity loss (species and genetic levels) and habitat fragmentation; (ii) underlying causes of biodiversity loss; and (iii) determinants of local biological diversity in management decisions]. Conservation and, where appropriate, restoration of the interactions within and between species and with the environment and related processes is of greater significance for the long-term maintenance of biological diversity than simply protection of species.

Principle 5: Ecosystem management should be decentralised to the lowest appropriate level taking into account the linkages with other levels.

Decentralised systems may lead to greater efficiency, effectiveness and equity. Ecosystem management should involve all stakeholders and balance local interests with the wider public interest.

The closer management is to the ecosystem, the greater the responsibility, ownership, accountability, participation, and use of local knowledge.

Principle 6: Management decisions should be based on all forms of relevant information, including that from all scientific disciplines as well as indigenous and local knowledge, innovations and practices.

Most problems of biological-diversity management are complex, with many interactions, side effects and implications. Therefore, information from all sources is critical to arriving at effective ecosystem management strategies. A much better knowledge of ecosystem functions and the impact of human use are desirable. All relevant information from any concerned area should be shared with all stakeholders and actors, taking into account, inter alia, any decision to be taken under Article 8(j) of the Convention on Biological Diversity. Assumptions behind proposed management decisions should be made explicit, involve the necessary expertise and checked against available knowledge and views of stakeholders.

Principle 7: Ecosystem management must consider the relevant economic values, impediments and opportunities including:

(a) the reduction of those market distortions that adversely affect biological diversity;

(b) the alignment of incentives to promote biodiversity conservation and sustainable use;

(c) the internalisation of costs and benefits to the extent feasible.

The greatest threat to biological diversity lies in its replacement by alternative systems of land use. This often arises through market distortions, which undervalue natural systems and populations and provide perverse incentives and subsidies to favour the conversion of land to less diverse systems.

Often those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environmental costs (e.g. pollution) escape responsibility. Alignment of incentives allows those who control the resource to benefit and ensures that those who generate environmental costs will pay.

Principle 8: Ecosystem management should be undertaken at spatial and temporal scales appropriate to the objectives taking into consideration effects on adjacent and other ecosystems.

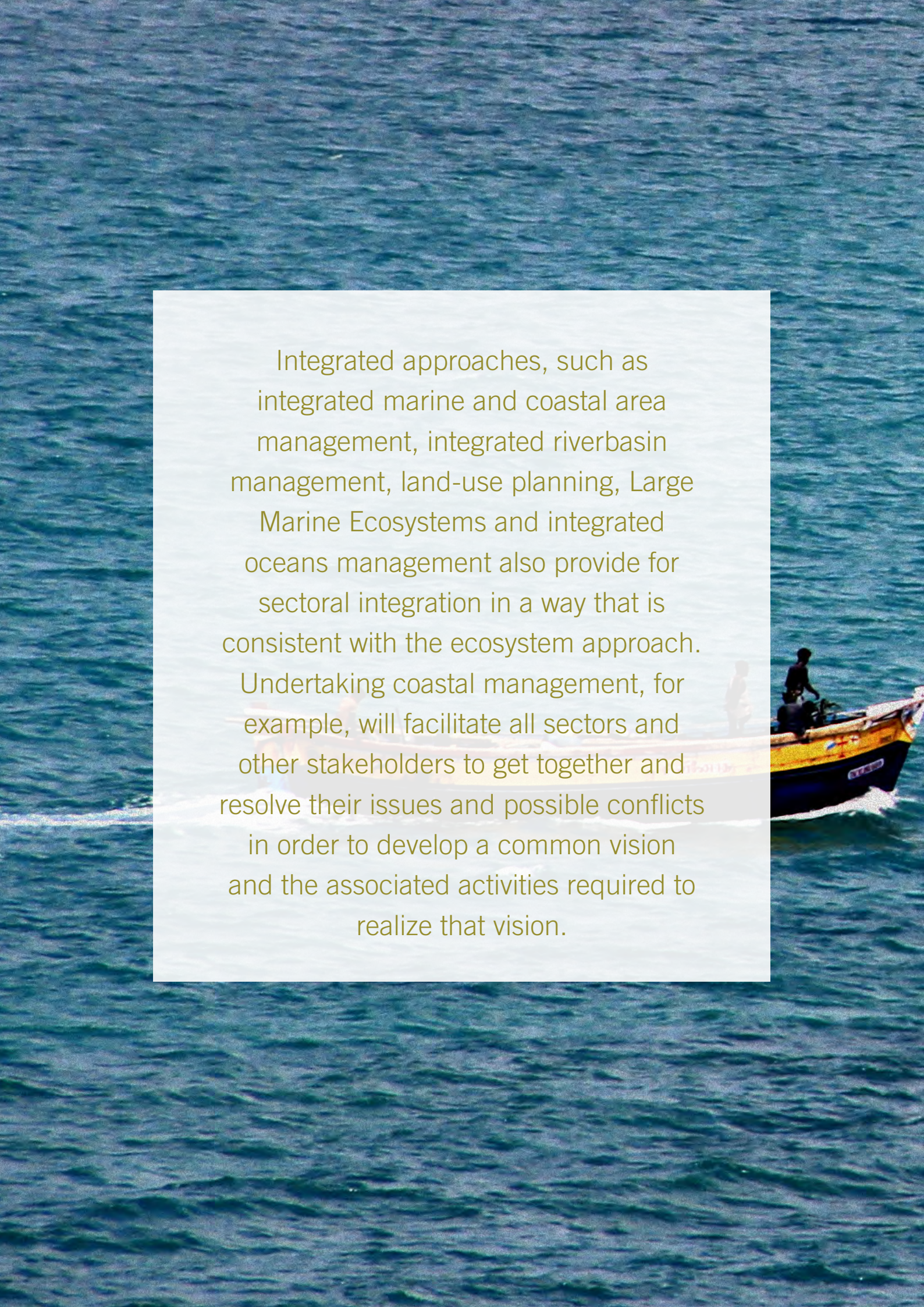
Application of ecosystem approach should be bounded by spatial and temporal scales that are appropriate to the objectives. Boundaries for ecosystem management will be defined operationally by users, managers, scientists and indigenous and local peoples. Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems; therefore, possible impacts need careful consideration and analysis. Connectivity between areas should be promoted where necessary. The ecosystem approach is based upon the hierarchical nature of biological diversity characterised by the interaction and integration of genes, species and ecosystems. This may require new arrangements or ways of organisation for institutions involved in decision-making to make, if necessary, appropriate compromises.

Principle 9: Ecosystem management should set objectives for the long term recognising the varying temporal scales and lag effects that characterise ecosystem processes.

Ecosystem processes are characterised by varying temporal scales and lag-effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

Principle 10: Ecosystem management should adopt adaptive management strategies recognising the inherent dynamics of change and uncertainties in ecosystems.

Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes. Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential “surprises” in the human, biological and environmental realms. Traditional disturbance regimes may be important for ecosystem structure and functioning, and may need to be maintained or restored. The ecosystem approach must utilise adaptive management in order to anticipate and cater for such changes and events and should be cautious in making any decision that may foreclose options, but, at the same time, consider mitigating actions to cope with long-term changes such as climate change. Therefore, ecosystem management must involve a learning process, which helps to adapt methodologies and practices to the ways in which these systems are being managed and monitored. There is also a need for flexibility in policy-making and implementation. Long-term, inflexible decisions are likely to be inadequate or even destructive. Ecosystem management should be envisaged as a long-term experiment that builds on its results as it progresses. This “learning-by-doing” will also serve as an important source of information to gain knowledge of how best to monitor the results of management and evaluate whether established goals are being attained. In this respect, it would be desirable to establish or strengthen capacities of Parties for monitoring.



Integrated approaches, such as integrated marine and coastal area management, integrated riverbasin management, land-use planning, Large Marine Ecosystems and integrated oceans management also provide for sectoral integration in a way that is consistent with the ecosystem approach. Undertaking coastal management, for example, will facilitate all sectors and other stakeholders to get together and resolve their issues and possible conflicts in order to develop a common vision and the associated activities required to realize that vision.

3.2 How does mainstreaming take place?

3.2.1 Enabling conditions

The enabling conditions for mainstreaming biodiversity include

- An institutional and legal framework
- A planning system
- Knowledge and information
- Political commitment (provided it reflects what society really wants)
- Participation
- Technical capacity
- Awareness
- Mainstreaming in sectors
- Ensuring livelihoods (tenure, certainty, long-term perspective)
- Communication and cooperation (in particular scientists-managers)
- National Biodiversity Strategy and Action Plans (NBSAPs)
- A monitoring system
- Regional cooperation
- Economic and social incentives

Mainstreaming instruments in India

National Environment Policy

The National Environment Policy (NEP) by the Ministry of Environment Forest and Climate Change (MoEFCC) aims at mainstreaming environmental concerns into all developmental activities. It emphasises conservation of resources, and points that the best way to aid conservation is to ensure that people dependent on resources obtain better livelihoods from conservation, than from degradation of the resources. It argues that environmental degradation often leads to poverty and poor health outcomes among populations.

The policy emphasise on the

- Important role of human beings in the sustainable development processes
- The non negotiability and incomparable value of environmental resources
- Right to development for all
- Equity in the use of environmental resources and
- The need for the decentralised and multisectoral approach in dealing.

The objectives of the policy are:

- Conservation of critical environmental resources
- Intra-generational equity- Livelihood security for the poor
- Inter-generational equity
- Integration of environmental concerns in economic and social development
- Efficiency in environmental resource use
- Environmental governance
- Enhancement of resources for environmental conservation

The document outlines a range of strategies to meet these objectives that aim at:

- Conservation of existing environmental resources through regulatory reforms
- Emphasis on education, information, research, capacity building and technological innovations
- Intersectoral collaboration and periodic evaluations of the existing policies.

What can be done to mainstream biodiversity?

(Source: Secretariat of the Convention on Biological Diversity 2011)

There are several ways for mainstreaming biodiversity into overall development planning:

- NBSAPs
- Institutional and legal frameworks at national level that support integration of biodiversity into different policies and plans
- Planning system
- Knowledge and information systems on biodiversity
- Political commitment (provided it reflects what society really wants)
- Participation from all stakeholders in developing programmes for biodiversity conservation
- Technical capacity development of the sectors responsible for managing biodiversity and coastal ecosystems
- Integrating coastal and marine biodiversity specifi cally into the strategies and plans of the key production sectors
- Comprehensive coastal and marine ecosystem monitoring
- Regional cooperation among the maritime states
- Economic and social incentives for conservation of coastal and marine biodiversity

3.2.2 What may biodiversity mainstreaming look like?

(Source: Secretariat of the Convention on Biological Diversity 2011)

Biodiversity is explicitly integrated into sectoral and/or cross-sectoral

- Policy documents
- Plans and actions
- Budgets
- Legislation
- Indicators and monitoring systems

Mainstreaming of biodiversity into sectors (and *vice versa*) can include strategies to

1. **Reduce the negative and enhance the positive impacts that the sector has on biodiversity.**

In fisheries strategies this may involve actions to reduce bycatch or eliminate effects of fishing practices on sea bottom habitat. In agricultural strategies, it might involve minimizing the use, and optimizing the application, of chemical fertilizers and pesticides so as to reduce negative impacts on groundwater, surrounding habitats and wildlife, and strengthening practices that integrate the natural processes into production systems or enhance agricultural biodiversity such as intercropping and on-farm conservation and management of agricultural crops.

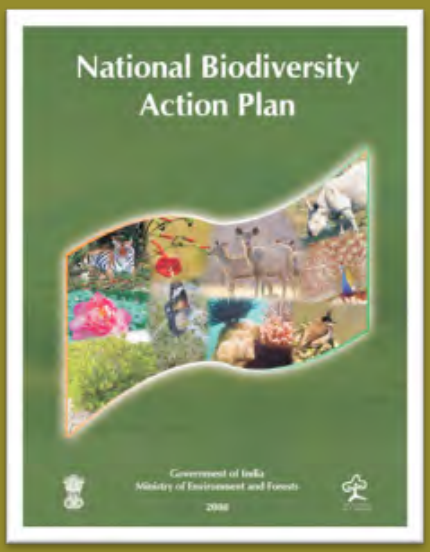
2. **Enhance or restore biodiversity and ecosystem services.**

This may involve establishing no-take zones in marine areas, drylands, forests or other productive ecosystems. In fisheries, when such zones are established in areas where fish spawn and feed, the areas provide local relief to the pressure on commonly harvested wild species. It might also involve the replanting and/or reintroduction of native plant and animal species to areas where they may have been depleted or lost, as well as the creation of in situ conservation areas of crop wild relatives.

3. **Secure and promote local communities' access to and benefits from the use of biodiversity, and enable their participation in the design and implementation of biodiversity management policies and practices.**

In forestry and fishery strategies, this could involve reserving certain areas for exclusive use by local communities and indigenous people, the joint management of areas and/or species with such groups, and the clarification of resource access and tenure in areas where the erosion and overlap of customary and formal rights have left tenure unclear and insecure. Provided local communities and indigenous people manage these resources sustainably, such strategies will have important results in terms of poverty reduction and human well-being more broadly.

Mainstreaming instrument in India:



The National Biodiversity Action Plan (NBAP) proposes to design actions based on the assessment of current and future needsof conservation and sustainable utilization, and ofphysical and fiscal instruments, with particularreference to implications and impact of suchinstruments on short and long term basis. Consideringthe multidisciplinary nature of biodiversity, the actionsidentified in the NBAP are aimed towards integrationof the three objectives of the CBD into relevantsectoral or cross-sectoral plans, programmes andpolicies. The NBAP takes into account ecosystemapproach, where appropriate, and promotesmainstreaming of gender considerations. Thechallenge before India is not only to sustain the effortsof the past, but also to further consolidate theendeavour in accordance with a rational needassessment.

