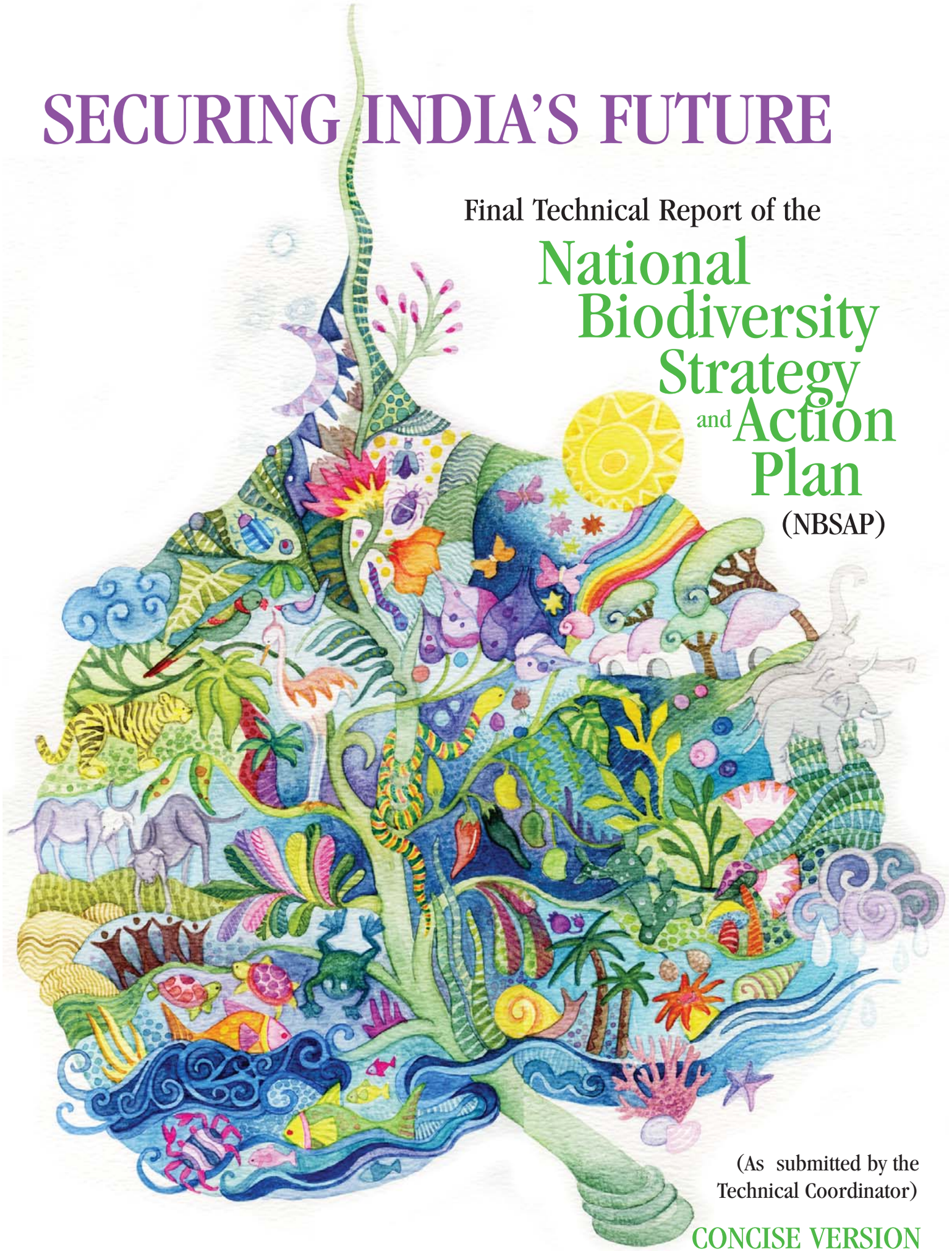
SECURING INDIA'S FUTURE

Final Technical Report of the

National Biodiversity Strategy and Action Plan

(NBSAP)



(As submitted by the Technical Coordinator)

CONCISE VERSION

(AND CD WITH FULL REPORT, ALL NBSAP DOCUMENTS, MAPS AND PHOTOS)

Credits and Acknowledgements

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Securing India's Future

Final Technical Report of the

National Biodiversity Strategy and Action Plan

(As submitted by the Technical Coordinator)

Concise Version

(with full report, and all other NBSAP documents, in enclosed CD)

Executive Agency
Ministry of Environment and Forests, Government of India

Technical Implementing Agency
Kalpavriksh, through a Technical and Policy Core Group

Administrative Agency
Biotech Consortium India Limited

Status of the Final Action Plan

The final report emanating from the NBSAP process was to become the National Biodiversity Strategy and Action Plan for India. However, since late 2003 when it was submitted to the Ministry of Environment and Forests, it has not received approval at the time of going to press. A brief of what has transpired since then, and why this report is being made public now:

- The National Biodiversity Strategy and Action Plan (NBSAP) has been one of the world's most participatory environmental planning processes. From January 2000, the Ministry of Environment and Forests (MoEF) facilitated this unique process, including the unusual step of giving its entire technical coordination to a NGO (Kalpavriksh, a then 20 year old environmental action group). MoEF had till end-2003 indicated that the final report emanating from this, as coordinated by the 15 member Technical and Policy Core Group (TPCG) facilitated by Kalpavriksh, would be the National Action Plan.

- The first (October 2002) and second drafts (March 2003) of the National Action Plan were produced and widely circulated under the MoEF's name, commented upon, and revised based on comments from GoI ministries, state governments, NGOs, community groups, and individual experts. These were also publicly discussed during the Final National Workshop in December 2002.

- The third revised version was looked at by a peer review group set up by the MoEF in mid-2003, after which the fourth draft was prepared and sent for external editing and finalization of design. A final draft was produced after this, and till this time the understanding with MoEF was that this would now be considered for approval as the National Plan.

- In January 2004, MoEF took the view that the final draft could only be published as a Final Technical Report, and that this would be converted into a National Action Plan after the Cabinet approved it. This was decided upon in the final Steering Committee meeting held on 29th January 2004.

- In May 2004, MoEF further changed its position and did not sanction the publication of the draft even as a Final Technical Report, and its Secretary indicated that the draft could not even be made public.

- It is learnt that MoEF is not comfortable with some parts of the report, but this was officially conveyed to Kalpavriksh only in early 2005. A list of the specific points of discomfort has never been made available to Kalpavriksh or the TPCG.

- In mid-2004, the report was apparently put through yet another review process, the results of which are not being made public. In February 2005, MoEF told Kalpavriksh it is now finalising a draft based on this review, which will go to the other ministries and then to Cabinet for approval. It has so far not publicly shared the revised draft, nor is it ready to provide a time frame for the finalisation of the plan.

- MoEF has also not conveyed its approval of the state, sub-state, thematic, and ecoregional action plans, to the relevant coordinating agencies, thereby delaying the implementation of these plans (except in the case of those agencies who have decided to go ahead with implementation regardless of receiving the formal approval from MoEF).

- In March 2005, MoEF wrote to Kalpavriksh asking it not to publish or in any form make publicly available, the report submitted in December 2003.

- These decisions are in complete contrast to the open and transparent process carried out throughout the NBSAP phase. They also ignore the energy and inputs that thousands of people have put into the process, and violate the contractual agreement between MoEF and UNDP/GEF.

- Kalpavriksh, in consultation with the TPCG, has decided to make the report submitted in December 2003 available to the public in published form, as the Final Technical Report of NBSAP (in the form agreed to by MoEF in writing, in early 2004). This report has already been available on the Kalpavriksh website, and electronically for anyone who requests it. The publication is so that the public can have easier access to the information, analysis and recommendations contained therein, without further delay. This move is also aimed at providing public access to the 100 - odd other documents produced in the NBSAP process. Finally, it is aimed at enabling the public to compare the final action plan as and when brought out by MoEF, with this Final Technical Report.

March 2005 **National Plan Drafting Core Group**

Table of Contents

(Note: For the full text of these chapters, as also for definitions of key terms, glossary, abbreviations, references, and annexures, please see the full document in the enclosed CD).

Concise Version

Securing India's Future:

Final Technical Report of National Biodiversity Strategy and Action Plan

1. Introduction

A process of preparing a National Biodiversity Strategy and Action Plan (NBSAP) for India, was carried out over the period 2000-2003. The NBSAP process involved consultations and planning with thousands of people across the country, including tribal (*adivasi*) and other local communities, NGOs, government agencies, academics and scientists, corporate houses, students, armed forces, and other sections of society. Its aim was to come out with detailed strategies and actions on the conservation of biodiversity, the sustainable use of biological resources, and equity in various aspects relating to such conservation and use. The process involved the preparation of over 71 strategy and action plans at local, state, ecoregional, and thematic levels, and 31 sub-thematic papers (*see box and map on pp. 2-3*). A large number of local events like public hearings, biodiversity festivals, workshops, *yatras*, and so on, contributed to the results. All these were finally built into the national level document.

The NBSAP process was carried out by the Ministry of Environment and Forests (MoEF), Government of India, under the sponsorship of the Global Environment Facility (GEF) through the United Nations Development Programme (UNDP). In a unique arrangement, its technical coordination was undertaken by a NGO, Kalpavriksh, which set up a 15-member Technical and Policy Core Group for the purpose; and its administrative coordination was by Biotech Consortium India Ltd. Over 100 agencies (including those chosen by each state government) and individuals were key partners in the process, carrying out action planning and expert reviews at various levels.

The NBSAP preparation for India has attempted to move away from the general trend of centralized planning. Efforts have been made towards decentralizing the planning and proceeding from the grassroots level upwards, as far as possible within the available time and resources.

Apart from the conventional methods of workshops, formal meetings and data collection, many BSAP processes have used interesting and innovative methods, for both outreach and feedback. Several states formed networks to help facilitate substantive inputs into their plans. Public hearings were held at almost all levels of the process. Students were also involved at various stages and levels of the process. Perhaps the most innovative methodology used was organizing biodiversity festivals and celebrations. These were in the form of *melas* (fairs), cycle rallies, cultural programmes, bullock cart rallies, *yatras* and boat rallies.

Some states already had, or were in the process of drafting, biodiversity or environment plans, under initiatives other than NBSAP. Instead of starting from scratch, the NBSAP process linked up with and built upon the work that had already been done in such cases.

