

**Box 13: Integration of Biodiversity Concerns in Programmes of Ministry of Tribal Affairs**

- Grants-in-aid to State Governments for supporting family/self-help groups/ community towards employment and income generation in sectors such as agriculture, horticulture, land reforms, watershed development, animal husbandry, ecology and environment, development of forests and forest villages, etc., with priority to be accorded to the tribals living in forest villages and synchronization of these programmes with JFM.
- In pursuance of article 275(1) of the Constitution of India, 100% central grants-in-aid to the states for promoting welfare of scheduled tribes for raising the level of administration of scheduled areas.
- Programme for integrated development of forest villages with a view to raise the Human Development Index (HDI) of their inhabitants and provision of basic facilities and services.
- Programme for infrastructure development relating to basic services and facilities such as approach roads, healthcare, primary education, minor irrigation, rainwater harvesting, drinking water, sanitation, community halls, etc., covering 2338 forest villages in 11 States.
- The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, which has come into force with effect from 31.12.2007; and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Rules, 2007, which have come into force with effect from 01.01.2008.

communities to meet their economic needs compatible with ecological sustainability. For instance, use of invasive species like Lantana for making value added products; and building upon traditional technologies like watermill for power generation in mountains as clean technology developed and customized at field level. The seminal idea is to involve all possible stakeholders, especially women, who are the custodians of natural resources and their management, to provide technology-based- livelihood opportunities to reduce their dependency on bio-resources. Participation of private sector in R&D also needs to be further encouraged. Institutional and human capacity needs to be constantly strengthened and updated to meet the new and emerging challenges relating to biodiversity, e.g. in the fields of biosafety, climate change, and invasive alien species.

There is need to look at the profiles of on-going education, training and extension programmes to lay directed focus on biodiversity conservation.

**Action Points**

- Develop consortium of lead institutions engaged in conservation providing linkages and networking across public and private sectors.
- Outsource research and promote joint ventures on key conservation issues.
- Promote application of biotechnology tools for conserving endangered species.
- Encourage DNA profiling for assessment of genetic diversity in endangered species to assist conservation.
- Develop DNA-probe based technology for tracking of LMOs.
- Develop specific pilot gene banks for LMOs approved for undertaking research and commercial use.
- Develop capacity for risk assessment, management and communication on LMOs.
- Support pilot studies on use of biotechnology tools for conservation where appropriate.





- Develop specific complimentary capacity building measures based on national needs and priorities for the formulation and implementation of national rules and procedures on liability and redress to strengthen the establishment of baseline information and monitoring of changes.
- Develop protocols for monitoring products based on genetic use restriction technologies.
- Strengthen participatory appraisal techniques and encourage formation of local institutional structures for planning and management of natural resources for ensuring participation of women.
- Preserve and strengthen traditional, religious, ritualistic, ethical and cultural methods of conservation.
- Promote livelihood diversification opportunities for making value added bioresource based products and building upon traditional as well as emerging environmental technologies customized at local/field level.
- Strengthen manpower, infrastructure and other pertinent capacities including upgradation of skills of officials of the MoEF to enable it to address new and emerging requirements in the field of biodiversity conservation and management.
- Strengthen capabilities of BSI and ZSI and promote their technical cooperation with SBBs and BMCs.
- Augment human resource development and personnel management in forestry and wildlife sector.

- Strengthen multidisciplinary R&D efforts on key areas pertaining to conservation and management of biological diversity.
- Strengthen and support departments of biology, botany, zoology, sociology, anthropology and other relevant disciplines in central, state and deemed universities/colleges, with a view to raising the standard of research and producing faculty who could guide the process of environmental education in schools.
- Promote both formal and non-formal means for environment education and biodiversity conservation.
- Design and implement awareness programmes, particularly for rural women, and also benefit from their wisdom. Women's organizations such as women's councils and mahila mandals could be used for this purpose.
- Incorporate modules on conservation and sustainable utilization of biodiversity in foundational and professional training courses for the officers of various services.





- Promote and/or strengthen education, training, awareness and extension programmes on biodiversity issues for various stakeholders including all levels of students, professionals (such as engineers, doctors, lawyers, CAs, etc.), elected representatives (such as representatives of PRIs, MLAs, MPs, Mayors, etc.), judiciary, NGOs, public and private sectors (e.g. corporate representatives, industrial associations etc.), defence and para military forces, customs, police, media, cultural, spiritual and religious institutions/ individuals.
- Enhance public education and awareness for biodiversity conservation through audio, visual and print media.
- Promote activities relating to animal welfare.

#### 5.10 Valuation of goods and services provided by biodiversity, and use of economic instruments in decision making processes

It is necessary that the costs associated with the degradation and depletion of natural resources be incorporated into decision-making, to reverse the tendency to treat these resources as free goods. At the macro-level, a system of natural resource accounting is required to assess whether in the course of economic growth, we are drawing down, or enhancing the biological resource base. In addition, the costs and benefits associated with various activities, including sectoral policies, should be evaluated to ensure that these factors are duly taken into account in decision-making.

There is also a need to move from the current near exclusive reliance on regulations, to a judicious mix of incentives and regulatory instruments.

##### Action Points

- Develop a system of natural resource accounting reflecting the ecological as well as economic values of biodiversity, with special attention to techniques of green accounting in national accounts and estimation of positive and negative externalities for use of various types of natural resources in the



production processes as well as in household and government consumption.

- Develop suitable valuation models for adoption at national, state and local levels.
- Support projects and pilot studies aimed at validating methods of valuation of bioresources.
- Identify key factors and indicators to assess effectiveness of valuation methods and models, taking into consideration the UN guidelines on monitoring and evaluation of socio-economic projects.
- Assess the utility of traditional and innovative fiscal instruments for promoting conservation and sustainable utilization of biodiversity.
- Develop systems for partial ploughing back of the revenues generated in protected areas, zoological parks, botanical gardens, aquaria, etc., for improving their management.
- Mobilize additional resources based on project formulation for biodiversity conservation.