Key action points vis-à-vis mainstreaming:

- Develop strong research base on impact assessment and conduct rigorous impact assessment of development projects, with a focus on biodiversity and habitats.
- Integrate biodiversity concerns across development sectors (such as industry, infrastructure, power, mining, etc.) and promote use of clean technologies.
- Accord priority to the potential impacts of development projects on biodiversity resources and natural heritage while undertaking EIA. In particular, ancient sacred groves and biodiversity hotspots should be treated as possessing incomparable values.
- Take steps to adopt and institutionalize techniques for environmental assessment of sectoral policies and programmes to address any potential adverse impacts, and enhance potential favourable impacts.
- Develop and integrate pre-project plans for reallocation and rehabilitation of local people likely to be displaced by development projects keeping in view their socio-cultural and livelihood needs.
- Give priority to impact assessment of development projects on .wetlands; in particular, ensuring that environmental services of wetlands are explicitly factored into cost-benefit analysis
- Consider and mitigate the impacts on river and estuarine flora and fauna, and the resulting change in the resource base for livelihoods, of multipurpose river valley projects, power plants and industries.
- Promote sustainable tourism through adoption of best practice norms for tourism facilities and conservation of natural resources while encouraging multistakeholder partnerships favouring local communities
- Survey and develop a national inventory of toxic and hazardous waste dumps, and an online monitoring system for movement of hazardous wastes. Strengthen capacity of institutions responsible for monitoring and enforcement in respect of toxic and hazardous wastes.

3.3 Public awareness and support[1]

Having a policy in place does not fully ensure that the desired impact will be achieved. Here, a crucial deciding factor is effective implementation of that policy, which subsequently is governed by public support. Public education and awareness can play important roles in improving conservation efforts (Goodale 1995[2]). A learned and informed society can make sound and informed decisions about conservation. In order to make an informed decision, the public needs background knowledge and current information on biodiversity, an appropriate forum to raise their voice and also a mechanism to monitor the policy processes. This will help in receiving greater public support for implementing biodiversity-friendly policies and programmes.

1 Adapted from Khera et.al (2010)

2 Goodale G. 1995. Training in the context of poverty alleviation and sustainable development. In Empowerment Towards Sustainable Development, pp. 82–91, edited by N Singh and V Titi. Halifax, NS, Canada: Fernwood Publishing Ltd., London, UK: Zed Books Ltd.

There are a number of factors, which influence the involvement of society in the decision-making process, including knowledge on the importance of the issue, ability to analyse policies and envision their impacts, capacity to organize them, and enter into a dialogue with the governments.

In order to have an effective stakeholder partnership in a country for achieving the biodiversity targets, it is imperative that the awareness level of the people is high, which comes from biodiversity education from an early stage.

Promoting and encouraging understanding of the importance of, and the measures required for, the conservation of biological diversity, as well as its propagation through media, and the inclusion of these topics in educational programmes are some of the steps that countries must take in order to enhance awareness (CBD, Article 13, UNEP).

The Millennium Ecosystem Assessment (2005) reinforces the importance of public environmental awareness and participation through educational courses or publication of reports as a support system to traditional legal enforcement measures. Experts, academics and mass media play important roles in enforcement and in increasing public awareness of environmental needs (Rosendal 2000[3]; Wuori 1997[4]; Somsen 1998[5]; Wolf 2002[6]).

Key measures implementable at the field level

- Access to and sharing of information
- Sharing and applying existing knowledge, especially local and indigenous
- Adapt research better to management needs
- Communication between scientists, local communities, media and managers (local languages!!)

3 Rosendal K G. 2000. The Convention on Biological Diversity and Developing Countries. Dordrecht, The Netherlands: Kluwer Academic Publishers

4 Wuori M. 1997. The formative side of history: the role of non-governmental organizations. In International Governance on Environmental Issues, pp. 159–172, edited by M Role´n, H Sjoberg, and U Svedin. Dordrecht, The Netherlands: Kluwer Academic Publishers

5 Somsen H. 1998. Dynamics, process, and instruments of environmental decision making in the European Union. In Law in Environmental Decision- Making: national, European, and internationalperspectives, pp. 161–205, edited by T Jewell and J Steele. Oxford, UK: Clarendon Press

6 Wolf S, White A, and Stanley N. 2002. Principles of Environmental Law, 3rd Edition. London: Cavendish Publishing Limited

Case study: Mainstreaming coastal and marine biodiversity conservation into production sectors in East Godavari River Estuarine Ecosystem (EGREE) and Sindhudurg coasts

Source: http://www.in.undp.org/content/dam/india/docs/mainstreaming-coastal-and-marine-biodiversity-conservation.pdf

EGREE encompassing the Godavari mangroves is the second largest area of mangroves along the east coast of India. The area is rich in plant and animal diversity, and generates significant ecological and economic benefits such as shoreline protection, sustaining livelihoods and carbon sink services. It is an Important Bird Area (IBA) with a recorded population of 119 bird species, of which 50 are migratory. In recognition of its national and global biodiversity significance, a part of the EGREE area is gazetted as Coringa Wildlife Sanctuary. In addition to the biodiversity significance of the area, it is also of enormous economic significance. The last few decades have witnessed rapid economic changes and emergence of large scale production activities in EGREE. The main production sectors operating in the landscape/seascape are fisheries, aquaculture, salt pans, manufacturing activities such as oil and gas exploration, fertilizers, edible oil, rice products, tourism and ports. In addition, there is dependency on the mangroves and marine resources by local villagers. These activities are impacting the overall ecological integrity of the EGREE, particularly the mangrove ecosystems, with associated impacts on the livelihoods of local people. In this connection, the UNDP-GEF intervention aims to mainstream biodiversity conservation into the production sectors of EGREE through (1) Cross-sectoral planning in the EGREE that mainstreams biodiversity conservation considerations, (2) Enhanced capacity of sector institutions for implementing biodiversity-friendly sector plans and (3) Improved community livelihoods and sustainable natural resource use. By project end, it is anticipated that production activities in at least 80,000 ha of the EGREE mainstream biodiversity conservation objectives, in turn improving the conservation prospects of several globally significant species apart from contributing to the socioeconomic well-being of the region. As part of this project, EGREE Foundation has been established at Kakinada to implement this project with the help of all stakeholders of the region. The State Forest Department of Andhra Pradesh is the implementing agency, whereas the Ministry of Environment, Forests and Climate Change, Government of India, is facilitating the entire programme in India. The Wildlife Institute of India is the knowledge partner of this programme.

Similarly, the same UNDP-GEF Marine Programme is also being implemented in the Sindhudurg coastal and marine ecosystem (SCME). The state of Maharashtra, with an extent of nearly 10 per cent of the total geographical area of India, is among the top five states in overall species diversity and natural resources. The coastal region, having an extent of approximately 720 km and popularly known as 'Konkan,' is known for its rich diversity and distinct culture. There are many important sites all along the coast. The Sindhudurg coastal and marine ecosystem (SCME), which includes Malvan Marine Sanctuary (MMS) and mangrove reserved forests, is one of among them. The SCME encompasses three distinct sites: (1) Malvan Marine Sanctuary, (2) the archipelago at Vengurla Rocks and (3) Angria Bank. A total of 367 species of marine plants and animals have been reported from Malvan Marine Sanctuary, including 10 or more species of marine mammal. The archipelago at Vengurla Rocks, including Burnt Island, is an IBA site and is known to have breeding colonies of eight tern species. Angria Bank, located 105 km from the shores of Vijaydurg, is a submerged plateau. Sporadic surveys of the site suggest that the area is rich in diversity of corals and reef ecosystems and a congregating site for breeding sharks and whale species. The Mangrove Cell of the State of Maharashtra is coordinating this programme with help of a 'Field Unit' that has been established exclusively for this project. One of the major activities of the project is to involve the local communities in conservation of coastal and marine biodiversity in the region so that their socioeconomic condition improves further.

3.4 Legal instruments

Legal instruments, which help the regions and countries in integrating biodiversity concerns into functioning of different sectors and programmes, and helps in minimizing the impacts.

Important Central Acts and Rules having Relevance to Biodiversity Conservation and where biodiversity should be integrated

- Fisheries Act, 1897.
- Destructive Insects and Pests Act, 1914.
- The Indian Forest Act, 1927.
- Agricultural Produce (Grading and Marketing) Act, 1937.
- Indian Coffee Act, 1942
- Import and Export (Control) Act, 1947.
- Rubber (Production and Marketing) Act, 1947.
- Tea Act, 1953.
- Mining and Mineral Development (Regulation) Act, 1957
- Customs Act, 1962.
- Cardamom Act, 1965.
- Seeds Act, 1966.
- The Patents Act, 1970.
- Wildlife (Protection) Act, 1972.
- Marine Products Export Development Authority Act, 1972.
- Water (Prevention and Control of Pollution) Act, 1974.
- Territorial Water, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976.
- Water (Prevention and Control of Pollution) Cess Act, 1977.
- Maritime Zones of India (Regulation and Fishing by Foreign Vessels) Act. 1980.
- Forest (Conservation) Act, 1980.
- Air (Prevention and Control of Pollution) Act, 1981.
- Agricultural and Processed Food Products Export Development Authority Act, 1985/ 1986.
- Environment (Protection) Act, 1986.
- Spices Board Act, 1986.
- National Dairy Development Board, 1987.
- Rules for the manufacture, use/import/export and storage of hazardous microorganisms/ genetically engineered organisms or cells, 1989
- Foreign Trade (Development and Regulation) Act, 1992.
- Protection of Plant Varieties and Farmers' Rights (PPVFR) Act, 2001
- Biological Diversity Act, 2002 and Rules, 2004
- Plant Quarantine (Regulation of Import into India) Order, 2003
- The Food Safety and Standards Act, 2006
- Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.

3.5 Impact assessment as a legal instrument for mainstreaming biodiversity

One legal instrument specifically of relevance to mainstreaming biodiversity is impact assessment. In the following section, we discuss two forms of impact assessment: Environmental Impact Assessment (EIA), which is already a mandatory requirement in India supported by law, and Strategic Environmental Assessment (SEA), which is still in its infancy and purely voluntary. These two differ in scales and objectives.

To ensure that development is planned and implemented with biodiversity in mind, impact assessment is being used as an important tool. The major conventions on biodiversity—CBD, the Ramsar Convention and the Convention on Migratory Species—recognize impact assessment as an important decision-supporting tool to help plan and implement development with biodiversity 'in mind.'

The CBD requires parties to apply impact assessment to projects (EIA) as well as to programmes, plans and policies (SEA), which have potential negative impact on biodiversity. The impact assessment should ideally address biodiversity conservation, sustainable use and equal benefit-sharing issues at the three levels, viz, habitat, species and genetic diversity. Some of the areas where integration of biodiversity may yield significant positive results are urban development, combating climate change, forestry, fisheries, trade, biotechnology, tourism, energy and climate change, and poverty reduction.

3.5.1 Environmental impact assessment (EIA)

EIA is a planning tool used to predict and evaluate the potentially significant impacts of proposed action and provide a mitigation plan for minimizing adverse impacts for making decisions on the proposed project/program/policy. It is a procedure to know the positive and negative aspects of a proposed activity including the natural, social and economic aspects. It is a decision-making process to take a decision whether a developmental project must start or not.

The International Association for Impact Assessment (IAIA) defines EIA as '*the process for identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of development proposals prior to major decisions being taken and commitments made.*' In environmental cases the purpose of the assessment is to ensure that decision makers consider the ensuring environmental impacts when deciding whether a project should be allowed to proceed or not. The EIA includes likely adverse effects on human beings, vegetation cover, animal kingdom, air, water, land and property.

Link to the global convention

Rio Principle 17 states, 'EIA as national instrument, shall be undertaken for the proposed activities that are likely to have a signifi cant adverse impact on the environment and are subject to a decision of a competent national authority.'

The EIA is a tool that seeks to ensure sustainable development through the evaluation of those impacts arising from a major activity (policy, project or programme and plan) that are likely to have environmental effects. The purpose of EIA is to ensure the protection and conservation of the environment and natural resources including human health aspects against uncontrollable development. It is anticipatory, participatory and systematic in nature and relies on multidisciplinary input.

The legal basis for EIA

EIA is an important management tool for ensuring optimal use of natural resources for sustainable development. A beginning in this direction was made in our country with the impact assessment of river valley projects in 1978–79, and the scope has subsequently been enhanced to cover other developmental sectors such as industries, thermal power projects and mining schemes. To facilitate collection of environmental data and preparation of management plans, guidelines have been evolved and circulated to the concerned central and state government departments. EIA has now been made mandatory under the Environmental Protection Act, 1986, for 29 categories of developmental activities involving investments of INR 50 crores and above.

The Environmental Clearance Regulation of 2006 is in supersession of the notification of 1994 relating to EIA. It has been issued in the exercise of the powers conferred by Section 3(I) and (2)(V) of the Environmental Protection Act, 1986, read with Rule 5(3)(d) of the Environment Protection Rules, 1986. The regulation provides that construction of new projects and activities or expansion or modernization of existing projects at the time of this notification will not be undertaken on and from the date of its publication (14 September 2006) without the prior environmental clearance from the central government or by the State Level Environmental Impact Assessment Authority (SLEIAA) duly constituted under this regulation. Thirty different categories of projects require clearance from the central government. Some of them are offshore and onshore oil and gas exploration, mining, airport, river valley, soda ash industry, pesticide industry and complex, chemical fertilizer, integrated paint industry and many others.

