

5. Water

5.1 Fresh Water

In Indian tradition, water is not a commodity, it is life-giving source. Traditionally, its use and management were governed by codes of conduct and traditional systems. Today these are being eroded. Water is a prime natural resource, a basic human need and a precious asset of the people. If the world's rainfall were averaged over its landmass, India would receive more than one-and-a-half times the rain that other parts of the world get. But rainfall in India has a wide spatial and temporal variation, and is highly seasonal. Eighty per cent of the country gets 80 per cent or more of the annual rainfall during the four months of the monsoon. Managing water so that it is available when and where it is required is a major issue.

Keeping in view the constraints of water availability and the variety of uses, the National Water Policy (1987) states that, planning and development of water resources needs to be governed by national perspectives. Thus water allocation is one of the important issues to be addressed. Special attention is to be given for equitable access of water, with emphasis on marginalized and weaker sections of the society. As also stated in the Water Policy, special efforts should be made to investigate and formulate projects either in, or for the benefit of, areas inhabited by tribal or other specially disadvantaged groups such as Scheduled Castes and Scheduled Tribes. This would require establishment of a better developed water infrastructure and improved water management.

Efficient water management and service provision for all would need increased participation, and decision-making at the lowest level. The decision-making process should be transparent to prevent corrupt practices which hamper the benefits from reaching the right place. Floods and drought affect vast areas of the country, transcending state boundaries. A third of the country is drought-prone. Floods affect an average area of around 9 million hectares per year. According to the National Commission on Floods, the area susceptible to floods is around 40 million hectares. The approach to the management of drought and floods needs also to be coordinated and guided at the national level. Proper planning needs accurate data and information. The National Water Policy states that a standardized national information system should be established with a network of data banks and data bases, integrating and strengthening the existing Central and State level agencies and improving the quality of data and the processing capabilities. There should be free exchange of data among the various agencies and duplication in data collection should be avoided.

Learnings and Perspectives

5.1.1 Appropriate Water Allocation Among Competing Needs and Demands

Water is a common resource. Everyone has a right to water.

- Water should be equitably and sustainably allocated, firstly to basic human needs—including livelihood needs—and then to the functioning of ecosystems and different economic uses including food security. Allocation mechanisms should balance competing demands and take into account the social, economic and environmental values of water. They should reflect the links between surface and groundwater and those between inland and coastal water, growing urbanization, land management, the need to maintain ecosystem integrity and the threats of desertification and environmental degradation. They should have incentives for conservation efforts made by users.
- Allocations must be made on the basis of good quality, current data regarding water availability.
- The effort must be to empower communities in general, and their traditionally deprived sections in particular, to decide water allocations.
- There must be systems for monitoring the use of allocated water.
- Integrated water resources management should be sustainable and should optimize water security and human benefit per unit of water, while protecting the integrity of ecosystems. Water should be treated as a valuable and finite resource. Water demand should be more actively managed, and water use efficiency increased in all sectors. Mechanisms to do this should be identified. Wastewater should be viewed as a resource.
- Irrigated agriculture is the world's largest user of water, and therefore offers the largest potential in terms of water savings, the benefits of which can be shared with other sectors. In order to realize this potential, there should be proper incentives for economical use of water and for the adoption of conservation technologies. Capacity building of farmers for adopting these measures and technologies is also essential.
- The value of ecosystems should be recognized in water allocation and river basin management. Allocations should, at a minimum, ensure flows through ecosystems at levels that maintain their existence and integrity and ensure the rights of riparian communities.
- There needs to be a plan for the conservation/protection of all rivers, especially the Himalayan rivers, taking into account all the uses.



