Inland water ecosystems

148. Has your country incorporated the objectives and relevant activities of the programme of work into the following and implemented them? (decision VII/4)

Strategies, policies, plans and activities	No	Yes, partially, integrated but not implemented	Yes, fully integrated and implemented	N/A
a) Your biodiversity strategies and action plans		X		
b) Wetland policies and strategies		X		
c) Integrated water resources management and water efficiency plans being developed in line with paragraph 25 of the Plan of Implementation of the World Summit on Sustainable Development		X		
d) Enhanced coordination and cooperation between national actors responsible for inland water ecosystems and biological diversity		X		

Further comments on incorporation of the objectives and activities of the programme of work

Several wide ranging policies, strategies and action plans have been formulated by the Government of India, which, directly or indirectly, support wetland conservation in India. The National Conservation Strategy and Policy Statements on Environment and Development, 1992 highlight conservation and sustainable development of wetlands, including coastal areas, riverine and island ecosystems. The National Forest Policy and the National Wildlife Action Plan emphasize conservation of wildlife on scientific principles of evolution and genetics, as well as social and cultural ethos of the county. Specific provisions have been made under the National Water Policy, 2002 for considering ecological requirements in prioritizing water use.

The National Environment Policy, 2006 envisages the following actions for wetlands:

a) Set up a legally enforceable regulatory mechanism for identified valuable wetlands.

b) Formulate conservation and prudent use strategies for each significant catalogued wetland, with participation of local communities and other relevant stakeholders.

c) Formulate and implement eco-tourism strategies for identified wetlands through multi-stakeholder partnerships.

d) Take explicit account of impacts on wetlands of significant development projects during the environmental appraisal of such projects.

e) Consider particular unique wetlands as entities with "Incomparable Values", in developing strategies for their protection.

f) Integrate wetland conservation, including conservation of village ponds and tanks, into sectoral development plans for poverty alleviation and livelihood improvement, and link efforts for conservation and sustainable use of wetlands with the ongoing rural infrastructure development and employment generation programmes. Promote traditional techniques and practices for conserving village ponds.

g) Integrate conservation and wise use of wetlands into river basin management involving all relevant stakeholders to ensure maintenance of hydrological regimes and conservation of biodiversity.

Effective linkages have been developed with the government agencies concerned with water resources management, fisheries, agriculture and rural development for conservation and sustainable livelihoods of the communities living in and around the wetlands. A multi-stakeholder approach, involving concerned government agencies, NGOs and community organizations, has been elaborately adopted by wetland authorities involved in the management of various lakes. Planning Commission, the apex planning authority in India, has played an important role in supporting multi-sectoral initiatives for mainstreaming of wetlands into developmental planning.

Some of the specific programmes are described below.

- For conservation and management of wetlands of the country, India is implementing a comprehensive programme since 1987. The basic objective of the programme is assessment of wetland resources, identification of wetlands of national importance, promotion of R&D activities, and formulation and implementation of management action plans of the identified wetlands. At present, 66 wetlands have been identified covering 21 states in the country. Activities under these management action plans include survey and demarcation, catchment area treatment, de-siltation, weed control, fisheries development, biodiversity conservation, community participation, water management, public awareness, pollution abetment, etc. The main focus for wetland conservation is now on biological methods of conservation rather than engineering options under the catchment area treatment component. Further, the main thrust is on watershed management and activities aimed at involving close participation of stakeholders in order to involve them in decision making processes of wetland conservation in a sustainable manner.

  Another important component of management action plans is conservation of endangered and threatened species. Several programmes have been initiated by the MoEF for the conservation of wildlife under *in situ* conditions and supplemented through *ex situ* conservation measures in identified cases. Some of the endangered species, particularly rhinoceros and sangai, the brow-antlered deer, have been re-introduced in the wetlands. Certain portions of Chilika, Kabar and Loktak wetlands have been declared as sanctuaries especially for the protection and conservation of wildlife. Construction of mounds and ponds has also been undertaken in some wetlands for developing them as suitable waterfowl habitats.

- Guidelines for sustainable development and management of brackish water aquaculture have been drawn up. Some state governments have also developed their own aquaculture guidelines and regulatory measures in the coastal zone areas.

- NLCP for the restoration and conservation of polluted and degraded lakes and other similar bodies has been initiated. So far, works on 28 lakes have been taken up under this project.
- The National River Conservation Directorate of the MoEF is engaged in implementing the NRCP to improve the water quality of the rivers, which are the major fresh water sources in the country. So far, a total of 31 rivers have been covered under the programme.
- Awareness building is one of the important components of management action plans. Several activities have been undertaken by the governments of Punjab, Orissa, Jammu and Kashmir, Madhya Pradesh, Himachal Pradesh, Manipur and Kerala to build awareness among various target groups including school children, youth and major stakeholder groups through audio-visuals, posters, nature camps, films, etc.
- India has designated 21 Ramsar Sites, which include Keoladeo National Park, Chilika Lagoon, Loktak Lake, Wular Lake, Sambhar Lake and Harike Lake. Action has been initiated to designate more wetlands as Ramsar sites.
- MoEF has prepared a Directory of Wetlands of India in 1990, based on a questionnaire survey, which includes information on location, geographical coordinates, area and ecological category of wetlands over 100 ha. in different states and union territories. As per the Directory, there are 2,167 natural wetlands and 65,253 manmade wetlands occupying an area of 4.1 million hectares. According to the latest survey carried out in 1995, the total mangrove area in the country is 4,533 sq. km. About 80% of mangrove forests occur in Sundarbans and Andaman and Nicobar Islands, the rest being distributed in the coastal states of Orissa, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Gujarat and Goa. A preliminary analysis of the project report on the wetlands of India indicates the total area of wetlands in the country as 7.6 million ha., out of which 3.6 million ha. are inland and the rest coastal. Several projects have been sanctioned by the Ministry for inventorization of wetland resources at the state and district levels.
- India is also implementing a GEF project on conservation and sustainable use of globally significant threatened wetlands of India.
- Celebration of World Wetland Day is being taken up as an important event for spreading awareness on wetlands, e.g., Chilika and Loktak. These initiatives have been supported by the MoEF through wetland authorities like Loktak Development Authority, Chilika Development Authority (CDA), etc. Beyond World Wetland Day, several local initiatives have come up as a response to these initiatives, for example, celebration of Loktak Day by the local communities.

149. Has your country identified priorities for each activity in the programme of work, including timescales, in relation to outcome oriented targets? (decision VII/4)	
a) No	
b) Outcome oriented targets developed but priority activities not developed	

c) Priority activities developed but not outcome oriented targets	
d) Yes, comprehensive outcome oriented targets and priority activities developed	X

Further comments on the adoption of outcome oriented targets and priorities for activities, including providing a list of targets (if developed).

As mentioned in response to Question 148, 66 wetlands have been identified for intensive conservation and management purposes under the National Wetland Programme of the Government of India. Successful models have been developed for conservation and sustainable development of Loktak and Chilika. Strategies developed and experiences gained would be applied in the remaining wetlands in a phased manner taking representative of diverse wetland ecosystems. In addition, consultative workshops organized in different regions of the country have identified key issues of wetlands which would be addressed through integrated conservation and development plans.

150. Is your country promoting synergies between this programme of work and related activities under the Ramsar Convention as well as the implementation of the Joint Work Plan (CBD-Ramsar) at the national level? (decision VII/4)

a) Not applicable (not Party to Ramsar Convention)	
b) No	
c) No, but potential measures were identified for synergy and joint implementation	
d) Yes, some measures taken for joint implementation (please specify below)	X
e) Yes, comprehensive measures taken for joint implementation (please specify below)	

Further comments on the promotion of synergies between the programme of work and related activities under the Ramsar Convention as well as the implementation of the Joint Work Plan (CBD-Ramsar) at the national level.

There is a close coordination between the implementing unit of Ramsar and that of CBD at the national level. There is a common Consultative Group on biodiversity issues which advises the Government for negotiation meetings under CBD, Ramsar Convention and Biosafety Protocol.

India took a lead role in the formulation of Ramsar guidelines on integration of wetlands into river basin management. As a follow up of this, CBD-Ramsar River Basin Initiative was undertaken and a joint programme was developed for integrated management of wetlands, biological diversity and river basin, which operates through cross-sectoral partnership at local, country and national levels. The synergy between

CBD and Ramsar Convention in India has helped to integrate various developmental sectors into the planning process at the river basin level for management of wetlands.

The models developed for Loktak and Chilika have been extensively used at the regional level to demonstrate successful stakeholder-led wetland conservation and management. The management of these wetlands involved extensive consultations at various levels; particularly through elaborate social processes to identify the problems and implement restoration measures. This helped to generate awareness at various levels in the sustainable development of the wetland, which was used as a practical example for communication, education and public awareness initiatives undertaken by the Ramsar Convention.

Restoration of Chilika lagoon through effective water management, community participation and providing sustained economic benefits to the community dependent upon these resources for their sustenance, was carried out by the Government of Orissa, through the support of MoEF, Wetlands International, NGOs and local communities. Restoration of Chilika lagoon was an example of application of a successful model for rehabilitation of biodiversity and livelihood support to a large community dependent upon the wetland. The Ramsar award was conferred to Chilika Development Authority for this exemplary wetland restoration model.

151. Has your country taken steps to improve national data on: (decision VII/4)

Issues	Yes	No	No, but developmentis under way
a) Goods and services provided by inland water ecosystems?	X		
b) The uses and related socioeconomic variables of such goods and services?	X		
c) Basic hydrological aspects of water supply as they relate to maintaining ecosystem function?	X		
d) Species and all taxonomic levels?	X		
e) On threats to which inland water ecosystems are subjected?	X		

Further comments on the development of data sets, in particular a list of data sets developed in case you have replied "**YES**" above.

Development of datasets on the subjects listed above is again undertaken as part of conservation activities by the concerned organizations. Some of these activities are as follows:

a) Economic evaluation of ecosystem processes and functions of inland water systems and impacts of developmental activities on the ecosystem services for Harike, Loktak,

River Yamuna floodplains, Bhoj Wetlands and Chilika was carried out for development of policy and resource allocation plans. The studies carried out have highlighted the significance of environmental flows for maintaining biodiversity and ecosystem integrity to ensure long term benefits.

b) Scenario approach was adopted in the case of Loktak Lake for balancing socio-economic benefits with goods and services provided by the wetland. Based on the detailed analysis, a barrage operation policy was developed to optimize power generation while maintaining the ecosystem processes and functions to deliver goods and services provided by the wetland. The negotiations are still going on with the hydro-power agency to resolve the water allocation policy.

c) Environmental flow assessment study was carried out by CDA in collaboration with Wetlands International and international experts to assess the impacts of Naraj Barrage and determine optimum fresh water flows required for maintaining salinity regimes in Chilika and agriculture productivity in the flood plain by allowing lateral flow of sediments.

d) The Government of India along with the UNDP in its CCF-1, executed a project "Inland Wetlands of India" through SACON to identify and generate baseline information on inland wetlands and broad-basing wetland conservation by evolving a 'National Network of Inland Wetland Conservation Areas'. Overall, 730 species of angiosperms, 803 species of fish, 23 species of freshwater turtles and 325 species of birds have been recorded from freshwater systems covering an area of 58.4 m ha. Out of the species recorded, 114 plants have been found to be endemic to the region. The survey indicated that 102 species of fish, 16 species of turtles and 26 species of birds are threatened.

e) Asian Waterfowl Bird Census periodically monitors changes in species and population of birds. These efforts are being further strengthened through the IBA programme coordinated by BNHS. BNHS has identified 65 IBAs and has carried out bird migration studies for Chilika, Harike, Keoladeo National Park and Point Calimare. ZSI and WII have carried out extensive inventorization of different waterbirds and other wildlife. Asian Waterbird Census is carried out periodically by Wetlands international in collaboration with BNHS in India. Efforts have been undertaken for conservation of migratory bird species through network of sites under Central Asian Flyways.

152. Has your country promoted the application of the guidelines on the rapid assessment of the biological diversity of inland water ecosystems? (decision VII/4)	
a) No, the guidelines have not been reviewed	
b) No, the guidelines have been reviewed and found inappropriate	
c) Yes, the guidelines have been reviewed and application/ promotion is pending	X
d) Yes, the guidelines promoted and applied	

Box LXIII.

Please elaborate below on the implementation of this programme of work and associated decisions specifically focusing on:

a) outcomes and impacts of actions taken;

b) contribution to the achievement of the goals of the Strategic Plan of the Convention;

c) contribution to progress towards the 2010 target;

d) progress in implementing national biodiversity strategies and action plans;

e) contribution to the achievement of the Millennium Development Goals;

f) constraints encountered in implementation.

Awareness at all levels on conservation and wise use of wetland resources has improved considerably by the actions taken so far in the country. Successful initiatives, such as the restoration of Chilika Lagoon in Orissa have led to the development of model case studies on conservation of wetland resources, which are being replicated in other representative wetlands. Measures undertaken at the national level for conservation and wise use of wetlands have significantly contributed to the achievements of the goals of the strategic plan of the CBD. Basin level wetland conservation plans and strategies have helped to promote cross sectoral planning for conservation and sustainable use of these ecosystems, particularly in the Mahanadi and Brahmaputra river basins, which are being further expanded to other priority regions of India. Inventorization of wetlands carried out through involvement of various agencies is improving information on status and trends of wetland ecosystems, which is providing key inputs to wetland policy formulation. Effective use of GIS technologies is leading to improved database for several key wetland sites. An effective example is the Loktak Atlas published by Wetlands International and Loktak Development Authority, which contains detailed information on hydrological, ecological and socio economic aspects of the wetland and its catchments.

Management Action Plans prepared for biodiversity rich habitats, particularly for rare and endemic species, e.g., Keibul Lamjao National Park, Manipur and Nalabana Bird Sanctuary in Chilika Lagoon shall lead to improved conservation status of these habitats. Conservation and management plans presently under implementation shall lead to reduction in the rate of biodiversity loss in the wetlands and their associated catchments, thereby significantly contributing to achieving the 2010 target. Wide ranging consultation processes have been initiated for the formulation of a national wetland policy and national biodiversity strategy. Wetland conservation and wise use has strong linkages with improving livelihoods of the wetland dependant communities. Significant models are also emerging on enhancement of socioeconomic status of communities dependant on wetlands through augmentation of resource base, demonstrated effectively in Chilika Lake where hydrological intervention for lake restoration has led to livelihood improvement of communities living in and around Chilika through increased incomes and reduced migration. Application of tools of wetland economic evaluation is also being carried out for integrating the values and functions of wetland ecosystems into planning for livelihood security and poverty reduction. These measures contribute significantly to achievement of MDGs. Experiences gained on problems and issues of wetland ecosystems need to be integrated into formulation of river basin level action plans for priority wetland ecosystems. Case studies from representative ecoregions need to be taken up, and efforts made to mainstream wetlands into national and state level developmental planning.