One of the reasons to adopt the EIA model in India is the Bhopal gas catastrophe, known to be the world's worst industrial disaster. In the course of time, the public also became aware of the requirements, and the central government with a notification in 1994 introduced EIA for the projects cited therein. The Environmental Clearance Regulation of 2006 is in supersession of the notification of 1994 relating to EIA. It has been issued in the exercise of the powers conferred by sections 3(I) and (2)(V) of the Environment Protection Act, 1986. The regulation provides that construction of new projects and activities or expansion or modernization of existing projects at the time of this notification will not be undertaken on and from the date of its publication without the prior environmental clearance from the central government or by the SLEIAA duly constituted under this regulation.

3.5.2 EIA of coastal projects: What are the indicators to look out for?

Coastal states are required to prepare Coastal Zone Management Plans as per the provisions of the Coastal Regulation Zone (CRZ) Notification 1991, identifying and categorizing the coastal areas for different activities and submit them to the ministry for approval.

For the purpose of protecting and conserving the coastal environment, the ministry declares coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action (on the landward side), up to 500 metres from the high tide line and the intertidal zone as the CRZ. This notification was issued under Section 3(I) and Section 3(2)(V) of the Environment Protection Act, 1986, and Rule 5(3)(d) of the Environmental Protection Rules, 1986. The notification imposes restrictions on the

1. Setting up and expansion of industries
2. Operations or processes in the CRZ

Based on the environmental results and the probable perturbations due to the proposed project, the impact of various activities on marine ecology will be assessed during construction as well as operational phases of the project. Suitable mitigation measures in terms of the marine environmental management plan will be suggested to minimize the adverse impact identified.

Severity of impacts of infrastructure development in the coastal zone varies widely depending on many factors such as the extent, period and type of disturbance, manmade perturbations, capacity of the receiving water to assimilate requirements for assessing such impacts as general baseline information. Tides will be assessed with available data in the area. The currents will be measured at the proposed release location for around one week. Water quality would be assessed at several locations to evolve a general background for the coastal sea off the project site. Intertidal and subtidal sediments off the project site would be studied for texture, selected metals (chromium, iron, cobalt, nickel, copper, zinc, lead, cadmium and mercury), organic carbon, phosphorous and pH. The status of flora and fauna of the project area would be established based on phytoplankton pigments, population and genetic diversity, zooplankton biomass, population and growth diversity, fisheries, mangroves and intertidal corals.

3.5.3 Biodiversity in EIA: Challenges and way forward (Source: Khera and Kumar, 2010)

The inclusion of biodiversity in EIA is a two-way process. It not only draws on information on biodiversity but also generates useful biodiversity data. There is no debate on the immediate need for biodiversity conservation, although debate regarding the best methodology to address biodiversity continues. The focus of discussion is on the best ways to address this problem. The main difficulties in inclusion of biodiversity in EIA include:

- absence or inadequate representation of the effect on ecosystem functions due to lack of biodiversity data;
- ill-defined baseline ecosystem conditions;
- lack of consideration of cumulative effects of projects;
- inadequate mitigation and postmonitoring;
- lack of quality control; and
- poor stakeholder participation.

There is a need to enhance the focus on developing impact prediction tools for biodiversity, which will not only standardize the impact prediction process for biodiversity but will also help the decision makers in making accurate decisions on the impacts of projects on biodiversity.

Second, a standardized approach for biodiversity monitoring based on scientific criteria and carefully selected indicators is also needed.

Third, the task of transferring the knowledge and information related to good practices in biodiversity impact prediction and monitoring methods needs to be undertaken by the established scientific organizations.

Fourth, adapting a long-term and more sustainable approach to impact assessment, which provides information on the potential risks at an early stage itself, and increasing the time and cost efficacy of mitigation measures. One such tool is SEA.

Case Study: Inclusion of biodiversity into EIA in India (Source: Khera and Kumar, 2010):

To assess the status of biodiversity inclusion in EIA studies in India, 22 EIA reports were evaluated from different sectors (transport, power, urban management, etc.) using a set of seven criteria and 30 questions defining attributes, as follows:

Criteria and attributes used for evaluating a sample of EIA reports in India

Criteria		Attribute/Question
Enough information on the impact area vis-à-vis biodiversity has been gathered	1	Is the location map showing known biodiversity area, urban area, other industrial establishments and projects and distance from coastal area/surface water bodies/ ecologically sensitive areas, etc. available?
	2	Has the impact area been described keeping in mind the biodiversity impacts, wherever biodiversity impacts are likely to occur over a larger area?
Baseline study is comprehensive enough to provide a basis for correct impact prediction	3	Have the components of the biodiversity likely to be affected by the project been identified and described sufficiently for the prediction of impacts?
	4	Does the information include listings of endemic and endangered species present within the proposed project area?
	5	Where applicable, does the baseline data identify and enumerate flora and fauna including seasonal variables, e.g. species, migration routes, spawning and breeding grounds?
	6	Has the importance of biodiversity elements present in the impact area been assessed and described?
	7	Were biodiversity experts involved in conducting the study?
	8	Does the method of collection of primary biodiversity data conform to the guidelines of MoEFCC?
	9	Have sources of secondary data been referred to?
	10	Are gaps and limitations of the baseline biodiversity data indicated and means to deal with them explained?
All the possible impacts on all components of biodiversity are predicted	11	In order to effectively address biodiversity impacts, it is imperative that biodiversity impacts are not merged within the broader category of ecological impacts, or merely as impact on flora and fauna. Therefore, it was a matter of concern if the biodiversity impacts were described in a separate section.
	12	Are direct biodiversity impacts described appropriately?
	13	Are indirect, secondary and cumulative biodiversity impacts described appropriately?
	14	Are short-term/long-term impacts on biodiversity due to air, noise or water pollution described?
	15	Has the significance of the impacts been assessed?
	16	Does the impact on biodiversity cover all the three levels, viz. ecosystem, species and genetic level?
	17	Are the biodiversity impacts predicted in quantitative terms?
	18	Are the biodiversity impacts predicted in qualitative terms?
	19	Are the methods/approaches used to identify the impacts and the rationale for using them described?
An effort is made to effectively involve stakeholders in decision making	20	Were vulnerable stakeholders of the project identified?
	21	Were effective measures taken to inform stakeholders for participation in the discussion?
	22	Were current and potential ecological services provided by the affected ecosystem discussed appropriately with the stakeholders to determine the values these services represent for society?
	23	Were concerns of public regarding biodiversity impacts adequately addressed in the mitigation plan?
Alternatives with least biodiversity damage are available	24	Have biodiversity impacts of the alternative solutions/sites been described and compared with the proposed development and with the likely future conditions in zero-option development?
Effective mitigation measures for the predicted impacts are proposed	25	Is mitigation a part of the project design from the start of the development of the project?
	26	Are mitigation measures proposed to address the biodiversity impacts at all levels, i.e. genetic/species/landscape and all structures trees/shrubs/herbs as well as temporal biodiversity?
	27	Is effectiveness of the mitigation measures addressed and gaps identified?

Criteria		Attribute/Question
An effective biodiversity monitoring plan is in place	28	Is a monitoring plan for biodiversity impact proposed?
	29	Are details of the criteria and indicators to be used during the monitoring available in the report?
	30	Have the limitations in monitoring biodiversity been identified and addresse

Each attribute was scored on a scale of 0 to 1, where 0 = the attribute was not met in the report, 0.5 = the attribute was only partially met in the report and 1 = the attribute was fully met in the report. Both authors evaluated each report to ensure consistency in the evaluation and as a quality-control measure. The point scores were used to generate a Biodiversity Inclusion Index (BII) using the following formula, which is modified from Atkinson et al (2000)[1] and Soderman (2005[2]):

$$BII = A + 0.5B / 30$$

where A = number of attributes fully met, B = number of attributes partially met and 30 = total number of attributes.

Using the above formula, the **BIImax** has a value of 1, that is a case where all the attributes are met completely. The **BII** allowed for easy comparison of the status of biodiversity inclusion between the EIA reports studied. However, while using an index is useful for overall comparison, comparing overall scores can hide differences in the relative strengths/weaknesses of the different EIAs.

Results indicated that in most cases biodiversity-related information was either missing or described in a superficial way.

Major limitations in the current practices are poor description of indirect, secondary and cumulative biodiversity impacts, and lack of representation of all the three levels (habitat, species and genetic) and forms (compositional, structural and functional) of biodiversity in impact prediction as well as in mitigation measures and monitoring plans.

None of the reports received a Biodiversity Inclusion Index score of >0.75, while approximately 63% of reports scored 0.50–0.75 and 37% <0.50.

[Source: Khera and Kumar, 2010]

1 Atkinson, S F, F Bhatia, S Schoolmaster and W T Waller 2000. Treatment of biodiversity impacts in a sample of US Environmental Impact Statements. Impact Assessment and Project Appraisal, 18(4), 271–282

2 Soderman, T 2005. Treatment of biodiversity issues in Finnish environment impact assessment. Impact Assessment and Project Appraisal, 22(2), 87–99.

3.5.4 The steps in the EIA of a project in India

(Source: ENVIRONMENTAL IMPACT ASSESSMENT NOTIFICATION-2006, MoEFCC, GoI) http://envfor.nic.in/legis/eia/so1533.pdf

All the projects and activities are broadly categorized into 'A' or 'B' category on the basis of spatial extent of potential impacts and potential impact on human health and natural and manmade resources. According to para 7 of the regulation, there are following stages:

1. **Project proposal**

   Any proponent embarking on any major development project will notify the Impact Assessment Agency (IAA) in writing by the submission of a project proposal. The project proposal will include all relevant information available including a land-use map in order for it to move to the next stage, which is screening. The submission of a project proposal signifies the commencement of the EIA process.

2. **Screening**

   Screening is done to see whether a project requires environmental clearance as per the statutory notifications.

3. **Scoping and consideration of alternatives**

   Scoping is a process of detailing the terms of reference of EIA. It has to be done by the consultant in consultation with the project proponent and guidance, if need be, from the IAA. The MoEFCC has published guidelines for different sectors, outlining the significant issues to be addressed in the EIA studies. Quantifiable impacts are to be assessed on the basis of magnitude, prevalence, frequency and duration, and for nonquantifiable impacts (such as aesthetic or recreational value), significance is commonly determined through the socioeconomic criteria. After the areas where the project could have significant impact are identified, the baseline status of these should be monitored and then the likely changes in these on account of the construction and operation of the proposed project should be predicted.

4. **Baseline data collection**

   Baseline data describe the existing environmental status of the identified study area. The site-specific primary data should be monitored for the identified parameters and supplemented by secondary data if available.

5. **Impact prediction, evaluation and assessment of alternatives**

   Impact prediction is a way of mapping the environmental consequences of the significant aspects of the project and its alternatives. For every project, possible alternatives should be identified and environmental attributes compared. Alternatives should cover both project location and process technologies. Alternatives should then be ranked for selection of the best environmental optimum economic benefits to the community at large.

6. **Environment Management Plan (EMP)**

   Once alternatives have been reviewed, a mitigation plan should be drawn up for the selected option and supplemented with an EMP to guide the proponent towards environmental improve

A precautionary approach is necessary to make preventive decisions in the face of uncertainty and to drive actions that will protect public health and the environment. One of the most important expressions of the precautionary principle internationally is the Rio Declaration from the 1992 United Nations Conference on Environment and Development, also known as Agenda 21. Application of the precautionary principle recognizes the merit of delaying development consent until the best available information can be obtained through consultation with local stakeholders/experts and/or new information can be consolidated. Its use promotes action to avert risks of serious or irreversible harm to the environment (Cooney and Dickson 2006[7]). The principle in a way provides an 'escape route' to anticipate and prevent threats to the environment and 'buy time' for developing appropriate and effective mitigation.

7 Cooney, R. and Dickson, B. (ed) (2006)Biodiversity and Precautionary Principle: Risk and Uncertainty inConservation and Sustainable Use, Earthscan, London.

ments. The EMP is a crucial input to monitoring the clearance conditions, and therefore details of monitoring should be included in the EMP.

7. **EIA report**

   An EIA report should provide clear information to the decision maker on the different environmental scenarios without the project, with the project and with project alternatives. The proponent prepares a detailed project report and provides information in a logical and transparent manner. The IAA examines if procedures have been followed as per MoEF notifications.

8. **Public hearing**

   After completion of the EIA report, the law requires that the public must be informed and consulted on a proposed development. The State Pollution Control Boards will conduct the public hearing before the proposals are sent to MoEFCC for obtaining environmental clearance. Any one likely to be affected by the proposed project is entitled to have access to the executive summary of the EIA. The affected persons may include a) Bona fide local residents; b) Local associations; c) Environmental groups active in the area; and d) Any other person located at the project site/sites of displacement. They are to be given an opportunity to make oral/written suggestions to the State Pollution Control Board as per Schedule IV.