#### 5.11 International cooperation

India has participated in major international events on environment and biodiversity conservation since



1972. India has also contributed to developing the agreed texts, ratified, and complied with the commitments in various international conventions relating to biodiversity. These agreements are: Convention on Biological Diversity (CBD), Convention on International Trade in Wild Species of Endangered Flora and Fauna (CITES), Ramsar Convention on Wetlands, World Heritage Convention, and the Bonn Convention on Conservation of Migratory Species (CMS). Some other international agreements which have bearing on biodiversity to which India is a Party include UNFCCC, UNCCD, Commission on Sustainable Development, World Trade Organisation, International Treaty on Plant Genetic Resources for food and agriculture and UN Law of the Seas.

A 'Global Tiger Forum' of tiger range countries has been created for addressing international issues related to tiger conservation.

India has also actively supported numerous regional and bilateral programmes on biodiversity. The MoEF, the nodal Ministry for the CBD and other biodiversity related conventions, is also the nodal agency in the country for the United Nations Environment Programme (UNEP), SACEP, ICIMOD, and IUCN. It has institutionalized the process for developing country's position on major issues for negotiations under different international conventions.

In this context, the MoEF is continuously taking steps to harmonise national policies and programmes in implementation of various multilateral environment

agreements, based on active involvement of various stakeholders. The MoEF functions in partnership with a number of institutions for developing and implementing national strategies on conservation and sustainable use of biological diversity. These partners include Ministries, State Government departments, universities, other academic institutions, autonomous bodies, women's organizations and NGOs.

India along with sixteen other megadiverse countries, rich in biodiversity and traditional







knowledge, has formed a group known as the Like-Minded Megadiverse Countries (LMMCs). These countries are Bolivia, Brazil, China, Colombia, Costa Rica, Democratic Republic of Congo, Ecuador, Indonesia, Kenya, Madagascar, Malaysia, Mexico, Peru, Philippines, South Africa and Venezuela. The LMMCs hold nearly 70% of all biodiversity. India chaired the LMMCs for a two-year period from March 2004 to March 2006, and coordinated the activities of this group focusing particularly on access and benefit sharing issues under the CBD.

Access to genetic resources and sharing of the benefits arising out of these resources form the core elements of the Convention. While access and benefit sharing is subject to national legislations, as provided for in Article 15 of the CBD, national action alone is not sufficient to ensure benefits to the country that provides the resources, particularly in instances where the genetic resource is utilized in another country for developing processes and products on which protection is obtained. In this background, an international regime (IR) on ABS is presently being negotiated by a Working Group on ABS under the aegis of the CBD, pursuant to a landmark decision of seventh Conference of Parties (COP) to the CBD. The eighth COP held in March 2006 has set a deadline of 2010 for completing the negotiations of IR on ABS. The ninth COP held in May 2008 has developed a detailed road map for completing the negotiations before COP-10 to be held in 2010.

Notable progress in this area notwithstanding, concerted efforts are now required to further improve

bilateral, regional and multilateral cooperation, as also cooperation with UN agencies and other international organizations on issues related to biodiversity. There is also a need to enhance our own capacities to comply with commitments, and ensure sustained flow of resources for biodiversity management.

#### Action Points

- Further consolidate and strengthen global cooperation, especially with UN agencies and other international bodies on issues related to biodiversity.
- Promote regional cooperation for effective implementation of suitable strategies for conservation of biodiversity, especially with neighbouring countries through fora such as SAARC, ASEAN and ESCAP.
- Develop projects for accessing funds for conservation and sustainable use of biodiversity from external sources, earmarked for conservation through bilateral, regional and other multilateral channels.
- Promote technology transfer and scientific cooperation towards conservation of biological resources, their sustainable use and equitable sharing of benefits arising out of their use, taking also into account extant regulations including those relating to taxation.



The preceding chapter outlines a number of new and continuing activities for augmenting biodiversity conservation. Considering that the subject of biodiversity is cross sectoral in nature, the implementation of these activities would be heavily dependent on coordinated efforts of diverse actors, including the concerned Central Ministries/ Departments, State Governments, local institutions, research institutions, various organizations both government and non-government, and people themselves. The NBA established on 1st October, 2003 under the Biological Diversity Act and the SBBs and local BMCs which are in process of being established under the same Act, would also have to be actively involved in a number of actions.

Since many of the activities envisioned in the NBAP are ongoing, these would be taken up and mainstreamed under the ambit of existing schemes



and programmes by the Central and State governments, public and private sector as well as civil society organizations, securing full utilization of available infrastructure and funds, with marginal to substantial augmentation and further inputs, wherever required. In addition, sources of external funding would also be explored and availed of, in accordance with the extant policies and regulations. Thus, no separate scheme or allocation for implementation of NBAP is envisaged.

As regards the time frame for implementation of these activities, these would be taken up in the short term (within 5 years), medium term (between 5 and 10 years), or long term (beyond 10 years) basis. Most of the activities are already operational or planned, and the time frame as mentioned against each in the matrix is indicative of the term when optimal level of implementation will be achieved.

A tabulated matrix for implementation of the key activities of NBAP, indicating the implementing agencies and time frame for each of these activities is given below. The list of implementing agencies listed in the matrix is only indicative.