Marine and coastal biological diversity
General

153. Do your country's strategies and action plans include the following? Please use an "**X**" to indicate your response. (decisions II/10 and IV/15)	
a) Developing new marine and coastal protected areas	X
b) Improving the management of existing marine and coastal protected areas	X
c) Building capacity within the country for management of marine and coastal resources, including through educational programmes and targeted research initiatives (if yes, please elaborate on types of initiatives in the box below)	X
d) Instituting improved integrated marine and coastal area management (including catchments management) in order to reduce sediment and nutrient loads into the marine environment	X
e) Protection of areas important for reproduction, such as spawning and nursery areas	X
f) Improving sewage and other waste treatment	X
g) Controlling excessive fishing and destructive fishing practices	X
h) Developing a comprehensive oceans policy (if yes, please indicate current stage of development in the box below)	X
i) Incorporation of local and traditional knowledge into management of marine and coastal resources (if yes, please elaborate on types of management arrangements in the box below)	X
j) Others (please specify below)	
k) Not applicable	

Please elaborate on the above activities and list any other priority actions relating to conservation and sustainable use of marine and coastal biodiversity.

India is taking adequate measures to conserve coastal and marine biodiversity. It is conducting meetings, conferences and workshops to identify the current issues and take measures to solve problems. The CRZ Notification prohibits developmental activities in coastal areas, and disposal of wastes in the mangrove and coral reef areas, thereby protecting them and their associated biodiversity.

The priority actions are elaborated as follows:

a) The area under PAs in islands and coastal bio-geographic zones is proposed to be increased from 18.5% to 36.14% and from 6.16% to 7.12% of the geographical area, respectively.

b) Effective management of PAs, including marine and coastal PAs, is one of the key strategies under the National Wildlife Action Plan, 2002.

c) The Government of India through its various Ministries and Departments is taking adequate capacity building activities throughout the country for the effective management of bioresources, in general, and marine and coastal resources, in particular. MoEF, Government of India is operating a specific programme called "All India Coordinated Project on Coastal and Marine Biodiversity", which is promoting research in three major areas, viz., survey and inventorization, capacity building and database development. It also extends support to conduct periodical training programmes for school and college teachers, forest officials and research scholars on estimation of bioresources in critical habitats like mangroves and coral reefs. Training courses are organized regularly at WII, Dehradun for PA managers. Besides this, the National Bioresources Development Board of the DBT is also supporting summer vacation training programmes for school children at various places on different themes including coastal and marine biodiversity. DOD and ICAR also support short-term training programmes, targeting different stakeholders. Further, the United Nations University and UNESCO help hold annual mangrove biodiversity assessment training programmes in which participants from Southeast Asian countries take part. Several national institutes such as WII, SACON, ZSI and BSI under MoEF; National Institute of Ocean Technology (NIOT), National Centre for Antarctic and Ocean Research (NCAOR), Centre for Marine Living Resources & Ecology (CMLRE) and ICMAM Project Directorate under DOD, NIO and Central Salt & Marine Chemicals Research Institute (CSMCRI) under CSIR, CMFRI under ICAR, universities and CSIR are involved in capacity building and conducting targeted research on marine and coastal resources. Specific Ocean Science and Technology Cells (OSTCs) of the DOD have been established in various universities to conduct research and for man power development in various fields of marine science, such as coastal ecology, mariculture, marine biology, marine microbiology, marine benthos, etc.

d) Implementation of ICMAM in order to reduce sediment and nutrient loads into the marine environment is already in practice in certain coastal and marine ecosystems. Chilika, the largest brackish water lagoon of India, is a pioneer in this regard where CDA is managing the area in an integrated way. The area was included in the Montreaux List (Ramsar Sites in danger), but was removed from it in 2001 because of concerted efforts of CDA. State wise Coastal Management Plans have also been prepared under CRZ Notification.

e) The coastal zone and marine PAs are serving as areas for reproduction of aquatic fauna, particularly fishes. In Sunderbans, the largest expanse of mangroves in India, the fish catch in the surrounding areas has increased after declaring the inner areas as a national park because of undisturbed spawning and nursery areas due to the high degree of protection in the national park.

f) Improving sewage and other waste treatment is the priority area and Coastal Zone Regulations are in place to check sewage and other waste treatment.

g) The National Wildlife Action Plan, 2002 calls for revision of fishing laws and their effective implementation. In Chilika, because of concerted efforts of CDA, fish landing actually increased due to control of excessive and destructive fishing practices.

h) The Government of India came out with an Ocean Policy Statement in 1982, which has been the guiding principle in several initiatives to develop ocean S&T, increase

knowledge about our marine resources and their proper use. To further coordinate the work of multiform agencies in the ocean sector and activities undertaken in this sector, efforts are on to establish an Ocean Resource Commission.

i) The technical report of NBSAP project and the National Wildlife Action Plan, 2002 call for the utilization of traditional knowledge in management plans. Almost 60% of the coastal fish catch is carried out by fishermen using local crafts, gears and techniques. In the day-to-day management of coastal resources of marine PAs and in tourism activities, local and traditional knowledge is used.

j) The National Environment Policy, 2006 seeks to: disseminate available techniques for regeneration of coral reefs and support activities based on application of such techniques; explicitly consider sea-level rise and vulnerability of coastal areas to climate change and geological events in coastal management plans, as well as infrastructure planning and construction norms; and adopt a comprehensive approach to Integrated Coastal Management by addressing linkages between coastal areas, wetlands and river systems, in relevant policies, regulations and programmes.

Implementation of integrated marine and coastal area management

154. Has your country established and/or strengthened institutional, administrative and legislative arrangements for the development of integrated management of marine and coastal ecosystems?	
a) No	
b) Early stages of development	
c) Advanced stages of development	
d) Arrangements in place (please provide details below)	X
e) Not applicable	

Further comments on the current status of implementation of integrated marine and coastal area management.

The MoEF has set up an administrative arrangement for the development of integrated management of marine and coastal ecosystems and has identified suitable institutions for undertaking scientific research in this area. The legislative measures include Wildlife Protection Act, CRZ Notification, Notified Marine Protected Areas and Marine Biosphere Reserves, etc. The Chilika example clearly demonstrates the effectiveness of the measures taken so far in the country. Setting up of CDA in 1992 was a major step in integrated management of this important coastal/marine ecosystem. CDA adopted a scientific approach and brought all the stakeholders to one platform. Because of the integrated management approach, Chilika was removed from Montreux record in 2001 and in 2002, it was given the Ramsar Wetland Conservation Award. Like CDA, the Gulf of Mannar Biosphere Reserve, Sunderbans Biosphere Reserve and Great Nicobar Biosphere Reserve are also now realities.

155. Has your country implemented ecosystem-based management of marine and coastal resources, for example through integration of coastal management and watershed management, or through integrated multidisciplinary coastal and ocean management?	
a) No	
b) Early stages of development	
c) Advanced stages of development	
d) Arrangements in place (please provide details below)	X
e) Not applicable	
Further comments on the current status of application of the ecosystem to management of marine and coastal resources.	
India is implementing the integrated coastal area management through the CRZ Notification, 1991 which has provisions to protect critical marine and coastal ecosystems, including mangroves and coral reefs. This Notification controls the discharge of aquaculture drainage water and other industrial wastes into mangrove and coral reef areas, prevents coral mining and regulates setting up of aquaculture ponds and other developmental activities in the coastal areas, which can cause adverse impacts on the marine and coastal ecosystems. To protect the marine and coastal habitats and endangered marine species, legal provisions are in place to create marine PAs. Many species have been listed as protected in the Wildlife Protection Act.	

Marine and coastal living resources

156. Has your country identified components of your marine and coastal ecosystems, which are critical for their functioning, as well as key threats to those ecosystems?	
a) No	
b) Plans for a comprehensive assessment of marine and coastal ecosystems are in place (please provide details below)	
c) A comprehensive assessment is currently in progress	
d) Critical ecosystem components have been identified, and management plans for them are being developed (please provide details below)	
e) Management plans for important components of marine and coastal ecosystems are in place (please provide details below)	X
f) Not applicable	
Further comments on the current status of assessment, monitoring and research relating to marine and coastal ecosystems, as well as key threats to them	

India has identified various components of the critical marine and coastal ecosystems. These components vary with varying locations. DOD has already completed the assessment of critical habitats of the country and developed databases to manage them. Periodical surveys have been conducted at several key locations to identify various biological components of the critical habitats. The MoEF has developed specific national mangrove and coral reef plans to manage and coordinate various activities, through the National Committee for Mangroves and Coral reefs. Effective mesh size regulations and fishing holidays have been introduced to reduce fishing pressure during the breeding season. Government has also made elaborate arrangements with its navy and coast guard to reduce poaching in the coastal and marine areas.

157. Is your country undertaking the following activities to implement the Convention's work plan on coral reefs? Please use an "**X**" to indicate your response.

Activities	Not implemented nor a priority	Not implemented but a priority	Currently implemented	Not applicable
a) Ecological assessment and monitoring of reefs			X	
b) Socio-economic assessment and monitoring of communities and stakeholders			X	
c) Management, particularly through application of integrated coastal management and marine and coastal protected areas in coral reef environments			X	
d) Identification and implementation of additional and alternative measures for securing livelihoods of people who directly depend on coral reef services		X		
e) Stakeholder partnerships, community participation programmes and public education campaigns			X	
f) Provision of training and career opportunities for marine taxonomists and ecologists			X	
g) Development of early warning systems of coral bleaching		X		

Activities	Not implemented nor a priority	Not implemented but a priority	Currently implemented	Not applicable
h) Development of a rapid response capability to document coral bleaching and mortality		X		
i) Restoration and rehabilitation of degraded coral reef habitats			X	
j) Others (please specify below)			X	

Please elaborate on ongoing activities.

India is a partner to the Global Coral Reef Monitoring Network. Considering the importance of coral species in the coastal system, their conservation has been given high priority in recent years. The Union Government, state governments, NGOs, community organizations and universities are involved in various activities such as coral reef research, awareness creation and conservation. Development of artificial reefs along the coast is in practice especially in the Kerala coast and Gulf of Mannar Biosphere Reserve, and it is proved to be one of the important means of fish stock regeneration and enhancement of socio-economic condition of fisher-folk. Fisher-folk have been educated and empowered for sustainable management of coral resources and maintaining their livelihoods in some coastal villages of the Gulf of Mannar and Gulf of Kutch. In some adjacent villages of the Gulf of Mannar Biosphere Reserve, people who were directly dependent on coral reefs for their livelihood have been trained for generating alternate income by setting up of cottage industries, viz. pickle preparation, vermiculture and vermicomposting, production of food grade agar from seaweeds, handicrafts etc. under the popularly known "Techno-socio-economic" programme. In some fishing villages (coral reef areas) of Gujarat, Community Learning and Earning Centers have been started and they are now serving as focal points for co-management. Signboards and posters in strategic public areas with key messages have been kept in almost all the coral reef areas of the country including the Andaman and Nicobar Islands. Collection, collation and dissemination of information pertaining to estuaries, mangroves and coral reefs of the country are being effectively carried out by the ENVIS Centres established by the Government of India.

Besides, several central and state government agencies are providing financial assistance for coral reef research. The MoEF is implementing a specific programme on mangroves and coral reefs which supports research and conservation activities in the country. The CORDIO (Coral Reef Degradation in the Indian Ocean) programme has been supporting activities such as reef monitoring, community based reef restoration, socio-economic monitoring, provision of alternate livelihood, public awareness creation etc. in the Gulf of Mannar region. The Global Coral Reef Monitoring Network, in collaboration with the Indian Coral Reef Monitoring Network, is conducting training courses for socio-economic monitoring in the coral reef areas of the Andaman and Nicobar Islands and Agatti Island of Lakshadweep.

All coral reefs areas outside the PA network are protected under Category-I of CRZ Notification. All hard corals species are declared as Schedule I animals under the Wildlife Protection Act, giving them maximum legal protection against any exploitation. Along with them, certain other marine/reef associates, such as sea cucumbers, molluscs etc., are also protected.

Marine and coastal protected areas

158. Which of the following statements can best describe the current status of marine and coastal protected areas in your country? Please use an "**X**" to indicate your response.	
a) Marine and coastal protected areas have been declared and gazetted (please indicate below how many)	X
b) Management plans for these marine and coastal protected areas have been developed with involvement of all stakeholders	X
c) Effective management with enforcement and monitoring has been put in place	X
d) A national system or network of marine and coastal protected areas is under development	X
e) A national system or network of marine and coastal protected areas has been put in place	X
f) The national system of marine and coastal protected areas includes areas managed for purpose of sustainable use, which may allow extractive activities	X
g) The national system of marine and coastal protected areas includes areas which exclude extractive uses	X
h) The national system of marine and coastal protected areas is surrounded by sustainable management practices over the wider marine and coastal environment.	X
i) Other (please describe below)	
j) Not applicable	

Further comments on the current status of marine and coastal protected areas.

There are 31 Marine Protected Areas in the country, located all along the Indian coastline including Andaman and Nicobar and Lakshadweep Islands. Besides, another 100 PAs have terrestrial or fresh water ecosystems which constitute boundaries with seawater or partly contain marine environment and they provide protection to the coastal and marine biodiversity. Three Marine Biosphere Reserves have also been established in the country, which includes the Gulf of Mannar Biosphere Reserve, the first of its kind in the whole of Southeast Asia. Government of India has asked the state and union territory governments to identify and propose new areas for the establishment of Marine Protected Areas. Management plans for some of these marine and coastal protected areas have been developed with involvement of all stakeholders.

Mariculture

159. Is your country applying the following techniques aimed at minimizing adverse impacts of mariculture on marine and coastal biodiversity? Please check all that apply.	
a) Application of environmental impact assessments for mariculture developments	X
b) Development and application of effective site selection methods in the framework of integrated marine and coastal area management	X
c) Development of effective methods for effluent and waste control	X
d) Development of appropriate genetic resource management plans at the hatchery level	X
e) Development of controlled hatchery and genetically sound reproduction methods in order to avoid seed collection from nature.	X
f) If seed collection from nature cannot be avoided, development of environmentally sound practices for spat collecting operations, including use of selective fishing gear to avoid by-catch	X
g) Use of native species and subspecies in mariculture	X
h) Implementation of effective measures to prevent the inadvertent release of mariculture species and fertile polypoids.	
i) Use of proper methods of breeding and proper places of releasing in order to protect genetic diversity	X
j) Minimizing the use of antibiotics through better husbandry techniques	X
k) Use of selective methods in commercial fishing to avoid or minimize by-catch	X
l) Considering traditional knowledge, where applicable, as a source to develop sustainable mariculture techniques	X
m) Not applicable	
Further comments on techniques that aim at minimizing adverse impacts of mariculture on marine and coastal biodiversity.	
India is regulating mariculture activities through the Aquaculture Authority of India, which is promoting sustainable aquaculture. It monitors the establishment of aquaculture ponds in accordance with the Coastal Zone Regulation, establishment of discharge water treatment systems, maintenance of buffer zones and establishment of salt tolerant plants in the buffer zone, banning and monitoring of the usage of certain chemicals (e.g.	

Chloromphinical) and other related activities. Besides this, ICAR, DBT and other Government agencies are supporting the development of culture systems for native species, improvement of cultivable species, culture techniques etc. Commercial scale mariculture is being practiced with the native species. State governments also regulate aquaculture activities through different methods, including the introduction of licensing procedures. Seaweeds like *Enteromorpha* and *Chaetomorpha* are used for treating the discharge water. Bivalves have also been used for reducing the turbidity of the discharge water and to reuse the same for culture; however, this has drawbacks because of the rapid reproductive activity of the bivalves. Most of the farms in operation go for sedimentation and aeration before discharging the pond water into the source.

Coastal mariculture is regulated under CRZ Notification. There is ban on coastal fishing during the monsoon/breeding period. Certain fish species such as whale shark, some other shark species, sea horses, sea cucumbers, some molluscs etc. are protected under Wildlife Protection Act. Fishing using traditional crafts/gears-subsistence level is very high.