9. **Decision-making**

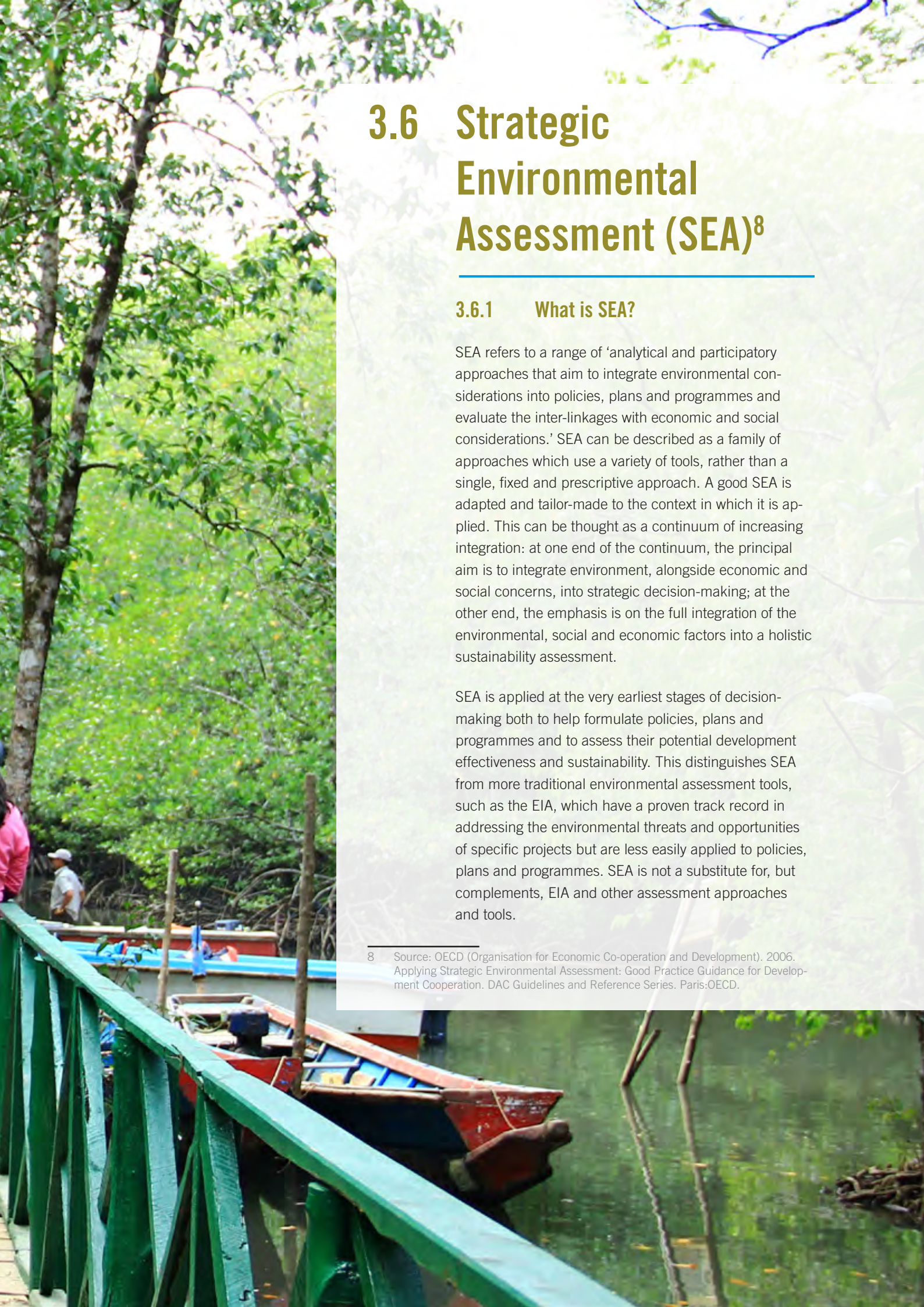
   The decision-making process involves consultation between the project proponent (assisted by a consultant) and the impact assessment authority (assisted by an expert group if necessary). The decision on environmental clearance is arrived at through a number of steps including evaluation of EIA and EMP.

Cost–benefit analysis

The cost–benefit effect simply compares all the expected present and future benefits of a project or policy with its present and future costs. It evaluates the practicability and viability of the project in relation to economic gains and the likely adverse effects of the project on the environment. Now it is felt that real value must be given to environmental components which must be recognized and considered in EIA. 'Direct value' must be given to the natural forces like air, water, vegetation cover; commercial or noncommercial, for example, output of a forest would include both lumber (commercial) and recreational amenity value (noncommercial). The 'indirect value' like the ecological functions of the ecosystem, such as climate stabilization and nitrogen fixation, must also be considered in cost–benefit effects. Recently, an innovative new approach has been evolved to be considered in EIA, known as the generational cost–benefit analysis. This approach discounts net benefits from the perspective of progeny involved. This approach was adopted by the courts also.

10. **Monitoring the clearance conditions**

    Monitoring has to be done during both the construction and operation phases of a project. It is done not just to ensure that the commitments made are complied with, but also to observe whether the predictions made in the EIA reports are correct or not. Where the impacts exceed the predicted levels, corrective action should be taken. Monitoring also enables the regulatory agency to review the validity of predictions and the conditions of implementation of the EMP. The project proponent, IAA and Pollution Control Boards should monitor the implementation of conditions. The proponent is required to file once in six months a report demonstrating the compliance to IAA.



3.6 Strategic Environmental Assessment (SEA)[8]

3.6.1 What is SEA?

SEA refers to a range of 'analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes and evaluate the inter-linkages with economic and social considerations.' SEA can be described as a family of approaches which use a variety of tools, rather than a single, fixed and prescriptive approach. A good SEA is adapted and tailor-made to the context in which it is applied. This can be thought as a continuum of increasing integration: at one end of the continuum, the principal aim is to integrate environment, alongside economic and social concerns, into strategic decision-making; at the other end, the emphasis is on the full integration of the environmental, social and economic factors into a holistic sustainability assessment.

SEA is applied at the very earliest stages of decision-making both to help formulate policies, plans and programmes and to assess their potential development effectiveness and sustainability. This distinguishes SEA from more traditional environmental assessment tools, such as the EIA, which have a proven track record in addressing the environmental threats and opportunities of specific projects but are less easily applied to policies, plans and programmes. SEA is not a substitute for, but complements, EIA and other assessment approaches and tools.

8 Source: OECD (Organisation for Economic Co-operation and Development). 2006. Applying Strategic Environmental Assessment: Good Practice Guidance for Development Cooperation. DAC Guidelines and Reference Series. Paris:OECD.

Table 2.1. SEA and EIA compared

EIA	SEA
Applied to specific and relatively short-term (life-cycle) projects and their specifications.	Applied to policies, plans and programmes with a broad and long-term strategic perspective.
Takes place at early stage of project planning once parameters are set. Considers limited range of project alternatives.	Ideally, takes place at an early stage in strategic planning. Considers a broad range of alternative scenarios.
Usually prepared and/or funded by the project proponents.	Conducted independently of any specific project proponent.
Focus on obtaining project permission, and rarely with feedback to policy, plan or programme consideration.	Focus on decision on policy, plan and programme implications for future lower-level decisions.
Well-defined, linear process with clear beginning and end (e.g. from feasibility to project approval).	Multi-stage, iterative process with feedback loops.
Preparation of an EIA document with prescribed format and contents is usually mandatory. This document provides a baseline reference for monitoring.	May not be formally documented.
Emphasis on mitigating environmental and social impacts of a specific project, but with identification of some project opportunities, off-sets, etc.	Emphasis on meeting balanced environmental, social and economic objectives in policies, plans and programmes. Includes identifying macro-level development outcomes.
Limited review of cumulative impacts, often limited to phases of a specific project. Does not cover regional-scale developments or multiple projects.	Inherently incorporates consideration of cumulative impacts.

3.6.2 Why SEA?

Applying SEA to development cooperation has benefits for both decision-making procedures and development outcomes. It provides the environmental evidence to support more informed decision-making, and to identify new opportunities by encouraging a systematic and thorough examination of development options. SEA helps to ensure that the prudent management of natural resources and the environment provides the foundations for sustainable economic growth which, in turn, supports political stability. SEA can also assist in building stakeholder engagement for improved governance, facilitate transboundary cooperation around shared environmental resources, and contribute to conflict prevention.

SEA is a continuous, iterative and adaptive process focussed on strengthening institutions and governance. It is not a separate system, nor a simple linear, technical approach. Instead, it adds value to existing country systems and reinforces their effectiveness by assessing and building capacity for institutions and environmental management systems.

Where SEA is applied to plans and programmes, a structured approach to integrating environmental considerations can be used. Key stages for carrying out an SEA on the level of plans or programmes include establishing the context, undertaking the needed analysis with appropriate stakeholders, informing and influencing decision-making, and monitoring and evaluation. SEA applied at the policy level requires a particular focus on the political, institutional and governance context underlying decision-making processes.

3.6.3 How is SEA conducted?

Some examples of tools that could be used in SEA

Tools for ensuring full stakeholder engagement:

- Stakeholder analysis to identify those affected and involved in the PPP decision
- Consultation surveys
- Consensus building processes

Tools for predicting environmental and socioeconomic effects:

- Modelling or forecasting of direct environmental effects
- Matrices and network analysis
- Participatory or consultative techniques
- GISs as a tool to analyse, organize and present information

Tools for analysing and comparing options:

- Scenario analysis and multicriteria analysis
- Risk analysis or assessment
- Cost–benefit analysis
- Opinion surveys to identify priorities

3.6.4 Basic Steps of SEA

1. Establishing the context for SEA
    a. Screening
    b. Setting objectives
    c. Identifying stakeholders
2. Implementing the SEA
    a. Scoping
    b. Collecting baseline data
    c. Identifying alternatives
    d. Identifying how to enhance opportunities and mitigate negative impacts
    e. Reporting
3. Informing decision-making
    a. Making recommendations
    b. Communication
4. Monitoring and evaluation

3.7 Marine Spatial Planning (MSP)[9]

What is marine spatial planning?

Marine spatial planning (MSP) is a practical way to create and establish a more rational organization of the use of marine space and the interactions between its uses, to balance demands for development with the need to protect marine ecosystems, and to achieve social and economic objectives in an open and planned way.

Marine spatial planning (MSP) is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process. It is important to remember that we can only plan and manage human activities in marine areas, not marine ecosystems or components of ecosystems. We can allocate human activities to specific marine areas by objective, e.g., development or preservation areas, or by specific uses, e.g., wind farms, offshore aquaculture, or sand and gravel mining.

Characteristics of effective marine spatial planning

- Ecosystem-based, balancing ecological, economic, and social goals and objectives toward sustainable development
- Integrated, across sectors and agencies, and among levels of government
- Place-based or area-based
- Adaptive, capable of learning from experience
- Strategic and anticipatory, focused on the long-term
- Participatory, stakeholders actively involved in the process

CASE STUDY

Integration of Biodiversity Aspects in Strategic Environmental Assessment of Nepal Water Plan and Environmental Impact Assessment of Operational Forest Management Plans in Nepal

This case study focuses on inclusion of biodiversity aspects in the Strategic Environmental Assessment (SEA) report of the Nepal Water Plan (NWP) finalised in July 2003, and separate plan-level Environmental Impact Assessment (EIA) reports of the Operational Forest Management Plan (OFMP) of Bara, Rautahat, and Dhanusha districts prepared in 1995, 1996 and 2000 respectively. The EIA report of OFMPs is taken into consideration as they are of plan level impact assessment. Nepal has prepared OFMPs of 20 Terai districts, and has included EIA as a separate chapter with a view to inform the decision-makers and the implementers to integrate environmental aspects including biodiversity conservation during their implementation (of OFMPs). The EIA report of OFMPs has more or less similar contents, issues, impacts, mitigation measures and monitoring requirements. The NWP is of national character, and OFMPs are location specific, i.e., within the administrative jurisdiction of the District Forest Office. The districts are the administrative units of His Majesty's Government of Nepal (HMGN). Each District Forest Office administers forest conservation and management activities including biodiversity aspects in forests, protected areas and wetlands. At present, about 39.6% of Nepal's total area (of 147,181 km2) is under forest cover and the forestry organisations administer it. The plan level EIA has been conducted only for the forestry sector. The SEA of NWP is the first of its kind in the water resources sector. http://www.eia.nl/nceia/pdfs/sea/casestudies/15_nepal_water_plan.pdf

[Source: Upreti/CBD, 2005]

9 Source: Ehler, C., and F. Douvere, (2009)

Why do we need marine spatial planning?

Most countries already designate or zone marine space for a number of human activities such as maritime transportation, oil and gas development, offshore renewable energy, offshore aquaculture and waste disposal. However, the problem is that usually this is done on a sector-by-sector, case-by-case basis without much consideration of effects either on other human activities or the marine environment. Consequently, this situation has led to two major types of conflict:

- Conflicts among human uses (user-user conflicts);
- Conflicts between human uses and the marine environment (user-environment conflicts).

These conflicts weaken the ability of the ocean to provide the necessary ecosystem services upon which humans and all other life on Earth depend. Furthermore, decision-makers in this situation usually end up only being able to react to events, often when it is already too late, rather than having the choice to plan and shape actions that could lead to a more desirable future of the marine environment. By contrast, marine spatial planning is a future-oriented process. It can offer you a way to address both these types of conflict and select appropriate management strategies to maintain and safeguard necessary ecosystem services.

The creation of MPAs is one measure that might result from a wider spatial planning process for the management of entire marine areas. Other measures may include the designation of shipping lanes and setting aside tracts for laying undersea cables.

MSP brings together multiple users of the ocean (e.g., energy, industry, government, conservation and recreation) to make informed and coordinated decisions about how to use marine resources sustainably.

It uses maps to create a more comprehensive picture of a marine area—identifying where and how an ocean area is being used and what natural resources and habitats exist. Its principal objective is to plan the equitable and sustainable use of our oceans as a whole, and balance ecological, economic and social interests.

Alternative visions of the future of marine areas

What if we do nothing?