The national level document, originally called the draft National Action Plan, was built on the following sources:

- 70 draft biodiversity strategy and action plans (BSAPs) at local (sub-state), state, ecoregional, and thematic levels, produced during the NBSAP process;
- 31 draft sub-thematic reviews commissioned or voluntarily offered during the NBSAP process;
- A large number of secondary sources, both documented and through personal communication (including previous national level documents such as the National Wildlife Action Plan, National Forestry Action Plan, National Conservation Strategy, country reports for Agenda 21, Biodiversity Conservation Prioritisation Project report, National Environment Action Programme, the IXth and Xth Five Year Plan Documents and others);

Sites, Themes, and Sub-Themes of the NBSAP Process

Sub-State Site BSAPs

1. Arvari (Rajasthan)
2. Bilaspur (Chhattisgarh)
3. Chedema (Nagaland)
4. Deccan Area (Andhra Pradesh)
5. Kachchh (Gujarat)
6. Karbi Anglong (Assam)
7. Ladakh (Jammu and Kashmir)
8. Lahaul-Spiti-Kinnaur (Himachal Pradesh)
9. Munsiari (Uttaranchal)
10. Nagpur (Maharashtra)
11. Nahin Kalan (Uttaranchal)
12. North Coastal Belt (Andhra Pradesh)
13. Rathong Chu (Sikkim)
14. Simlipal (Orissa)
15. Sundarbans (West Bengal)
16. Uttara Kannada (Karnataka)
17. Vidarbha (Maharashtra)
18. West Garo Hills (Meghalaya)

State and Union Territory BSAPs

1. Andaman and Nicobar Islands
2. Andhra Pradesh
3. Arunachal Pradesh
4. Assam
5. Bihar
6. Chandigarh
7. Chhattisgarh
8. Delhi
9. Goa
10. Gujarat
11. Haryana
12. Himachal Pradesh
13. Jammu and Kashmir
14. Jharkhand
15. Karnataka
16. Kerala
17. Lakshadweep
18. Madhya Pradesh
19. Maharashtra
20. Manipur
21. Meghalaya
22. Mizoram
23. Nagaland
24. Orissa
25. Pondicherry
26. Punjab
27. Rajasthan
28. Sikkim
29. Tamil Nadu
30. Tripura
31. Uttaranchal
32. Uttar Pradesh
33. West Bengal

Ecoregional BSAPs

1. Aravallis
2. Central Forest Belt
3. East Coast
4. Eastern Ghats
5. Gangetic Plains
6. North-East India
7. Shiwaliks
8. West Coast
9. Western Ghats
10. West Himalayas.

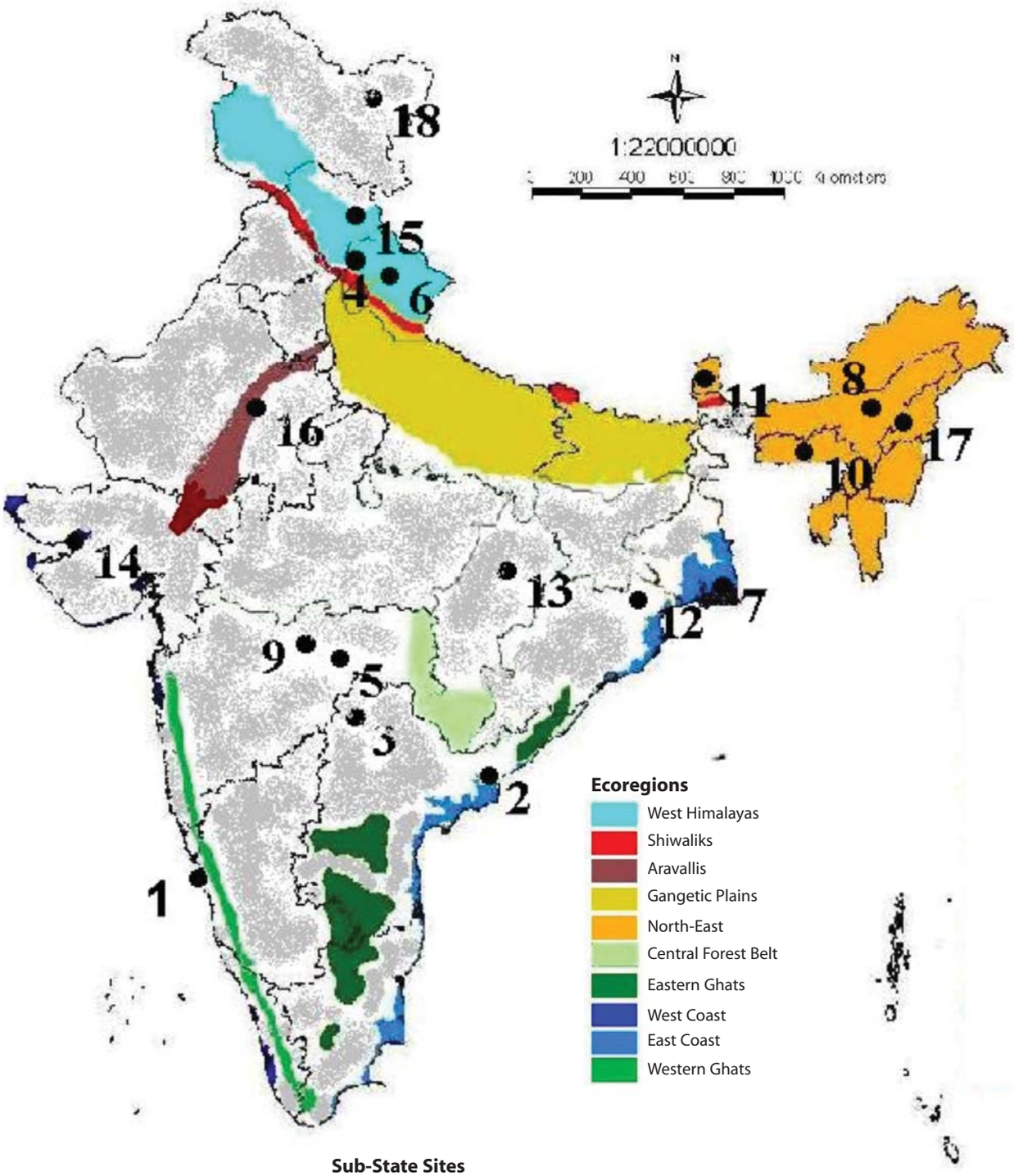
Thematic BSAPs

1. Access, Benefit-Sharing and Intellectual Property Rights
2. Culture and Biodiversity
3. Domesticated Biodiversity
4. Economics and Valuation of Biodiversity
5. Education, Awareness and Training
6. Health and Biodiversity
7. Livelihoods, Lifestyles and Biodiversity
8. Micro-Organic Diversity
9. Natural Aquatic Ecosystems
10. Natural Terrestrial Ecoystems
11. Policies, Laws, Institutions and Planning
12. Wild Animal Biodiversity
13. Wild Plant Biodiversity.

Sub-Thematic Reviews

1. Agricultural Biotechnology and Globalisation
2. Biodiversity in EIAs
3. Biodiversity in the Media
4. Climate Change
5. Community Conserved Areas in Gujarat
6. Community-Based Monitoring
7. Conventional Technologies and Biodiversity
8. Customary Laws and Biodiversity in North-east India
9. Dams and Biodiversity
10. Ecological Impacts of NTFP Collection in West Bengal
11. Environmental Education and Persons With Disabilities
12. Environmentally Friendly and Alternative Technologies
13. Home Gardens and Biodiversity
14. Humanised Natural Landscapes in the Eastern Himalaya
15. Important Bird Areas
16. Indigenous Knowledge and Biodiversity
17. Integrated Biodiversity Information System
18. Invasive Alien Species and Biodiversity
19. Living Marine Resource Drugs and Biodiversity
20. Mining And Biodiversity
21. Natural Dyes and Biodiversity
22. Nomadic Pastoralism and Biodiversity
23. Non-Pastoral Nomads
24. Non-Timber Forest Produce
25. Non-Timber Forest Produce in the Western Ghats
26. Paper Industry and Biodiversity
27. Pesticides/Toxics and Biodiversity
28. Public Distribution System and Biodiversity
29. Remote Sensing
30. Research on Agricultural Biodiversity
31. Thermal Power and Biodiversity
32. Tourism and Biodiversity
33. Tree Plantations and Biodiversity
34. Urban Biodiversity
35. Wildlife-Human Conflicts

NBSAP Sites



Sub-State Sites

1. Uttara Kannada
2. North Coastal Belt
3. Andhra Deccan
4. Nahin Kalan
5. Vidarbha
6. Munsiari
7. Sunderbans
8. Karbi-Anglong
9. Nagpur
10. West Garo Hills
11. Rathong Chu
12. Simlipal
13. Bilaspur
14. Kachchh
15. Lahaul-Spiti
16. Arvari
17. Chedema
18. Ladakh

Source : Wildlife Institute of India, Dehradun

- The experience and work of the Technical and Policy Core Group members; and
- Inputs of experts who were specifically requested to contribute, and others who provided comments on earlier drafts of the NAP.

The draft NAP went through an extensive assessment by executing agencies, sub-thematic reviewers, and other partners of the NBSAP process, as also a few hundred other institutions, experts, government officials, NGOs, and activists. The draft was also reviewed by a core group of experts set up by the Ministry of Environment and Forests. Its Executive Summary was made available in large numbers, in English, Hindi, and Telegu. It was also hosted on the website http://sdnp.delhi.nic.in/nbsap and made accessible for anyone to review. Information on its availability was sent out, with a short description, to the mass media, NGO and other networks, and various websites.

Unfortunately, the finally revised version which incorporated all these inputs and was submitted to the MoEF in late 2003, had as of April 2005 not been accepted by MoEF as the final national action plan. This document is, therefore, being published as the Final Technical Report of NBSAP. (For a full description of the way the document was treated after its submission, please see the note before the Table of Contents).

Structure of the Final Technical Report of NBSAP

The Final Technical Report of NBSAP is in two volumes. The first contains **eight chapters**:

- The **first** chapter deals with background and objectives, methodology, scope and approach of the NBSAP.
- The **second** chapter contains a statement of basic principles underlying the analysis and recommendations of the NAP.
- The **third** chapter deals with the evolutionary, physical, and historical context of India's biodiversity.
- The **fourth** chapter discusses the overall profile of India's biodiversity.
- The **fifth** chapter deals with some key proximate and root causes for the erosion of India's biodiversity.
- The **sixth** chapter discusses ongoing initiatives and key actors involved in the conservation of wild and domesticated biodiversity in India.
- The **seventh** chapter deals with broad strategies and related actions for achieving conservation, sustainable use, and equitable access/sharing of benefits for both wild and domesticated biodiversity.
- The **eighth** chapter deals with the overall implementation mechanism that would be needed for the strategies and actions presented in the seventh chapter.