5.1.2 Combat Corruption Effectively

- The fight against corruption must start with awareness building and should aim at maximizing transparency to the public in the entire decision-making process of a project, from planning through procurement to construction and operation. No party to any corrupt practice can have immunity to the consequences.
- Water governance arrangements should improve accountability, introduce and enforce appropriate legal provisions against corruption, take timely, exemplary and preventive action against corruption, monitor the performance of public institutions, donors and private companies, develop codes of conduct, and invite civil society to play an active role in these processes.
- Judicial systems and capacities to enforce these arrangements must be put in place.
- Assured access for citizens to all relevant information in the public domain is a powerful tool for fighting corruption. The public should also have access to effective and affordable justice. All actions, whether initiated by International Financial Institutions, countries or others, to fight corruption, should be welcomed.

5.1.3 Data Availability

- There is a need for qualitative and quantitative data on water. Generating a water database needs high technical capacity and technology. It has to be generated by government organizations and they must give access to the data to the public and NGOs.

5.1.4 Encourage More Efficient Service Provision

- The predominantly public delivery of water and sanitation services should be complemented by greater use of different and often innovative forms of service delivery, including self-help groups formed by the people themselves, informal service providers, co-operative societies, and local and international private enterprises. In each situation, the approach should be chosen that would best benefit people and the environment.
- All service providers should be subject to effective regulation, benchmarking and monitoring. They should be efficient, accountable, and protected from inappropriate pressures. There should be clear separation between the roles and responsibilities of the regulator and the service providers.
- Regulation is a national level function which should be strengthened through international networking and the application of consistent principles, standards and methods.
- Developing countries must have access to latest technologies which facilitate efficient service provision, and to financial support for these. Local R&D for commercially viable technologies to conserve and augment water supply need to be explored and supported.

5.1.5 Ensure Appropriate Water and Sanitation Infrastructure and Services

- Water is an integral part of sustainable development. Policies regarding all aspects of water should be clearly linked to policies for poverty reduction and economic growth. Governments should review the priority given to water and sanitation, and to productive water infrastructure in national and international programmes to tackle poverty. Key measurable indicators must be identified and monitored in this regard.

- Water and sanitation infrastructure and services should be pro-poor and gender-sensitive. The plans for these should be realistic and targeted to the needs of the poor, and should include targets and indicators of progress at all levels.

- The UN Millennium Declaration target on drinking water should be complemented by a corresponding target to halve the proportion of people lacking access to improved sanitation by 2015.

Population having drinking water and sanitation facilities (%)

	1985	1990	1999
Drinking water supply			
Rural	56.3	73.9	98.0*
Urban	72.9	83.8	90.2^
Sanitation facilities			
Rural	0.7	2.4	9.0*
Urban	28.4	45.9	49.3^

*With Government initiative only under CRSP, MNP, JRJ, and IAY, coverage through private initiative is not known

^As on 31-3-1997

Note: Percentage coverage in respect of rural water supply and sanitation are based on population covered in current years to corresponding 1991 census population

Percentage coverage in respect of urban water supply and sanitation are based on population covered in current years to corresponding current population

Source: Ministry of Finance (2001)

5.1.6 Equitable Access For All

- Public responsibility includes the task to setup and enforce stable and transparent rules that enable all water users to gain equitable access to, and make use of, water. Special efforts need to be made with regard to access for socially disadvantaged groups and women, as well as in water-stressed areas, such as, arid areas, coastal areas, etc.

- By 2003, a framework for a water resources management plan, as well as a model plan (with alternatives), should be developed. By 2005, all states should have developed and adopted their plans.

- The primary responsibility for ensuring equitable and sustainable water resources management rests with governments. It requires the participation of all stakeholders who use or protect water resources and their ecosystems. Special attention is needed to improve the participation of those people, particularly the poor, socially disadvantaged and women, who are often excluded from decision making. Knowledge of rights of the stakeholders is a precondition to equitable access. This needs to be facilitated.

- Institutional framework and mechanisms need to be in place, at national, state, and local levels, to ensure effective participation.