In the next 20 years, human activities in many areas of the ocean will have increased significantly. Traditional uses, such as marine transportation, sand and gravel mining, and marine recreation will continue to grow in importance. Oil and gas development will continue to push further and deeper offshore with many of its operations occurring only underwater. Fisheries, will continue to exist, but at lower levels, due to the diminished stocks, and in more restricted areas because of competition for ocean space. New uses of the ocean, e.g., offshore renewable energy and offshore aquaculture, will compete with traditional uses for space. Climate change will have modified species distributions and habitats; increasing ocean acidification will raise new concerns about the survival of some species. In many areas, increasing public concern about the health of the ocean will lead to significant areas set aside for nature conservation. Conflicts among human activities will increase, e.g., collisions of ships with wind turbines might occur, as might conflicts between wave parks and surfers and sailors.

Alternatively, what might marine spatial planning produce?

In the next 20 years, our oceans could be very different. We could have achieved a vision of clean, safe, healthy, productive and biologically diverse oceans. Ecosystem-based, marine spatial planning of human activities could result in society gaining more benefits from the use of the marine environment than previously, while its natural diversity is better protected. Climate change will drive change both in the environment itself and the way in which people use it. Offshore renewable energy development will be commonplace and carbon capture and storage in the ocean could be underway. The cumulative environmental effects of using the marine environment will be managed through integrated MSP and account will be taken of the changing acidity and temperature that will already be affecting our oceans and seas. We will be responding to this through MSP so that the integrity of marine ecosystems is conserved.

We will be using the sea for a variety of reasons, delivering greater economic and social benefits. However, MSP means that activities in the marine environment will co-exist and that the effects of different activities on each other and the cumulative effects on the environment as a whole will be taken into account and managed consistently. Marine industries will have access to certain places, generating wealth for the nation. Consumers of marine products, including offshore renewable energy or seafood, will expect these to have been produced sustainably, and marine industries will ensure that the environmental and social effects of their operations are acceptable.

Our seas will be cleaner and healthier than they are now and they will be ecologically diverse and dynamic. Ecosystems will be resilient to environmental change so that they

Deliver the products and services we need for present and future generations. Representative, rare, vulnerable and valued species and habitats will be protected. Spatial and other management measures will be in place to make sure that there is no net loss of biodiversity as a result of human activities. Spatial management measures, such as a representative and ecologically coherent network of well-managed marine protected areas, will help deliver this and in some cases enable ecosystems to recover from previous damage. Fish stocks will be caught sustainably, with access to them shared between commercial and recreational fishermen. In the long term, management of human activities in the marine environment will be implemented to secure long-term benefits for the whole of society and nature. Sustainable marine development Could be the outcome.

What are the benefits of marine spatial planning?

When developed properly, marine spatial planning can have significant economic, social, and environmental benefits. Box below shows some of the most important benefits of marine spatial planning.

- Identification of biological and ecological important areas
- Biodiversity objectives incorporated into planned decision-making
- Identification and reduction of conflicts between human use and nature
- Allocation of space for biodiversity and nature conservation
- Establish context for planning a network of marine protected areas
- Identification and reduction of the cumulative effects of human activities on marine ecosystems

- Greater certainty of access to desirable areas for new private sector investments, frequently amortized over 20-30 years
- Identification of compatible uses within the same area of development
- Reduction of conflicts between incompatible uses
- Improved capacity to plan for new and changing human activities, including emerging technologies and their associated effects
- Better safety during operation of human activities
- Promotion of the effcient use of resources and space
- Streamlining and transparency in permit and licensing procedures

- Improved opportunities for community and citizen participation
- Identification of impacts of decisions on the allocation of ocean space (e.g., closure areas for certain uses, protected areas) for communities and economies onshore (e.g., employment, distribution of income)"
- Identification and improved protection of cultural heritage
- Identification and preservation of social and spiritual values related to ocean use (e.g., the ocean as an open space)

Stakeholder Participation

Involving key stakeholders in the development of marine spatial planning (MSP) is essential for a number of reasons. Of these, the most important is because MSP aims to achieve multiple objectives (social, economic and ecological) and should therefore reflect as many expectations, opportunities or conflicts occurring in the MSP area.

The scope and extent of stakeholder involvement differs greatly from country to country and is often culturally influenced. The level of stakeholder involvement will largely depend on the political or legal requirements for participation that already exist in your country.

Generally speaking, all individuals, groups or organizations that are in one way or another affected, involved or interested in MSP can be considered stakeholders. However, involving too many stakeholders at the wrong moment or in the wrong form can be very time consuming

And can distract you from the expected or anticipated result.

To involve stakeholders effectively (e.g., leading toward expected results) and efficiently (e.g., producing expected results at least-cost), you need to consider three important questions

1. Who should be involved?
2. When should stakeholders be involved?
3. How should stakeholders be involved?


GOA BEACH

3.8 GIS and remote sensing

Marine protected areas (MPAs) are important tools for the conservation of marine biodiversity but their designation and effective monitoring require frequent, comprehensive, reliable data. Remote sensing (RS), as demonstrated for terrestrial protected areas, has the potential to provide key information to support MPA management. RS to monitor biodiversity surrogates, e.g. ecological (e.g., primary productivity) and oceanographic (e.g., Sea Surface Temperature) parameters that have been shown to structure marine biodiversity. RS has the potential to inform marine habitat mapping and monitoring, and can be used to track anthropogenic activities and its impacts on biodiversity in MPAs. RS shows great promise to support wildlife managers in their efforts to protect marine biodiversity around the world, in particular when such information is used in conjunction with data from field surveys (Kachelriess et al 2014[10]).

GIS for Ocean Conservation Marine habitats and the life they contain are threatened by global warming, extreme weather, natural and man-made pollution, overharvesting, and additional human disturbances. GIS technology is a tool that helps conservationists acquire, manage, analyze, and visualize spatial and thematic oceanic data through map generation. It is used around the world to map marine habitats; water quality; species distribution, population, and behavior; pollution; fishing grounds; and other factors that impact marine life. ESRI's ArcGIS software suite is a tool that can show at-risk areas in danger of biodiversity loss, habitat degradation, and resource depletion. It also acts as an aid in monitoring and examining the effectiveness of conservation practices and protected areas to ensure the preservation of the earth's oceans (Plakos, 2007).

By integrating common database operations such as query and statistical analysis with maps, a GIS enables management of location-based information. Tools for display and analysis of various statistics help in linking databases and maps to create dynamic displays. Thus, distribution of population, vegetation, animal ranges, human–animal interactions, animal migration and transboundary movement of animals are but a few examples of what can be displayed. The emphasis is on developing digital spatial databases, using the datasets derived from precise navigation and imaging satellites, aircrafts, digitization of maps and transactional databases. Tools to visualize, query and overlay various databases in ways not possible with traditional spreadsheets make GIS valuable for explaining events, predicting outcomes and planning strategies.

10 Kachelriess, D., M. Wegmann, M. Gollock, and N. Pettorelli. 2014. "The Application of Remote Sensing for Marine Protected Area Management." Ecological Indicators 36: 169 177. doi:10.1016/j.ecolind.2013.07.003

"Remote sensing is the art and science of making measurements of the earth using sensors on airplanes or satellites. These sensors collect data in the form of images and provide specialized capabilities for manipulating, analysing, and visualizing those images. Remote sensing makes it possible to collect data on dangerous or inaccessible areas. Remote sensed imagery is integrated within a GIS."

CASE STUDY

Remote sensing and GIS case-studies on tropical coasts (Source: Dahdouh-Guebas 2002)

Remote sensing and GIS have been used to study mangrove forests (e.g. Ramachandran et al., 1998[11]), seagrass beds (e.g. Ferguson and Korfmacher, 1997[12]; Dahdouh-Guebas et al., 1999[13]; Pasqualini, 2001[14]) and coral reefs (e.g. Holden and Ledrew, 1999[15]; Lubin et al., 2001[16]). Blasco et al. (1998[17]) reviewed the suitability of various remote sensing technologies in different mangrove research fields and concluded that aerial photography is best suited for investigating the density, phenol- ogy, hydrological status, human impact, height and floristics of mangrove forests. Despite innovations in remote sensing technology, aerial photographs often remain as the preferred technology (Ramsey and Laine, 1997[18]; Kadmon and Harari-Kremer, 1999[19]; Mumby et al., 1999[20]; Dahdouh-Guebas et al., 2000[21]; Hyyppa et al., 2000[22]; Manson et. al., 2001[23]; Lubin et al., 2001[24]; Verheyden et al., 2002[25]; Sulong et al., 2002[26]). Also in the study of larger mangrove assemblages, data with a high spatial resolution may reveal relevant details on vegetation structure dynamics (Dahdouh-Guebas et al., 2000b[27]). Such results may be used to predict future changes in vegetation structure (Dahdouh-Guebas, 2001[28]).

11 Ramachandran, S., Sundaramoorthy, S., Krishnamoorthy, R., Devasenapathy, J., and Thanikachalam, M.:1998, 'Application of remote sensing and GIS to coatal wetland ecology of Tamil Nadu and Andaman and Nicobar group of islands with special reference to mangroves', Current Science 75(3), 236–244.

12 Ferguson, R.L. and Korfmacher, K.: 1997, 'Remote sensing and GIS analysis of seagrass meadows in North Carolina, USA', Aquatic Botany 58, 241–258.

13 Dahdouh-Guebas, F., Coppejans, E. and Van Speybroeck, D.: 1999, 'Remote sensing and zonation of seagrasses and algae along the Kenyan coast', Hydrobiologia 400, 63–73.

14 Pasqualini, V., Pergent-Martini, C., Clabaut, P., Marteel, H. and Pergent, G.: 2001, 'Integration of aerial remote sensing, photo- grammetry, and GIS technologies in seagrass mapping', Photogrammetric Engineering and Remote Sensing 67(1), 99–105

15 Holden, H. and Ledrew, E.: 1999, 'Hyperspectral identification of coral reef features', International Journalof Remote Sensing 20(13), 2545–2563

16 Lubin, D., Li, W., Dustan, P., Mazel, C.H. and Stamnes, K.T.: 2001, 'Spectral signatures of coral reefs: features from space', Remote Sensing of Environment 75(1), 127–137.

17 Blasco, F., Gauquelin, T., Rasolofoharinoro, M., Denis, J., Aizpuru, M. and Caldairou, V.: 1998, 'Recent advances in mangrove studies using remote sensing data', Marine and Freshwater Research 49(4),287–296.

18 Ramsey, E.W. and Laine, S.C.: 1997, 'Comparison of LANDSAT Thematic Mapper and high resolution photography to identify change in complex coastal wetland', Journal of Coastal Research 13, 281–292

19 Kadmon, R. and Harari-Kremer, R.: 1999, 'Studying long-term vegetation dynamics using digital processing of historical aerial photographs', Remote Sensing of Environment 68, 164–176.

20 Mumby, P.J., Green, E.P., Edwards, A.J. and Clark, C.D.: 1999, 'The cost-effectiveness of remote sensing for tropical coastal resources assessment and management', Journal of Environmental Management 55(3),157–166.

21 Dahdouh-Guebas, F., Verheyden, A., De Genst, W., Hettiarachchi, S. and Koedam, N.: 2000, 'Four decade vegetation dynam- ics in Sri Lankan mangroves as detected from sequential aerial photography: a case study in Galle', Bulletin of Marine Science 67, 741–759.

22 Hyyppa, J., Hyypp ¨ a, H., Inkinen, M., Engdahl, M., Linko, S. and Zhu, Y.H.: 2000, 'Accuracy comparison ¨of various remote sensing data sources in the retrieval of forest stand attributes', Forest Ecology and Management 128, 109–120.

23 Manson, F.J., Loneragan, N.R., McLeod, I.M. and Kenyon, R.A.: 2001, 'Assessing techniques for estimating the extent of mangroves: topographic maps, aerial photographs and landsat TM images', Marine and Freshwater Research 52, 787–792

24 Lubin, D., Li, W., Dustan, P., Mazel, C.H. and Stamnes, K.T.: 2001, 'Spectral signatures of coral reefs: features from space', Remote Sensing of Environment 75(1), 127–137.

25 Verheyden, A., Dahdouh-Guebas, F., Thomaes, K., De Genst, W., Hettiarachchi, S. and Koedam, N.: 2002, 'High resolution vegetation data for mangrove research as obtained from aerial photography', in F. Dahdouh-Guebas (ed.), Remote Sensing and GIS in the Sustainable Management of Tropical Coastal Ecosystems, Environment, Development and Sustainability 4(2), 113–133

26 Sulong, I., Mohd-Lokman, H., Tarmizi, K. and Ismail, A.: 2002, 'Mangrove mapping using Landsat imagery and aerial photo- graphs: Kemaman District, Terengganu, Malaysia', in F. Dahdouh-Guebas (ed.), Remote Sensing and GIS in the Sustainable Management of Tropical Coastal Ecosystems, Environment, Development and Sustainability 4(2), 93–112

27 Dahdouh-Guebas, F., Verheyden, A., De Genst, W., Hettiarachchi, S. and Koedam, N.: 2000b, 'Four decade vegetation dynamics in Sri Lankan mangroves as detected from sequential aerial photography: a case study in Galle', Bulletin of Marine Science 67, 741–759

28 Dahdouh-Guebas, F.: 2001, Mangrove Vegetation Structure Dynamics and Regeneration, Ph.D. Dissertation, Vrije Universiteit Brussel, Brussels, Belgium, 317 pp.