S. No.	Actions	Activities	Coordinating agency	Associated agencies	Time frame
		<ul style="list-style-type: none"> <li>Develop cost effective and situation specific technologies for medium and long term storage of seed samples collected by different institutions and organizations.</li> <li>Undertake DNA profiling for assessment of genetic diversity in rare, endangered and endemic species to assist in conservation programmes.</li> <li>Develop a unified national database covering all <i>ex situ</i> conservation sites.</li> <li>Develop networking of botanical gardens and consider establishing a unified command.</li> <li>Encourage cultivation of plants of economic value, gathered from their natural populations and promote development of elite varieties of such plants.</li> <li>Promote inter-sectoral linkages and synergies to develop and realize full economic potential of <i>ex situ</i> conserved materials in crop and livestock improvement programmes.</li> <li>Strengthen basic research on reproduction biology of rare, endangered and endemic species to support reintroduction.</li> </ul>	<ul style="list-style-type: none"> <li>- MoA/ICAR</li> <li>- DBT</li> <li>- MoA</li> <li>- MoEF</li> <li>- MoA</li> <li>- MoA</li> <li>- MoEF</li> </ul>	<ul style="list-style-type: none"> <li>State/U.T. governments, SAUs, research institutions, CSIR institutions, community gene banks, CSOs.</li> <li>DAHD&amp;F, NRC on DNA Fingerprinting, CCMB, CDFD, SAUs, research institutions and universities.</li> <li>NBA, PPVFRA, DBT, PC, public and private institutions.</li> <li>BSI, NBA, State/U.T. governments, CSIR institutions, universities, colleges and research institutions.</li> <li>SAUs, AYUSH, DBT, CSIR institutions, public and private sector, CII, FICCI, ASSOCHAM and other industry associations.</li> <li>ICAR, NABARD, PC, State/U.T. governments, SAUs, CSIR institutions, research institutions and universities.</li> <li>MoA, MoST, BSI, ZSI, research institutions and universities.</li> </ul>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Medium</li> <li>- Short</li> <li>- Short</li> <li>- Medium</li> <li>- Medium</li> <li>- Medium</li> </ul>
2	<p>Augmentation of Natural Resource Base and its sustainable utilization: Ensuring inter and intra-generational equity</p>	<ul style="list-style-type: none"> <li>Promote sustainable use concept and best practices for sustainable use of biodiversity in relevant economic sectors.</li> <li>Promote decentralized management of biological resources with emphasis on community participation.</li> <li>Integrate biodiversity concerns into sectoral and inter-sectoral policies and programmes.</li> <li>Promote conservation, management and sustainable utilization of bamboos and canes, and establish bambusetum and canetum.</li> <li>Encourage cultivation of medicinal plants and culture of marine organisms utilized for drugs to prevent their unsustainable extraction from the wild.</li> <li>Promote capacity building at grassroot level to ensure eco-friendly and sustainable use of natural resources.</li> <li>Develop suitable mechanisms for protection of traditional knowledge associated with genetic resources.</li> <li>Adopt a comprehensive approach to Integrated Coastal Zone Management by strengthening linkages among coastal areas, wetlands and river systems.</li> <li>Promote techniques for conservation and regeneration of coral reefs and mangroves.</li> <li>Encourage agro-forestry, organic farming, environmentally sustainable cropping patterns, diversified farming systems and more efficient irrigation techniques.</li> </ul>	<ul style="list-style-type: none"> <li>- PC</li> <li>- PC &amp; MoPR</li> <li>- PC, DoLR &amp; MoEF</li> <li>- MoEF &amp; MoA</li> <li>- MoA &amp; MoES</li> <li>- MoEF</li> <li>- MoEF</li> <li>- MoEF</li> <li>- MoEF</li> <li>- MoA</li> </ul>	<ul style="list-style-type: none"> <li>MoEF, MoA, MoCI, MoT, MoRD, MoTA, MoES, AYUSH, CII, ASSOCHAM, FICCI and other industry associations.</li> <li>MoEF, MoA, MoRD, MoES, MoH&amp;FW, MoTA, AYUSH</li> <li>MoEF, MoA, MoCI, AYUSH CII, ASSOCHAM, FICCI and other industry associations.</li> <li>State governments, SFRI, CSIR institutions, research institutions and universities.</li> <li>AYUSH, MoEF, PC, MoST, MoPR, ICMR, CSIR institutions, universities and research institutions.</li> <li>NBA, SBBs, BMCs, MoA, MHRD, State/U.T. governments, SFDs, PRIs, CSOs.</li> <li>NBA, PPVFRA, AYUSH, CSIR institutions, MoCI.</li> <li>MoES, MoA, MoWR, NIO, ZSI, Centres of Excellence, State/U.T. government including science, technology and environment departments, Coast Guards, research institutions and universities, public and private sector.</li> <li>MoES, NIO, ZSI, SDMRL, State/U.T. governments, Coast Guards and private sector.</li> <li>SAUs, State/U.T. governments including agriculture, horticulture and forest departments, MoTA, MoFPI, APEDA, NABARD, private sector.</li> </ul>	<ul style="list-style-type: none"> <li>- Long</li> <li>- Medium</li> <li>- Short</li> <li>- Medium</li> <li>- Medium</li> <li>- Short</li> <li>- Medium</li> <li>- Short</li> <li>- Short</li> <li>- Short</li> <li>- Medium</li> </ul>