5.1.7 Improve Water Management

- The close link between forests and water, and the traditional relationship between agriculture and water, need to be recognized and protected to ensure sustained productivity.
- National water management policies should take account of the impact of trade in water-intensive goods on water availability and ecosystems integrity. For example, in water-scarce regions, people should grow crops with low water requirements, or of high value compared to the water used. Options for improving the water balance by importing water intensive goods from water-rich regions should be explored, where appropriate and cost-effective.
- The potential of rainwater harvesting for augmenting rural and urban water supply is increasingly becoming recognized. This alternative should be further explored and utilized.
- Proper water pricing must be an integral part of water policies. However, care must be taken to ensure that the poor and socially disadvantaged are not denied access. Moreover, there must be adequate monitoring and control of market mechanisms.
- It is necessary to study and analyze the impacts of subsidies (on water, energy, and other relevant inputs) on water use. Subsidies that inhibit water-use efficiency or cause negative effects on the environment should be reduced.
- Our traditional water management approaches and systems were both sustainable and accountable. These need to be revived and invigorated. Policies must recognize and build on these.
- Principles of reuse and recycling of water resources must be incorporated into water management plans and strategies. There must be incentives for water conservation.

5.1.8 Manage Risks to Handle Variability and Climate Change

- Water management arrangements should take account of climate variability and expand the capacity to identify trends, manage risks and adapt to hazards such as floods and droughts. Anticipation and prevention are more effective and less expensive than having to react to emergencies. Early warning systems should become an integral part of water resources development and planning. Communities must be capacity-built to help them anticipate, prepare for, and cope with disasters.
- Closer links should be established between development and disaster management systems. Development plans in vulnerable areas should factor in disasters and their impacts. This should be achieved both by reducing poor people's vulnerability to disasters and by strengthening post-disaster recovery systems. There is need to build in comprehensive security of vulnerable communities, including security of food, water, shelter and livelihood.

- Decision-making mechanisms under uncertainty should ensure flexibility to respond to both rapid-onset disasters and long-term changes in water resources. Risk management should be an integral part of water resources management. This should include establishing close co-ordination beyond the water sector.
- Exposure to flood risk should be minimized through wetland and watershed restoration, better land use planning and improved drainage. The impacts of climate change on the Himalayan snows and the consequent water flows are a real threat today. Measures must be taken to minimize the risks and manage the consequences.
- Particular attention needs to be paid to the poor in both rural and urban areas who are typically resident on land vulnerable to disasters, those whose livelihoods are particularly vulnerable to their impacts, and who are often the victims of disasters.
- Organizations that deal with disaster preparedness, management, and creation of awareness about disasters, should be strengthened. Such action will also place societies in a better position to deal with future climate change.
- Developed countries should help by sharing appropriate disaster management technologies and information, along with capacity-building of the disaster management crew.
- Regional co-operation in disaster preparedness and management should be supported.

5.1.9 Manage Water at Lowest Appropriate Levels

- People need to be closely involved in management and governance decisions concerning water resources. Local stakeholders should develop mechanisms for collaborative management of local water needs and resources. The design and operation of water services should use a people-centred approach and be based on understanding the needs of the people to be served.
- Decision-making, implementation of projects, and operation of services should be decentralized to the lowest level capable of handling such tasks, keeping in mind that watersheds are the appropriate frame of reference for water resources management. Local governments, community-based organizations and private service providers (where they exist) should be the key players in local management and the provision of local services. This requires appropriate legislation, financial mechanisms and capacity building to empower local governments and other stakeholders, and to facilitate the role of small-scale service providers.
- National governments should strengthen their domestic public funding capabilities and create a viable financial frame for local governments. This will require significant support to modernize the financial planning, management and accounting skills in local governments.
- Decentralization of responsibilities for water and other services to local

“The need for integrated water resource management and decentralization of decision making to the lowest level are paramount.”

Ashoke Chatterjee
Multi-stakeholder
Consultation

government should go hand in hand with parallel actions to improve management and provide clear authority to raise and retain revenues.