Sections prior to or after these eight chapters also provide:

- Definitions of key terms used
- Glossary and List of Abbreviations
- An index of agencies and organisations identified as the lead agencies responsible for each action
- Annexures with lists of the Technical and Policy Core Group, the executing agencies and sub-thematic reviewers, and various people who contributed to or commented on the NAP.

The second volume of the NAP includes the summaries of each of the local, state, ecoregional, and thematic BSAPs, and of the sub-thematic reviews. It also contains a number of other annexures that provide information relevant to the text in Volume 1, such as listings of protected areas and threatened species, forest types, germplasm collections, and so on. Finally, it contains a chart showing the points of commonality between the strategies of the NAP and those recommended in the local, state, and ecoregional BSAPs.

A ***critical analysis*** of the NBSAP process was carried out at two stages of the project. This was based on 11 parameters that were derived by reading through progress reports, minutes of various meetings held by executing agencies, reports of visits to sites undertaken by members of the Technical and Policy Core Group (TPCG), BSAPs submitted by the executing agencies as well as an independent evaluation mission. The key questions analysed, and results obtained, were:

Was the scope of coverage achieved?

All kinds of biodiversity (ecosystems, species, genes; wild and domesticated) were covered in the process and quite strongly at the national level. However, one or more of these were weakly covered in some sites, and the inter-relations between them were weakly developed. At some sites issues related to domesticated biodiversity were given less coverage, and in most there was a paucity of information on micro-organisms. The latter, however, probably reflects a genuine lack of information than a weakness in the BSAPs formulation.

Were all the aspects of biodiversity covered?

Various aspects of biodiversity were dealt with, in an integrated manner: conservation of biodiversity, sustainability in the use of biological resources, and equity in decisions regarding the access to and benefits derived from these resources; however, at many specific sites, one or more of these aspects were weakly developed or absent, most common amongst these being issues of equity. In addition, aspects such as the ecosystem benefits provided by biodiversity, and a clearer concept of "sustainable use", were weakly developed.

Were the guidance, coordination, and communication adequate?

A series of guidelines and concept notes were circulated to all executing agencies. These guidelines were used at many sites, but at others it was evident that some of the guidelines were not followed. Coordinating bodies at the centre constantly kept in touch with the executing agencies through over 100 letters and emails a day, telephone calls, a bimonthly newsletter, a website, and frequent circulars. However, communication was weak in some parts of the country, especially in terms of responses from executing agencies to the project coordinators.

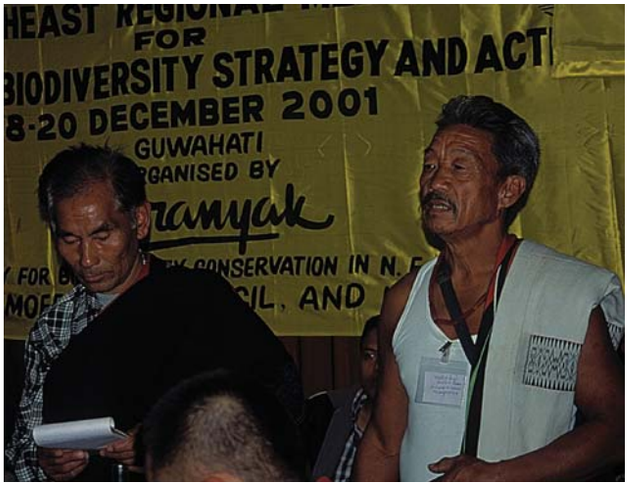
Was the process participatory enough?

The process has probably been the most participatory exercise on environment and development issues ever undertaken in India, involving literally tens of thousands of people, from various sectors including farmers, *adivasis*, and fisherfolk. However, certain sectors (armed forces, corporate houses, political and religious leaders) remained under-represented. In the local, state, ecoregional, and thematic groups set up, 32% of the membership was of scientists and academics, 24% of NGOs, and 15.5% of forest staff. This information was collated towards the middle of planning process. However, the figures are unlikely to have changed.

An innovative step was the publication of a brochure in 16 languages, *Call for Participation*, seeking involvement; this was subsequently translated into another 4 or 5 languages by executing agencies; this Call evoked 658 responses directly to the central coordinating team. Of these, 650 were analysed

ASHISH KOTHARI

▲ *Boat rally at Perangapattai, precursor to a meeting with fisherfolk, on the Eastern Coast; one of many such events in NBSAP*



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▲ *Participants at North-eastern regional workshop, Guwahati*

ASHISH KOTHARI

▲ *Posters being localised at the NBSAP biodiversity festival in Sirsi, Karnataka*

B.M.S. RATHORE

▲ *Jaiv Vividhata Panchayat (Village Biodiversity Council) with women in Chhattisgarh, one of very many public hearings in NBSAP*

according to which, about 60 of the respondents who responded directly to the central coordinating team were involved in some substantial way in the process to which he/she was referred to. However, in many other cases it was not possible to track the level of involvement.

Only one-tenth of the people involved in the various state, local, ecoregional, and thematic groups, were women; also, at some sites it is not clear if women were actually consulted, specially when making a specific recommendation on their behalf.

Were the stated outputs achieved?

The NBSAP process has yielded, at the time of writing, 31 state and union terrritory, 10 ecoregional, 16 local or sub-state, and 14 thematic plans (some of these not final versions). In addition, 30 sub-thematic reviews have been received. Essential points from these action plans and reviews were built into the national level document.

Were cross-cutting issues adequately integrated?

Cross-cutting issues such as equity and people's empowerment, gender sensitivity, integration of biodiversity into all sectors of planning, integration of indigenous knowledge systems, and international issues, were stressed in the planning phase and continuously reiterated throughout the process. Many of these were also incorporated at a number of sites and in various thematic working groups, and aspects such as globalisation, the integration of conservation and livelihoods, biopiracy, received serious attention. However, at many sites issues of equity, empowerment, and gender, were weakly dealt with as was that of sectoral integration of biodiversity.

Was there adequate buy-in from the government?

Governmental stake in the NBSAP process was high in some parts of the Government of India and in many states. News of the acceptance of BSAPs by top state and district level authorities is being received. However, it remained weak or absent in other parts of GOI and in many states. Integration of NBSAP in the 10th plan was not possible due to a slight difference in the respective time schedules of the national plan finalisation, and the 10th Plan finalisation. However, MoEF seemed confident that critical elements of the NBSAP can be incorporated into the annual plans within the 10th Plan ambit.

Were linkages with past or ongoing processes adequate, was existing information accessed adequately?

Strong linkages with past and ongoing processes were built into the NBSAP process, including a review of several national plans and policies relating to natural resources. The MoEF's own Macro-Action Plan on Biodiversity was a base document; other documents built on were the National Wildlife Action Plan, the National Forestry Action Plan, National Environment Action Programme, National Conservation Strategy, Agenda 21 reports, and reports of the Biodiversity Conservation Prioritisation Project. At the level of each site, linkages were built to many earlier or ongoing sub-state, state or ecoregional level plans. However, given the vastness of the country, there are bound to be some processes and projects that were not linked to; links with projects of other central ministries and departments such as Health, Agriculture, and Biotechnology remained weak, despite repeated attempts to establish such links.

In some states, lack of inter-departmental coordination and of institutional memory were barriers in effective use of existing information and processes resulting in either duplication of efforts or absence of synergy.

What were the unanticipated impacts in terms of awareness, capacity enhancement, action, networking etc?

Amongst the strongest points about NBSAP were the "unanticipated" positive impacts: widespread awareness of

biodiversity issues, fresh generation of field data on various aspects of biodiversity; capacity enhancement and empowerment of people, especially village communities, through participatory planning exercises; action being initiated even during the planning phase at many sites; and widespread networking.

Were the resources adequate?

While the financial resources within NBSAP for such a widespread exercise were limited, the coordinating teams and executing agencies stretched what was available to the maximum possible, and tried to augment the resources through various innovative methods. Nevertheless, there remained a need for extra resources for activities such as the publication of the 75 local, state, ecoregional, and thematic action plans which there is an attempt to meet through other sources.

Was the time frame followed?

For a number of reasons, the original time frame of two years proved to be very inadequate. The process ultimately took four years. The reasons included: a somewhat unrealistic original time budgeting, given the extensive nature of the exercise; more time required to reach out to all sections of society and hundreds of locations in India; more time required by many executing agencies and TPCG members to finalise their inputs; delays in governmental procedures both at the centre and in the states; unexpected events such as the Kachchh earthquake; untimely response from many governmental or NGO agencies; complexity of a three-way decision-making process (MoEF, BCIL, and Kalpavriksh), dropping out of some coordinators and key participants originally identified; more than envisaged complexity in the task of putting together the final national level report.

ASHISH KOTHARI

▲ *Cultural festival at Yuksom, Sikkim, with NBSAP inputs*

Use of BSAPs and Sub-thematic Reviews in the Final Technical Report

The local, state, ecoregional, and thematic Biodiversity Strategy and Action Plans (BSAPs), and sub-thematic reviews, have been critical sources for the preparation of this national level document. In particular, Chapters 3-7 of the national document have drawn information from the BSAPs and sub-thematic reviews. Information has been incorporated in different ways, including:

1. Factual information on evolution and profile of biodiversity
2. Examples of threats, initiatives, implementation
3. Strategies and actions that could be adapted to the national level.

Much of this information from specific BSAPs and sub-thematic reviews has been presented in the form of tables, boxes, and strategies, or referred to in the appropriate context within the relevant chapter. An attempt has been made to cover all the BSAPs and sub-thematic reviews submitted as part of the NBSAP process. However, it has not been possible to build every aspect of each BSAP into the national plan.

A special exercise was carried out to understand the 'points of commonality' between the Strategies and Actions Plans (SAPs) at local, state, regional and national level. This meant reading through the SAP chapters of all the BSAPs to:

a. Ensure that the priorities and recommendations, which have emerged after the 3-year consultative process, are reflected adequately in the national level strategies.
b. Incorporate new/innovative strategies presented in the BSAPs, which had not yet found a place in the national document.