Alien species and genotypes

160. Has your country put in place mechanisms to control pathways of introduction of alien species in the marine and coastal environment? Please check all that apply and elaborate on types of measures in the space below.	
a) No	
b) Mechanisms to control potential invasions from ballast water have been put in place (please provide details below)	X
c) Mechanisms to control potential invasions from hull fouling have been put in place (please provide details below)	
d) Mechanisms to control potential invasions from aquaculture have been put in place (please provide details below)	X
e) Mechanisms to control potential invasions from accidental releases, such as aquarium releases, have been put in place (please provide details below)	
f) Not applicable	

Further comments on the current status of activities relating to prevention of introductions of alien species in the marine and coastal environment, as well as any eradication activities.

The Port Authorities undertake activities to regulate introduction of alien species through ballast waters of the ship.

Agricultural biological diversity

161. Has your country developed national strategies, programmes and plans that ensure the development and successful implementation of policies and actions that lead to the conservation and sustainable use of agrobiodiversity components? (decisions III/11 and IV/6)	
a) No	
b) No, but strategies, programmes and plans are under development	
c) Yes, some strategies, programmes and plans are in place (please provide details below)	
d) Yes, comprehensive strategies, programmes and plans are in place (please provide details below)	X

Further comments on agrobiodiversity components in national strategies, programmes and plans.

India is bestowed with immense agro-biodiversity and a rich diversity in landraces/ traditional cultivars/farmers' varieties in several agri-horticultural crops. A large number of crop plants (384) are reported to be cultivated in India. This includes 168 species earlier reported under the Hindustani centre, one of the eight Vavilovian centres of origin and diversity. Further, an enormous richness (326 species) is reported in wild relatives of crop plants as well. A total of 49 indigenous major and minor crops have been reported in the 'History of Agriculture in India', which included 5 cereals and minor millets, 4 pulses, 1 oilseed crop, 9 vegetables, 5 tuber crops, 11 fruits, 5 spices, 1 sugar-yielding plant and 7 fibre crops.

Much of the country's agrobiodiversity is in the custody of farming communities/ tribals who followed age-old farming systems, including shifting cultivation, made conscious/unconscious selections, and inherited and perpetuated their seed/propagules over generations. Concentration of genetic diversity, comprising native species and landraces, is more in Western Ghats, northeastern Himalayas, southern plateau, central India and northwestern Himalayas.

The crops in which rich diversity occurs in India include rice, wheat, barley, pigeon pea, chick pea, minor millets, mung bean, urad bean, horse gram, moth bean, rice bean, cluster bean, sesame, forage grasses, okra, eggplant, cucumber, melons, citrus, banana and plantains, jackfruit, mango, tamarind, jamun , jute, cotton, ginger, turmeric, pepper, cinnamon and cardamom. Among tuberous crops, rich variability exists in sweet potatoes, taros and yams. Native resources are also available in *Coleus* species, sword bean, velvet bean and several plantation crops including arecanut and coconut. Diversity also occurs in several minor fruits, such as berries and nuts, and several species of *Rubus, Ribes, Juglans, Pyrus* and *Prunus*. In medicinal plants, India's vast genetic resource base is well known the world over.

Richness in biodiversity among various livestock and poultry species is quite astounding. There are 27 breeds of cattle, 8 breeds of buffalo, over 42 breeds of sheep, 20 breeds

of goats, 7 breeds of camel, 8 breeds of horses and few types of pigs. Considerable biodiversity is also known to exist in yak, mithun (Taurus) and other avian species. India harbours a large population of animal genetic resources with 197.7 million cattle, 77.0 million buffalo, 45.7 million sheep, 110.2 million goat, 2.0 million equines, 1.0 million camel, 10.6 million pig, 0.13 million mithun and 0.04 million yak.

Of about 20,000 species comprising the fish genetic resources of the world, nearly 11 per cent (or 2118 fish species) have been reported in India, including the finfishes from the biodiversity-rich Western and Eastern Ghats.

Keeping the above in view, conservation and sustainable use of agricultural biodiversity has received major attention. ICAR and DARE cater to the needs of all genetic resources-related activities in India as the umbrella organisation and the respective activities on plant, animal, fish, agriculturally important microbes, mushroom and insect genetic resources are covered by the respective National Bureaus/National Research Centres/ institutions under the ICAR. The activities covered on plant genetic resources include, planning, conducting, promoting, coordinating collecting, introducing, exchanging, evaluating, documentating, conserving and sustainably managing diverse germplasm of crop plants and their wild relatives, and also ensuring their continous availability for use by breeders and other researchers in India and abroad. More recently, some NGOs have also been actively engaged in the development of Community Gene Banks, including by the establishment of medium term storage facilities to support this activity in selected pockets.

The Indian agricultural research system, comprising national institutes, agricultural universities, research organisations and others, is already pursuing the ecosystem approach for crop improvement and genetic resource conservation in the 21 identified agro-climatic zones across the country. India welcomes the on-going work towards refining the guidelines and developing operational systems for this purpose. ICAR, established in 1929, is the second largest agricultural R&D organisation in the world. Over the years, ICAR has contributed significantly to many vital technological break-throughs for achieving food and nutritional security for the growing human population, focussing on marginal farmers, and, at the same time, maintaining ecological balance and conservation of natural resources. In tune with our emerging needs, India is re-orienting its efforts to meet the future challenges of increased food production, while ensuring conservation and sustainable utilisation. These efforts are need based and demand driven, and there has been a paradigm shift from a commodity and product based approach to a systems and programme based approach following eco-regional planning.

With MoA as the nodal agency, the Inter-Ministerial Consultation Group overviews the developments and responds to emerging issues. A National Action Plan of Agro-biodiversity in India has been developed and published jointly by National Academy of Agricultural Sciences, ICAR and Indian Society of Plant Genetic Resources in 1999, including the status of agro-biodiversity in India (plants, livestocks, poultry, fishes, insects and agriculturally import microbes), agro-biodiversity management and thrust areas, priorities and a National Action Plan. The PVPFRA, 2001 legislation also has provisions for declaration of non-use of terminator gene technology in development of new plant varieties for registration.

162. Has your country identified ways and means to address the potential impacts of genetic use restriction technologies on the *In situ* and *Ex situ* conservation and sustainable use, including food security, of agricultural biological diversity? (decision V/5)	
a) No	
b) No, but potential measures are under review	
c) Yes, some measures identified (please provide details below)	
d) Yes, comprehensive measures identified (please provide details below)	X

Further information on ways and means to address the potential impacts of genetic use restriction technologies on the *In situ* and *Ex situ* conservation and sustainable use of agricultural biodiversity.

As per the policy of the Govt. of India, import of GURTS is banned in India, and the conditions of import of plant genetic resources into India include a declaration about use of GURTS in the imported sample (Notification no. GSR 1037 (E) dated 5.12.1989).

The legislation PVPFRA, 2001, also has provisions for declaration of non-use of terminator gene technology in development of a new plant varieties for registration.

Annex to decision V/5 - Programme of work on agricultural biodiversity

Programme element 1 – Assessment

163. Has your country undertaken specific assessments of components of agricultural biodiversity such as on plant genetic resources, animal genetic resources, pollinators, pest management and nutrient cycling?	
a) No	
b) Yes, assessments are in progress (please specify components below)	X
c) Yes, assessments completed (please specify components and results of assessments below)	

Further comments on specific assessments of components of agricultural biodiversity.

National Bureaus of Plant, Animal, Fish and Microbial Genetic Resources are operating effectively under the ICAR. In addition, there is the National Bureau of Soil Survey and Land Use Planning. These Bureaus have played a vital role in their mandated specific areas while working in partnership with national research institutes/centres, All India Coordinated Crop Improvement Projects, state agricultural universities, lead institutions and NGOs.

For example, an assessment of collected and conserved crop genetic resources has been undertaken by the NBPGR since its inception. About 180,000 collections were

available at NBPGR in 1999. A mission mode programme on Sustainable Management of Plant Biodiversity under NATP was launched on July 1999, after a gap analysis in the existing collections, involving 127 cooperating centres representing 90 organizations.

Under this project, from 1999 to March 2005, about 9,00,000 accessions comprising landraces, local cultivars, trait-specific germplasm of crop plants and their wild relatives have been collected through 1,718 explorations. Focused attention has been laid on collection of landraces/primitive cultivars of crops, endangered crop species, lesser known crops, backyard cultigens and wild relatives of crop plants. Equal emphasis was also laid on collection of vegetables, horticultural species, fibre crops, medicinal plants and under-utilized plant species. Several unexplored areas have been explored for the first time in the programme such as Muthikulam forest area (Tamil Nadu), Indira Gandhi Wild Life Sanctuary (Tamil Nadu), Papikondalu Wild Life Sanctuary (Andhra Pradesh), Kudremukh region (Kerala), Suriyur area (Kerala), Kavaratti (Lakshdweep), Valley of Flowers (Uttaranchal), Tehri Dam submergence areas (Uttaranchal), Western Ghats (Kerala and Tamil Nadu), Andaman and Nicobar Islands, Mizo hills (Mizoram), Jaintia and Khasi hills (Meghalaya), Naga hills (Nagaland), Brahamputura Islands (Assam), etc. Special missions were primarily planned in areas suspected to lose diversity due to natural or human-caused disturbances. These special missions have been undertaken in Tehri Dam submergence areas (Uttaranchal) and Sardar Sarovar Dam (Narmada Valley). The areas having significantly rich diversity (particularly potential species) like Valley of Flowers (Uttaranchal), Andaman and Nicobar Islands, Sunderbans (West Bengal), Brahamputra River Island (Arunanchal Pradesh), etc. were explored on priority. Besides, need-based missions were also launched in cyclone-hit areas of Orissa and earthquake-hit areas of Gujarat. In total, sixteen special exploration missions have been undertaken in different inaccessible and diversity rich areas and 8,000 accessions were augmented during the missions. Several new records have been identified – *Musa acuminata x M. balbisiana* (Bhat Manohar, a *Musa* species – first known natural tetraploid of banana), *Corchorus pseudoolitorius* (new species), *Citrus madurensis, Solanum gigantium, Actinida callos* and *Citrus macroptera* (new records) were collected for valuable trait-specific germplasm from diverse habitats. Besides, several rare/endemic/endangered species have been collected.

164. Is your country undertaking assessments of the interactions between agricultural practices and the conservation and sustainable use of the components of biodiversity referred to in Annex I of the Convention (e.g. ecosystems and habitats; species and communities; genomes and genes of social, scientific or economic importance)?

a) No	
b) Yes, assessments are under way	X
c) Yes, some assessments completed (please provide details below)	
d) Yes, comprehensive assessments completed (please provide details below)	

Further comments on assessment of biodiversity components (e.g. ecosystems and habitats; species and communities; genomes and genes of social, scientific or economic importance).
The status of components of agro-biodiversity is being monitored regularly and overall degradation is observed because of adoption of high yielding varieties in place of locally adopted varieties, changing nature of cropping systems and infrastructural developments.

165. Has your country carried out an assessment of the knowledge, innovations and practices of farmers and indigenous and local communities in sustaining agricultural biodiversity and agro-ecosystem services for food production and food security?	
a) No	
b) Yes, assessment is under way	X
c) Yes, assessment completed (please specify where information can be retrieved below)	
Further comments on assessment of the knowledge, innovations and practices of farmers and indigenous and local communities.	
A mission mode project on collection, documentation and validation of ITK was initiated in 2000. The objectives of the project are to collect, classify and document ITK with respect to agricultural production and farming systems in different agro-climatic regions of the country including agro-biodiversity. About 2000 ITKs have been documented till 2003, in diverse agro-biodiversity related thematic areas, such as water management, storage of farm produce (seeds), cropping systems, soil fertility management, tillage practices, fisheries, veterinary and animal husbandry, ethnic foods, housing materials, thermal efficiency, fuel management, etc.	

166. Has your country been monitoring an overall degradation, status quo or restoration/ rehabilitation of agricultural biodiversity since 1993 when the Convention entered into force?	
a) No	
b) Yes, no change found (status quo)	
c) Yes, overall degradation found (please provide details below)	X
d) Yes, overall restoration or rehabilitation observed (please provide details below)	

Further comments on observations.
The status of components of agro-biodiversity is being monitored regularly and overall degradation is observed because of adoption of high yielding varieties in place of locally adopted varieties, changing nature of cropping systems and infrastructural developments. On-farm conservation of genetic resources and diversified farming practices are being promoted. Databases and monitoring systems are being developed.

Programme element 2 – Adaptive management

167. Has your country identified management practices, technologies and policies that promote the positive, and mitigate the negative, impacts of agriculture on biodiversity, and enhance productivity and the capacity to sustain livelihoods?	
a) No	
b) No, but potential practices, technologies and policies being identified	
c) Yes, some practices, technologies and policies identified (please provide details below)	X
d) Yes, comprehensive practices, technologies and policies identified (please provide details below)	
Further comments on identified management practices, technologies and policies.	
The negative impacts of agriculture on biodiversity, productivity and sustaining livelihoods are now getting attention and, thus, management practices, technologies and policies are being identified to mitigate the same. For example, promotion of integrated crop and livestock farming, revival of traditional watershed management practices and discouraging the indiscriminate use of chemical fertilizers and pesticides.	

Programme element 3 - Capacity-building

168. Has your country increased the capacities of farmers, indigenous and local communities, and their organizations and other stakeholders, to manage sustainable agricultural biodiversity and to develop strategies and methodologies for *In situ* conservation, sustainable use and management of agricultural biological diversity?	
a) No	
b) Yes (please specify area/component and target groups with increased capacity)	X
Further comments on increased capacities of farmers, indigenous and local communities, and their organizations and other stakeholders.	
The Biological Diversity Act and the PVPFRA have been enacted and the provisions of increasing capacity of farmers, local communities and other stakeholders are being	

implemented. Projects on on-farm conservation are in progress to develop workable models. Sustainable cropping patterns, with emphasis on legumes, are being promoted. Landraces, farmers' traditional varieties and livestock breeds are being documented and conserved.

169. Has your country put in place operational mechanisms for participation by a wide range of stakeholder groups to develop genuine partnerships contributing to the implementation of the programme of work on agricultural biodiversity?	
a) No	
b) No, but potential mechanisms being identified	X
c) No, but mechanisms are under development	
d) Yes, mechanisms are in place	

170. Has your country improved the policy environment, including benefit-sharing arrangements and incentive measures, to support local-level management of agricultural biodiversity?	
a) No	
b) No, but some measures and arrangements being identified	
c) No, but measures and arrangements are under development	
d) Yes, measures and arrangements are being implemented (please specify below)	X
Further comments on the measures taken to improve the policy environment.	
Supportive national legislation has been enacted (PVPFRA 2001; Biological Diversity Act 2002). Rules for their implementation have been framed based on wide consultations.	