5.1.10 Promote Gender Equity

- Policies and systems related to water and sanitation need to be reviewed for gender sensitivity.
- Water management policies and mechanisms should not distinguish between water users by gender and should ensure equitable access of women to water resources, including safe drinking water and sanitation.
- Water resources management should be based on a participatory approach. Men and women should be equally involved in sustainably managing the use of water resources and sharing of benefits. To achieve equity, in many parts of the world, the role of women in water management needs to be strengthened and their participation broadened.
- Water and sanitation experts and policy makers, and those involved in the implementation of these programmes, e.g., Panchayati Raj institutions, should be trained to work in a gender-inclusive manner. In many places, specific support is also needed to empower women to take up leadership and managerial roles in water resources policies and management.
- Water policies and water management systems should be gender-sensitive. They should reflect the division of roles and labour—paid and unpaid—between men and women in all settings related to water. Data relating to water should be disaggregated by gender, where relevant.
- There must be provision for specific support to improve access of women and girls to sanitation, including in schools.



5.1.11 Promote Participatory Benefit Sharing

- In many water-scarce countries, the development of new water sources and infrastructure may be necessary to provide water for development and to mitigate the impacts of desertification, droughts and climate change.
- Where possible small projects should be preferred. Decisions to develop large water infrastructure projects including construction of dams should be taken after a participatory integrated assessment of needs and options, taking a precautionary approach into account. All risks, costs and benefits should be fully accounted for. Actions to improve the performance of existing infrastructure should be a high priority. The role of large infrastructure in sustainable development and poverty reduction should be directly demonstrated.
- Project designs should minimize potential negative impacts on the environment, enhance the livelihoods of project-affected parties, and create alternative livelihoods where necessary. People affected by a project should participate in project decision-making and share in project benefits. Proper mechanisms and incentives should be in place for compliance with rules and agreements concerning environmental and social aspects of projects.

5.1.12 Protect Water Quality and Ecosystems

- Drinking water quality should be safeguarded because it is essential for human health.
- Water governance arrangements should protect ecosystems and preserve or restore the ecological integrity of groundwater, rivers, lakes, wetlands and associated coastal zones. This will help to maintain the wide range of ecological services that healthy ecosystems provide, and the livelihoods that depend upon them.
- Water resources management should complement programmes to combat desertification and other forms of environmental and ecological degradation.
- Pollution prevention should be prioritized, because it is normally more cost effective than the restoration of polluted waters. Water supplies should be protected from pollution right from the source to the user.
- Treatment of waste water must be intensified and made more affordable for municipalities and industry. Investments in appropriate sanitation facilities should protect water bodies from pollution and reduce health hazards. Countries should intensify their attention to the management of diffuse (non-point) sources of pollution, including agricultural run-offs.
- Effective legal frameworks for protecting water quality should employ the full range of policy instruments including regulation, voluntary measures, market and information-based tools. Where such frameworks exist, water quality should be monitored and the regulations enforced. This approach should make use of the 'polluter pays' principle, thus giving incentives to polluters to apply the best available technology to prevent pollution.
- Water laws should be reviewed and strengthened, with respect to the quality aspects. Citizen participation in enforcing these laws should be encouraged, as also monitoring of water quality by communities, students, etc.

5.1.13 Share Benefits

- Watersheds, river basins, lakes and aquifers must be the primary frame of reference for water resources management. Institutional and participatory mechanisms need to be developed at this level. Inter-basin transfers may be considered where feasible, with adequate environmental safeguards.
- Water can promote regional co-operation. Such co-operation across internal and international boundaries should be intensified as a means to share the upstream and downstream benefits. Sharing of traditions, experiences and learnings among developing countries must be facilitated.
- Co-operative management of such water is best served by long-term commitments. Active strategies, plans and mechanisms should be worked out to exchange water-related knowledge and develop mutual understanding.