The detailed analysis from this exercise is presented in Volume 2 of the full report.

2. Statement of Principles

1. Biological diversity is the central tenet of nature, one of its key defining features. Evolution has produced an amazing variety of plants, animals, and micro-organisms, and the ecosystems of which they are a part, all intricately linked. Humans are one amongst these millions of species. The survival of human societies and cultures is dependent on biological diversity. It provides the essential *ecosystem benefits* including hydrological and geochemical cycles and climatic regulation that form the basis for human survival. It also meets the myriad survival and *livelihood* needs of fisherfolk, farmers, forest-dwellers, pastoralists, craftspersons, and others. This wonderful diversity and each of its components are worthy of highest *respect* and conservation in their own right. Most importantly, biodiversity is the basis for the continuous *evolution* of species and ecosystems.

2. Given the above, the two bottom lines that are considered pre-requisites in this action plan are: **Ecological Security** of the country or of any region within it, and **Livelihood Security** of those most critically dependent on biodiversity and its components:
   - *Ecological security* refers to the maintenance of: the diversity of ecosystems and habitats; the diversity of species, subspecies/varieties, populations and communities; the interactions between species, populations, communities and their habitats and ecosystems; their integrity including biological productivity of ecosystems and taxa; the evolutionary potential of natural and agricultural systems; and critical ecosystem benefits. This refers to both wild and domesticated biodiversity.
   - *Livelihood security* refers to the security of human communities and individuals critically dependent on biological resources, including guaranteed access to, control over, and responsibility towards, such biological resources and related knowledge.

3. Both ecological and livelihood security have been severely eroded, and continue to be **threatened**. Therefore, there is a need to take urgent and comprehensive measures to reverse this trend.

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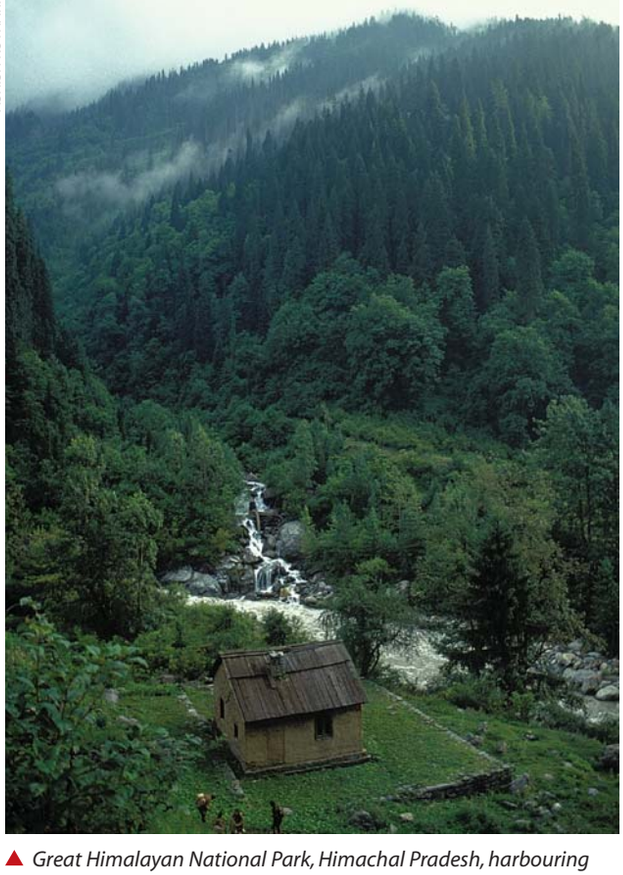

▲ *Great Himalayan National Park, Himachal Pradesh, harbouring several threatened species of plants and animals*

4. Three basic goals need to be achieved to reverse this trend:
   - **Conservation** of biodiversity, including the integrity and diversity of genes, species and ecosystems and their evolutionary potential;
   - **Sustainable use** of biological resources, referring to the use of components of biological diversity in such a manner and at such rates that does not lead to the long-term decline of this diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations;
   - **Equity** in conservation and use, including equitable access to and decision-making control over biodiversity as well as equitable distribution of costs and benefits associated with conservation and sustainable use. In particular, this includes creating democratic spaces for the voices of disprivileged women and men in defining conservation and use priorities.

5. Meeting these basic goals requires the following broad **measures**:
   - Reorientation of the development process, ensuring that ecological and livelihood security become central concerns, and that the conservation of biological diversity receives the highest priority.
   - Conservation of natural and domesticated ecosystems, and of wild and domesticated species, to the

fullest extent possible; and the restoration and regeneration of degraded ecosystems.

- Recognition of community tenurial rights, ensuring rights of women, children and other disprivileged sections within them.
- Recognition and integration of the full range of intrinsic as well as direct values of biodiversity into human activities.
- Recognition, respect, and revitalisation of gender-differentiated indigenous and community knowledge systems relating to biodiversity, and synergising these with mainstream knowledge systems.
- Development of alternative (including community) intellectual rights systems appropriate for indigenous knowledge, which respect the principle that life forms should not be subjected to private and monopolistic IPR regimes.
- Balancing of local, national, and international interests related to biodiversity, on the basis of principles of ecological sustainability and social equity; within these principles, local interests to get priority over national, and national over international.
- Respect for cultural diversity, and the diversity of governance systems, customary practices and laws, and other aspects of human society, in so far as these are in consonance with the basic principles of ecological sustainability and social equity.
- Elimination of absolute poverty and preventing deprivation of local communities from natural resources necessary for them to maintain an acceptable living standard.
- Development and strengthening of formal and non-formal education efforts at primary, secondary and tertiary levels, aimed at enhancing understanding and awareness of biodiversity and promoting action for sustainable use and biodiversity conservation.

ASHISH KOTHARI

Organic farming and horticulture is spreading in India, using a combination of traditional practices and new techniques with constant innovation

ICSF

Small-scale and traditional farmers protest against unsustainable trawling and commercial aquaculture, which threaten both wildlife and livelihoods

3. Evolutionary, Physical, and Historical Context of India's Biodiversity

[*Note: for a fuller description, please see Chapter 3 of the full report.*]

India is the seventh largest country in the world with an area of 32,87,263 sq.km extending from 8° 4′ to 37° 6′ N and 68° 7′ to 97° 25′ E. The country extends for 3,214 km on the north to south axis and for 2,933 km east to west. It has a land frontier of 15,200 km and a coastline, including that of the islands, amounting to 7516 km.

It is estimated that some 225 million years ago in the Palaeozoic era, all the present-day continents were part of one landmass called Pangaea. By about 180 million years ago, in the late Triassic and early Jurassic periods, this super mass started breaking, creating Laurasia (Angara) in the north, and Gondwanaland in the south, with the Tethys Sea in the middle. Gondwanaland then split in the Jurassic period, with South America and Africa drifting to the west, India breaking off from Antarctica, and the southern hemisphere landmasses slowly coming into their present-day positions. By about 45 million years ago, India had begun thrusting into Eurasia, creating the buckling and folding which produced the mighty Himalayan chain. This northward push of the Indian landmass is continuing even today.

In current times, the major geological divisions of India are the Deccan Peninsula, with the Western and Eastern Ghats, the Himalaya, the Indo Gangetic plains, the Aravallis, the islands, the rivers, the lakes and the coastal stretch (one of the longest in the world).

It is instructive to look briefly at the evolutionary history of India with respect to the development of flora and fauna. Interestingly, the continental drift theory, used now to explain several geological and biological features of the world, was prompted by discoveries in India. Fossil remains of plants and animals entombed in sediments have helped to explain the progress of life through geological ages and the distribution of land and sea in the past. There is also significant evidence of the Indian region being one of the earliest cradles of human evolution, including very early settlements, and development through the stone ages to the rise of early civilization along the Indus and later along the Gangetic plains.

India is known as a site for the first domestication of several crop and livestock species. In the case of crops, available records date back to the neolithic (4500-4000 B.P.) and Harappan (4600-3750 B.P.) cultures, both characterized by incipient farming. Neolithic culture sites have been located in the north, east and south of India, while the Harappan sites are all located in the western region of the subcontinent, including Pakistan. The history of domestication of animals in India goes back as far as 7000 years B.P., judging from evidence from the

▼ *The layered cliffs of the northern Western Ghats, evidence of successive volcanic eruptions over millions of years*

ASHISH KOTHARI

▼ *Fossils from the Fossil National Park, Madhya Pradesh, part of increasing evidence of the rich prehistoric life of the Indian subcontinent*

PALLAVA BAGLA

Mesolithic cultural phases at Bagor in district Bhilwara in Rajasthan and Adamgarh near Hoshangabad in Madhya Pradesh. It was from these early beginnings that Indian civilizations developed one of the world's most diverse and intricate agricultural and animal husbandry systems, one which aptly mirrored the region's great natural biological diversity.

Complex arrangements of land use and of people-resource relations, affected the biodiversity of India through the early historic to the colonial times. Agrarian activity attained greater pace with the emergence of the Mauryan Empire during the 3rd century BCE. Early historical (600 BCE onwards) archaeological and literary evidences (Kautilya's *Arthashastra* 321 BCE, Megasthenes *Indika*, Visakhadatta's *Mudrarakshasas* and the inscriptions of Asoka) indicate that a large share of the Mauryan resources came from the agrarian sector. The spread of agrarian activity also resulted in large-scale forest clearance all over the subcontinent. In the process, hunter-gathering communities were compelled to move into adjoining hilly tracts or take to agriculture and/or associated occupations and get assimilated into the steadily expanding caste-based rural and urban society.

ASHISH KOTHARI

▲ *Traditional bamboo aqueduct, one of a bewildering variety of low-impact water harvesting techniques devised through the ages*

The Post Mauryan period saw the cultivation of various types of cash crops, like the beginning of cotton in the black soil of the Deccan, pepper in the far south, coconut in the Konkan coast and sugarcane in the Ganga valley. During the Gupta and Post Gupta Period (4th-12th Cent AD), uncultivated fallow tracts were regularly donated to members of priestly communities and to religious establishments and complexes such as Buddhist *viharas* and brahmanical *mathas*. While this tradition paved the way for the creation of settlements of priestly communities, it also led to the expansion of agriculture in hitherto uncultivated land. This also led to large-scale felling of forests. In south India, tanks played a very important role in local level irrigation projects. The situation continued without much change during the late Medieval and Mughal Period (1526-1700 AD). The proliferation of local-level irrigation projects over major parts of India is one of the principle features of the socio-economic and environmental history of Medieval India.