S. No.	Actions	Activities	Coordinating agency	Associated agencies	Time frame
3	Regulating introductions, and managing invasive alien species	<ul style="list-style-type: none"> <li>Develop unified national system for regulation and quarantine check of all introductions.</li> <li>Develop domestic quarantine to contain the spread of invasive species to neighbouring areas.</li> <li>Promote intersectoral linkages to check accidental introductions.</li> <li>Develop a national database on invasive alien species reported in India.</li> <li>Develop appropriate Early Warning and Awareness System.</li> <li>Provide priority funding to basic research on managing invasive species.</li> <li>Promote capacity building for managing invasive alien species.</li> <li>Promote restorative measures of degraded ecosystems using native species.</li> <li>Promote regional cooperation in adoption of uniform quarantine measures.</li> </ul>	<ul style="list-style-type: none"> <li>- MoA &amp; MoEF</li> <li>- MoA</li> <li>- MoA</li> <li>- MoA</li> <li>- MoA</li> <li>- MoA</li> <li>- MoA</li> <li>- MoEF</li> <li>- MoEF</li> </ul>	<ul style="list-style-type: none"> <li>PC, CBEC, State/U.T. governments, research institutions and universities.</li> <li>ICAR, MoEF, MoCI, State/U.T. governments, research institutions and universities.</li> <li>ICAR, MoEF, MoCI, PC, State/U.T. governments, research institutions and universities.</li> <li>ICAR, MoEF, State/U.T. governments, research institutions and universities.</li> <li>State/U.T. Governments, CSOs, media, research institutions and universities.</li> <li>ICAR, MoST, MoEF, PC, research institutions and universities.</li> <li>ICAR, DAHD&amp;F, MoEF, NBA, BSI, ZSI, State/U.T. governments, research institutions and universities.</li> <li>MoA, MoRD, PC, CSOs, PRIs, State/U.T. governments, research institutions and universities.</li> <li>MoA, MEA, MoF (Department of Revenue through CBEC), MHA.</li> </ul>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Medium</li> <li>- Medium</li> <li>- Short</li> <li>- Short</li> <li>- Short</li> <li>- Short</li> <li>- Medium</li> <li>- Long</li> <li>- Medium</li> </ul>
4	Assessment of vulnerability, and adaptation to climate change & desertification	<ul style="list-style-type: none"> <li>Identify key vulnerabilities to climate change in the Indian context.</li> <li>Focus on sea-level rise and vulnerability of coastal areas and their biodiversity to climate change and geological events.</li> <li>Participate in voluntary partnerships with other countries both developed and developing, to address the challenges of sustainable development and climate change, consistent with the provisions of the UN Framework Convention on Climate Change.</li> <li>Identify the most important gaps in knowledge that limit the national ability to develop and implement climate change adaptation strategies for species and ecological processes and functions.</li> <li>Develop ecological criteria for identifying the species and ecosystems that are at great risk from climate change and identify their priority habitats.</li> <li>Identify information gaps and priorities, through expert consultative process, for long-term monitoring of climate change impacts on biodiversity.</li> <li>Establish a climate change and biodiversity website for decision makers.</li> <li>Adopt watershed management strategies for arresting and reverting desertification and for expanding the green cover.</li> </ul>	<ul style="list-style-type: none"> <li>- MoST &amp; MoEF</li> <li>- MoST &amp; MoEF</li> <li>- MoEF &amp; MoST</li> <li>- MoEF &amp; MoST</li> <li>- MoEF &amp; MoST</li> <li>- MoEF &amp; MoST</li> <li>- MoEF &amp; MoST</li> <li>- MoEF &amp; MoST</li> <li>- DoLR, MoA &amp; MoEF</li> </ul>	<ul style="list-style-type: none"> <li>MoES, DoS, DRDO, MoM, PC, research institutions and universities.</li> <li>MoES, DoS, MoM, PC, research institutions and universities.</li> <li>MEA, DEA, MHA.</li> <li>DoS, research institutions and universities, centres of excellence, CSOs.</li> <li>DoS, research institutions and universities, centres of excellence, CSOs.</li> <li>MoST, MoEs, DoS, research institutions and universities, CSOs.</li> <li>NIC.</li> <li>MoRD, MoPR, State/U.T. governments, research institutions and universities.</li> </ul>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Medium</li> <li>- Long</li> <li>- Medium</li> <li>- Medium</li> <li>- Long</li> <li>- Medium</li> <li>- Long</li> <li>- Long</li> </ul>