5.2 Marine Resources

The protection of the oceans, seas and coastal areas, including their living resources, requires a multi-sectoral, but integrated approach, that addresses

all dimensions of ocean-related issues. The various elements include the management and sustainable development of coastal areas, the protection of the marine environment, the sustainable use and conservation of marine living resources in both the high seas and areas under national jurisdiction, and research on critical uncertainties, including climate change.

Learnings and Perspectives

5.2.1 Managing Marine and Coastal Areas

Coastal areas must be recognized as complex, diverse and fragile ecosystems, and not simply as areas geographically located besides the world's oceans. Coastal zones and marine areas are under constant threat from maritime disasters—oil spills and leaks, pollution from sea-going vessels, pollution from installations and facilities used for exploitation of natural resources at sea, and dumping of untreated wastes in the oceans.

- The landward and seaward sides should be viewed as a single unit of the coastal zone and must be considered as part of an integrated whole, for its proper management, taking into account present and future population pressures. The coastal zone should be considered as a unit for the purposes of strategic planning.
- Sedimentation needs to be prevented, especially in the coastal wetland areas, such as lagoons and mangroves, as this could affect productivity of the oceans.
- Preservation of genetic diversity by *ex-situ* and *in-situ* methods should be undertaken. For marine flora and fauna, *ex-situ* conservation is not a very feasible option because of the large variety of species. *In-situ* conservation through maintaining resources in their native wild state by protecting the habitat appears to be a more practical approach. Captive breeding of endangered fauna and flora could be initiated where possible and necessary.
- It is important to understand the critical link between the stability and sustainability of marine resources and coastal ecosystems, and the stability and sustainability of social systems. Social and environmental costs should be considered at the initial planning stage of all projects.
- Global mechanisms and agreements for the monitoring and reduction of pollution from shipping and offshore industries could be strengthened by encouraging the development of an international code of conduct for shipping, and of internationally accepted environmental principles for offshore industries; increasing the understanding of the impact of oil spills and the need for risk reduction strategies; and promoting the identification of areas that are particularly at risk from shipping.
- The sea must not be seen as a convenient place where anything which is environmentally less acceptable on land, could be dumped. It is critical to prevent the discharge of untreated effluents from industry, domestic wastes,

and also vessel-based pollution, such as ballast water discharge, harmful anti-foulants, ship recycling and dumping of wastes at sea.

5.2.2 Equitable Access to Marine Resources

Communities' rights to livelihoods should be taken care of in any development plan. Commercial rights of developers should not result in generating huge profits for relatively few people at the expense of the many who are left with a degraded and polluted environment. The equity and sustainability factors in management of marine and coastal resources thus become critical.

- An integrated programme is necessary to ensure that the ecological security of the coastal zone and the livelihood security of coastal communities are not only protected, but also become mutually reinforcing. The conservation strategy must be people-centered, so that the local population develops an economic stake in conservation.
- There is need for a comprehensive deep sea fishing regulation, keeping both the traditional and deep-sea fishing industry in view.
- Means by which marine resources can be sustainably used to support local industry must be explored.



5.2.3 Participatory Management of Marine and Coastal Resources

Coasts and coastal people must be recognized as an integral part of marine and coastal resources. Coastal area management must recognize the multi-dimensional aspects and recognize the importance of human, ecological and economic factors in the formulation and implementation of management policies. The role of stakeholders must be recognized as crucial for sustainable management.

- The importance of the role of local communities of the coastal zone practicing different occupations like fishing, agriculture, arts and crafts, etc. in sustainable maintenance of the area and stake in the resources of the area must be understood.
- Public information and participation in decision-making must be promoted as prerequisite conditions for new development projects. Research reports must be made available to the public, especially local communities.
- A stakeholder approach in fisheries management must be adopted taking into account both equity and sustainability factors. All those who have a stake should be part of this process, consulted and involved in management and operation.
- Sustainable mechanisms must be established to overcome social, environmental and economical issues in an integrated fashion.