The Muslim period is credited with the selection and hybridisation of wide varieties of fruits, and the western contact for introduction of several plants. However, this still remained an era of more forests than cultivated land. A critical feature of land and water use upto this point in Indian history was the predominance of common property regimes (CPRs). Large tracts of forests, pastures or grazing lands, freshwaterbodies, coastal and marine areas, and to some extent agricultural lands (especially *jhum* or shifting cultivation lands), were under CPRs, controlled and managed by village institutions.

The British involvement began with renovation and maintenance of the existing irrigation systems. It was also during the colonial period that the scale and sweep of forest degradation underwent dramatic change. Forests were destroyed not just for revenue, but also to set up the railways. Common property resources were turned into private or state property. From 1869-1925, forests, that were in states under the control of the princes, were also drawn into the orbit of colonial capitalist expansion. Large-scale slaughter of wild animals and the conversion, by British business houses, of large expanses of woodlands into tea, coffee and rubber plantations were the other features of forest degradation during the colonial period. The most serious consequence of colonial

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▲ *Fisherwoman in Manipuri wetland: small-scale technologies suited to the environment*

forestry policies and practices was the decline in traditional conservation and management systems of the forests. By the mid-1800s, communities across the country were resisting colonial intrusion on their lands, forests and water systems. It led to many small and big struggles by tribal communities for their right to livelihood. The interaction of colonialism, technological development, and resource reallocation from subsistence use to central governments or external markets generated land use conflicts between the Indian agricultural and forestry sectors throughout the nineteenth and twentieth centuries.

After assessing the evolutionary and historical context, it is instructive to look at the present socio-economic and cultural features of India, as relevant to biodiversity. As the second most populous country in the world, the majority of whose population continues to be directly dependent on natural resources for their livelihoods, India faces immense challenges in conserving its rich biodiversity while ensuring livelihood and ecological security.

For thousands of years, people have also modified local biodiversity for meeting their changing needs. This has resulted in enhanced biodiversity at taxa levels through the creation of thousands of new crop varieties and livestock breeds. Such interaction with the local ecosystems has also led to an intertwining of cultural diversity with local biodiversity, each shaping the other in a continuing process of adaptation and change. This cultural and ethnic diversity of the many communities which have lived in close proximity to and depended on nature, and developed sophisticated knowledge systems on this basis, is also critical to understand.

It is a cliché, but nevertheless one that bears repetition, that India is a predominantly agrarian economy. According to the provisional figures of the 2001 Census, 58.4% of the country's total workers and 73.3% of the workers in rural areas remain dependent on the primary sector (listed as cultivators and agricultural labourers), including agriculture, animal husbandry, forestry, fisheries, and related occupations and livelihoods. With 28% of the population now living in urban areas, significant sections of the population have also moved into the secondary and tertiary sectors, into urban and industrial settlements and livelihoods. The country today therefore displays the largest possible range of economic pursuits and livelihoods, ranging from ancient hunter-gatherers and nomadic pastoralists, to the modern computer professional and space scientist. Despite significant changes in modern times, there remains a continuing direct dependence of the vast majority of the country's rural population on natural resources and elements of biodiversity.

Changes in land use patterns over the ages have had a major impact on biodiversity. Due to land being an inelastic resource, per capita availability of land is declining with the growth of population. It was 0.89 ha/capita in 1950-51, and had declined to 0.33 ha/capita in 1999-2000. Land use and land management have undergone significant changes in the last 50 years, although to date no comprehensive land use policy taking ecosystem diversity and livelihood systems based on them into account, has been developed. Changes in land use have been effected in accordance with changes in the government's development priorities during different periods, with a significant impact on biodiversity.

4. Profile of Biodiversity in India

[*Note: for a fuller description, please see Chapter 4 of the full report.*]

The Diversity

India, with 2.4% of the world's area, has 8.1% of the world's total biodiversity, making it one of the 12 megadiversity countries in the world. This is based on the species richness and levels of endemism recorded in a wide range of taxa of both plants and animals. This diversity can be attributed to the vast variety of landforms and climates, resulting in habitats ranging from tropical to temperate, and from alpine to desert. Adding to this is a very high diversity of human-influenced ecosystems, including agricultural and pasture lands, and possibly one of the world's largest diversity of domesticated plants and animals. India is also considered one of the world's eight centres of origin of cultivated plants. Being a predominantly agriculture-based country, India also has a complex mosaic of wild and cultivated habitats, giving rise to very specialised biodiversity which is specific to the confluence of two or more habitats.

One of the recent approaches to classification of India's ecosystems has been based on biogeography. This system divides the country into ten Biogeographic Zones, further sub-divided into twenty six Biotic Provinces. These zones are: the Trans Himalaya; the Himalaya; Desert; Semi-Arid; Western Ghats; Deccan Peninsula; Gangetic Plain; Coasts; North-east; and the Islands.

Within this broad classification, it is necessary to look at the diversity of specific ecosystems. Natural terrestrial ecosystems in India are of the following broad kinds: forests (ranging from dry thorn scrub to wet evergreen, classified into 16 major forest-type groups and 221 minor forest-type groups), five types of grasslands, deserts (ranging from sandy salt to cold) and permanently snow-bound areas. Within each of these, there is an immense diversity.

India has a rich variety of wetland and marine habitats, ranging from small streams and village ponds through large lakes and reservoirs, some of the longest rivers in the world, coastal lagoons, estuaries and backwaters, the unique Rann of Kachchh, coral reefs and mangroves, to open coastal and oceanic waters. To this must be added the numerous human-made wetland water bodies like reservoirs behind dams and impoundments, salterns and aquaculture ponds. Notwithstanding this enormous variety, India's wetlands can be grouped, based on salinity,

▼ *Coral reefs in the Indian Ocean, amongst the most biologically diverse of ecosystems*

ROMULUS WHITAKER

VIVEK GOUR-BROOME

▲ *Mygalomorph spider* Poecilotheria regalis*, a large tree-dwelling species found in old growth forest in the Western Ghats*

into two major categories – marine and brackish or freshwater, within each of which there are several distinct ecosystems.

About 45,000 to 47,000 plant species are reported to occur in India, representing 11% of the known world flora. Nearly 90,000 species of fauna have been reported, a little over 7% of the world's reported animal diversity. There exists considerable information on the patterns of species richness, endemism and the diversity of different plant groups (angiosperm, gymnosperms, pteridophytes, lichens, bryophytes, algae, fungi), various animal groups (including marine and terrestrial), and micro-organisms, but much more needs to be understood and appreciated. Information on micro-organisms is especially deficient.

From the desert ecosystem of Rajasthan in the West to the flood plain systems of Bengal in the East, from the mountain agriculture of the Himalayas to the wetland ecosystem of Kerala, from the semi-arid rainfed ecosystems in the

VIVEK GOUR-BROOME

▲ *Witch's butter, a wood-rotting fungus commonly found across India*

Deccan plateau to the highly developed terraces of North-east India, the wide-ranging agro-ecosystems in India offer a mind boggling variety. They also represent a fascinating array of practices which embody a vast expanse of agriculture related knowledge systems of local rural communities. Major agroclimatic zones of India include Humid Western Himalaya; Humid Bengal-Assam; Humid Eastern Himalayan Region and Bay Islands; Sub-Humid Satluj Ganga Alluvial Plains; Sub-Humid to Humid Eastern and South Eastern Uplands; Arid Western Plains; Semi-Arid Lava Plateaus and Central Highlands; and the Humid to Semi-Arid Western Ghats and Karnataka Plateaus.

At least 166 species of crops (6.7% of total crop species in the world) and 320 species of wild relatives of cultivated crops are believed to have originated in India. These spread across the entire range of crops known to humans: cereals, millets, legumes, vegetables, fruits, oilseeds, forages, fibres, sugar yielding plants, condiments, spices, medicinal and aromatic plants, and others. Crops with high diversity include *Rice*: 50,000 varieties (although a disputed figure), *Mango*: 1000 varieties, *Sorghum*: 5000 varieties, *Pepper*: 500 varieties.

India also has the distinction of having among the widest range of animal breeds within each species (e.g. 20 breeds of goat, 42 of sheep, 15 of buffalo, 30 of cattle and 18 of poultry), representing a significant percentage of the world's domesticated livestock diversity. The diverse cultures, agro-ecological zones, and social and economic practices in the country directly account for the rich livestock diversity. These breeds have been developed and evolved over hundreds of years to suit the different production goals and requirements of different classes of livestock owners.

The Values

The vast diversity of species and ecosystems contribute to the richness and beauty of life on Earth. Human beings constitute only one of the millions of species that inhabit the earth. Each species is unique and was created as a consequence of evolutionary processes, without human intervention. Therefore, every species has a natural right to exist. It is this understanding and appreciation of the inherent value of each and every life form that constitutes the "ethical" value of biodiversity, and a large number of India's spiritual and philosophical traditions strongly emphasise it.

There is growing awareness about the importance of maintaining a high level of biodiversity in terrestrial and aquatic habitats in the context of what is referred to as "ecosystem services", or "ecosystem benefits" (the latter term is used in this document). Ecosystem benefits are generated as a result

ASHISH KOTHARI

▲ *Crop diversity from the drylands of Andhra Pradesh, part of an astounding range found across India*

SUJATHA PADMANABHAN

▲ *Yak in Ladakh, eminently suited to the cold and harsh environment*

ASHISH KOTHARI

▲ *The East Kolkata wetlands provide sewage recycling, high fish and vegetable output, and several other benefits to the city...yet are being filled in and constructed upon*

ASHISH KOTHARI

▲ *Forest and grassland composite of the Western Ghats, one of the world's greatest concentrations of biodiversity*

of interaction and exchange between biotic and abiotic components of ecosystems. These include numerous invisible but essential benefits, viz. soil formation and fertility generation, reduction of soil salinity, decomposition and waste dissipation, productivity, carbon sequestration and atmospheric gases balance, stabilization of climate and mitigation of climatic change, nutrient cycling, maintenance and raising of water table, enhancement of water and air quality, flood and drought control, and many more.

In India, biodiversity supports the livelihoods of millions of ecosystem people. Around 70% of the Indian population depends on local ecosystems for its basic subsistence requirements with regard to water, food, fuel, housing, fodder and medicine. Around 10,000 species of plants, and a few hundred animal species, are involved in this direct relationship of biodiversity and livelihood.