S. No.	Actions	Activities	Coordinating agency	Associated agencies	Time frame
5	Integration of biodiversity concerns in economic and social development	<ul style="list-style-type: none"> <li>Integration of biodiversity concerns across development sectors and promote use of clean technologies.</li> <li>Develop strong research base on impact assessment.</li> <li>Integrate plans for reallocation and rehabilitation of local people likely to be displaced by development projects.</li> <li>Promote integrated approach to management of river basins, according priority to mitigating the impacts on river and estuarine flora and fauna.</li> <li>Adopt "best practice" norms for infrastructure development projects.</li> <li>Strengthen traditional practices of rain water harvesting.</li> <li>Ensure provision for environmental restoration during commissioning and after decommissioning of industries.</li> <li>Promote sustainable tourism through adoption of "best practice" norms.</li> </ul>	<ul style="list-style-type: none"> <li>MoEF &amp; PC</li> <li>MoEF &amp; MoST</li> <li>PC &amp; concerned State govt. agencies</li> <li>MoWR &amp; PC</li> <li>MoUD &amp; PC</li> <li>MoUD</li> <li>MoCI &amp; MoEF</li> <li>MoT</li> </ul>	<ul style="list-style-type: none"> <li>MoST, MoA, MoCI, MoPNG, AYUSH, public and private sector, CII, FICCI, ASSOCHAM and other industry associations</li> <li>Research institutions, CSOs, public and private sector, CII, FICCI, ASSOCHAM and other.</li> <li>MoWR, MoTA, MoEF, MoPR, CSOs, public and private sector, CII, FICCI, ASSOCHAM and other.</li> <li>MoEF, MoA, State/U.T. governments, universities and research institutions, public and private sector, BSI, ZSI.</li> <li>Min. of Surface Transport, MoT, NHAI, MoEF, MoCI, research institutions, public and private sector, CII, FICCI, ASSOCHAM and other industry associations.</li> <li>MoRD, MoEF, MoCI, research institutions, State Governments, public and private sector, CSOs.</li> <li>MoM, NHAI, MoST, public and private sector, CII, FICCI, ASSOCHAM and other industry associations, CSOs.</li> <li>MoEF, MHRD, public and private tour operators, CSOs.</li> </ul>	<ul style="list-style-type: none"> <li>Medium</li> <li>Short</li> <li>Short</li> <li>Short</li> <li>Short</li> <li>Short</li> <li>Short</li> <li>Medium</li> <li>Short</li> </ul>
6	Impact of pollution	<ul style="list-style-type: none"> <li>Strengthen monitoring and enforcement of emission standards, for both point and non-point sources, minimizing adverse impacts on biodiversity.</li> <li>Treat and manage industrial effluents to minimize adverse impacts.</li> <li>Promote biodegradable and recyclable substitutes for non-biodegradable materials.</li> <li>Avoid excessive use of fertilizers and pesticides; promote organic farming of locally-adapted traditional crop varieties where feasible.</li> <li>Develop a strategy for strengthening regulation, and addressing impacts, of ship-breaking activities.</li> </ul>	<ul style="list-style-type: none"> <li>MoEF</li> <li>MoEF</li> <li>MoEF</li> <li>MoA</li> <li>Min. of Shipping &amp; MoEF</li> </ul>	<ul style="list-style-type: none"> <li>CPCB, SPCBs, State Environment Departments, CSOs.</li> <li>CPCB, SPCBs, public and private sector, CII, FICCI, ASSOCHAM and other industry associations, CSOs.</li> <li>CPCB, SPCBs, public and private sector, CII, FICCI, ASSOCHAM and other industry associations, research institutions, CSOs, BIS.</li> <li>MoPR, State/U.T. governments, farming communities, public and private sector, CSOs.</li> <li>Min. of Surface and Transport, MoCI, public and private sector, CSOs.</li> </ul>	<ul style="list-style-type: none"> <li>Short</li> <li>Medium</li> <li>Long</li> <li>Short</li> <li>Medium</li> </ul>
7	Developing and integrating biodiversity databases	<ul style="list-style-type: none"> <li>Develop an integrated national biodiversity information system with distributive linkages for easy storage, retrieval and dissemination.</li> <li>Collect, collate and consolidate all available information.</li> <li>Intensify area-specific survey, identification and inventorization activities.</li> <li>Strengthen research base on taxonomy and genetic diversity.</li> </ul>	<ul style="list-style-type: none"> <li>NBA</li> <li>MoEF</li> <li>MoEF</li> <li>MoEF</li> </ul>	<ul style="list-style-type: none"> <li>MoEF, BSI, ZSI, CSIR institutions, universities and research institutions, CSOs.</li> <li>NBA, BSI, ZSI, MoA, MoST, CSIR institutions, research institutions and universities, Centres of excellence, SAUs.</li> <li>BSI, ZSI, MoA, Centres of excellence, universities and research institutions.</li> <li>BSI, ZSI, MoA, centres of excellence, universities and research institutions.</li> </ul>	<ul style="list-style-type: none"> <li>Medium</li> <li>Short</li> <li>Medium</li> <li>Short</li> </ul>
8	Strengthening	<ul style="list-style-type: none"> <li>Accelerate effective actions at the central, state and local levels to implement provisions under the Biodiversity Act 2002 and its Rules 2004.</li> <li>Review enabling policies regarding agricultural lands</li> </ul>	<ul style="list-style-type: none"> <li>MoEF</li> <li>MoA</li> </ul>	<ul style="list-style-type: none"> <li>NBA, SBBs, BMCs, State/U.T. governments, CSOs.</li> <li>MoEF, MoRD, MoUD.</li> </ul>	<ul style="list-style-type: none"> <li>Medium</li> <li>Long</li> </ul>