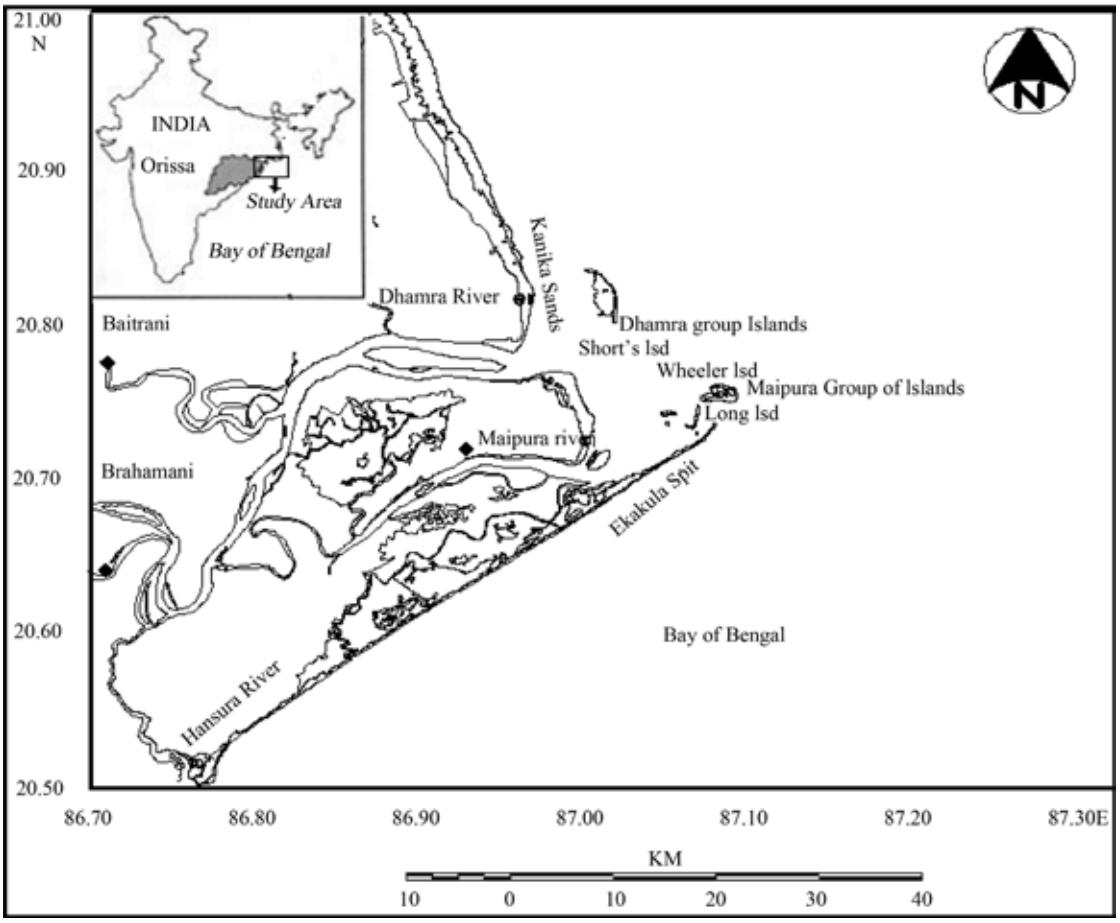
CASE STUDY: Use of GIS and Remote Sensing

Areal Extent of Erosion and Accretion in and around the Gahirmatha Coast, NW of Bay of Bengal by Remote Sensing and GIS Analysis of Multi-Temporal Satellite Imagery

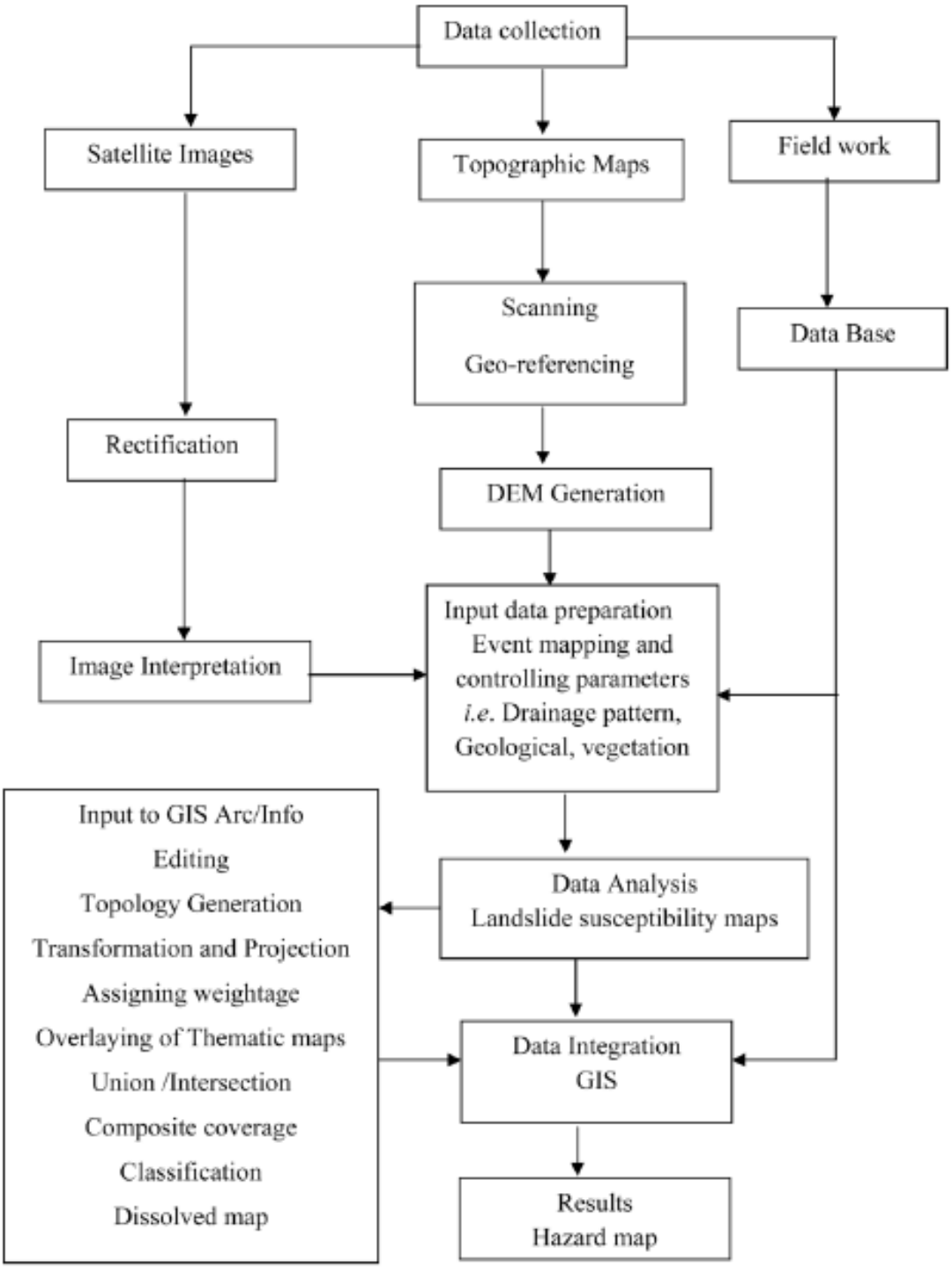
The shoreline morphology change due to erosion and deposition is a major concern for coastal zone management. In the present study, a highly dynamic coast of Gahirmatha on Bay of Bengal in northeast India is experiencing active erosion, which is mainly wave and tide erosion related hazard threat ending human habitation and sustainability of the coast. In this study, high resolution satellite imagery of time series provided detailed sequence of coastal morphology and their changes in all respects. Comparison study of relative shoreline positions on time series satellite data spanning three decades from 1973 to 2004 covering for the years of 1973, 1983, 1987, 1990, 1998, 2000 and 2004, provided regional changes with accelerated erosion and accretion. The result of the studies have revealed that the areas of severe erosion found along the coast are confined to the promontories of the present day mouths itself of the Baitrani at Dhamra and Brahmani at Maipura inlets. In this background, it is significant to understand the magnitude of factors that are responsible for prograding or retrograding of coast. The present study is an attempt in this direction.

Source: Veeraanarayanaa, B., K. Ravikumar, T. Ramesh, M. Venkateswararao, P. N. Sridhar, (2015). Balabathina, International Journal of Geosciences, Vol. 6, pg. 705-719.

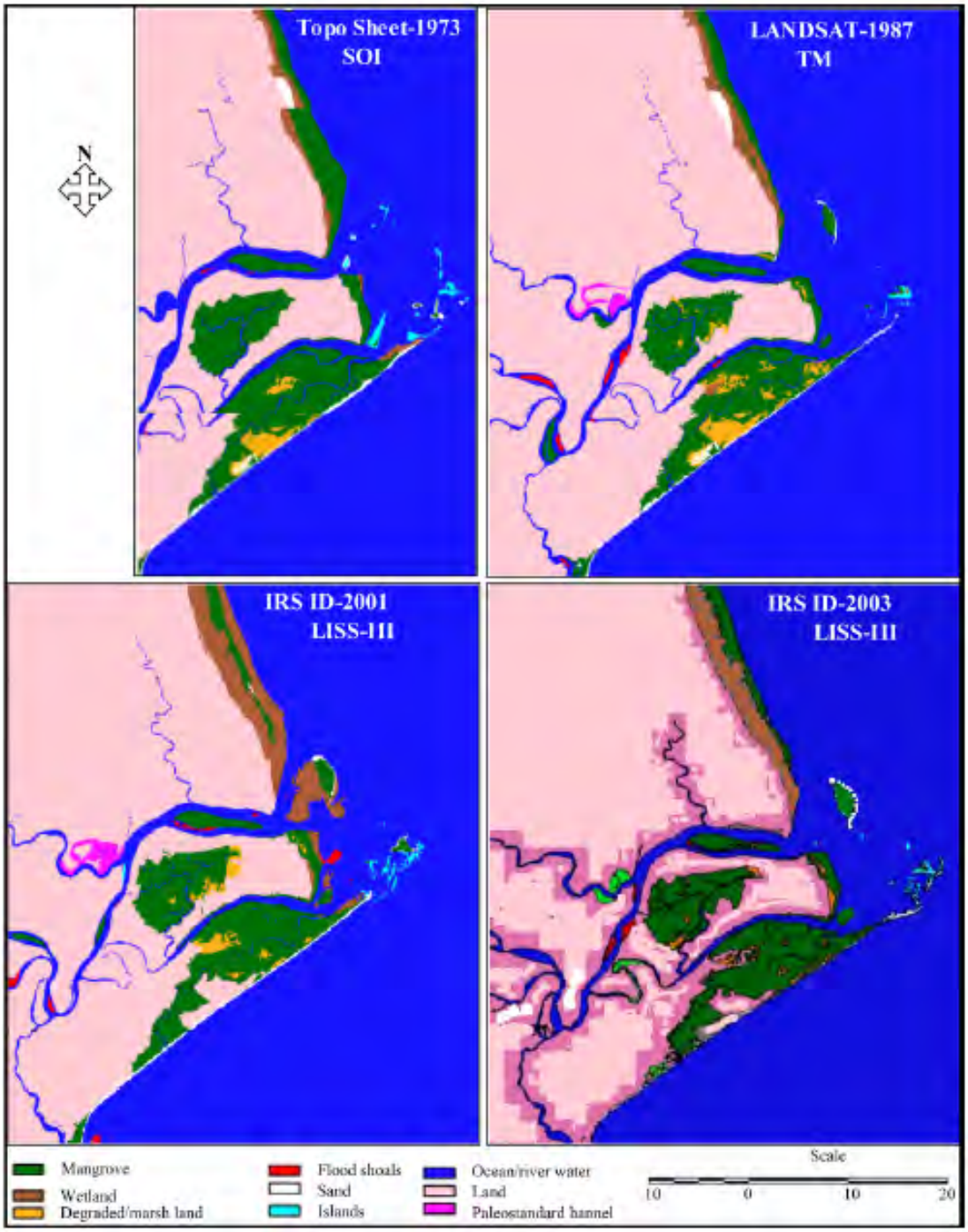
Map of Gahirmatha coast showing the study area for coastal erosion/accretion.



The below mentioned flow diagram explains the methodology adopted for thematic layer preparation.



Morphological changes of coast during 1973-2003.



3.9 Economic and financial tools

Economic and financial tools include economic valuation, removal, phasing out or reform of harmful subsidies and other incentives that are harmful to biodiversity, positive incentive measures such as payments for ecosystem services, taxes, user fees and other disincentives that apply the polluter-pays principle.

3.10 Sectoral standards, codes of conduct, guidelines, certification schemes and good practices

3.10.1 An overview[29]:

Standards are policy guidelines that regulate the effect of human activity upon the environment. Standards may specify a desired state (e.g. lake pH should be between 6.5 and 7.5) or limit alterations (e.g. no more than 50% of mangrove forest may be damaged).

Guidelines provide voluntary and practical advice and streamlining on how to undertake particular processes. Guidelines, for example the CBD Tourism guidelines, are usually relatively general and can be applied to a number of circumstances.

Codes of Conduct can be very detailed, and set out standards of behaviour for responsible practices with a view to ensuring sustainable resource use. A good example of a sector specific code of conduct is the FAO Code of Conduct for Responsible Fisheries.

Good practices (or best practices) are informal examples of actions that can be undertaken to achieve certain sustainability goals, or points that need to be kept in mind towards this end. The best practices for conserving traditional knowledge related to sustainable fisheries, or good practices for community-based coastal tourism are some of the examples.

29 Source: Secretariat of the Convention on Biological Diversity. 2011

3.10.2 Marine products certification[30]:

The Marine Stewardship Council (MSC) is an international non-profit organisation established to address the problem of unsustainable fishing and safeguard seafood supplies for the future. Our vision is for the world's oceans to be teeming with life – today, tomorrow and for generations to come. Through our certification and ecolabelling program, we're helping to create a more sustainable seafood market. We run the only certification and ecolabelling program for wild-capture fisheries that meets best practice guidelines set by both the United Nations Food & Agriculture Organization and ISEAL, the global membership association for sustainability standards. By being part of this program fisheries, retailers and food processors from around the globe are helping to safeguard seafood supplies (MSC 2016).