“We do not have micro plans for our fishing villages. Small fishing communities have to be the focus of our policies.”

Nandakumar Kamat
Multi-stakeholder
Consultation

5.2.4 Sustaining the Use of Resources

With shrinking diversity of habitats and eroding genetic diversity of wild populations, it is becoming increasingly difficult to increase and sustain world fisheries to meet the growing demands.

- A specific harvesting location should not be exploited year after year, but should be rested periodically for the species to stabilize in that area before being harvested again.
- Corporate responsibility must be demonstrated in adopting proactive sustainable fisheries benchmarking strategies thereby encouraging the stakeholders and others to follow.

5.2.5 Development of Infrastructure

- Modern technologies for storage, processing and marketing of marine resources, especially fish must be developed. Infrastructure like roads from fish landing centres to major marketing centres

5.2.6 Information, Research and Development

To prevent duplication of activities leading to wastage of resources, Research and Development (R&D) needs to be focused to suit Indian conditions. Periodic and comprehensive studies need to be carried out to quantify the available resources over space and time as the ocean environment is dynamic. There need to be mechanisms to ensure exchange of data between various departments of the government, research and academic institutions, etc. and also establish networks among them.

- Studies to develop a base-line data for better understanding of existing and emerging situations need to be undertaken. An inventory of marine (ocean and coast) biodiversity needs to be developed and updated systematic.
- Research for reducing and reversing sea water intrusion into ground water, desalination of ocean water by using renewable energy sources such as wind, wave and solar technologies, for exploration and exploitation of living and non-living resources and energy from the oceans, needs to be undertaken. As far as possible, these technologies should be indigenously developed so as to make them socio-economically relevant. Solutions must use research findings as well as the traditional wisdom of local communities.
- There is need to develop new resources through sea ranching and marine culture in enclosed and semi-enclosed water bodies. The net harvestable potential needs to be increased by increasing biomass and the fish stock through modern technologies.
- Traditional sustainable modes of harnessing marine resources.
- Networks of institutions need to take up integrated and interdisciplinary ocean research. R&D should not only aim towards technology development, but also for tackling socio-economic problems. Findings of research need to be widely disseminated.

- An agency to bring out standard maps of coastal zones, including EEZ, topography, resources, database on global maritime regulations, etc. must be established. This agency would also need to conduct periodic comprehensive surveys to quantify the available resources over space and time. A national registry of accidents which are taking place in the oceans and in the coastal zone needs to be maintained.
- Co-operation among nations to promote the development and transfer of technology specifically directed to the needs and interests of the local population and situation needs to be enhanced.

5.2.7 Regulations

Regulations must recognize that marine and coastal resources are multi-dimensional and cut across administrative boundaries and departments. Regulations must be supportive of sustainable management of our marine and coastal resources. New policies and laws would be required to support this.

- The responsibility of the management of the marine resources and areas are today with different agencies, whose mandates may not be complementary. A National Maritime Agency is needed for the holistic management of marine resources and areas. Longest possible stretches of the coast need to be placed under a single authority so that strategic planning for the concerned zone takes place.

There is a need to make decision makers aware of the importance of the oceans and its influence on various factors that are critical.

- There is need for a coordinated policy and steps to acquire knowledge of ocean resources as well as the technology to exploit them.
- Ways in which the navy and the coast guard can further participate in the management of marine resources need to be explored.

5.2.8 Capacity Building

The oceans have a great potential to be explored and used sustainably. Government, non-government, research and academic institutions and the communities must be able to recognize the inter-relations in coastal zone management and the benefits of sustainable development of coastal and marine resources. Capacities of the people involved in these need to be built to achieve and practice sustainable management of marine and coastal resources.