S. No.	Actions	Activities	Coordinating agency	Associated agencies	Time frame
		<ul style="list-style-type: none"> <li>Formulate policies for grasslands, pastoral lands, sacred groves etc.</li> <li>Revitalize traditional practices and other folk uses of bio-resources.</li> <li>Develop synergies among relevant statutes and regulation in line with the NEP and identify areas for new legislation.</li> <li>Review and update regulatory processes for LMOs (including national biosafety guidelines keeping in view biodiversity and human health.</li> <li>Harmonise provisions concerning disclosure of source of biological material and associated knowledge relevant to the Patents Act, 1970, Plant Varieties Protection and Farmer's Rights Act, 2001 and Biological Diversity Act 2002.</li> <li>Develop appropriate system and modalities for operationalizing provisions for prior informed consent and benefit sharing under the Biological Diversity Act.</li> <li>Support preparation of PBRs.</li> <li>Reorient and converge national policies on use of natural resources (including forestry, agriculture, fisheries, industry, mining etc.) and integrate biodiversity concerns.</li> </ul>	<ul style="list-style-type: none"> <li>- MoEF</li> <li>- MoEF</li> <li>- MoEF</li> <li>- MoEF &amp; DBT</li> <li>- MoEF</li> <li>- MoEF</li> <li>- MoEF &amp; PC</li> </ul>	<ul style="list-style-type: none"> <li>State/U.T. governments, MoA, MoRD</li> <li>NBA, SBBs, BMCs, AYUSH, State/U.T. governments, CSIR institutions, research institutions and universities, Centres of excellence, CSOs</li> <li>Concerned Ministries, State/U.T. Governments.</li> <li>MoA, MoH&amp;FW, DGFT, MFPI, State/U.T. governments, SAUs, ICAR, ICMR.</li> <li>MoA, PPVFRA, MoCI, NBA.</li> <li>NBA, SBBs, BMCs.</li> <li>NBA, SBBs, BMCs.</li> <li>NBA, MoCI, MoA, MoM, public and private sector, CII, FICCI, ASSOCHAM and other industry associations.</li> </ul>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Medium</li> <li>- Short</li> <li>- Short</li> <li>- Short</li> <li>- Medium</li> <li>- Long</li> <li>- Long</li> </ul>
9	Developing national capacities for biodiversity conservation and appropriate use of new technologies	<ul style="list-style-type: none"> <li>Develop consortium of lead institutions and promote joint research on key conservation issues.</li> <li>Promote application of biotechnology tools for conserving endangered species.</li> <li>Consolidate follow up studies on released LMOs.</li> <li>Implement ban on 'genetic use restriction technologies'</li> <li>Strengthen local institutional structures ensuring participation of women.</li> <li>Integrate traditional knowledge and practices into biodiversity conservation.</li> <li>Promote use of non-conventional sources of energy.</li> <li>Support traditional, religious, ritualistic, ethical and cultural methods of conservation.</li> <li>Strengthen manpower, infrastructure and capacities of MoEF</li> <li>Strengthen BSI and ZSI capabilities and link them to assist SBBs and BMCs.</li> <li>Augment human resource development and personnel management in forestry and wildlife sector.</li> <li>Develop a unified national system for conservation of all components of agricultural biodiversity.</li> <li>Expand the network of botanical gardens and zoological parks.</li> </ul>	<ul style="list-style-type: none"> <li>- MoEF &amp; MoST</li> <li>- DBT</li> <li>- MoEF &amp; DBT</li> <li>- MoA</li> <li>- MoEF &amp; DoWCD</li> <li>- MoEF</li> <li>- MNRE</li> <li>- MoEF</li> <li>- DoPT</li> <li>- MoEF</li> <li>- MoEF</li> <li>- MoA</li> <li>- MoEF</li> </ul>	<ul style="list-style-type: none"> <li>MoES, MoA, universities and research institutions, CSIR institutions, public and private sector.</li> <li>MoEF, universities and research institutions, CSIR institutions, public and private sector.</li> <li>MoA, ICAR, SAUs, State/U.T. governments.</li> <li>NBA, DBT, MoEF.</li> <li>MoA, MoRD, MoPR, CSOs, State/U.T. governments.</li> <li>NBA, MoC, MoA, MoRD, MoTA, AYUSH &amp; CSIR institutions.</li> <li>MoEF, State/U.T. governments, CSOs, public and private sector.</li> <li>MoC, religious and cultural organizations, State/U.T. governments, CSOs, public and private sector.</li> <li>PC, MoEF.</li> <li>ZSI, BSI, State/U.T. governments, universities and research institutions.</li> <li>WTI, State/U.T. governments, universities and research institutions.</li> <li>State/U.T. governments including agriculture, horticulture and animal husbandry department, SAUs, public and private sector, research institutions, CSIR institutions.</li> <li>State/U.T. governments, BSI, ZSI, CSIR institutions, universities and research institutions, public &amp; private sector.</li> </ul>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Medium</li> <li>- Medium</li> <li>- Short</li> <li>- Medium</li> <li>- Long</li> <li>- Long</li> <li>- Medium</li> <li>- Short</li> <li>- Long</li> <li>- Short</li> <li>- Long</li> <li>- Long</li> </ul>