VIVEK GOUR-BROOME

▲ *Non-timber forest produce, such as these being used by Gond adivasis of Maharashtra, are a source of sustenance for several hundred million people*

Empirical evidence reveals that the largest use by communities of ecosystem resources (8000 species of plants and a few hundred species of animals) is for maintaining "health security" of human, livestock and crops (bio-pesticides and bio-fertilizers). A considerable part of daily food intake of rural (especially tribal) communities also comes from the wild. Cultivated diversity is also a critical part of health and food security. Traditionally communities have preferred a

diverse range of foods from their fields, pastures, wetlands, and forests, to the extent possible. In particular, many traditional crops like millets, which have been increasingly replaced by wheat and rice, have been favoured.

The global economic value of ecosystem benefits and components of biodiversity, as estimated by Constanza (1997), amounts to US$33 billion, which is around 1.8 times the world's GNP. There is only indicative information on the economic values of biodiversity, particularly in countries like India. But even these indicative estimates are adequate to point to the immense economic values of biodiversity.

It is well known that nature is a major source, inspiration and subject of scientific thought. The mainstream sciences as well as the several non-mainstream indigenous sciences are all centrally concerned with the understanding of nature. Thus, biodiversity which constitutes the whole of "living" nature has a profound and intrinsic "scientific value" in all cultures.

An intricate link exists between culture and biodiversity in India, with its many different communities and their traditions. This includes the cultural value of agricultural biodiversity. Culture is an often forgotten and neglected part of cropping practices. But for farmers, especially women, culture has been an inalienable part of their decision to raise diverse crops on their lands.

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▲ *Model of a temple made of several dozen seed varieties, from Tamil Nadu: celebrating biodiversity*

Finally, nature has an aesthetic value that is "experienced" by human beings when they are in natural surroundings. There seems some evidence that growing up in degraded environments can result in the implantation of negative attitudes in human populations.

▼ *Aerides Maculosum*

VIVEK GOUR-BROOME

▼ *Geckoella Nebulosa*

VIVEK GOUR-BROOME

▼ *Giant Robber Crab*

PANKAJ SEKHSARIA

▼ *Indian Elephant*

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▼ *Great Indian Bustard*

ASAD RAHMANI

5. Causes for the Loss of Biodiversity

[*Note: for a fuller description, please see Chapter 5 of the full report.*]

Significant erosion of India's biodiversity at the ecosystem, species and genetic level has already taken place. The causes of this erosion are of two kinds: first, the proximate causes, or factors that can be pin-pointed as the direct and immediate ones causing the loss; and second, the root causes, or factors that are indirect and often hidden, and which in the first place give rise to the proximate causes.

Proximate causes of the loss of biodiversity: For natural ecosystems and wild taxa, these are habitat destruction and degradation; hunting, exploitation, collection and fishing; the introduction of exotics; and others like accidental mortality, human-induced disasters, and climate change. Habitat destruction and degradation have resulted in the loss of forests, grasslands, marine areas, freshwater habitats, etc due to many factors like diversion of forest land for non-forest purposes; official programmes that converted natural mixed forests into plantations or those that planted trees on grasslands; pollution of aquatic ecosystems due to industrial effluents and pesticide use; extractive processes like mining, and so on. Hunting and poaching, often combined with habitat loss, have threatened several species. In the marine ecosystem, over-harvesting has begun to deplete the stock of many species of fishes, following the introduction of mechanised technologies. The impact of exotics has been poorly documented, though freshwater fishes have been perhaps the most affected by this. There is increasing incidence of accidental mortality of animals belonging to endangered species, due to a variety of reasons such as electrocution, train hits, road kills and trawlers. Recent research on climate change indicates possible shifts in vegetation type boundaries and consequent impacts on biodiversity.

The proximate causes of the loss of biodiversity in agricultural ecosystems and domesticated taxa are habitat destruction; the introduction of exotics and hybrids; the homogenisation of ecosystems; and others like the loss of wild relatives, and market orientation. In India over 50% of agricultural land faces moderate to severe degradation, resulting in the loss of traditional agro-ecosystems, which harbour high levels of crop and livestock diversity. Loss of pastures due to developmental projects and agricultural expansion (e.g. after irrigation was introduced into the semi-arid zone of western India) has adversely affected indigenous livestock breeds.

▼ *Mining such as at this copper quarry in Madhya Pradesh, has emerged as one of the single biggest threats to biodiversity, including to several dozen protected areas*

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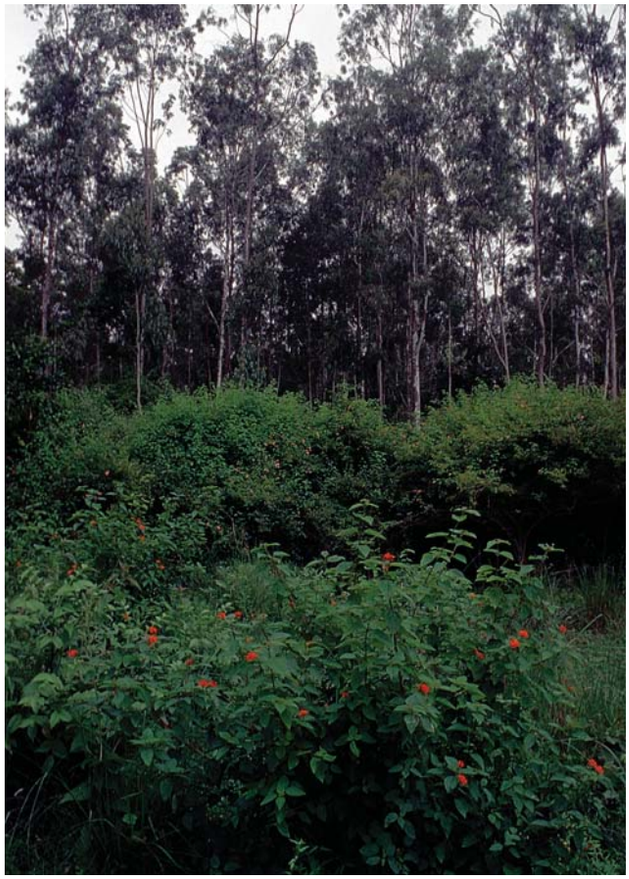
Studies in North-east India, have shown a whole range of 'minor' cultivated and semi-cultivated varieties as threatened because their areas of cultivation are losing out to non-agricultural land uses. However, the biggest factor in the decline of both cultivated plants and domesticated animals (at the species and genetic levels) is the recent large-scale introduction of exotics and modern cross-breeds. Modern agricultural fields stress single crop productivity as against the traditional multi-cropping patterns, and hence such homogenisation has resulted in the loss or reduction of area of some crops like pulses, sorghum, millets, and their replacement by a handful of varieties of rice and wheat. Crop and perhaps livestock (including poultry) genetic diversity has possibly also been affected by the loss of wild relatives of crops, as also natural pollinators and dispersal agents. The loss of some indigenous varieties of crops, like some of the small millets, is also due to a preference of cash crops over food crops.



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▲ *The monoculture of trees and crops, and the introduction of exotic breeds of livestock, all part of governmental policy, threaten indigenous diversity across India*

Root Causes of the loss of biodiversity are qualitative in nature, and their impacts are felt through a complex interplay of different site-specific social, economic and environmental factors. One major root cause is the **model of development** that India has followed, which has centred on large-scale industrial expansion, commercial (monocultural) agricultural production, and increasing the consumption of goods and benefits through exploiting natural resources, with scant regard for sustainability. Abundant evidence is now available of the negative impacts of this development model on natural and agricultural ecosystems, habitats and species, as well as ecosystem based livelihoods and socio-economic equity.

The **erosion of customary rights and traditional management** regimes over forests, pastures and common lands and water bodies, which were attuned to ecosystem specific natural resources, has also led to the loss of biodiversity. Starting in the colonial period and extending beyond Independence, common property rights of communities were replaced by state owned rights, or state administered individual (private) rights. Many tenurial conflicts are rooted in such blanket processes of state acquisition of forest and revenue lands as well as communal water management systems, without detailed surveys of existing uses and users. Past and continuing confusion in official land records has left hundreds of thousands (possibly a few million) of forest dwellers without land titles, labeled as 'encroachers', often leading to their displacement, and forcing them to clear new land. Unsustainable and reckless harvesting from forests, wetlands, and other ecosystems, has ensued partly due to such processes. This is aggravated by a severe lack of inter-departmental coordination, enabling vested interests to occupy biodiversity-rich areas (the real encroachment), allowing mining and other destructive activities in natural areas, and encouraging inappropriate land/water uses by a range of line agencies.

Increasing social, political, and economic inequities pervade both rural and urban, and traditional and modern India. Inequities between land-owning peasants and forest-dwellers in the past have, for instance, often led to severe deforestation. The ongoing process of market driven economic liberalization and globalisation, leading to intense competition for the country's bio-diverse resource base, poses special challenges to the state to protect the resource rights of the less privileged communities. Unequal political power and elite influence over state policies and programmes, are leading to over-exploitation of natural resources for unsustainable consumerism by elite groups while leading to displacement from basic survival resources of tribal, pastoral, fisher

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▲ *While villagers are removed from protected areas, hordes of tourists are allowed in, a common form of inequity*

and other ecosystem dependent communities. Caste-based, class-based and also gender inequities in access and control over natural resources have also been among the root causes of biodiversity loss, e.g. through encroachment of pasture lands by powerful landlords.

Changes in cultural, ethical and moral values, have also led to biodiversity loss through the following: the alienation of local communities from natural resources; the spread of homogenous attitudes such as the notion that wheat and rice are the only grains worth eating; the devaluation of traditional/indigenous knowledge; displacement of local communities due to large-scale development projects with inadequate or non-existent rehabilitation measures; and urban consumerist lifestyles that are largely bereft of cultural or ethical links with biodiversity and often set the model for rural and semi-rural areas.