Programme element 4 – Mainstreaming

171. Is your country mainstreaming or integrating national plans or strategies for the conservation and sustainable use of agricultural biodiversity in sectoral and cross-sectoral plans and programmes?	
a) No	
b) No, but review is under way	
c) No, but potential frameworks and mechanisms are being identified	

d) Yes, some national plans or strategies mainstreamed and integrated into some sectoral plans and programmes (please provide details below)	X
e) Yes, some national plans or strategies mainstreamed into major sectoral plans and programmes (please provide details below)	

172. Is your country supporting the institutional framework and policy and planning mechanisms for the mainstreaming of agricultural biodiversity in agricultural strategies and action plans, and its integration into wider strategies and action plans for biodiversity?	
a) No	
b) Yes, by supporting institutions in undertaking relevant assessments	X
c) Yes, by developing policy and planning guidelines	X
d) Yes, by developing training material	
e) Yes, by supporting capacity-building at policy, technical and local levels	
f) Yes, by promoting synergy in the implementation of agreed plans of action and between ongoing assessment and intergovernmental processes.	
Further comments on support for institutional framework and policy and planning mechanisms.	
National Planning Commission approves policies, broad programmes of work and allocation of funds based on proposals developed by nodal union ministries and state governments through a wide consultation-cum-discussion process, involving periodic assessments.	

173. In the case of centers of origin in your country, is your country promoting activities for the conservation, on farm, *In situ*, and *Ex situ*, of the variability of genetic resources for food and agriculture, including their wild relatives?	
a) No	
b) Yes (please provide details below)	X
Further comments on of the conservation of the variability of genetic resources for food and agriculture in their center of origin.	
India has developed infrastructure and expertise in *ex situ* conservation of crop plant species germplasm and a strong National Genetic Resources Conservation is in operation. On-farm conservation methodologies are being assessed for adoption. A few case studies on on-farm conservation are being evaluated under the NATP on Plant Biodiversity. For example, i*n situ* conservation of wild species of *Citrus* was established in 1976 and a Citrus gene sanctuary was identified in the North Eastern Hill region.	

Box LXV.

Please provide information concerning the actions taken by your country to implement the Plan of Action for the International Initiative for the Conservation and Sustainable Use of Pollinators.
Integrated pest management practices are being promoted with a view to reducing excessive use of pesticides and diversified farming systems are getting more emphasis.

Box LXVI.

Please elaborate below on the implementation of this programme of work and associated decisions specifically focusing on: a) outcomes and impacts of actions taken; b) contribution to the achievement of the goals of the Strategic Plan of the Convention; c) contribution to progress towards the 2010 target; d) progress in implementing national biodiversity strategies and action plans; e) contribution to the achievement of the Millennium Development Goals; f) constraints encountered in implementation.
Sustainable agricultural practices are now receiving greater attention with a renewed focus on integrated crop farming and livestock production systems for generating additional income to farm families. On-farm *in situ* conservation approach, with *ex situ* conservation providing a safety back up, is being explored under different ecosystems with a view to developing workable models. Value-addition to agri-products (like minor millet's fortification in biscuit-making) and horti-products is getting more popular. Support is being provided for conservation and improvement of landraces, traditionally grown farmers' varieties, native livestock breeds, best practices and associated traditional knowledge. Agricultural biodiversity has received major attention in the technical report the of NBSAP project. Small-sized farm holdings, resource-poor marginal farmers, low level of investment in agri-sector and limited technological advances are the major challenges.

Forest biological diversity

General

174. Has your country incorporated relevant parts of the work programme into your national biodiversity strategies and action plans and national forest programmes?	
a) No	
b) Yes, please describe the process used	X
c) Yes, please describe constraints/obstacles encountered in the process	

d) Yes, please describe lessons learned	
e) Yes, please describe targets for priority actions in the programme of work	

Further comments on the incorporation of relevant parts of the work programme into your NBSAP and forest programmes

MoEF has formulated a National Forestry Action Programme (NFAP), a comprehensive strategic long term plan for the next twenty years, to address the issues underlying the major problems of the forestry sectors in line with the National Forest Policy, 1988. The objective of the NFAP is to achieve the ultimate goal of sustainable forest management through evolving issue-based programmes, including having one-third area of the country under forest or tree cover, in line with the provisions of the NFP, 1988. The main components of the programme are:

- Protect existing forest resources
- Improve forest productivity
- Reduce total demand
- Strengthen policy and institutional framework
- Expand forest area

The different provinces of the country have their State Action Plans and their programme of work fits with the national work programme. The work programmes/activities under the broad policy framework decided by the National Board for Wildlife and MoEF are implemented by the State Forest and Wildlife Departments.

The NAEB was constituted in the MoEF in August 1992. The mandate of the NAEB is promoting afforestation, tree planting, ecological restoration and eco-development activities in the country with special attention to degraded forest areas and lands adjoining forest areas, national parks, sanctuaries and other PAs, as well as the ecologically fragile areas like the Western Himalayas, Aravallis, Western Ghats, etc.

NAEB has evolved specific schemes to promote afforestation and management strategies, which help the states in developing specific afforestation and eco-development packages for augmenting biomass production through the participatory JFM planning process.

In order to develop interconnectivity among rural development, forest conservation and employment generation in the forest-fringed villages, a number of schemes under JFM and eco-development of areas adjoining PAs are being implemented under the Five Year Plans of the provinces as well as centrally-sponsored schemes. An umbrella afforestation scheme of the MoEF called 'National Afforestation Programme' is being implemented through decentralised institutions of Forest Development Agencies constituted by a federation of Joint Forest Management Committees (JFMCs) at village micro-level. The work programmes are decided at micro-level through participatory processes for meeting the basic needs of the local people. The FDAs also obtain funding assistance from other departments for undertaking development works.

The SFR-2003 provides a much more comprehensive status of forest and tree cover in the country. Significant aspects of SFR-2003 are: introduction of an additional class of forest cover by splitting dense forest cover (canopy density above 40%) into two classes, namely very dense forest (canopy density more than 70%) and moderately dense forest (canopy density between 40-70%) while open forest cover having density 10-40% remains the same. The same criteria have been applied in the case of mangroves also.

Special projects of "Forest Type Mapping of India's Forests" and "Monitoring of Changes in Forest Cover in Tiger Reserves of India" have also been initiated.

FSI has been conducting field inventory for estimating the growing stock (volume) and other parametres of the forests by laying out systematic sample plots. So far, about 80% of the country's forest areas has been inventoried, including some areas more than once, and about 140 reports have been published. During 2002-2007, FSI is also conducting field inventory of forest resources inside and outside forests, including vegetation survey and estimation of soil carbon in forests.

A methodology has been developed for a comprehensive assessment of forest resources inside and outside forest areas by stratifying the country into physiographic zones and taking a sample of 10 percent districts for detailed inventory during a cycle of two years. The information thus generated will form a part of the biennial SFRs. These estimates will be further improved through subsequent sampling and surveying of other sets of districts. Together with forest inventory, assessment of herbs and shrubs (vegetation survey) is being carried out. In addition, assessment of regeneration status, biodiversity indices and soil carbon in forest areas are also being carried out.

Documentation, conservation and evaluation of biodiversity are important components of the NFP. The various forestry organisations under the MoEF through their various research and development activities have been contributing to the management and conservation of forest biological diversity. Some of the projects initiated in this direction are as follows:

1. Environmental conservation strategies for land use in lower western Himalayas: Butterflies as indicators in monitoring environmental changes in urban gradients
2. Plant growth strategy characterization and derelict mined ecosystem in western Himalayas
3. Upgradation and computerization of National Insect Reference Collection
4. Inventorisation and monitoring of biodiversity sites of Doon Valley and surroundings, Uttaranchal
5. Assessment of conservation status of hill bamboos collection of germplasm from various eco-climatic zones and establishment of germ plasm bank
6. Studies on floristic composition and associated mycorrhiza of dominant species in Baspa Valley of District Kinnaur, Himachal Pradesh (H.P.)
7. Studies on plant diversity of Renuka & Simbalwara Wildlife Sanctuaries of H.P.

8. Development of ecologically viable and socio-economically acceptable integrated model for checking willow (salix spp.) mortality in Lahaul Valley of H.P.
9. Development of database in tree improvement of mandatory species on Tamilnadu and Kerala
10. Estimation of gene diversity and enhancing seed production in seed orchards of Eucalyptus, Casuarina, Acacia and Teak
11. Assessment of biological diversity of various ecosystems and to establish methods for conservation in the Kaziranga National Park of Assam

Box LXVII.

Please indicate what recently applied tools (policy, planning, management, assessment and measurement) and measures, if any, your country is using to implement and assess the programme of work. Please indicate what tools and measures would assist the implementation.

National Environmental Policy 2006, has been prepared by the Ministry in consultation with experts to harmonize the demands of development and environment. The Biological Diversity Act and Wildlife Protection Act, 1972 are other legal provisions made by the Government of India for assisting implementation of work programme.

Box LXVIII.

Please indicate to what extent and how your country has involved indigenous and local communities, and respected their rights and interests, in implementing the programme of work.

Local SHGs are formed and locally available knowledge is documented with due acknowledgement. Newer technologies are developed using the ideas received from local people. Sufficient measures are taken to respect the rights and interests of local communities through various processes such as JFM, eco-development programmes etc. Sharing of benefits from NTFP management, eco-tourism development and meeting their livelihood needs through various forestry development activities are some other initiatives in this direction. The Government of India has recognized the importance of indigenous knowledge with the communities and made provisions for protection of IPRs and granting royalty and monetary benefits emanating through use of traditional knowledge. The knowledge about medicinal plants of local communities is also being documented to provide due recognition. Several projects targeting the importance of TK are ongoing with organizations of Government of India.

Indigenous knowledge of Angami tribe in sustainable management of biodiversity, and collection of ethno-botanical data from various tribes of Central India are some of the ongoing important internally and externally aided projects of the institutes under ICFRE.

Further relevant information may be seen in response to Question 58.

Box LXIX.

Please indicate what efforts your country has made towards capacity building in human and capital resources for the implementation of the programme of work.
Extensive efforts have been made across the country towards capacity building in human and capital resources through various projects and programmes funded by national and international agencies. Regular trainings are held on importance of biological diversity for various stakeholders. Awareness camps are held for farmers to apprise them on techniques for propagation of medicinal plants. Development of community-based market information services for medicinal plants of Uttaranchal through a website http://marketinfoherbs.icfre.org has been launched by the FRI under the ICFRE.

Box LXX.

Please indicate how your country has collaborated and cooperated (e.g., south-south, north-south, south-north, north-north) with other governments, regional or international organizations in implementing the programme of work. Please also indicate what are the constraints and/or needs identified.
Regional institutes of ICFRE have been collaborating with regional research centres of ICAR and other organizations under Govt. of India and Universities to assess sustainable utilization and documentation of biodiversity. Strategic tie-ups have been established with State Governments of Bihar, Jharkhand, West Bengal, Sikkim, Uttaranchal, Punjab, Haryana, etc. to evaluate and document biodiversity in those states. Skilled manpower in the form of local talent is a constraint in achieving the desired goal. WWF also monitors wildlife trade through its TRAFFIC division. It has assisted the enforcement agencies in the work of field investigations, raids and seizures, enforcement training, and field studies. Several projects, including with assistance by World Bank (Forestry Research, Education and Extension Project (FREEP) in ICFRE), UNDP, United States Department of Agriculture (USDA) and UNEP, have been completed in the last few years.

Expanded programme of work on forest biological diversity

Programme element 1 – Conservation, sustainable use and benefit-sharing

175. Is your country applying the ecosystem approach to the management of all types of forests?	
a) No (please provide reasons below)	
b) No, but potential measures being identified (please provide details below)	
c) Yes (please provide details below)	X

Comments on application of the ecosystem approach to management of forests (including effectiveness of actions taken, lessons learned, impact on forest management, constraints, needs, tools, and targets).

Ecosystems approach to evaluate and conserve biodiversity in various regions has helped in documenting the species association patterns and their dominance. Efforts are being made to adopt ecological restoration of wastelands based on the ecosystems approach, where all the components of the ecosystem are restored including their floral and faunal biodiversity. Given the high dependence of people on biological resources, the ecological management is the best option. Various state and centrally sponsored schemes have been initiated in the mountainous regions for involving local people with management and sustainable use of biodiversity. Some of the important schemes are Sanjhi Van Yojana, eco-development in and around PAs, management of NTFPs, etc. Environmental values are being assigned to the forests and the intangible benefits, such as carbon sequestration, water conservation, aesthetic importance, are being valued as the ecological services of the forests. Recently, a proposal of providing ecoservices by the Himalayan ecosystems of Uttaranchal State was submitted to the Planning Commission of India by the state government, highlighting the fact that compensation needs to be given to the state in lieu of protection of forests.

Different institutes of ICFRE are actively engaged in ecological studies on Dipterocarpus forest of Gibbon Wildlife Sanctuary and monitoring of biodiversity of Kaziranga National Park (Assam), Nauradehi Wildlife Sanctuary (Madhya Pradesh), Debrigarh Wildlife Sanctuary (Orissa). Gradually, the management of national parks and sanctuaries is also being oriented towards the concept of ecosystem management for holistic conservation of species and maintenance of natural ecological cycles. At the regional level, the projects are initiated as per the specific bio-climatically defined ecosystems. The management of NTFPs is also being reoriented on the overall ecological management principles. In the review of the success of various programmes, such as JFM and community management, ecological management criteria are being used as indicators.

Research on the landscape scale impact of NTFP extraction, and burning and grazing on biodiversity and socio-economic issues began in 1998 in the Western Ghats. This research is aimed at understanding the interaction between ecological and socio-economic processes, and determine the spatio-temporal consequences. In this research effort, interviews with local tribal and non-tribal people are used to get an understanding of the interactions between human activities and biodiversity, as viewed by the local people. This simulation model developed in the project for understanding various interactions will then be tested at other sites in the Western Ghats and used to inform and guide land use decisions at key intervention points, e.g., local/provincial governments. A number of flagship species of the ecosystem (both floral and faunal) have been targeted through ecological projects such as Project Tiger, Project Elephant, Crocodile, Rhino, Great Indian Bustard, Vultures, Manipuri Deer, *Santalum album*, *Tectona grandis, Melina arborea* etc. for conservation and improvement of their habitat. Biosphere reserves and national parks established in the country are based on the ecological management concept.

176. Has your country undertaken measures to reduce the threats to, and mitigate its impacts on forest biodiversity?

Options	X	Details
a) Yes	X	Please specify below the major threats identified in relation to each objective of goal 2 and the measures undertaken to address priority actions
		The major threats are changing land use and land management, habitat fragmentation, pressure on national resources, over-exploitation of forest and soil resources, forest fires, broken corridors, etc. Afforestation, ecological restoration and eco-development activities are the measures undertaken with special attention being given to the regeneration of degraded forest areas and lands adjoining forest areas, national parks, sanctuaries and other PAs as well as the ecologically fragile areas. Major programmes for *ex situ* and *in situ* conservation have been initiated to conserve endangered, rare and threatened species.
b) No		Please provide reasons below

Further comments on measures to reduce threats to, and mitigate the impacts of threatening processes on forest biodiversity (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets).

Efforts are afoot to conserve forest biodiversity at national level and several activities are being undertaken in this direction. Many measures have been taken to tackle the problem of land degradation and biodiversity loss. Some of them are i) participatory planning and management of natural resources; ii) protection and conservation of forest and community areas; iii) implementation of Maru Gaucher Yojana to rehabilitate Gauchar land in arid districts of Rajasthan; iv) concerns arising out of the EIA studies carried out by the organizations on specific sites of biodiversity significance. The Government of India is implementing projects for protection of Manipuri deer, rhino, crocodile, Magar, Musk deer in some states with a positive effect on populations of these species. As a result of targeted efforts, the populations of orchids, medicinal plants, Nilgiri tahr, civet cat, turtles, chital and sambhar have increased. Some other examples of broader initiatives to reduce threats to biodiversity loss are as follows:

- EIA has been made mandatory by the Govt. of India for all developmental projects. Biological diversity status and impacts due to the developmental activity undertaken in the project are major criteria for granting permission to the projects.
- Forest Conservation Act, 1980, Wildlife (Protection) Act, 1972, National Forest Policy, 1988, and National Wildlife Action programme are the legislative and policy measures to enforce conservation efforts.