S. No.	Actions	Activities	Coordinating agency	Associated agencies	Time frame
		<ul style="list-style-type: none"> <li>● Evolve suitable mechanism to coordinate all activities related to conservation (wildlife, forestry, agriculture, animal husbandry, fisheries, etc).</li> <li>● Strengthen and support relevant departments of central, state and deemed universities/colleges</li> <li>● Promote both formal and non-formal means for environment education and biodiversity conservation.</li> <li>● Incorporate modules on conservation and sustainable use of biodiversity in foundational and professional training for All India and State Services.</li> <li>● Promote and augment public education and awareness</li> <li>● Support research on threats to biodiversity. 'Hot Spot' areas and lower taxa.</li> <li>● Upgrade technologies for conservation and use.</li> <li>● Conservation and management of biodiversity through biotechnological interventions</li> <li>● Enhance research on bio-fertilizers, bio-pesticides and IPM.</li> <li>● Improve capability for impact assessment.</li> <li>● Strengthen taxonomic capacity.</li> <li>● Promote activities relating to animal welfare.</li> </ul>	<ul style="list-style-type: none"> <li>- PC, MoA &amp; MoEF</li> <li>- MHRD</li> <li>- MoEF</li> <li>- MoEF, MoST &amp; MHRD</li> <li>- MoEF</li> <li>- MoEF &amp; MoST</li> <li>- MoEF</li> <li>- DBT</li> <li>- MoA &amp; MoST</li> <li>- MoEF</li> <li>- MoST &amp; PC</li> <li>- MoEF &amp; MoST</li> <li>- AWB</li> </ul>	<ul style="list-style-type: none"> <li>➤ State/U.T. governments, research institutions and universities, CSIR institutions and CSOs.</li> <li>➤ UGC, AICTE, central, state and deemed universities/colleges, MoEF.</li> <li>➤ MoHRD, UGC, NCERT, AICTE, CBSE, State Councils and Boards.</li> <li>➤ BSI, ZSI, NBA, CSIR institutions, universities and research institutions, CSOs.</li> <li>➤ MHRD, UGC, media, CSOs, public and private sector.</li> <li>➤ State/U.T. governments, MHRD, MoA, DBT, universities and research institutions, CSIR institutions.</li> <li>➤ TIFAC, MoST DoS, MoES, universities and research institutions.</li> <li>➤ DST, MoA, MoEF and their associated organizations</li> <li>➤ State/U.T. governments, universities and research institutions.</li> <li>➤ CPCB, SPCBs, public and private sector, CSOs, research institutions.</li> <li>➤ BSI, ZSI, State/U.T. governments, universities and research institutions, CSIR institutions, CSOs.</li> <li>➤ MoEF, MoA, DAHD&amp;F, CSOs, universities and research institutions, public and private sector.</li> </ul>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Medium &amp; Long</li> <li>- Medium</li> <li>- Medium</li> <li>- Short</li> <li>- Medium</li> <li>- Short</li> <li>- Medium &amp; Long</li> <li>- Long</li> <li>- Short &amp; Medium</li> <li>- Short &amp; Medium</li> <li>- Short</li> </ul>
10	Use of economic instruments/valuation in biodiversity related decision making processes	<ul style="list-style-type: none"> <li>● Develop valuation models and a system for natural resource accounting (reflecting ecological and economic values of biodiversity).</li> <li>● Develop valuation models and validate through pilot studies.</li> <li>● Develop systems for greater return of revenues (generated in protected areas, zoological parks, botanical gardens, aquaria etc.) for strengthening biodiversity conservation.</li> </ul>	<ul style="list-style-type: none"> <li>- MoEF &amp; MoSPI</li> <li>- MoEF &amp; MoSPI</li> <li>- MoEF</li> </ul>	<ul style="list-style-type: none"> <li>➤ PC, State/U.T. governments, IEG, IGIDR, Central Statistical Organization, universities and research institutions, CSIR institutions, CSOs, TERI.</li> <li>➤ PC, State/U.T. governments, IEG, IGIDR, Central Statistical Organization, universities and research institutions, CSIR institutions, CSOs, TERI.</li> <li>➤ MoSPI, PC, State/U.T. governments, IEG, IGIDR, Central Statistical Organization, universities and research institutions, CSIR institutions, CSOs, TERI.</li> </ul>	<ul style="list-style-type: none"> <li>- Long</li> <li>- Long</li> <li>- Long</li> </ul>
11	International cooperation	<ul style="list-style-type: none"> <li>● Strengthen cooperation with international agencies on biodiversity issues.</li> <li>● Promote regional cooperation.</li> <li>● Mobilise external funding.</li> <li>● Enable technology transfer.</li> </ul>	<ul style="list-style-type: none"> <li>- MEA &amp; MoEF</li> <li>- MEA &amp; MoEF</li> <li>- MoF &amp; MoEF</li> <li>- MoEF &amp; MoST</li> </ul>	<ul style="list-style-type: none"> <li>➤ MoST, MoA, PC, DEA, MHA.</li> <li>➤ DEA, MoA, MoST, MHA.</li> <li>➤ MEA, DEA, MoA, MoST.</li> <li>➤ MEA, DEA, MoA.</li> </ul>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Long</li> <li>- Medium</li> <li>- Medium</li> </ul>



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## ABBREVIATIONS

ABS	: Access and Benefit Sharing
AICTE	: All India Council for Technical Education
APEDA	: Agricultural and Processed Food Products Export Development Authority
ASEAN	: Association of South East Asian Nations
ASSOCHAM	: The Associated Chambers of Commerce and Industry of India
AWBI	: Animal Welfare Board of India
AYUSH	: Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy
BIS	: Bureau of Indian Standards
BHC	: Benzene Hexachloride
BMCs	: Biodiversity Management Committees
BNHS	: Bombay Natural History Society
BSI	: Botanical Survey of India
BR	: Biosphere Reserve
Bt	: <i>Bacillus thuringiensis</i>
CAs	: Chartered Accountants
CBD	: Convention on Biological Diversity
CBEC	: Central Board of Excise and Customs
CBSE	: Central Board of Secondary Education
CCMB	: Centre for Cellular & Molecular Biology
CDFD	: Centre for DNA Fingerprinting and Diagnostics
CDM	: Clean Development Mechanism
CDRI	: Central Drug Research Institute
CEE	: Centre for Environment Education
CGIAR	: Consultative Group on International Agricultural Research
CII	: Confederation of Indian Industry
CIMAP	: Central Institute of Medicinal and Aromatic Plants
CITES	: Convention on International Trade in Wild Species of Endangered Flora and Fauna
CMS	: Bonn Convention on Conservation of Migratory Species
CoE	: Centre of Excellence
COP	: Conference of Parties
CPCB	: Central Pollution Control Board
CSIR	: Council of Scientific and Industrial Research
CSOs	: Civil Society Organizations
CZA	: Central Zoo Authority
D/o Energy	: Department of Energy
D/o Mining	: Department of Mining
DAHD&F	: Department of Animal Husbandry, Dairying and Fisheries
DBT	: Department of Biotechnology
DCGI	: Drug Controller General of India
DEA	: Department of Economic Affairs
DDP	: Desert Development Programme
DDT	: Dichloro-Diphenyl-Trichloroethane
DGFT	: Director General of Foreign Trade
DoLR	: Department of Land Resources