Lack of recognition of the full values of biodiversity is one of the root causes of unsustainable exploitation of biological resources. There has been *an ethical and cultural undervaluation*, as is evident in the rapid decline in the protection being accorded to sacred groves and landscapes, and to species. Farmers across the country have lost their cultural links with the land, as agriculture has become more market oriented. *Productivity undervaluation* has occurred because of the myth that traditional cultivars, which are essential for a diverse cropping system, are low yielders (ignoring the overall superior input-output ratio, energy efficiency, and overall biomass output of such agriculture). Non-appreciation of water and other ecosystem benefits provided by biodiversity, has led to critical ecosystems often being diverted for 'developmental' purposes. Modern India's health policies and programmes have consistently ignored the *health value*

▼ *India's model of development is inherently unsustainable and destructive to biodiversity, as reflected in this advertisement; it needs a drastic re-orientation*

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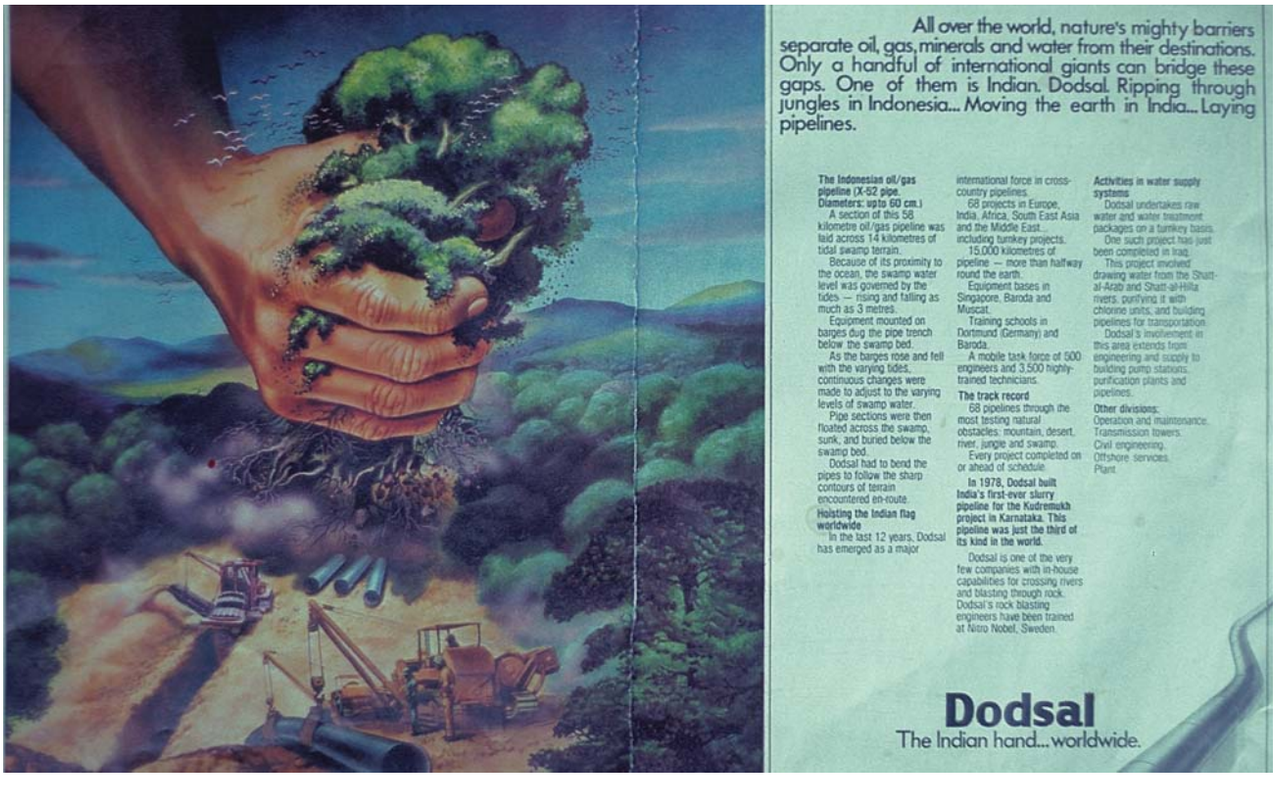

that elements like medicinal plants and traditional crops have provided. Agricultural policies and programmes do not even acknowledge the role of agrobiodiversity in nutrition and health. Economic planning and budgeting in India has not taken adequate account of the enormous *economic value* of biodiversity. If ecosystem benefits like water security and soil productivity, survival and livelihood contributions to hundreds of millions of people, health services to the majority of rural and a significant proportion of urban population, were to be provided for through technological means, the cost to the economy would be colossal and unaffordable.

ASHISH KOTHARI

▲ *Inadequate valuation and respect for the benefits of biodiversity, such as water and health security, lead to diversion of natural ecosystems for purposes such as tea cultivation*

Some inappropriate, inflexible, weak, and contradictory laws and policies have also been a root cause for biodiversity loss, specifically due to: contradictions between policies and laws relating to environment on the one hand, and those relating to industrial development, commerce, and welfare on the other; lack of an adequate integration of biodiversity concerns into most policies and laws, including many of the 'environmental' ones; centralising tendency of some laws; weak enforcement, and in cases, lack of implementation of existing laws that have the potential to create a positive impact on conservation of biodiversity and related livelihoods; inadequate empowerment of citizens, especially biodiversity-dependent communities, to use the existing policies and laws or to challenge them when inimical to biodiversity conservation; and no holistic land use plan and policy that can specify fragile areas as being off-limits to destructive development processes .

VIVEK GOUR-BROOME

▲ *The Kadaknath chicken of central India, one of the 18 indigenous breeds of poultry in India, all of them threatened by the introduction of exotics and other factors*

Some demographic changes have also contributed to the pressures on biological resources: the growth in population since the time of Independence; the localized demographic movements, of which the most dramatic, yet least recognised, has been the movement of persons (several million) displaced by large development projects, including large dams; illegal immigration from within and outside the country; and unrecognised refugees of policies that have forced people off the land.

ASHISH KOTHARI

▲ *Amongst the several species already extinct, the Pink-headed duck once inhabited parts of north-eastern India, but all that remains are a few museum specimens*

In India a number of biodiversity elements have been subjected to impacts of **inappropriate trade systems:** for example, the sheer increase in the quantum and scale of demand on specific biological resources, as more consumers are able to access them; and national and international markets being usually much more 'homogenising', in that they demand standardised, "quality-controlled" products, in contrast to local markets which are content with a diversity of produce. Impacts on biodiversity from trade are likely to significantly increase in the next few years, with India's acceding to the World Trade Organisation's treaties. For instance, export policies that spread monocultures and export oriented cash crops are being encouraged, at the cost of biodiverse farming systems.

6. Ongoing Initiatives and Their Major Actors

[*Note: for a fuller description, please see Chapter 6 of the full report.*]

Overall Planning and Governance

The conservation of biodiversity and use of biological resources is dependent on the overall structure of planning and governance in India. A substantial part of the country's biodiversity is on lands (and in waters) that are state-owned. But there are also significant parts that are in the hands of communities and individuals. Generally, decisions regarding the conservation, use, and distribution of biodiversity and biological resources, are currently within the broader framework of India's political decision-making process. This process has emphasised representative democracy, in which elected representatives from village to national level take decisions and cause them to be implemented. The process has also stressed that planning and management be done by specialised agencies, e.g. the Forest Department for forests (and 'forest lands', a legal category which also includes non-forest ecosystems). Over the last few years, greater focus is being put on decentralised governance of resources and other aspects of village and city life.

Some crucial *gaps* in the current planning and governance of biodiversity are:

- India still does not have a comprehensive national land and water use plan.
- Governance of biodiversity (and natural resources generally), remains highly centralised, and in the control of government agencies, though changes are slowly coming in.

Understanding and Information

In spite of the several decades of research by various government organizations and university departments, our understanding of the multitude of India's natural ecosystems, their species diversity and the constraints in their sustainability still remains fragmented and localized. Even as basic a thing as an inventory of faunal and floral elements is not comprehensive. Sustainable utilization and management fronts fare no better. These lacunae have been recognized and several initiatives, at governmental and non-governmental levels, are in place to cover them. For instance, government run institutions have been carrying out survey, exploration and research work,

▼ *Participatory monitoring at Biligiri Rangaswamy Sanctuary, carried out by NGOs and the Soliga adivasis: aiding in more transparent planning processes*

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documentation of specific aspects of biodiversity, inventories of specific ecosystems and monitoring and impact assessments of cetain ecosystems; several autonomous institutions are also involved in research and education; NGOs have been involved in research, documentation of ongoing work, rapid threat assessments, dissemination of information, monitoring and providing support to local communities in their conservation efforts. Communities have also been involved in monitoring exercises as also in mapping the biodiversity in their region.

Some key *gaps* that remain are the following:

- Baseline data on species and genetic diversity, particularly intra-specific genetic diversity, and their micro and macro habitats, is inadequate.
- There are serious gaps in knowledge with relation to marine biodiversity and resources.
- Identification of indicator species, which serve as early warning signs of habitat change, is inadequate.
- There is very little understanding of the links between wild and agricultural biodiversity.
- Inadequate monitoring of wildlife populations takes place as an explicit activity of management.
- There is a lack of studies relating to biodiversity impacts of the range of human activities, including of wildlife management practices themselves.
- Development of community-based Monitoring and Evaluation methodologies, and building capacity to use these, is weak.
- There is limited understanding of research initiatives taken up by communities, and of traditional forms of research and documentation.
- There is lack of understanding and valuation of ecosystem values of biodiversity.
- There is inadequate coordination amongst the various agencies undertaking research and monitoring.

The lack of understanding and information about biodiversity is especially acute with respect to domesticated biodiversity. On the other hand, Green Revolution technologies, which have promoted high yielding varieties and monoculture and have thus been instrumental in destroying agrobiodiversity, have long been researched upon. It is only in very recent years that some mention of agrobiodiversity is seen when references are made to pesticide use in agriculture and in discussions on transgenic crops. Some of the efforts in the understanding and research on agricultural and livestock diversity, include maintaining a repository of information; field surveys to assess the status of indigenous species of livestock and agriculture. NGO efforts include the monitoring of agro-biodiversity and documentation of biodiversity and related knowledge.

Some key *gaps* include the following:

- There is no monitoring in agricultural areas for tracking diversity, and the impacts of various agricultural policies and programmes or of other developmental activities and cultural changes, on this diversity.
- Documentation of the innovative work on domesticated biodiversity is meagre.
- There is no comprehensive database on domesticated biodiversity.
- There is little understanding in the formal sector, of the links between domesticated biodiversity and culture.