The marine stewardship council's fishery certification programme and seafood ecolabel recognizes and rewards sustainable fishing. It is a global organization working with fisheries, seafood companies, scientists, conservation groups and the public to promote the best environmental choice in seafood (http://www.msc.org/).

Marine Stewardship Council (MSC)

Our fisheries, our future. Sustainable fishing in the developing world

https://www.youtube.com/watch?v=Vq5l3pNCUzY

India is one among the top ten fish producing countries in the world contrlbuting over 5% (7.5 million t) of the world fish production. The marine fisheries sector contributes nearly 50% of the total fish production and the total export of seafood during 2008-09 was estimated at 6,02,835 t at a value of Rs. 8608 crores. The estimated manpower employed in the marine fisheries sector in 2005 has been 1.24 million and in addition an almost equal number has been reported to be involved in the harvest and Post-harvest activities including marketing. In the last five decades, the technological advancements fostered by fisheries research in the harvest and pos ~harvest sectors have accelerated the process of transformation of a traditional substance level marine fisheries sector into a market driven multi-crore rupee industry (Pillai and Ganga 2010).

In the context of globalization and challenges of global competition in trade and economics, there is urgent need for policy interventions at the state and national levels which will ensure sustainable exploitation of the marine resources as well as better livelihood opportunities for the fisherfolk. It is also necessary to encourage and facilitate resource management initiatives from within the fishworker communities themselves. Fisheries management is a continuous and interactive process, where, economic, social and ecological costs and benefits are to be understood and interventions designed. According to Hillborn (2002[31]), the key to successful fisheries management is not confined to better science, more reference points and precautionary approaches but rather in implementing better systems of marine governance which provides incentives for all the stakeholders (fishworkers. scientists and managers) to make decisions that will be in their interest as well as contribute to societal goats (Pillai and Ganga 2010),

30 MSC (2016)

31 Hilborn, R. 2002. The Dark Side of Reference Points. Bulletin of Marine Science 70(2): 403-408

3.10.3 Clean Beach Certification

(Source: http://www.cleanbeaches.com/):

The Clean Beaches Coalition (CBC) is a network of coastal organizations and individuals committed to promoting clean, healthy and well managed beaches around the world. CBC has pioneered the concept of Blue Wave Ethics and Blue Wave Certification.

Blue Wave beaches and destinations represent the complete eco-coastal experience. As such, it supports clean, safe and economically thriving beach communities and have developed the 7 blue wave ethics ensure sustainable beaches. The Blue Wave program is the first national environmental certification for beaches. The Blue Wave certification process is designed to help maintain robust, healthy, and vibrant beaches.

CASE STUDY: USER FEE SYSTEM FOR THE TUBBATAHA REEF NATIONAL MARINE PARK, PHILIPPINES

The Tubbataha Reef National Marine Park (33,200 hectares) is located off Palawan Island in the Sulu Sea. The Park is managed in accordance with the NIPAS Act, which requires the creation of a multi-sectoral governing body (or PAMB) to ensure the implementation of the site management plan. However, government funds to protect and manage the Park have always been insufficient. Despite the premium quality and popularity of Tubbataha for scuba diving, its biodiversity value has been grossly underestimated. To enhance the Park's recreational value and at the same time maintain its ecological integrity, the Board, in cooperation with the diving community and other stakeholders and NGOs, developed a user fee system that would best capture and monetize the recreational benefits from tourism. A willingness-to-pay study in 1999 showed that an average diver was willing to pay $41 per visit. Using these results, a two-tiered pricing scheme was developed whereby local divers pay $25 and foreign pay $50 for entrance. The collection system is managed by the Tubbataha Management Office under a park superintendent and is consistent with the government's guidelines on determining fees in protected areas (DENR-DAO 2000-51). The Park has generated a total income of Philippine Peso (PHP) 9.3 million (approximately US $186 000) from diving fees since 2000. In 2004, an income of PHP 2.5 million (approximately US $50 000) from entrance fees and fines was enough to cover 41 percent of the annual core costs of PHP 6 million to protect Tubbataha. The experience shows the importance of adopting a business approach to instituting user fee systems for long-term sustainable financing of MPAs while being careful not to compromise the long-term benefits from biodiversity. **(Source: Tongson and Dygico, 2004).**

3.11 Incorporating biodiversity into policies, plans and programmes of Key Relevant Sectors

3.11.1 Poverty alleviation

Since the poor are particularly dependent on the goods and services supplied by biodiversity, and the poorest and biodiversity-rich areas of the world largely overlap, geographical development strategies that ignore their protection undermine poverty alleviation and are therefore counterproductive. For this reason, it is crucial for development and poverty alleviation strategies and programmes to prioritize biodiversity (CBD cross-cutting programme on biodiversity and development). The imperative to integrate biodiversity concerns into development plans and policies of relevant sectors and programmes is enshrined in the CBD and other biodiversity conventions, and reinforced by the findings of Millennium Ecosystem Assessment (2003) and Global Biodiversity Outlook (CBD 2006). In 2007, the 2010 biodiversity target was integrated into the Millennium Development Goals as target 7 B4, which was a clear indication of the perceived contribution that biodiversity may provide for achieving the global development goals.

3.11.2 Urban development

Another sector is urban development, which is becoming more and more important for mainstreaming biodiversity, not only because of the increase in the proportion of the world's population and more concentrated human assemblages in the urban areas, but also because these urban areas are expanding into the natural ecosystems in the peri-urban areas. Ecosystems in urban areas are, most often, in a highly fragmented and stressed form and are therefore not able to meet the tremendously increasing demand for the ecosystem services required by city dwellers—in the form of clean air and water, spiritual and stress-releasing activities, and most importantly, disaster risk reduction.

According to CBD's Cities and Biodiversity Outlook, by 2050 almost three billion additional people will inhabit the world's cities and the world will have undergone the largest and fastest period of urban expansion in history.

While discussing cities, it is important to bear in mind that 13 out of the 20 most populated cities in the world in 2005 are port cities. Port cities are highly vulnerable to natural disasters like cyclones and urban flooding, which are becoming more frequent due to climate change. A study published by OECD focussing on the threats from coastal flooding in 136 port cities around the world concludes that by the 2070s, the total population exposed could grow more than three-fold to around 150 million people due to the combined effects of climate change (sea level rise and increased storminess), subsidence, population growth and urbanization. About 38 per cent of the port cities studied in this paper are found in Asia. Realizing the need to conserve biodiversity in the cities and also to involve local governments and other stakeholders in this process, several initiatives have been taken under the umbrella of CBD.

URBAN BIODIVERSITY
Securing a green future of our cities
[Source: Khera 2013]

In the fast-developing urban areas, pollution and waste management pose a serious threat to the health and overall quality of life of citizens. Predicted impacts of climate change and disasters only escalate the problem, especially in coastal megacities and hill stations. Urban biodiversity contributes to provisioning of ecosystems services leading to amelioration of urban microclimate, public health, and enhancement of the overall quality of life of citizens. Though there are several challenges associated with conserving urban biodiversity, there are many successful examples and good initiatives as well. The decision lies on us- in which way we want to conserve and maintain the elements of urban biodiversity for securing a green future for our cities

Relationship of human beings with the physical environment has many dimensions and facets. This relationship manifests itself in the form of life-supporting Ecosystem Services that we derive from the stable and intact ecosystems. Ecosystem services are the benefits that people obtain from the ecosystems, including provisioning (timber, fodder, food, fuelwood, medicinal plants etc), regulating (air quality maintenance, climate regulation, carbon sequestration, regulation of human diseases, pest and disease control, water purification, natural hazard and disaster risk reduction, climate amelioration, pollination etc), cultural (spiritual and education services, aesthetic value etc), and supporting services (water cycling, provisioning of habitat, production of atmospheric oxygen etc). These life-supporting ecological services can be ensured on a sustainable basis only if the ecosystems are stable and resilient.

So, what determines the stability and overall health of the ecosystems?..... It's the variety and variability among living organisms that provides stability and resilience to the ecosystems. Biodiversity—the backbone of ecosystems—is the variability among living organisms from all sources, and the ecological complexes of which they are part. The variability of living elements -or biodiversity- exists at different levels such as habitat, species and also at the genetic or variety level.

When we visualize the Ecosystem Services, it is very natural for us to imagine the source of these services as a lush green forest, a huge clear water lake, ocean and so on. Similarly, Biodiversity is perceived as tiger, orchids, whales, crop varieties and so on. All this is fine, and it is very natural to start our thinking from the pristine ecosystems and species and recognize their importance for human lives……the worry begins when this trail of thought ends without recognizing the value of urban ecosystems and urban biodiversity ! The fact is that the urban ecosystems are the closest relationship that the urban dweller can have with nature. Most of the critical and life-supporting ecosystem services needed by the urban dwellers such as clean air and a disease-free environment are being contributed by urban biodiversity.

Varying sizes of pockets of natural ecosystems present in the urban landscape are heavily influenced by human activities, and commonly referred to as Urban open spaces. Urban open spaces include greenspaces such as urban parks, remnants of the natural forested areas, avenue plantations etc., as well as water bodies. Urban open spaces have been recognized for providing ecosystem services, including air and water purification, mitigation of the impact of environmental pollution, carbon sequestration, regulation of micro climate (especially temperature reduction by the green cover), recreational value, habitat for urban wildlife, therapeutic value, as well as an increasingly recognized desired surrounding for yoga, walk and other daily exercises. In future, social and spatial implications of new lifestyles, values, and attitudes to nature and sustainability will lead to even higher demands for urban open spaces. However, the presence of urban open spaces or an adequate tree cover is not in itself sufficient for ensuring that the urban openspaces areas will continue to provide the ecosystem services to the urban dwellers. Planning and management of urban open spaces based on ecological prin-

ciples is essential for their own sustainability as well as to fulfil the objectives for which they are being protected i.e. provision of ecosystem services. Conservation and management of urban biodiversity is, therefore, important for sustaining urban open spaces and the resulting ecosystems services.

In the urban context, habitat biodiversity would mean presence of different types of habitats like wetlands, rivers, forests, gardens, open greens, homestead gardens and roadside plantings. Different types of habitats are required to maintain the flow of various ecosystem services. For examples, a very important ecosystem service is reduction of disaster risk, which essentially means that a network of greenspaces, avenue plantation, wetlands and river flood plain reduce the flow of water and absorb excess water in case of heavy rainfall and reduce the threat of a flash flood or general urban flooding.

Species biodiversity- different types of species of plants, animals, birds, insects, amphibians- is essential for maintaining the required stability and resilience in the urban ecosystems. High species biodiversity acts as an insurance against changes in climate and species loss due to anthropogenic pressure; even if some species do not survive, others will be present in the ecosystem to quickly take up the task of the lost species, a function referred to as 'ecological niche'. A good example for the importance of maintaining different species in the urban ecosystems is the relationship between mosquitos and frogs; arguably, the loss of frog due to their habitat loss is one of the main reasons for the exponentially growing mosquito population in the urban areas in several parts of India.

Presence of structural form of biodiversity such as various layers of vegetation like trees, shrubs, herbs, grasses and creepers, have their own roles to play in the ecosystem by virtue of the strata they occupy in a particular ecosystem. Differential species interactions that take place between different elements of biodiversity over different spaces and time in an urban setting result in the variety of functions that take place in an ecosystem. These set of functions are the basis for all the ecosystem services provided by the ecosystem.

Urban biodiversity has its own set of challenges and management methods. The urban ecosystems differ from the natural ones in the fact that there are numerous 'stressors' affecting biodiversity and consequently the ecosystem stability in urban areas. The most important stressors are fragmentation of natural habitats by transportation corridors, residential and shopping complexes as well as continuous anthropogenic pressures in the form of vehicular pollution, toxicity due to solid and liquid waste, and manipulation of habitats and species composition by human activities. The stress on urban biodiversity leads to inhibited ecosystem services, which has a far reaching effect on changing the perception of citizens towards the relevance of urban ecosystems and biodiversity. A declined interest in managing urban biodiversity further reduces the effectiveness of the urban open spaces in providing the required ecosystem services. This vicious cycle can only be put to an end by managing the urban open spaces and urban biodiversity with a long term planning in a way that the ecosystem services from urban open spaces and biodiversity can be effectively optimized.

There is mounting evidence cross the globe that urban biodiversity and healthy urban ecosystems contribute to health and overall wellbeing of the citizens, and accordingly the urban local governments and citizens are coming together to act for conserving biodiversity and urban ecosystems. A very successful example is the "Healthy Parks, Healthy People" initiative in Victoria, Australia, aiming at emphasizing the value of visiting parks and natural open spaces for the benefits they provide as healthy places for body, mind, and soul. In New York, the *MillionTreesNYC* initiative for greening the city is implemented with partnership of public and private sector. The main objective of the project Life+ in Europe is to increase nature and biodiversity protection in urban areas and by local authorities.

In order to provide forum for experience sharing, there are several global initiatives focusing on the issue. The Global Partnership on Cities and Biodiversity under the umbrella of the global Convention on Biological Diversity (CBD) bring focus to urban biodiversity and engaging citizens and local authorities for conserving this important resource. Local Action for Biodiversity (LAB) is a global urban biodiversity

programme coordinated by ICLEI – Local Governments for Sustainability; recently, LAB India programme was launched, which joins a global network of cities committed to conserving urban biodiversity. In India, these are cities of Hyderabad, Thane, Delhi-NCT, Guntur, Shimla, Anantapur District, Kurunegala, Matale and Varanasi.