- Government initiatives to protect biodiversity hotspot areas in the country and promote research in such sensitive areas with regards to impacts of climate change on biodiversity. Workshops sponsored by the MoEF on protection of mangroves, promotion of sacred groves and consolidating information on lesser known tree species are some examples of recognition and commitment by the Government for India for reducing loss of biodiversity.
- In Himachal Pradesh, a complete ban on hunting and green felling has been imposed, which will help in mitigating the impact of processes that are a threat to forest biodiversity.
- A number of tree improvement programmes based on genetic variability in the natural and production forests have been undertaken under various domestic and externally-aided projects, to supply improved and tested planting material for large scale afforestation and thus reduce pressure on natural resources.
- "National Tiger Conservation Authority" and "Wildlife Crime Control Bureau" have been established by the Govt. of India to save the tiger. The provisions in the Biological Diversity Act are being enabled at the ground level for reducing the loss of biodiversity.
- Proposals have been initiated for creation of a 'National Bureau for Forest Genetic Resources' and 'Forest Phyto Biodiversity Network' in ICFRE. The primary objective is to conserve the germ plasm of all forestry species as well as create a databank of phyto biodiversity.

India is a member of the APFISN under the FAO. The status of national activities being implemented on forest invasive species (FIS) is being documented. This stock-taking shall be used to reduce the impacts of existing FIS, including economic and other impacts in forestry sector, and to develop techniques to prevent the introduction of FIS, and monitor and control their impacts.

177. Is your country undertaking any measures to protect, recover and restore forest biologicaldiversity?

Options	X	Details
a) Yes	X	Please identify priority actions in relation to each objective of goal 3 and describe measures undertaken to address these priorities
		Extensive *in situ* and *ex situ* conservation programmes are in place. Certain areas of the forests are declared as reserved forests to recover and conserve the depleting biodiversity.
b) No		Please provide reasons below

Further comments on measures to protect, recover and restore forest biological diversity (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets).

Protection measures are in place, involving local communities for resource management, such as water harvesting, soil working to reduce the impacts on forest biodiversity, and biomass productivity. Globally, two of the hotspots, namely Indo-Burma and Srilanka-Western Ghats, cover a major portion of forest biodiversity of the Indian sub-continent. The ICFRE and its institutes, through different project activities, have been contributing towards conservation of forest biodiversity and genetic resources of north-eastern India, covering eastern Himalayas (Sikkim, North Bengal Himalayas) and Andaman and Nicobar Islands.

Creation of MPCAs, recent establishment of Great Himalayan National Park, strengthening of wildlife sanctuaries are some of measures taken by the states to protect, recover and restore the forest floral and faunal biodiversity. The Wildlife wing of different states such as H.P. have undertaken Integrated Eco-development Projects in selected wildlife sanctuaries and national parks with active involvement of local communities. Restoration of degraded habitats of animals through large scale plantations of different indigenous species of trees under various schemes is also being undertaken by the states. The governments are trying to enhance protection to threatened species to reduce poaching/hunting. For example, under Project Elephant and Project Tiger, strengthening of skilled and trained manpower and settlement of tribals have been initiated in buffer areas. The census methodology of threatened species is also being improved in accordance with IUCN guidelines, to keep count and track movement of selected species.

178. Is your country undertaking any measures to promote the sustainable use of forest biological diversity?

Options	X	Details
a) Yes	X	Please specify priority actions in relation to each objective of goal 4 and describe measures undertaken to address these priorities
		The objectives under Goal 4 envisage that products be derived from sustainably managed resources, reduce unsustainable consumption of biological resources, ensure that no species of wild flora and fauna are endangered by international trade. The Government of India is committed to the above objectives. In relation to the first objective, the Forest Certification Policy for products manufactured with the use of forest bioresources is being developed. The Criteria and Indicators (C&I) for forests are being finalized by IIFM, Bhopal. The need for incorporating the C&I in the Forest Working Plan and modalities for incorporation of C&I in the Working Plans are being worked out. The process of incorporating the C&I in the Working Plans requires a long-term association and interaction through regular meetings between the State Forest Departments and IIFM. The pilot testing of C&I in the Working Plan shall be undertaken where the preparation of Working Plans is under way, preferably in the selected Forest Management Units (FMUs) under IIFM-ITTO (International Tropical Timber Organization)

		research project. For the finalisation of Minimum Acceptable Standards, the political and social implications of such actions need to be taken into cognizance. Under the Operational Strategy for Sustainable Forestry Development with Community Participation in India, the criteria at the local level biodiversity in FMUs are: maintenance, conservation and enhancement of bio-diversity; and the indicators are: variety of plant species, variety of animal and bird species, pure patches of certain species (specific habitats), water bodies/water holes, production of timber and poles, basal area, stem density. Some issues on which further actions shall be taken are given below • Draft local and regional level certification standards with the help of all stakeholders in the production-to-consumption chain in each species, area and region. Such stake holders include the local collector, the primary forest produce cooperative societies, JFMCs, local knowledgeable persons such as the Kochias, vaidhyas etc., professional foresters, agricultural and horticultural scientists, ecologists, social scientists and traders. Such standards should be widely circulated to national and international experts, and certification agencies for comments and then adopted.
b) No		Please provide reasons below

Further comments on the promotion of the sustainable use of forest biological diversity (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets).

Chhattisgarh Forest Department's initiative on forest certification includes the following recommendations on issues that are, at present, a constraint:

- The need to have a single issue labeling of forest products derived from NTFP. This is defined as a process which results in a claim which may be used on product referring to the quality of forest or forest management at the origin of the raw material of which the product is made. Labeling is based on certification of forest management and verification of chain of custody as per ITTO guidelines. Labeling on this basis is described as 'single issue' because it only covers forest management and takes no account of other environmental impacts. This is internationally accepted and will help entrepreneurs to market certified herbal products. The certification process in other states needs to be similarly streamlined.
- Need for an independent and autonomous institution to undertake certification in the state/country.
- Quality assurance through lab testing facilities for NTFP. FRI, Dehradun provides at present seed certification for forest tree species. The seed quality certification should incorporate the seed source origin as well.
- For international movement of products of plant and animal origin, the provisions of the Biological Diversity Act will apply.

179. Is your country undertaking any measures to promote access and benefit-sharing of forest genetic resources?

Options	X	Details
a) Yes	X	Please specify priority actions in relation to each objective of goal 5 and describe measures undertaken
		Production forestry in India has to ensure protection of forest genetic resources *in situ* and reduce pressures from habitat loss, land use change and degradation (the objective of Goal 5). At present, ABS is through the forestry research institutes under ICFRE and State Forest Departments. Access of general public to genetic material is limited and needs further strengthening. In order to provide quality genetic material of seeds and clonal varieties, a large number of Seedling Seed Orchards (SSO), Clonal Seed Orchards (CSO) and Seed Production Areas (SPA) are identified, selected and are being managed by the State Forest Departments and ICFRE Institutes for species such as Poplar, Eucalyptus, Teak, Casuarina, etc. all over the country to decipher the benefit of tree improvement. Institute of Forest Productivity, Ranchi also has CSO, SSO and SPA. A massive network project has been undertaken with three ICFRE institutes to develop newer technologies in tree improvement. The National Bureau of Forest Genetic Resources and germplasm banks for forest species are proposed to be created within ICFRE, which will help to preserve the genetic resources and provide regulated access. The Biological Diversity Act also shall regulate the access of resources from forests. Degradation of habitat loss is monitored and inventorized by the FSI and NRSA. There are schemes of the Govt. of India for monitoring of forest fires. The advances in this technology to detect fires instantaneously and take remedial measures will also help reduce the forest degradation.
b) No		Please provide reasons below

Further comments on the promotion of access and benefit-sharing of forest genetic resources. (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets)

A good number of projects are underway to develop packages for cultivation of medicinal plants and provide good seeds to the farmers with emphasis on sustainable development of resources, namely

1. development of appropriate silvicultural systems for selected medicinal plants of Chhotanagar and Sarnath Parganas
2. creation of germplasm resource bank of threatened medicinal plants of Darjeeling Himalayas, and
3. medicinal plants under tropical climate of M.P.

Marketing mechanisms and appropriate certification of forest biological resources are major initiatives still required to streamline sustainable access and benefit sharing.

Programme element 2 – Institutional and socio-economic enabling environment

180. Is your country undertaking any measures to enhance the institutional enabling environment for the conservation and sustainable use of forest biological diversity, including access and benefit-sharing?

Options	X	Details
a) Yes	X	Please identify priority actions in relation to each objective of Goal 1 and describe measures undertaken to address these priorities
		At present, access to forest genetic resources is only through specific projects for specific species. For example, Eucalyptus material imported from Australia for research trials. Access across national boundaries will be subject to legal provisions of Biological Diversity Act in the country. Community participation projects and JFM programmes are examples of local institutions strengthened for conservation of biodiversity. Funds are allotted from the government to enhance the institutional capacity for sustainable use and conservation of forest biological diversity.
b) No		Please provide reasons below

Further comments on the enhancement of the institutional enabling environment for the conservation and sustainable use of forest biological diversity, including access and benefit-sharing (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets).

There is a dire need to have a holistic approach for institutional strengthening for conservation and sustainable use of forest biological diversity. Some efforts have already been initiated by Government of India to enhance technological expertise through research.

Bioprospecting area, a network programme on "Bioprospecting of biological wealth using biotechnological tools", was initiated during the 9th plan involving 13 institutions. The objectives of the first phase were i) Characterization of biodiversity in different agro-ecological regions through remote sensing and GIS-based studies; ii) Bioresources mapping, inventorisation and monitoring of biological diversity; iii) Characterization and conservation of Himalayan endangered species including MAPs; and iv) Bioprospecting of molecules and genes for product development. The first phase has been completed and leads obtained have been taken up further during the second phase for product development. The DBT and Department of Space jointly supported a project for biodiversity characterization at landscape level using satellite remote sensing and GIS, in which Western Ghats, North Eastern region, western Himalayas and Andaman & Nicobar Islands were taken up for mapping. The main objectives of the study included preparation of ecological zone maps using satellite remote sensing data incorporating topographical and bio-climatic information, landscape characterization to establish disturbance gradient using GIS, and detailed assessment of biodiversity at community level and their distribution pattern in few important biodiversity rich sites of the islands. (source: http://dbtindia.nic.in)

ICFRE and its institutes, WII, IIFM, GBPHIED and IPIRTI are actively pursuing research on various aspects of forest biological diversity. The capacity of state forest, wildlife and environment departments needs further strengthening in this regard.

181. Is your country undertaking any measures to address socio-economic failures and distortions that lead to decisions that result in loss of forest biological diversity?		
Options	**X**	**Details**
a) Yes	X	Please identify priority actions in relation to each objective of Goal 2 and describe measures undertaken to address these priorities
		Low income communities and their dependence on forest resources is a major socio-economic constraint. Besides, illegal trade of forest products (plant and animal origin) and the high prices they fetch in international markets are a hindrance to the protection of forest diversity. Funding mechanisms for research on regular basis need to be improvised to understand the socio-economic lapses leading to loss of forest biological diversity.
b) No		Please provide reasons below

182. Is your country undertaking any measures to increase public education, participation and awareness in relation to forest biological diversity?		
Options	**X**	**Details**
a) Yes	X	Please identify priority actions in relation to each objective of goal 3 and describe measures undertaken to address these priorities
		Forest officials are trained in modern nursery practices and forest management. Training for bamboo genetic resource conservation is imparted to officials of State Forest Departments, NGOs and farmers. Several training programmes in biodiversity conservation, NTFP, eco-restoration of wastelands, management of Forest Herbaria and Arboreta, establishment and maintenance of field germplasm bank, cultivation of medicinal plants under agroforestry tree species are being organized by ICFRE. The Indira Gandhi National Forest Academy, Dehradun also runs refresher courses that target aspects of forest biodiversity conservation for mid to senior level forest officers. Sponsored trainings, workshops and publications on biodiversity are undertaken by forestry organizations and forest departments at different levels. Recently organized workshops include those on sacred groves, lesser known tree species, mangrove ecosystems, water conservation, vultures. Eco-tourism centers are being developed in several states such as Uttaranchal, Uttar Pradesh, Tamilnadu, Karnataka and Rajasthan to generate awareness. University departments are active in several states and run campaigns for educating the masses.

b) No		Please provide reasons below

Further comments on measures to increase public education, participation and awareness in relation to forest biological diversity (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets).

Public awareness of the importance of the forest biological diversity needs to be strengthened further and made into a campaign for students and school children. Even the implementing agencies such as the forest departments need to be made aware of the goals of the CBD.

The Council has one of the largest collections of floral and faunal species, herbarium and xylarium of forest species, which are used as awareness and educational tools. The MoEF needs to strengthen this aspect further along with mass awareness programmes with the State Forest Departments.

Programme element 3 – Knowledge, assessment and monitoring

183. Is your country undertaking any measures to characterize forest ecosystems at various scales in order to improve the assessment of the status and trends of forest biological diversity?

Options	X	Details
a) Yes	X	Please identify priority actions in relation to each objective of Goal 1 and describe measures undertaken to address these priorities
		Major emphasis is given to assess Himalayan ecosystem and lateritic soil ecosystem
b) No		Please provide reasons below

Further comments on characterization of forest ecosystems at various scales (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets).

At the Ranchi Institute of the ICFRE, two projects, one for Himalayan biodiversity study and the other for lateritic soil ecosystem for biodiversity assessments, are being implemented. The DBT has sponsored projects for monitoring of biodiversity. In a study of developing a bio-monitoring system, a detailed classification of satellite imagery showing important landscape features and vegetation type has been prepared for all the study sites. For example, the response of stream insect communities to human disturbance highlights their potential as a valuable bio-monitoring tool. Bio-monitoring has also been carried out using birds as bio-indicators. A group of 18 rural high schools of Karnataka, with committed and competent teachers and students, has been identified for bio-

monitoring studies. This network completed a study on freshwater fishes, medicinal plants and other biodiversity resources. The first version of the CD ROM for the identification of 250 medicinal plants and 70 freshwater fishes has been developed (Source http://dbtindia.nic.in).

Monitoring is also carried out in preservation plots established by the ICFRE for representative forest types. The number of such plots has to be increased to include all forest formations and monitor changes in respect of biological diversity and biological indicators therein on a regular basis. Besides, regular census is carried out in national parks and sanctuaries for threatened animal species.

Some organizations, such as BNHS, actively partake in census of avifauna in different regions of the country.

184. Is your country undertaking any measures to improve knowledge on, and methods for, the assessment of the status and trends of forest biological diversity?