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DoPT	: Department of Personnel & Training
DoRD	: Department of Rural Development
DoS	: Department of Space
DoWCD	: Department of Women & Child Development
DPAP	: Drought Prone Area Programme
DRDO	: Defence Research Development Organization
DST	: Department of Science & Technology
EIA	: Environmental Impact Assessment
EIVs	: Entities of Incomparable Value
ESCAP	: Economic and Social Commission for Asia and the Pacific
FDA	: Forest Development Agency
FICCI	: Federation of Indian Chambers of Commerce and Industry
FIS	: Forest Invasive Species
GEAC	: Genetic Engineering Approval Committee
GIB	: Great Indian Bustard
GMOs	: Genetically Modified Organisms
GURTs	: Genetic Use Restriction Technologies
HDI	: Human Development Index
IBSC	: Institutional Biosafety Committee
IAS	: Invasive Alien Species
ICAR	: Indian Council of Agricultural Research
ICFRE	: Indian Council of Forest Research and Education
ICIMOD	: International Centre for Integrated Mountain Development
ICMR	: Indian Council of Medical Research
IEG	: Institute of Economic Growth
IFGTB	: Institute of Forest Genetics and Tree Breeding
IGIDR	: Indira Gandhi Institute of Development & Research
IGNFA	: Indira Gandhi National Forest Academy
IIFM	: Indian Institute of Forest Management
IIIM	: Indian Institute of Integrative Medicine
IR	: International Regime
IUCN	: International Union for Conservation of Nature
IWDP	: Integrated Wasteland Development Programme
JFM	: Joint Forest Management
JFMCs	: JFM Committees
LaCONES	: Laboratory for Conservation of Species
LMMCs	: Like Minded Megadiverse Countries
LMOs	: Living Modified Organisms
M/o Culture	: Ministry of Culture
MEA	: Ministry of External Affairs
MEAs	: Multilateral Environment Agreements
MEC	: Monitoring cum Evaluation Committee
MHA	: Ministry of Home Affairs
MHRD	: Ministry of Human Resource Development
MLAs	: Member of Legislative Assembly
MNRE	: Ministry of New & Renewable Energy
MoA	: Ministry of Agriculture
MoCI	: Ministry of Commerce & Industry

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MoD	: Ministry of Defence
MoEF	: Ministry of Environment and Forests
MoES	: Ministry of Earth Sciences
MoF	: Ministry of Finance
MoFPI	: Ministry of Food Processing Industries
MoHFW	: Ministry of Health and Family Welfare
MoIT	: Ministry of Information Technology
MoM	: Ministry of Mines
MoPNG	: Ministry of Petroleum & Natural Gas
MoPR	: Ministry of Panchayati Raj
MoRD	: Ministry of Rural Development
MoSPI	: Ministry of Statistics & Programme Implementation
MoST	: Ministry of Science & Technology
M/o Surface Transport	: Ministry of Surface Transport
MoT	: Ministry of Tourism
MoTA	: Ministry of Tribal Affairs
MoUD	: Ministry of Urban Development
MoWR	: Ministry of Water Resources
MPs	: Member of Parliament
MSP	: Multi-Stakeholder Partnership
NABARD	: National Bank for Agriculture and Rural Development
NAEB	: National Afforestation and Eco-Development Board
NAFED	: National Agricultural Cooperative Marketing Federation of India Ltd.
NAP	: National Afforestation Programme
NBA	: National Biodiversity Authority
NBAGR	: National Bureau of Animal Genetic Resources
NBAIM	: National Bureau of Agriculturally Important Microorganisms
NBAP	: National Biodiversity Action Plan
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
NCDMA	: National Clean Development Mechanism Authority
NCERT	: National Council of Education Research and Training
NDMA	: National Disaster Management Authority
NEERI	: National Environmental Engineering Research Institute
NEP	: National Environment Policy, 2006
NGOs	: Non Government Organizations
NHAI	: National Highways Authority of India
NIC	: National Informatics Centre
NIF	: National Innovation Foundation
NIO	: National Institute of Oceanography
NIPER	: National Institute of Pharmaceuticals Education and Research
NISCAIR	: National Institute of Science Communication and Information Resources
NLCP	: National Lake Conservation Plan

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NRA	: Natural Resource Accounting
NRCDNAF	: National Research Centre on DNA Fingerprinting
NRCP	: National River Conservation Plan
NTFPs	: Non-Timber Forest Products
PAs	: Protected Areas
PBRs	: People's Biodiversity Registers
PC	: Planning Commission
PEs	: Public Enterprises
PRIs	: Panachayati Raj Institutions
PPVFRA	: Protection of Plant Varieties and Farmers' Rights Authority
RCGM	: Review Committee on Genetic Manipulation
RI	: Research Institutions
SAARC	: South Asian Association for Regional Cooperation
SACEP	: South Asia Cooperative Environment Programme
SAHDs	: State Animal Husbandry Departments
SAUs	: State Agricultural Universities
SBBs	: State Biodiversity Boards
SC	: Schedule Caste
SDMAs	: State Disaster Management Authorities
SDMRI	: Suganthi Devadasan Marine Research Institute
SFBs	: State Forest Boards
SFDs	: State Forest Departments
SFM	: Sustainable Forest Management
SFRIs	: State Forest Research Institutes
SPCBs	: State Pollution Control Boards
ST	: Schedule Tribe
TBGRI	: Tropical Botanic Garden And Research Institute
TIFAC	: Technology Information, Forecasting and Assessment Council
TKDL	: Traditional Knowledge Digital Library
TRIPS	: Trade-Related Aspects of Intellectual Property Rights
UGC	: University Grant Commission
UN	: United Nations
UNCCD	: United Nations Convention to Combat Desertification
UNEP	: United Nations Environment Programme
UNESCO	: United Nations Educational, Scientific and Cultural Organization
UNFCCC	: United Nations Framework Convention on Climate Change
UPOV	: International Union for the Protection of New Varieties of Plants
US\$	: US Dollar
U.T.	: Union Territories
WII	: Wildlife Institute of India
WLBI	: Wildlife Board of India
WTO	: World Trade Organization
ZSI	: Zoological Survey of India

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## LIST OF PHOTOGRAPHS

### FRONT COVER (clockwise)

Tiger  
 Red star glory - *Ipomoea hederifolia*  
 Deer  
 Rhinoceros  
 Peacock  
 Bulbul – a bird  
 Coral  
 Butterfly  
 Mangrove forests  
 Rose

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River flowing through forest

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### INSIDE OF BACK COVER

Ducks swimming in a lake in the backdrop of mountains









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कर्तव्या

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