- The capacity of coastal communities and governments (national, state and local) to develop and implement programmes in integrated coastal and ocean management need to be enhanced. Building of adequate capacity to explore, exploit and sustainably manage the resources of the oceans. The three basic challenges of biodiversity conservation, community development and viable eco-tourism are to be met.
- More trained marine taxonomists are needed. There is an urgent need to document our marine biodiversity. To overcome the shortfall of taxonomists,

students and teachers of colleges and schools could be trained to undertake studies in the coastal areas. Educators need to look at the multitude of closely interrelated factors mutually affecting each other, rather than analyzing one factor at a time.

- A cadre of youth from among the coastal communities need to be capacity-built to spread awareness among their own people and visitors about the vital importance of conserving coastal biodiversity and utilizing the resources in a sustainable manner. Local communities especially youth should be trained to scientifically and sustainably harvest various resources.
- Organizations of fishworkers need to be encouraged and members trained to manage the organizations professionally. Fishworkers organizations should also have representation of women from the fishing community.
- Capacities of the regulatory authorities to effectively implement the laws and policies related the marine areas need to be built. Regulatory agencies need to adjust to be also oriented about interrelationships of the entire marine area and not to just look at oceans in isolation.

Every human should have the idea of taking care of the environment, of nature, of water. So using too much or wasting water should have some kind of responsibility and with that, a sense of discipline.

The Dalai Lama

5.2.9 Public Education and Awareness

Public awareness and education on the importance of protection of the coastal and ocean environment helps to meet social and economic needs and aspirations of the country in the long run.

- Awareness campaigns on existing regulations for management of coastal areas need to be conducted. Education and communication material on the need for conservation and protection of rare and endangered species need to be developed.
- Research findings on marine resources, their development and management have to be demystified. The educational and communication material targeted at the public has to be developed in local languages.
- Opportunities for interactions between communities, policy makers, regulating agencies, NGOs, scientists, etc. need to be increased.
- Appropriate strategies and decision making tools that would enhance the capabilities of professionals, Government, and non government organizations to take up local and community level action programmes need to be developed.

5.2.10 Coastal Tourism

Alternative tourism, eco-tourism, sustainable tourism, etc. are today increasingly becoming popular. These could have adverse economic, social and environmental impacts if not practiced properly. Carefully thought-out policies are necessary to ensure that the tourism practiced is sustainable.

- Coastal tourism management guidelines need to be formulated involving all stakeholders (private, public, international, national, and local). The guidelines should reflect the needs and aspirations of those who have or would have a stake in this.

- A national master plan on coastal tourism, including cruise tourism needs to be developed with inputs from local, national and international agencies. The master plan must be coordinated with plans of other economic sectors (private and public)—fishery, forestry, mineral and oil exploration, urban planning, etc. A mechanism to coordinate between various sectors—tour operators, public and private sectors, regulatory agencies, scientific and social groups, tourists, etc. is needed.
- Those groups and individuals must be compensated, who suffer economic loss due to tourism development. Tourists and tour operators must be charged the “true cost” of the resource used.



5.2.11 Disaster Management

Disaster response cannot be handled by legislation alone. The entire community needs to be aware and part of the process. Adequate research and planning is needed to focus on ways to mitigate the impact of disasters.

- Policies and measures are needed to mitigate the consequences of natural disasters in coastal areas. Such policies should include early warning systems, better preparedness and preventive measures. Development strategies should include policies to reduce vulnerability to disasters, based on vulnerability assessments and adaptation strategies.
- Disaster management plans should include not only plans to minimize and mitigate the effects of disasters, but also immediate relief and subsequent rehabilitation.
- Disaster Management/Response plans should be made known to the general public, especially the coastal communities who are most vulnerable and affected.

5.3 Wetlands

Wetlands cover about six per cent of the earth’s land surface. They are found in every part of the world and include a wide variety of habitats—coastal, tidelands, freshwater marshes, bogs, fens, floodplains, and swamps. They are among the most important and productive ecosystems on earth, though often not recognized as such. The disruption of the wetlands has a high cost—economically, socially and ecologically. The management of wetlands will succeed only when there is cooperation between the government (all levels), non-government and private sectors and the civil society.