Options	X	Details
a) Yes	X	Please identify priority actions in relation to each objective of goal 2 and describe measures undertaken to address these priorities
		The status of threatened species is assessed by different organizations such as ICFRE, Universities, other state agencies and NGOs, such as ATREE. Projects for monitoring forest canopy species diversity are being formulated with UNDP/GEF, aided by ATREE, in collaboration with other organizations. May also refer to box in response to Question 180 for a major project on bio-prospecting by DBT. Establishment of preservation plots for monitoring of biodiversity is being proposed for all State Forest Departments by ICFRE. Some examples are as below: a. Inventorization and monitoring of biodiversity sites of Doon valley and surroundings, Uttaranchal b. Assessment of conservation status of hill bamboos. Collection of germplasm from various eco-climatic zones and establishment of germplasm bank c. Assessment of biological diversity of various ecosystems and to establish methods for conservation in the Kaziranga National Park, Assam d. Ecorestoration of degraded mangrove habitats along Goa Coast e. Conservation and management of Coondapur mangroves, Karnataka f. Inventory of coastal plant communities of North Andhra Region

b) No		Please provide reasons below

Further comments on improvement of knowledge on and methods for the assessment of the status and trends (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets).

Acquiring knowledge on forest biological diversity is a continuous process. More lessons are learnt while executing various projects. Accordingly, improvement is being made on methods for assessing forest biological diversity. While executing these projects, a lot of constraints in communicating with local communities are faced and efforts were made to convince them for sustainable harvest of forest resources.

185. Is your country undertaking any measures to improve the understanding of the role of forest biodiversity and ecosystem functioning?

Options	X	Details
a) Yes	X	Please identify priority actions in relation to each objective of goal 3 and describe measures undertaken to address these priorities
		Biodiversity monitoring and impact on ecosystem functioning are the priority actions as far as biodiversity assessment is concerned. Development of high yielding clones of Eucalyptus, Poplar, *Tamarinda indica,* Neem, Teak, etc. promote the conservation of genetic diversity Casuarina planting stock improvement programme of ICFRE has enhanced productivity.
b) No		Please provide reasons below

186. Is your country undertaking any measures at national level to improve the infrastructure for data and information management for accurate assessment and monitoring of global forest biodiversity?

Options	X	Details
a) Yes	X	Please identify priority actions in relation to each objective of goal 4 and describe measures undertaken to address these priorities
		The Council has one of the largest collections of floral and faunal species, botanical garden, herbaria and xylarium of forest species, which are used as awareness and educational tools.

b) No		Please provide reasons below

Further comments on the improvement of the infrastructure for data and information management (including effectiveness of actions taken, lessons learned, impacts on forest biodiversity, constraints, needs, tools and targets).

Efforts have been going on towards data collection for repositories, digitization of specimens and infrastructure development of live reference collection, arboretum and botanical garden.

ICFRE has initiated efforts to be a node of the GBIF for the Government of India. The purpose is to make the world's primary data on biodiversity freely and universally available via the Internet. India is a member of the network as per Memorandum of Understanding between MoEF, CSIR and GBIF.

Biological diversity of dry and sub-humid lands

187. Is your country supporting scientifically, technically and financially, at the national and regional levels, the activities identified in the programme of work? (decisions V/23 and VII/2)

a) No	
b) Yes (please provide details below)	X

Further comments on scientific, technical and financial support, at the national and regional levels, to the activities identified in the programme of work.

About 228 mha (69%) geographical area of India falls within the dryland (arid, semi-arid and dry sub-humid) as per Thornthwaite classification. The activities related to such vast dry and sub-humid lands have been undertaken by various central ministries such as MoEF, MoA, Ministry of Water Resources, Ministry of Rural Development and MHRD.

The implementation of various programmes, schemes, measures and activities for conservation of natural resources, and for addressing land degradation have also been through the establishment of National and State-level Landuse Boards, which have been set up under the Ministries of Agriculture, Rural Development and Environment & Forests. These are the National Landuse and Wasteland Development Council, the NWDB and the NAEB respectively. Apart from these, the National River Conservation Directorate has been set up for cleaning of the most polluted river stretches in the major rivers in the country.

The activities related to the dry and sub-humid lands are implemented with respect to the legislations such as Forest (Conservation) Act, 1980; Environment (Protection) Act, 1986; Water (Prevention and Control of Pollution) Act, 1974, as amended in 1988; Wildlife Protection Act, 1972; 73rd and 74th Constitutional Amendments and Biological Diversity Act, 2002.

The policy framework for these activities is provided by several policies prepared by respective Ministries, such as National Water Policy, 1987; National Landuse Policy Outline, 1988; National Forest Policy, 1988; National Policy on Education, 1986, as amended in 1992; Policy on Abatement of Pollution, 1992; National Livestock Policy Perspective, 1996; National Agricultural Policy, 2000; National Population Policy, 2000; National Land Reforms Policy; Draft Grazing and Livestock Management Policy; Draft National Policy for CPR Lands; Policy on Drought; and National Environment Policy, 2006.

Several institution and organizations of central and state governments are focussing their activities on issues related to arid and semi-arid regions. These include: Central Arid Zone Research Institute (CAZRI), Jodhpur; AFRI, Jodhpur; Regional Offices of ZSI and BSI, Jodhpur; National Research Centre on Camel, Bikaner; Indian Grassland & Fodder Research Institute, Jhansi; National Research Centre for Agroforestry, Jhansi; Central Soil Salinity Research Institute, Karnal and Anand; International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad; Central Research Institute for Dryland Agriculture, Hyderabad; Gujarat Ecology Commission (GEC); and Gujarat Ecological Education and Research (GEER) Foundation.

A large number of social sector and community development programmes are undertaken in order to combat desertification. Social sector programme schemes for women and child development are undertaken along with programmes on health and literacy. Local community development programmes include Jawahar Gram Samridhi Yojana, Rural drinking water supply and sanitation. Many schemes of income generation for poverty eradication are implemented. Credit assistance for rural agro-based activities and schemes include Micro-Credits for Rural Development, NABARD, Apex Finance and Development Corporation, Micro-Credit Assistance to Women through NORAD etc.

Along with these activities, efforts are also being made for the capacity building and strengthening of the role of various stakeholders in the dryland regions of the country through programmes, such as Capacity Building under Watershed Programmes for Wastelands, Integrated Child Development Services Training Programme, Support to Training and Employment Programme for Women, Employment and Income Generating Training-cum-Employment-cum-Production Units for Women.

Steps have also been taken to augment renewable energy sources by initiating programmes for tapping solar energy, harnessing wind power, undertaking plantation programmes with people's participation and encouraging farmers to plant trees on their fields. The National Programme of Improved Chulhas (stoves) is also being implemented along with the National Project on Biogas Development.

Several programmes for conservation of land resources have been undertaken such as National Watershed Development Project on Rainfed Areas, Soil Conservation in the Catchment of River Valley Projects, All India Coordinated Research Project for Dryland Agriculture.

Programmes on ecorestoration of degraded lands have been undertaken, such as Integrated Afforestation and Ecodevelopment Project Scheme, Integrated Wasteland Development Programme, Eco-Task Forces, Scheme for Reclamation of Alkali Soils.

The specific programmes addressing the desert and drought prone regions are Desert Development Programme (DDP), DPAP, Indira Gandhi Nahar Project (IGNP).

A large number of technologies have been used in the country for combating desertification. These technologies include the following:

- Technologies for conservation of soil, water and vegetation: Integrated Soil Fertility Management, Integrated Nutrient Management, Soil Quality Monitoring, Use of Modelling for Assessment of Resources Status, Permanent Vegetative Cover through Alternate Landuse Systems, Alternate Landuse Systems for Different Agro-ecological Regions, Soil and Rainwater Conservation, Inter-Terrace Land Treatment, Water Harvesting and Recycling, Tillage, Mulching, Increase in Water Storages.
- Technologies specifically to control land degradation in different bio-climatic regions: Control of Wind Erosion, Stablisation of Sand Dunes, Shelterbelt/Wind break Plantations, Management of Pasture and Rangeland.
- Technologies for management of degradation of degraded land: Management of Soil and Water Erosion, Rehabilitation of Mine Spoils, Management and Utilisation of Industrial Effluents, Management of Salt Affected Soils and Water-logged Areas, Reclamation of Water-logged Saline Soils, Alternate Landuses for Salt-affected Soils, Agro-forestry for Moderately Alkaline Soils/Reclaimed Soils.
- Traditional/indigenous technologies for combating desertification: Agriculture, water harvesting, conservation of forged resources, combined production system, protection of vegetative cover, sacred groves, water utilisation practices, energy, storage of grains/tubers.
- Technologies for drought mitigation: Measures to combat land degradation caused due to drought, use of early warning systems, agriculture-based technologies such as crop weather modelling, contingent crop planning, mid-season correction.

Apart from all these activities, there is a good network of PAs for *in situ* conservation. For example, arid and semi-arid regions of Gujarat have the largest land area under 25 PAs (c. 17,000 sq. km.) Rajasthan has 28 PAs covering about 9500 sq. km.

Some other initiatives include: participatory land regeneration and water conservation programmes such as Border Area Development Program, DDP and DPAP in Gujarat and Rajasthan; afforestation and rehabilitation of Aravalli Region, setting up of Aravalli biodiversity park with the help of IUCN to support around 40 plant communities, consisting of 3,000-4,000 species typical of the Aravallis mountains – the oldest mountains on the sub-continent, including grassland typical of local arid and semi-arid regions, etc.

Manoj Dholakia

Streams are an important component of the water regime of a forest; also, many of our rivers originate in forests.

Abdhesh Gangwar

Much of the country's agrobiodiversity is in the custody of farming communities/tribals who followed age-old farming systems, including shifting cultivation, made conscious/unconscious selections, and inherited and perpetuated their seeds/propagules over generations.

Rohit Vyas

Several of the marine and inland water ecosystems have been brought under the PA network; more efforts are needed to establish and effectively manage the marine PAs and adequately protect inland water ecosystems.

Manoj Dholakia

'Ship of the Desert'. Camels (*Camelus dromedaries*) are used as beasts of burden and also provide humans with milk, meat, wool, leather, and fuel from dried manure.

Manoj Dholakia

Olive Ridley Turtles in several hundred thousands nest on the Gahirmatha beach, Orissa. It is the world's largest known sea turtle rookery.

Ashok Captain

Beetle feeding on flowers

Fritz Bachmayer (Dr. Parvish Pandya's stock photos)

Considering the criticality of coral reefs as coastal habitats, marine protected areas have been established for their conservation.

188. Has your country integrated actions under the programme of work of dry and sub-humid lands into its national biodiversity strategies and action plans or the National Action Programme (NAP) of the UNCCD? (decisions V/23, VI/4 and VII/2)	
a) No	
b) Yes (please provide details below)	X

Further comments on actions under the programme of work of dry and sub-humid lands integrated into national biodiversity strategies and action plans or the National Action Programme (NAP) of the UNCCD.

National Action Programme to combat desertification in the context of UNCCD has been prepared in 2001. Many collaborative approaches are in the process of implementation to club different activities under various programmes to improve environmental conditions through conservation and improvement in biodiversity in the dry regions. Programmes such as National Watershed Development Project for Rainfed Areas, Soil Conservation in the Catchment of River Valley Projects, All India Co-ordinated Research Project for Dryland Agriculture, Integrated Afforestation and Eco-development Project Scheme, Integrated Wasteland Development Programme, DDP, DPAP, Indira Gandhi Nahar Project are already in place.

189. Has your country undertaken measures to ensure synergistic/collaborative implementation of the programme of work between the national UNCCD process and other processes under related environmental conventions? (decisions V/23, VI/4 and VII/2)	
a) No	
b) Yes, some linkages established (please provide details below)	X
c) Yes, extensive linkages established (please provide details below)	

Further comments on the measures to ensure the synergistic/collaborative implementation of the programme of work between the national UNCCD processes and other processes under related environmental conventions.

The ICFRE has 'observer status' with the UNFCCC and is involved with the climate change policy issues in Landuse, Landuse change and Forestry Sector. AFRI, Jodhpur has been associated with the activities under programmes of UNCCD conducted by MoEF and has worked on various aspects for combating desertification, viz., sand dune stabilization, water conservation and management studies, agro forestry in dry areas and salt land reclamation. The various programmes related to watershed and waterbodies are forging linkages with the Ramsar Convention on Wetlands. Forest areas in the drylands in Gujarat and Rajasthan are also part of the national PA network for *in situ* conservation of biodiversity in those areas.

Programme Part A: Assessment

190. Has your country assessed and analyzed information on the state of dryland biological diversity and the pressures on it, disseminated existing knowledge and best practices, and filled knowledge gaps in order to determine adequate activities? (Decision V/23, Part A: Assessment, Operational objective, activities 1 to 6)	
a) No	
b) No, but assessment is ongoing	
c) Yes, some assessments undertaken (please provide details below)	X
d) Yes, comprehensive assessment undertaken (please provide details below)	

Further comments on the relevant information on assessments of the status and trends and dissemination of existing knowledge and best practices.

In comprehensive terms, state, sub-state and eco-regional levels of biodiversity assessment were made while preparing the Biodiversity Strategy and Action Plans (BSAPs) at various state, sub-state and eco-region levels. Several site-specific assessments of biodiversity had also been undertaken by various national and state level institutions and university departments. Some of the examples are given below:

- CAZRI has made elaborate faunal assessment of Thar region of Rajasthan
- GEC made extensive status survey of rare and threatened biodiversity of Gujarat
- GEER Foundation has made extensive biodiversity assessments of almost all the PAs of Gujarat, and status of medicinal plants of Gujarat.
- AFRI, Jodhpur is engaged in assessment and enhancement of bioproductivity, increasing the vegetative cover and conserving the biodiversity in hot arid and semi-arid regions of Rajasthan, Gujarat and Dadra & Nagar Haveli, using agro forestry research model for sustainable production, development of silvipasture model for Maru Gaucher project suitable for arid and semi-arid region of Rajasthan, raising of arboretum-cum-botanical garden for native flora of Rajasthan, survey and silvicultural management practices for commercially exploited medicinal plants, assessment on the pest problems in forest nurseries and their management in arid and semi-arid regions, etc.

The dissemination of knowledge and best practices is done through ENVIS Centres.

Programme Part B: Targeted Actions

191. Has your country taken measures to promote the conservation and sustainable use of the biological diversity of dry and sub-humid lands and the fair and equitable sharing of the benefits arising out of the utilization of its genetic resources, and to combat the loss of biological diversity in dry and sub-humid lands and its socio-economic consequences? (part B of annex I of decision V/23, activities 7 to 9)	
a) No	
b) Yes, some measures taken (please provide details below)	X
c) Yes, many measures taken (please provide details below)	

Further comments on the measures taken to promote the conservation and sustainable use of the biological diversity of dry and sub-humid lands and the fair and equitable sharing of the benefits arising out of the utilization of its genetic resources, and to combat the loss of biological diversity in dry and sub-humid lands and its socio-economic consequences.

As mentioned in the answer to Question 187, a large number of programmes and technologies have been implemented all over the country. To mention a few specific examples, many measures are taken to improve the productivity of drylands through afforestation, assisted regeneration and resource management and conservation of diversity for sustainable utilization under programmes such as JFM, Watershed Development Programmes and India Eco-development Programme. In addition, site-specific projects have also been undertaken, such as drought proofing projects in Kachchh, comprehensive community drought preparedness programme to improve quality of life of women and children in Jodhpur district by AFRI, identification of key indicators and suitable strategies for sustainable JFM in Gujarat and Rajasthan, standardization of nursery practices in respect of selected species suitable for arid and semi-arid regions, development of suitable models for urban aesthetic forestry, etc.

India has enacted the Biological Diversity Act, 2002 for ensuring access and benefit sharing of biological diversity and the associated knowledge for the entire country, which also includes the drylands.