Based on the existing knowledge on strategies for urban biodiversity conservation and management, following four factors clearly stand out as critically important:

- A strategic approach to identify and protect open spaces in the developing as well as existing urban areas is extremely important, as these open spaces act as nucleus of urban biodiversity conservation. Conservation of biodiversity in urban ecosystems is not confined merely to open spaces, but is greatly affected by activities outside the open spaces. Area based conservation strategies, therefore, would be difficult to yield result unless and until urban biodiversity is integrated in the regional planning and urban development plans and policies. New tools such as Strategic Environment Assessment (SEA) and the Economics of Ecosystems and Biodiversity (TEEB) would be extremely useful in this context.

- The available open spaces must be managed based on sound ecological principles. Maintenance of diversity of habitats and species across open spaces, maintaining structural features of biodiversity, and restricted use of exotic species of plants are some of the key strategies. Also, a certain level of natural diversity exists between- for example, among urban parks- that needs to be maintained rather than bringing all the parks in an urban area under a similar management regime and species composition. Amelioration of the overall urban area through green networks and channels in the form of road-side avenue plantations, streams, and community and home-stead gardens etc would be critical in expanding the 'biodiversity space' in the cities.

- Regular monitoring of ecosystems is important to measure the management effectiveness of the conservation strategies applied, and to adapt accordingly. Monitoring urban biodiversity is therefore an important strategy and activity in many of the cities. Most commonly used indicators for urban ecological monitoring are birds, as they are sensitive to even small environmental changes and thus useful models for studying a variety of environmental problems. An unnatural change in the population of a bird species provides an indication of an ecological imbalance in the urban environment and provides an 'early warning' to the citizens. Thus maintaining the populations of bird species in urban areas is also an economically viable option for urban ecosystem management. Regular monitoring of urban biodiversity indicators is also immensely useful for monitoring the impacts of climate change on urban ecosystems.

- Engagement of citizens has been one of the most important factors in successful conservation management of urban biodiversity in many cities of the World. Ecosystem services trade-offs exist in the way open spaces are managed; for example, a park managed to optimize space for walk and sports would have less plant density and cover leading to reduced cooling effect. Citizens groups and associations must be at the centre stage to plan and manage the open spaces for conserving biodiversity and for optimum provisioning of ecosystem services. Involvement of citizens is especially critical when it comes to monitoring urban biodiversity.

The House Sparrow (*Passer domesticus*) is known to co-occur with humans since historic times, and thus serves as a good indicator of the ecological quality. Recently a major decline in its population was reported from many parts of the World. Several studies and initiatives are now focussing on this species, not only to restore its population but also to look into the reasons of its decline to get a clue for human populations as well. Decline in this species was also reported from Delhi[32] and other parts

in India. While the reasons of its decline are yet to be established[33], a great deal of initiatives[34] pave the way for restoring the population. Delhi Government has taken an important step by declaring the House Sparrow as the State Bird of Delhi. All this explicitly reflects not only the importance of different elements of urban biodiversity, but also the need for regular monitoring to be able to take timely action.

Management of urban biodiversity is not a new concept. Historically, the foremost criteria for human settlements used to be presence of clean water bodies and healthy ecosystems. The high-paced development of human settlements and the changing relationship of humans with nature have posed a challenge today on the urban managers to find new and innovative ways to sustain healthy urban ecosystems. Predicted impacts of climate change and ever increasing threat from natural disasters only add to this challenge. Investing in urban biodiversity seems to be the future right now to tackle the situation and to continue to receive the ecosystem services for our own health and overall wellbeing.

Cities and Biodiversity Outlook (CBO) brings into sharp focus not only the extraordinary wealth of urban biodiversity but also its role in generating ecosystem services upon which large and small urban populations and communities rely for their food, water, and health. It makes a strong argument for greater attention to be paid by urban planners and managers to the natural or nature-based assets within their metropolitan boundaries as one way toward realizing a range of targets established both pre- and post-Rio+20. In partnering with cities, the CBD has also recognized their potential for assisting in meeting the 20 strategic Aichi Biodiversity Targets by 2020 that were agreed upon by governments at the 2010 meeting of the Convention in Nagoya, Japan.

33 http://neerajkhera.blogspot.in/2013/05/rock-pigeon-new-dominant-in-cities.html

34 http://www.citizensparrow.in/

3.11.3 Fisheries and aquaculture

Fisheries and aquaculture have had damaging impacts on both commercially harvested fish stocks, and nontarget species and habitats. Here are some examples of how fisheries as an activity can have a negative implication on biodiversity:

- The use of trawl nets has been reported to cause major disturbances to ocean floor and benthic fauna
- Negative impacts on nontarget species
  - Use of gillnets for fishing may lead to accidental capture of juvenile individuals of large fish species
  - Use of small gauge gillnets leads to increased accidental capture of juvenile fish
  - Placement of gillnets across river mouths leads to massive catch, including nontarget species, leading to population decline
  - Capture of undersized individuals of molluscs for commercial utilization, reduction of population levels and breeding success
- Use of explosives and poisons for fishing causes massive and unselective mortality of aquatic fauna and has led to the destruction of coral reefs

The Code of Conduct for Responsible Fisheries, of the Food and Agriculture Organization of the United Nations, which is still voluntary in nature, seeks to ensure that the fisheries sector commits itself to biodiversity-friendly fisheries practices.

A good example of integrating biodiversity concern into fisheries sector:

Central Institute of Fisheries Technology's (CIFT's) semipelagic trawl system (SPTS)

SPTS was developed by scientists of the Fishing Technology Division of CIFT as an alternative to bottom trawling, which causes high impacts on the sea bottom and also is nonselective. This gear system has been developed and optimized taking into consideration the biological, behavioural and distribution characteristics of tropical demersal and semipelagic finfish and cephalopod resources and the technical capabilities of the small-scale mechanized trawler fleet, operating in Indian waters. The system consists of a four-panel semi-pelagic trawl with double bridles, front weights and vertically cambered high aspect ratio otter boards that can selectively harvest fast-swimming demersal and semipelagic finfishes and cephalopods, which are generally beyond the reach of conventional bottom trawls, currently used in commercial trawl fisheries in India. Indian Ranger Forest Officers—participants of the WII-GIZ training course on coastal and marine biodiversity and MPA management—getting information on the newly introduced SPTS developed by CIFT, along with the team of Mangrove Cell Maharashtra and UNDP-GEF project team (Malvan Jetty, Maharashtra, January 2015).

3.11.4 Shipping and trade

Threat to coastal marine biodiversity also comes from invasive alien aquatic species, especially in geographically and evolutionary isolated ecosystems, such as small island developing states.

Risks are increasing due to growing global trade, transport, tourism and climate change. One specific case is where the shipping industry is responsible for the spread of invasive species carried by the ships in the ballast water. Ballast water is the water that a ship pumps into tanks in the hull to add weight and improve stability. The ballast water is pumped in or discharged at ports to balance the load that the ship has taken in or delivered.

Thus, the ballast water that has been sucked in at one port could be discharged in another port in another continent. In the process the ship can take in aquatic species from one location and discharge it in the other. Problem arises if any of the aquatic species thus taken in turns hypercompetitive in the new environment and destroys other species populations. In other words, the imported species turns into an invasive species.

Biodiversity concerns are being integrated in the shipping sector via the Ballast Water Management Convention,[35] adopted in 2004, which aims at preventing the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Under the convention, all ships in international traffic are required to manage their ballast water and sediments to a certain standard, according to a ship-specific ballast water management plan.

3.11.5 Tourism[36]

Tourism is one of the world's fastest growing industries. It also a source of increasing stress on fragile ecosystems. Its social, economic and environmental impacts are immense and complex, not least because tourism concentrates on vulnerable natural and cultural sites. The challenge is therefore to ensure that tourism is developed in harmony with environmental considerations.

The CBD Guidelines on Biodiversity and Tourism Development are a comprehensive instrument developed within the framework of the Convention on Biological Diversity to achieve more sustainable tourism development.

They are conceived as a practical tool providing technical guidance to policy makers, decision makers and managers with responsibilities covering tourism and/or biodiversity, whether in national or local government, the private sector, indigenous and local communities, nongovernmental organizations and other organizations, on ways of working together with key stakeholders involved in tourism and biodiversity (CBD 2004).

Marine and coastal tourism Coastal and maritime tourism can also provide a trade opportunity for developing countries to conserve and protect ecosystems and species. Instead of overexploiting marine resources, marine and coastal areas can be used for sustainable tourism and recreation. If carefully designed, activities such as surfing, wind surfing and sea kayaking can be developed into sustainable tourist attractions (Ghosh 2011[37]). Marine Protected Areas (MPAs) are another way that marine regions can develop a sustainable tourism industry by catering for activities such as recreational fishing, whale watching and scuba diving. MPAs serve to conserve resources and consequently benefit surrounding areas through protecting species migration and enhanced recruitment. MPAs have grown in popularity amongst tourists in recent years (Aas et al. 2008[38]; Hoyt 2001[39]; Hollingworth and Pitcher 2002[40] | UNEP 2013[41]).

35 The Ballast Water Management Convention website, http://www.imo.org/OurWork/Environment/BallastWaterManagement/Pages/Default.aspx

36 Source: CBD 2004

37 Ghosh, T. (2011). Coastal Tourism: Opportunity and Sustainability. Journal of Sustainable Development 4(6) · November 2011DOI: 10.5539/jsd.v4n6p67

38 Aas, Ø., Arlinghaus, R., Ditton, R.B., Policansky, D., Schramm, H.L. (2008). Global challenges in recreational fisheries. Blackwell Publishing, Oxford.

39 Hoyt, E. (2001). Whale Watching 2001; Worldwide tourism numbers, expenditures, and expanding socioeconomic benefits. A special report from the International Fund for Animal Welfare. Available at: http://www.cetaceanhabitat.org/pdf_bin/hoyt_ww_2001_report.pdf

40 Hollingworth, C. E. and Pitcher, T. J. (2002). Recreational fisheries: ecological, economic and social evaluation. Blackwell Science, Oxford.

41 UNEP. (2013). Green Economy and Trade – Trends, Challenges and Opportunities. Available at: http://www.unep.org/greeneconomy/GreenEconomyandTrade

The tourism industry is dependent on a wide variety of ecosystem services. Tourist activities in coastal areas often focus on diverse marine resources such as coral reefs, whales, and birdlife, and require clean water resources for activities such as swimming and scuba diving. Tourism revolving around wildlife viewing (e.g. safari) requires intact and healthy ecosystems in order to support species populations. National parks are often located in forested and mountainous areas and rely on the services of functioning ecosystems to provide visitors with opportunities for recreational, educational, and cultural experiences (CBD 2009).

Nature-based tourism and dive tourism produce much of the economic value of coral reefs—an estimated $30 billion each year. Studies indicate that the economic value of coastal ecosystems as tourism destinations is strongly correlated to local environmental conditions. As reef ecosystems are degraded, nature-based tourism industries stand at risk. **Destruction of coral reefs in Jamaica and Barbados, for example, has resulted in dramatic declines in visitation and revenue loss, which in turn has led to social unrest (MEA 2005).** The value of coral reefs is estimated between US$100,000 and $600,000 per square kilometre a year. Meanwhile, the estimated costs of protecting them, through the management costs of a marine protected area, is just US$775 per square kilometre per year (UNEP-WCMC 2006 I CBD 2009).

Tourism has traditionally been a source of financing for protected areas, and this contribution is growing (see Eagles and Hillel 2008[42]). Recognising the CBD's ambitious protected area targets (between 10 and 12% of all relevant ecosystems legally protected by 2010 and 2015, respectively for terrestrial and marine ecosystems, see SCBD 2006), and the funding gaps between available and needed resources, many CBD Parties are proposing to increase the flow of resources from tourism to protected areas through concessions, enhancement of attractions and equipment, marketing, and capacity building for park agencies. Visitation revenues and tourism partnerships are particularly targeted as funding sources in developing destinations (CBD 2009).

CASE STUDY:

Local Agenda 21 and resort rejuvenation (Spain)

The municipality of Calvià is situated on the south coast of Mallorca, Balearic Islands, Spain, and has been a popular resort destination with approximately 1.6 million annual tourist visits. Following unsustainable tourism growth in recent decades, high human pressure on local resources and environmental degradation, tourism dropped off in the area by 20% between 1988 and 1991. In response to this a local forum of industry, government and community representatives, initiated a local action plan for the future integrated sustainable development of the Calvià region, with a particular emphasis on the tourism sector. The outcome was the Calvià Local Agenda 21 Action Plan, approved in 1997. Despite government changes in the mid-2000s, elements of the Plan, and growth regulating policy tools are still in effect in 2008. A number of environmental protection measures have resulted from the Plan including: the de-classification of 1700 hectares of land previously allocated for urban development, and removal unsustainable resort buildings; creation of a marine park and te0rrestrial protected areas; cessation of sea dredging, previously used to regenerate beaches; and implementation of recycling and urban waste reduction plans. Plans to institute an environmental airport fee, however, had to be scaled back due to strong resistance from the tourism trade and local residents. (Source: UNEP & UNWTO 2005 in CBD 2009).

42 Eagles, P. and O. Hillel. 2008. Improving protected area finance through tourism. In Protected areas in today's world: their values and benefits for the welfare of the planet. Secretariat of the Convention on Biological Diversity, Technical Series no.36: p 77-86. Accessed at: www.cbd.int/doc/publications/cbd-ts-39-en.pdf.

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