Learnings and Perspectives

5.3.1 Management of Wetlands

- Management strategies should not look at wetlands in isolation, but must look at the catchment areas and coastal zones, and also the way land is

used. Increased international cooperation to manage wetlands is needed, as wetlands may not follow geographic boundaries of states and countries. All countries must recognize the need to protect local habitats and paths/corridors for all migratory species.

Wetland conservation projects must look at both social and economic factors, in addition to ecological factors.

5.3.2. Participatory Management

- Views of the local population must be taken in developing management plans for wetlands. Incentives to encourage traditional and sustainable activities in these wetlands must be provided.
- The local population, scientific organizations in the region, NGOs and the local regulatory authority needs to collaborate and cooperate in planning and managing the wetland. Women and youth should be consciously included in the community groups. Local communities need to be part of the process, from assessing the environmental impact of the development projects. The findings of such studies must be made available to the public.
- Local organizations that represent various stakeholders should be strengthened. Opportunities must be provided for the stakeholders to meet, discuss and arrive at locally appropriate management strategies. Local groups must be involved in implementing restoration of wetlands that are either ecologically in a critical condition or reaching a critical condition.

5.3.3 Regulations

- Legal and management support needs to be provided to effectively oversee management of wetlands. Mechanisms to check use of water, reclamation, discharge of untreated effluents from industrial, domestic and agricultural wastes, introduction of invasive species, etc. need to be improved.
- In addition to looking at social and economic factors to manage the wetlands, the political, inter-jurisdictional, institutional, legal and financial supports must also be in place to appropriately complement the efforts at local, regional and national levels. A process needs to be established for the different departments of the government to collaborate on various issues related to the management of wetlands.
- 'True cost' of the resource used must be charged, and the income so generated must be used to manage the wetland.

5.3.4 Information, Research and Development

- Research needs to be undertaken for identifying wetlands and classifying them according to their ecological status. The flora, fauna (including migratory species) and other resources (nutrient deposits) needs to be documented, and system developed to monitor and update the information. Wherever possible the values of the wetland should be quantified and strategies suggested to use the wetland sustainably. Networks for monitoring

and exchanging data on water quality, quantity, uses of the wetland for various purposes, etc. should be established.

- Studies need to be undertaken to understand the minimum flow requirements of water to maintain the natural system in the wetland. Potential growth of population must be kept in mind while undertaking all studies.
- Adequate financial and infrastructure assistance must be provided to carry out research activities.

5.3.5 Capacity Building

- Managers of wetlands must be professionally trained to conduct environmental impact assessment, and to establish, protect and implement strategies for management of wetlands, and most importantly understand the integrated nature of wetlands.
- The capacities of the local organizations must be enhanced to improve their organizational, planning, managerial, financial, negotiation and evaluation skills.
- The local population must be trained to apply ecological understanding in the sustainable use of wetlands so that they benefit economically and ecologically.
- Capacity building of local college teachers and students is necessary so they can undertake studies to understand the demands on wetlands and their impact on the ecology and economy of the area, in addition to documenting the environmental quality, flora and fauna of the wetland. They must also be trained to regularly monitor the situation.

5.3.6 Public Education and Awareness

- Education and public awareness are critical factors that contribute to the success of any wetland management plan. These programmes must generate awareness among people about the functions, services, and values of the wetlands, so that they are perceived as important both ecologically and economically. Awareness and education programmes must aim to build up public support for conservation of wetlands, and enhance abilities to be involved in planning and managing the wetland.
- NGOs and local management committees must take on the responsibility to conduct awareness programmes. Educational programmes must be looked at as a long-term process that would bring a change in the attitude of the public. The importance of education and public awareness must be recognized in any policy formulated for wetland conservation.
- Sustainable wetland practices from various areas (regional, national, international) must be disseminated and shared.



GREEN INDIA, CLEAN INDIA

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Competition