192. Has your country taken measures to strengthen national capacities, including local capacities, to enhance the implementation of the programme of work?	
a) No	
b) Yes, some measures taken (please provide details below)	X
c) Yes, comprehensive measures taken (please provide details below)	
d) Yes, all identified capacity needs met (please provide details below)	

Further comments on measures taken to strengthen national capacities, including local capacities, to enhance the implementation of the programme of work.
Details of capacity building programmes have been mentioned in reply to Question 187. Measures have been taken to afforest degraded lands, conserve existing flora and fauna, and improve the productivity in the dry regions through institutional manpower and scientists trained in biodiversity management and conservation and capacity building of the local people.

Mountain biodiversity

Programme Element 1. Direct actions for conservation, sustainable use ad benefit sharing

193. Has your country taken any measures to prevent and mitigate the negative impacts of key threats to mountain biodiversity?	
a) No	
b) No, but relevant measures are being considered	
c) Yes, some measures taken (please provide details below)	X
d) Yes, many measures taken (please provide details below)	

Further comments on the measures taken to prevent and mitigate the negative impacts of key threats to mountain biodiversity
Mountain biodiversity has been given special importance in various policies, plans and programmes of Government of India. For example, National Environment Policy, 2006 calls for adoption of appropriate land use planning and watershed management practices for sustainable development of mountain ecosystems; adopt 'best practices' norms for infrastructure construction in mountain regions to avoid or minimize damage to sensitive ecosystems and despoiling of landscapes; encourage cultivation of traditional varieties of crops and horticulture by promotion of organic farming, enabling farmers to realize a price premium; promote sustainable tourism through adoption of 'best practices' norms for tourism facilities and access to ecological resources, and multi-stakeholder partnerships; take measures to regulate tourist inflows into mountain regions to ensure that these remain within the carrying capacity of the mountain ecology; and consider particular unique mountain scapes as entites with 'Incomparable Values' in developing strategies for their protection. National Wildlife Action Plan, 2002 calls for development of stringent standards of waste disposal, energy and water consumption, construction plans and material and measures to prevent damage to forest and mountain vegetation. A strong network of PAs (covering 9.6% of total geographical area in Indian Himalayas, and 10.1% in Western Ghats) has been established in the Indian mountains towards preventing inappropriate land use practices and changes in different ecosystems and to

ensure maintenance of biodiversity, in particular ecosystem integrity. This coverage is considerably higher than the national average of 4.7%. Further, a target of 33% forest cover has been established in the country to be achieved by 2020. The Himalayan region represents nearly 34% forest cover. Intensive studies on structure and function of forest vegetation along with disturbance intensities are regularly conducted in the mountain region for developing appropriate strategies and assess the impact of anthropogenic disturbances. There is a ban on green tree cutting above 1000 m. altitude. Measures are being undertaken to mitigate the impact of shifting cultivation. Stringent view is taken for providing environmental clearance to developmental projects in mountain areas.

Several institutions have been set up with specific focus on research on mountain biodiversity such as Bioresource Development Unit at IHBT, Palampur, GBPIHED, Almora, Mountain Bioresource Complex at Dehradun, etc.

194. Has your country taken any measures to protect, recover and restore mountain biodiversity?	
a) No	
b) No, but some measures are being considered	
c) Yes, some measures taken (please provide details below)	X
d) Yes, many measures taken (please provide details below)	

Further comments on the measures taken to protect, recover and restore mountain biodiversity

To enhance the capacity of mountain ecosystems, to resist and adapt to climate change and other natural calamities and to ensure minimum viable population sizes to enable genetic adaptation to changing environmental conditions, the size of protected areas in the mountains has usually been kept large. For example, Nanda Devi National Park, a world heritage site today, got degraded due to excessive influence of mountaineers. In 1982, the mountaineering activity was banned completely leading to recovery of this threatened and fragile ecosystem. Valley of Flowers too was declared a National Park in 1982 and camping was banned leading to the recovery of this famous alpine meadow.

The Indian Himalayan Region (Trans, Northwest, West, Central and east Himalayan provinces) has 15 national Parks and 59 wildlife sanctuaries. In addition 6 biosphere reserves have also been designated (i.e. Nanda Devi in Uttaranchal, Kangchenjunga in Sikkim, Dehang Debang in Arunachal, Nokrek in Meghalaya, Manas and Dibru Saikhowa in Assam). Of these, the Nandadevi Biosphere Reserve has been included in Global Network of Biosphere Reserves. The oldest PA of the region is Corbett National Park, which was established in 1936. The random distribution of PAs covering more than 5.5% area in each biogeographic province of the Indian Himalayan Region [Trans – 7

PAs (9.2% of the area); Northwest – 29 (5.88%); West – 18 (13.06%); Central – 8 (7.82%); and East – 12 (11.44%)] takes care of representative habitats and biota along longitudinal east to west gradient. The system of PAs in the Western Ghats includes the Nilgiri Biosphere Reserve, the first and largest Biosphere Reserve in India, 13 National Parks and 45 wildlife sanctuaries. The largest national park is in Bandipur and the largest wildlife sanctuary is in the Anamalai hills. The Bandipur, Periyar and Kalakad-Mundanthurai are Project Tiger Reserves. Some other protected areas of the region fall under Project Elephant Reserves.

More recently, to follow an ecosystem approach of conservation in two entirely diverse parts of the Himalayan mountains, two biosphere reserves have been proposed: (i) Cold Desert Biosphere Reserve in Trans Himalayan areas; (ii) World Peace Park Biosphere Reserve in Arunachal Pradesh. Further, to enhance ecosystem sustainability, with particular emphasis on degraded slopes, restoration through intervention of native plants is being attempted. In this context, application of Sloping Watershed Environmental Engineering Technology (SWEET) across the Himalayan region, and Sloping Agriculture Land Technology (SALT) in North East States is being promoted. Towards examining the representativity and sustainability of existing PAs and to identify gaps and weaknesses, the PA system in the Indian Himalayan Region has been reviewed.

Initiatives have been made recently in different mountain areas of India to initiate specific activities to facilitate maintenance, protection and conservation of existing level of endemic species. An atlas of endemics of Western Ghats has been prepared. GBPIHED has initiated a programme to document and map the Himalayan endemics. Under this initiative, the conservation implications of plant endemism in high altitude Himalayas were reviewed and an action plan was developed. FRI is actively engaged in studies of Himalayan pines and their genetic variability, and medicinal plants of Uttaranchal through nursery and planting technology. Similarly, efforts are being carried out in environmental conservation strategies for land use in the lower western Himalayas with butterflies as indicators in monitoring environmental changes along an urban gradient.

Himalayan Forest Research Institute, Shimla is actively engaged in assessment of conservation status of Hill Bamboos, collection of germplasm from various eco-climatic zones in Sutlej catchment area, and establishment of germplasm bank and standardization of nursery techniques for mass propagation of selected medicinal plants of temperate Himalayas in different nurseries of Shimla.

To develop *ex situ* mechanisms, establishment of gene banks in the form of arboreta, herbal gardens and school campus conservation models are being promoted across the Indian Himalayas. Also, to ensure *ex situ* maintenance of highly sensitive plant species (e.g. endemic medicinal plants, native multipurpose trees) efficient propagation protocols (conventional and biotechnological) have been developed and further initiatives are underway.

195. Has your country taken any measures to promote the sustainable use of mountain biological resources and to maintain genetic diversity in mountain ecosystems?	
a) No	
b) No, but some measures are being considered	
c) Yes, some measures taken (please provide details below)	X
d) Yes, many measures taken (please provide details below)	

Further comments on the measures to promote the sustainable use of mountain biological resources and to maintain genetic diversity in mountain ecosystems

Vast areas of mountains in India have been declared reserved forests from where forest produce is being harvested in a sustainable manner primarily for local use. The areas are also utilized for eco-tourism. A large representative network of PAs has been established in the mountains of India. Himalayas and Western Ghats have 9.72% & 10.1% area under PAs, respectively. Institutions of participatory management have been developed, e.g. JFM village forest council, etc. Domestication of wild plant resources is being encouraged for their sustainable use. Demonstrations and trainings on Natural Resource Management practices are being imparted with a particular emphasis on people and resource dynamics in mountain watersheds to promote sustainable land use practices in relation to human livelihood needs.

196. Has your country taken any measures for sharing the benefits arising from the utilization of mountain genetic resources, including preservation and maintenance of traditional knowledge?	
a) No	
b) No, but some measures are being considered	
c) Yes, some measures taken (please provide details below)	X
d) Yes, many measures taken (please provide details below)	

Further comments on the measures for sharing the benefits arising from the utilization of mountain genetic resources

The Biological Diversity Act, 2002 has provisions to ensure fair and equitable sharing of benefits arising out of utilization of biodiversity (which include mountain genetic resources) and related TK. Several programmes are underway for documenting TK by institutions in the country. For example, a project to document traditional ecological knowledge is in progress at ICFRE, Dehradun and this knowledge will be utilized to develop valuable and effective technology, which can be further strengthened through institutional expertise. Use of ethnobotanical knowledge is being analyzed in the context of modern knowledge, and understanding the factors which lead to formation of sacred groves is being analyzed.

Programme Element 2. Means of implementation for conservation, sustainable use and benefit sharing

197. Has your country developed any legal, policy and institutional framework for conservation and sustainable use of mountain biodiversity and for implementing this programme of work?	
a) No	
b) No, but relevant frameworks are being developed	
c) Yes, some frameworks are in place (please provide details below)	X
d) Yes, comprehensive frameworks are in place (please provide details below)	

Further comments on the legal, policy and institutional frameworks for conservation and sustainable use of mountain biodiversity and for implementing the programme of work on mountain biodiversity.

The umbrella coverage to legal, policy and institutional framework for conservation and sustainable use and implementation of the programmes on mountain biodiversity is provided by the Biological Diversity Act, 2002 and Biological Diversity Rules, 2004. The Indian Forest Act, 1947 and Wildlife Protection Act, 1972 also provide for conservation of forests and protection of mountain biodiversity.

National Bioresource Development Board has been set up by the DBT to decide broad policy framework for sustainable utilization of bioresources.

Other specific programmes, policies and legal frameworks focusing on biodiversity protection in the country have covered mountain biodiversity as well. Some of the examples are given below:

i. Of the total 583 threatened plants (Red Data Book species) in India, 121 (20.8%) species are from the Himalayan region. Various organizations are implementing programmes for improving the status of these species. Nearly 29 mammalian species listed under Schedule 1 of the Indian Wildlife Protection Act are Himalayan.

ii. Both the mountain areas, the Himalayas and Western Ghats, are considered among the global hotspots of endemic diversity. The Himalayan region is known to represent over 3471 endemic species of flowering plants. Likewise, in Western Ghats, of the total 4000 flowering plant species, 1500 are endemic which include 49 monotypic endemic genera. With regard to fauna, of the total 120 mammalian species in Western Ghats, 14 are endemic.

iii. A number of mountain species have been included in different appendices of the CITES for banning their international trade so as to protect their status. For example, from the Himalayan region, species like *Saussurea costus, Renanthera imschootiana, Vanda coerula* and *Paphiopedilum fairrieanum, P. insigne, P. venusetum* are included in Appendix I, which requires total ban on international commercial trade except for scientific research and conservation purposes for which both export as well as import

198. Has your country been involved in regional and/or transboundary cooperative agreements on mountain ecosystems for conservation and sustainable use of mountain biodiversity?	
a) No	
b) No, but some cooperation frameworks are being considered	X
c) Yes (please provide details below)	

Further information on the regional and/or transboundary cooperative agreements on mountain ecosystems for conservation and sustainable use of mountain biodiversity

India is involved in development of Transboundary Cooperative Agreement on Kanchendzonga Landscape Area, which involves Nepal, Bhutan and India. The initiative specially focuses on finding possibilities to establish biological corridors between PAs within Kanchendzonga Landscape in East Himalayas. A corridor for elephants between India and Nepal is also being discussed for Dudhwa National Park.

To promote appreciation and conservation of mountain biological diversity as means of reducing human conflicts, more proposals to establish biosphere reserves are being considered. The proposal for establishment of World Peace Park (as Biosphere Reserve) in Arunachal Pradesh is of special significance.

Programme Element 3. Supporting actions for conservation, sustainable use and benefit sharing

199. Has your country taken any measures for identification, monitoring and assessment of mountain biological diversity?	
a) No	
b) No, but relevant programmes are under development	
c) Yes, some measures are in place (please provide details below)	X
d) Yes, comprehensive measures are in place (please provide details below)	

Further comments on the measures for identification, monitoring and assessment of mountain biodiversity

Various institutions are involved in the identification/monitoring and assessment of mountain diversity such as BSI, ZSI, GBPIHED, State Departments of Agriculture, Horticulture, Fisheries and Forests, university departments and research institutions. Biodiversity registers are being created in some of the areas, which include listing of the species and their traditional uses by local communities as well. Village communities are preparing biodiversity registers under an ICEF-sponsored project in Garhwal.

200. Has your country taken any measures for improving research, technical and scientific cooperation and capacity building for conservation and sustainable use of mountain biodiversity?	
a) No	
b) No, but relevant programmes are under development	
c) Yes, some measures are in place (please provide details below)	X
d) Yes, comprehensive measures are in place (please provide details below)	

Further comments on the measures for improving research, technical and scientific cooperation and capacity building for conservation and sustainable use of mountain biodiversity

Mountain areas are provided relatively higher funds under the research schemes and programmes in the country. Some examples of the research initiatives are given below.

Himalayas

- At several institutions, initiatives are under way to conduct long-term research on species adaptability to changes in the Himalayas; and role and importance of biodiversity and ecosystem functioning.
- Towards developing collaborative research programmes of mutual interest, various programmes with different countries are being initiated. For example, in the Himalayas, GBPIHED is involved in development of a global project on Pollinators and Sustainable Agriculture. Also, the Institute is one among international partners for Peoples and Resource Dynamics Project on watershed.
- Several interdisciplinary key research programmes on mountain biodiversity and its relationship to ecosystem structure and functioning are being implemented by different government, non-government organizations. BSI (North Circle Dehradun, Sikkim Himalayan Circle Gangtok, East Himalayan Field Station Itanagar) and ZSI (Northern Regional Circle Dehradun, Arunachal Pradesh Regional Station Itanagar) are implementing programmes on inventorization and prioritization of biodiversity elements at species level, characterization of their habitat relations and assigning ethnobiological values.
- The GBPIHED is conducting researches on status assessment of priority species and their habitat relationships. Also, different projects being implemented by the Institute on *ex situ* conservation of plants, especially the high value medicinal plants, rhododendrons and other important species.

Western Ghats:

- Southern (Coimbatore) and Western (Pune) circles of BSI, and ZSI Regional Station Pune undertake activities on inventorization of species in Western Ghat region.

- The Western Ghats Biodiversity Network (launched in 1994) through participation of school and college students/teachers and NGOs, collects information on status, distribution and ecology of species. The efforts of network have resulted in developing PBRs.
- TBGRI, Thiruvananthapuram (Kerala) is conducting programmes for *ex situ* conservation of species.
- Several notable NGOs like FRLHT, MSSRF, BNHS, ATREE, Kalpavriksha, Zoo Outreach Organization, etc. are also implementing programmes/projects pertaining to species conservation.

201. Has your country taken any measures to develop, promote, validate and transfer appropriate technologies for the conservation of mountain ecosystems?	
a) No	
b) No, but relevant programmes are under development	
c) Yes, some measures are in place (please provide details below)	X
d) Yes, comprehensive measures are in place (please provide details below)	

Further comments on the measures to develop, promote, validate and transfer appropriate technologies for the conservation of mountain ecosystems

Technology development, promotion and transfer for the conservation of mountain ecosystems is being undertaken in terms of various projects by research institutions. For example, GBPIHED has established a rural biotechnological complex for giving training programmes for rural inhabitants, women groups, etc.

The XII Finance Commission has earmarked a separate fund for the Himalayan states considering their rich forests and special problems.

A meeting of Mountain States was held at Dehradun in 2004 for regional cooperation and a demand for Hill Council at the Central level was put forward, which is gathering momentum and support.

An Indo-Nepal pilot project, sponsored by International Development Research Council, is underway to estimate the value of ecosystem services generated in the Central Himalayas.

E. OPERATIONS OF THE CONVENTION

202. Has your country actively participated in subregional and regional activities in order to prepare for Convention meetings and enhance implementation of the Convention? (decision V/20)	
a) No	
b) Yes (please provide details below)	X

Further comments on the regional and subregional activities in which your country has been involved.

India has participated actively in Asian regional meetings for preparing for CBD meetings, whenever these are held.

India has participated in meetings of LMMCs in Mexico, Peru, and Malaysia. India, in its capacity as the Chair of the LMMCs for a two-year period from March 2004 – March 2006, had organized an Expert and Ministerial-level Meeting of the LMMCs in New Delhi from 17-21 January, 2005.

203. Is your country strengthening regional and subregional cooperation, enhancing integration and promoting synergies with relevant regional and subregional processes? (decision VI/27 B)	
a) No	
b) Yes (please provide details below)	X

Further comments on regional and subregional cooperation and processes.

SAARC has seven countries of the region as members, viz, Nepal, India, Bangladesh, Bhutan, Pakistan, Maldives and Sri Lanka. So far, five Environment Ministers' Conferences have been held under SAARC, which also has a Committee on Environment, Meteorology and Forest, for working out the detailed plan of action in these areas and implementing the same.

The following question (204) is for DEVELOPED COUNTRIES

204. Is your country supporting the work of existing regional coordination mechanisms and the development of regional and subregional networks or processes? (decision VI/27 B)	
a) No	
b) No, but programmes are under development	

c) Yes, included in existing cooperation frameworks (please provide details below)	
d) Yes, some cooperative activities ongoing (please provide details below)	

205. Is your country working with other Parties to strengthen the existing regional and subregional mechanisms and initiatives for capacity-building? (decision VI/27 B)	
a) No	
b) Yes	X

206. Has your country contributed to the assessment of the regional and subregional mechanisms for implementation of the Convention? (decision VI/27 B)	
a) No	
b) Yes (please provide details below)	X

Further comments on contribution to the assessment of the regional and subregional mechanisms.

India participates in all SAARC meetings, including the five Environment Ministers' Conferences that have been held under SAARC, which also has a Committee on Environment, Meteorology and Forest, for working out the detailed plan of action in these areas and implementing the same.

India in its capacity as the Chair of the LMMCs for a two year period from March 2004-March 2006 had organized an Expert and Ministerial level Meeting of the LMMCs in New Delhi from 17-21 January, 2005. This meeting adopted the New Delhi Ministerial Declaration of Like Minded Megadiverse Countries on Access and Benefit Sharing, which is seen as the beginning of new era in the negotiations on International Regime on ABS.

List of Abbreviations

ABS	Access and Benefit Sharing
AFRI	Arid Forest Research Institute
AICOPTAX	All India Coordinated Project for Capacity Building in Taxonomy
AICTE	All India Council for Technical Education
APFISN	Asia-Pacific Forest Invasive Species Network
ARIPO	African Regional Industrial Property Organization
ASEAN	Association of Southeast Asian Nations
ATREE	Ashoka Trust for Research in Ecology and Environment
AYUSH	Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy
BGCI	Botanical Garden Conservation International
BIONET	Biodiversity Information Network
BMCs	Biodiversity Management Committees
BNHS	Bombay Natural History Society
BSI	Botanical Survey of India
BTIS	Biotechnology Information System
C&I	Criteria and Indicators
CAG	Comptroller and Auditor General
CAMP	Conservation Assessment Management Plan
CAZRI	Central Arid Zone Research Institute
CBD	Convention on Biological Diversity
CBSE	Central Board of Secondary Education
CBSG	Captive Breeding Specialist Groups
CCF	Country Cooperation Framework
CCMB	Centre for Cellular and Molecular Biology
CCRAS	Central Council for Research in Ayurveda and Siddha
CDA	Chilika Development Authority
CDEP	Centre for Development and Environment Policy
CDFD	Centre for DNA Fingerprinting and Diagnostics
CDM	Clean Development Mechanism
CEC	Commission on Education and Communication

CEE	Centre of Environment Education
CEMDE	Centre for Environmental Management of Degraded Ecosystems
CES	Centre for Ecological Sciences
CHM	Clearing House Mechanism
CIL	Coal India Ltd
CIMAP	Central Institute of Medicinal and Aromatic Plants
CITES	Convention on International Trade in Endangered Species
CMFRI	Central Marine Fisheries Research Institute
CMLRE	Centre for Marine Living Resources & Ecology
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CoML	Census of Marine Life
CORDIO	Coral Reef Degradation in the Indian Ocean
CPCB	Central Pollution Control Board
CPREEC	C.P.R. Environmental Education Centre
CRZ	Coastal Regulation Zone
CSD	Commission on Sustainable Development
CSE	Centre for Science and Environment
CSIR	Council of Scientific and Industrial Research
CSMCRI	Central Salt & Marine Chemicals Research Institute
CSO	Clonal Seed Orchards
CWS	Centre for Wildlife Studies
CZA	Central Zoo Authority
DAC	Department of Agriculture and Cooperation
DALHT	Documentation and Rapid Assessment of Local Health Traditions
DANIDA	Danish International Development Agency
DARE	Department of Agricultural Research and Education
DBT	Department of Biotechnology
DDP	Desert Development Programme
DFID	Department for International Development
DGFT	Directorate General of Foreign Trade
DOD	Department of Ocean Development
DPAP	Drought Prone Areas Programme

E&D	Environment and Development
EATSAP	Education Awareness and Training Strategy and Action Plan
EC	European Commission
ECB	Environment Capacity Building
EE	Environment Education
EIA	Environmental Impact Assessment
EMCBTAP	Environment Management Capacity Building Technical Assistance Project
ENVIS	Environmental Information System
EPTRI	Environment Protection Training and Research Institute
ESCAP	Economic and Social Commission for Asia and the Pacific
ESD	Education for Sustainable Development
ESF	Education for a Sustainable Future
FAO	Food and Agriculture Organization
FDAs	Forest Development Agencies
FIS	Forest Invasive Species
FMU	Forest Management Unit
FPC	Forest Protection Committees
FREEP	Forest Research Education and Extension Project
FRI	Forest Research Institute
FRLHT	Foundation for Revitalization of Local Health Traditions
FSI	Forest Survey of India
GBIF	Global Biodiversity Information Facility
GBPIHED	G.B. Pant Institute of Himalayan Environment & Development
GEBMAP	Gene Banks of Medicinal and Aromatic Plants
GEC	Gujarat Ecological Commission
GEER	Gujarat Ecological Education and Research Foundation
GEF	Global Environment Facility
GFIS	Global Forest Information Service
GIS	Geographical Information Systems
GMOs	Genetically Modified Organisms
GPCA	Gene Pool Conservation Areas
GSPC	Global Strategy for Plant Conservation

GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
GURTS	Gene Use Restriction Technologies
H.P.	Himachal Pradesh
HSBC	Hongkong and Shanghai Banking Corporation
HSMD	Hazardous Substances Management Division
IARI	Indian Agricultural Research Institute
IBA	Important Bird Areas
IBCN	Indian Bird Conservation Network
IBPGR	International Bureau of Plant Genetic Resource
ICAR	Indian Council of Agricultural Research
ICEF	India Canada Environment Facility
ICFRE	Indian Council for Forestry Research and Education
ICIMOD	International Centre for Integrated Mountain Development
ICMAM	Integrated and Coastal Marine Area Management
ICMR	Indian Council of Medical Research
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICSSR	Indian Council for Social Science Research
IFGTB	Institute of Forest Genetics and Tree Breeding
IFS	Indian Forest Service
IGES	Institute for Global Environmental Strategies
IGRMS	Indira Gandhi Rashtriya Manav Sangrahalaya
IHBT	Institute of Himalayan Bioresource Technology
IIED	International Institute of Environment and Development
IIFM	Indian Institute of Forest Management
IIN	Investing in Nature
IKS	Indigenous Knowledge Systems
IMO	International Maritime Organisation
IMTECH	Institute of Microbial Technology
IndOBIS	Indian Ocean Biogeographic Information System
IN-PGRS	Indian National Plant Genetic Resources System
INSONA	International Society of Naturalists

IOCoML	Indian Ocean Census of Marine Life
IPC	International Patent Classification
IPM	Integrated Pest Management
IPO	International Property Office
IPR	Intellectual Property Rights
IREDA	Indian Renewable Energy Development Agency
IREP	Integrated Rural Energy Programme
ISPSG	Indian Subcontinent Plant Specialist Group
ISRO	Indian Space Research Organization
ISROSG	Indian Subcontinent Regional Orchid Specialist Group
ITK	Indigenous Traditional Knowledge
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union
JFM	Joint Forest Management
KIP	Knowledge, Innovation and Practices
LaCONES	Laboratory for Conservation of Endangered Species
LMMCs	Like Minded Megadiverse Countries
MAB	Man and the Biosphere
MAPs	Medicinal and Aromatic Plants
MATs	Mutually Agreed Terms
MEAs	Multilateral Environmental Agreements
MEE	Management Effectiveness Evaluation
MHRD	Ministry of Human Resource Development
MLEE	Multilocus Enzyme Electrophoresis
MNES	Ministry for promotion of Non-Conventional Energy Sources
MoA	Ministry of Agriculture
MoEF	Ministry of Environment and Forests
MoHFW	Ministry of Health and Family Welfare
MoST	Ministry of Science and Technology
MPCAs	Medicinal Plant Conservation Areas
MR-LR	Marine Research-Living Resources
MSE	Madras School of Economics

MSSRF	M. S. Swaminathan Research Foundation
MTCC	Microbial Type Culture Collection
NABARD	National Bank for Agriculture and Rural Development
NACO	National AIDS Control Organization
NAEB	National Afforestation and Eco-development Board
NAGS	National Active Germplasm Sites
NAM	Non Aligned Movement
NAP	National Action Programme
NAPAs	National Adaptation Programmes of Action
NARI	National AIDS Research Institute
NATP	National Agricultural Technology Project
NBA	National Biodiversity Authority
NBAGR	National Bureau of Animal Genetic Resources
NBAIM	National Bureau of Agriculturally Important Microorganisms
NBFGR	National Bureau of Fish Genetic Resources
NBPGR	National Bureau of Plant Genetic Resources
NBRI	National Botanical Research Institute
NBSAP	National Biodiversity Strategy and Action Plan
NCAOR	National Centre for Antarctic and Ocean Research
NCC	National Cadet Corps
NCDMA	National Clean Development Mechanism Authority
NCERT	National Council for Education, Research and Training
NCL	National Chemical Laboratory
NCR	National Capital Region
NEAA	National Environment Appellate Authority
NEAC	National Environmental Awareness Campaign
NEERI	National Environmental Engineering Research Institute
NEHU	North Eastern Hill University
NFAP	National Forestry Action Programme
NFIDS	National Forest Inventory Database System
NGC	National Green Corps
NGO	Non-governmental Organization

NICD	National Institute of Communicable Diseases
NICED	National Institute of Cholera and Enteric Diseases
NIM	National Interactive Meets
NIO	National Institute of Oceanography
NIOT	National Institute of Ocean Technology
NISCAIR	National Institute of Science Communications and Information Resources
NISSAT	National Information System on Science and Technology
NLCP	National Lake Conservation Plan
NMITLI	New Millennium Indian Technology Leadership Initiative
NMNH	National Museum of Natural History
NNRMS	National Natural Resources Management System
NOIDA	New Okhla Industrial Development Authority
NPCBB	National Programme on Cattle and Buffalo Breeding
NRCP	National River Conservation Plan
NRSA	National Remote Sensing Agency
NSTMIS	National Science and Technology Management Information System
NTFP	Non-timber Forest Produce
NWCP	National Wetland Conservation Programme
NWDB	National Wasteland Development Board
OBIS	Ocean Biogeographic Information System
OSTCs	Ocean Science and Technology Cells
PA	Protected Area
PBR	People's Biodiversity Registers
PIC	Prior Informed Consent
PPO	Polyphenol Oxidase
PQO	Plant Quarantine Order
PSCST	Punjab State Council of Science & Technology
PVPFRA	Plant Varieties Protection and Farmers' Rights Act
R&D	Research and Development
RET	Rare, Endangered and Threatened
RMC	Regional Medical Centre
RMI	Records Management Initiative

RMNH	Regional Museum of Natural History
RRL	Regional Research Laboratory
RS	Remote Sensing
S&T	Science and Technology
SAARC	South Asian Association for Regional Cooperation
SACEP	South Asia Cooperative Environment Programme
SACON	Salim Ali Centre for Ornithology and Natural History
SALT	Sloping Agriculture Land Technology
SASEANEE	South and South East Asia Network for Environmental Education
SAYEN	South Asia Youth Environment Network
SBBs	State Biodiversity Boards
SEA	Strategic Environment Assessment
SFR	State of the Forests Report
SGIS	Sacred Grove Information System
SHGs	Self-Help Groups
SIDA	Swedish International Development Agency
SIDBI	Small Industries Development Bank of India
SOD	Superoxide Dismutase
SoE	Status of Environment
Sp.	Species
SPA	Seed Production Areas
SPCB	State Pollution Control Board
SRISTI	Society for Research and Initiatives for Sustainable Technologies and Institutions
SSO	Seedling Seed Orchards
STP	Sewerage Treatment Plants
TBGRI	Tropical Botanical Garden and Research Institute
TERI	The Energy Research Institute
TILCEPA	Theme on Indigenous and Local Communities, Equity and Protected Areas
TK	Traditional Knowledge
TKDL	Traditional Knowledge Digital Library
TKRC	Traditional Knowledge Resource Classification
TOF	Trees Outside Forests

TRIPs	Trade-Related Aspects of Intellectual Property Rights
TVE	Television Trust for the Environment
UGC	University Grants Commission
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	UN Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
UNIDO	United Nations Industrial Development Organization
UPOV	International Union for the Protection of New Varieties of Plants
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WCPA	World Commission on Protected Areas
WFCC	World Federation of Culture Collection
WII	Wildlife Institute of India
WLPA	Wildlife Protection Act
WPSI	Wildlife Protection Society of India,
WSSD	World Summit on Sustainable Development
WTI	Wildlife Trust of India
WTO	World Trade Organization
WWF	Worldwide Fund for Nature
ZSI	Zoological Survey of India

Government of India
Ministry of Environment & Forests

Paryavaran Bhavan, CGO Complex, Lodhi Road
New Delhi - 110 003. (INDIA)
Telephone:+91-11-2436 1896, 2436 0721
E-mail: secy@menf.delhi.nic.in
website: http://envfor.nic.in