In Situ Conservation

Conservation *in situ* is the conservation of ecosystems and species in their natural surroundings. Such conservation not only ensures the continuation of the full range of conditions needed for ecosystems and species to thrive, but also provides for the elements of evolution to continue. India has taken several critical steps towards *in situ* conservation of wild biodiversity. These range from the establishment of protected areas and conservation programmes for threatened species by central and state governments, conservation programmes by NGOs, and establishment and management of sacred spaces and other community conserved areas by tribal and other communities.

Some key *gaps* that have been identified are the following:

- The current PA network does not adequately cover many biotic provinces.
- Measures to tackle threats to PAs have been inadequate.
- Little attention has been paid to the conservation of plants in general and lower groups of plants and animals in particular.
- Conservation policies and programmes (both government and non-government) have alienated local

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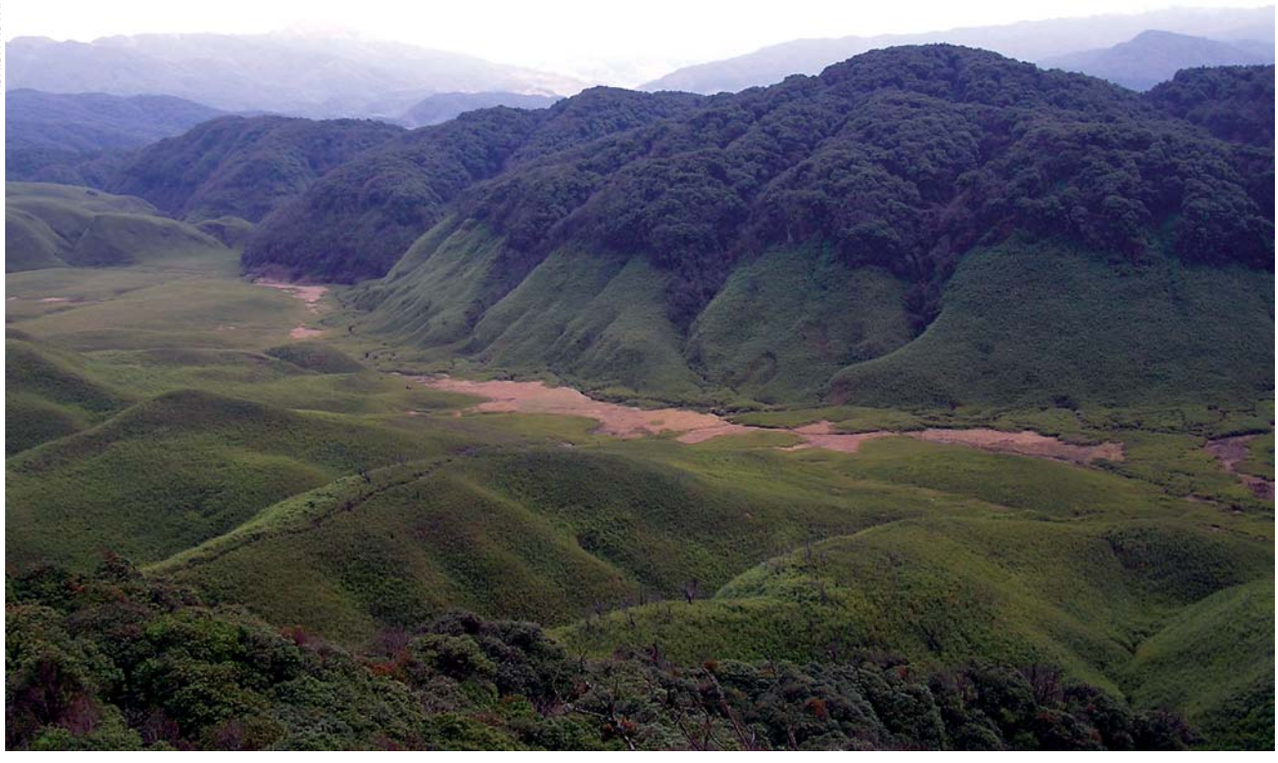

▲ *Over 70 sq. km. of rich forest and grasslands harbouring the threatened Blyth's tragopan, has been declared protected by the tribal community of Khonoma, Nagaland*

people and have not recognized the potential of community-based conservation.
- Biodiversity conservation in forestry, fisheries, and grassland management programmes is weakly integrated.
- Issues relating to human-wildlife conflict are not being adequately addressed.

It is only in the recent past that agricultural scientists and others have acknowledged what farmers and pastoralists all along knew, that the best way to conserve agrobiodiversity is to continue to grow it in fields and raise it in pastures. In this sense, *in situ* conservation of crop and livestock diversity is its continued presence in farming and animal husbandry practices. Unfortunately, most of the formal sector agrobiodiversity initiatives have been restricted to *ex situ* conservation after collecting from farmers and pastoralists. Increasingly, there is a realisation that this needs to change, and that the future of this diversity is largely in *in situ* conditions, where not only can continued diversification take place, but evolutionary forces are also allowed full play. These efforts include the establishment of gene sanctuaries, strengthening *in situ* conservation practices of local communities, and establishing networks of farmers working in different parts of the country. In some parts of India, communities themselves have got together and established networks.

Some key *gaps* that remain are the following:
- Very few governmental organisations and agricultural universities have a systematic programme for *in situ* conservation.
- Most official and NGO propagated agriculture and animal husbandry practices actively discourage the use of indigenous varieties and breeds.
- There is a serious lack of financial support for maintenance and use of indigenous varieties.
- Much of the *in situ* conservation efforts of communities remain unreported, undervalued and at serious risk.
- There are few efforts focusing on the conservation of sites and landscapes significant for agrobiodiversity.

Ex Situ Conservation

Given the sad but undeniable reality that there simply are not enough spaces left for the full range of *in situ* conservation initiatives to be put into place, and that at least for the forseeable future, natural habitats are going to

continue being under threat, there is an urgent need for conservation initiatives outside natural habitats. Such *ex situ* conservation includes zoological parks (for animals), botanical gardens (for plants), and culture collections (for micro-organisms). The range of initiatives include the establishment of zoological parks and botanic/herbal/home gardens, captive breeding and release of some highly endangered species in the wild, and setting up of germplasm facilities.

Some key *gaps* are the following:

- Facilities for the *ex situ* conservation of biodiversity are limited and inadequate for the range of biodiversity that needs to be conserved.
- There is a lack of overall vision and direction linking *ex situ* to *in situ* conservation, including systematic planning on captive breeding or cultivation, for reintroduction into the wild.
- There is a lack of a central database with full information on all zoological parks and botanical gardens, especially on pedigree lines, genealogies, exchanges and so on.
- There is a lack of financial, technical and legal support for non -governmental and community efforts.

Given the rapid erosion of agrobiodiversity in the fields and pastures of India, there is a critical need for a back-up reservoir of indigenous crop, livestock, and pet diversity. This is, in a very limited manner, possible in *ex situ* conditions, such as gene banks and breeding centres. Such facilities can never conserve the vast diversity that is in *in situ* conditions, but could provide critical repositories of important germplasm that could be re-utilised if the *in situ* stocks diminish. India has a strong *ex situ* conservation programme for domesticated biodiversity. This includes collection, introduction, exchange, evaluation, documentation, conservation, and sustainable management of diverse germplasm of crop plants and their wild relatives, as also of livesock and poultry, and the establishment of community gene banks.

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▲ *Botanical parks such as the Gurukul garden in Kerala provide a valuable repository of diversity from which the wild can be restocked if conditions are appropriate*

Some key *gaps* that remain are as follows:

- Large-scale loss of genetic diversity makes it difficult to locate and use, for *ex situ* breeding purposes, traditional livestock varieties.
- There is a lack of financial, policy and infrastructure support to community gene and grain banks.
- So far, the major emphasis was on collecting germplasm of important cultivated crops and limited to selected areas. Unfortunately, similar attention is not paid to conservation of traditional landraces/breeds, particularly so in the case of animals, many of which are therefore being replaced by hybrid breeds.
- There is inadequate or no repatriation of seeds and livestock breeds back from government *ex situ* collections to farmers and pastoral communities.

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▲ *Gene banks such as this one harbouring about 20,000 varieties of rice in Chhattisgarh, provide a critical back-up when diversity is being lost in the field*

Sustainable Use

Almost all the ecosystems, and a great proportion of species in India, are under some form of human use. While in the past a number of factors, including traditional restraints and customary practices, low population, and lifestyles that were not resource-intensive, contributed to the sustainability of this

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▲ *A home garden in the Western Ghats of Karnataka, part of a revival of such practices that are so essential for household level food and health security*

use, today's levels of utilisation are very often well beyond the capacity of the ecosystem or species to recuperate. Reaching sustainable levels of use is therefore a critical goal. Despite the fact that the concept of sustainability is a well established principle of management, its practice often poses problems. For some, it is the simple question: will the ecosystem or species being used be able to return to its original form or numbers, after use? For others, the question is more complicated: will the ecosystem or species not only return to its original form and numbers, but will it also retain the internal diversity and the relations with the rest of nature, after use? Will all the other elements of diversity that are dependent on the ecosystem or species in question, be able to continue meeting their needs born of this dependence?

The Convention on Biological Diversity defines sustainable use as "the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations".

In the absence of a clear national understanding on this issue, thumb-rule measures are used, such as whether the overall coverage of an ecosystem remains, or whether the overall numbers of a species remain at a viable level. It is quite clear that even using these somewhat simplistic parameters, resource uses in India are often well above sustainability levels. Some initiatives towards reaching sustainability include government schemes such as Joint Forest Management, establishment of people's protected areas for the sustainable harvesting of Non-Timber Forest Produce, and allocation of private woodlots for farmers; NGO and community initiatives such as looking at sustainable livelihood options for coastal communities, several ecotourism initiatives, and efforts at the sustainable harvesting, processing and marketing of bioresources.

Some key *gaps* are as follows:

- Conceptual and empirical work on the definition of sustainability remains inadequate.
- Assessment (including M&E) of the sustainability of all existing resource uses by communities, industry, urban

AJIT PATTNAIK

▲ *At Chilika Lake (containing a wildlife sanctuary), the Chilika Development Authority involves fisherfolk in sustainably managing the area*

consumers, and others, remains extremely weak or even absent in cases.

- There is no comprehensive assessment of the extent and nature of the dependence of people's livelihoods on biological resources, the threats to these livelihoods and the changes they are undergoing.
- There are inadequate assessments and feasibility studies of the population and productivity of each species, in both terrestrial and aquatic ecosystems.
- There is limited acknowledgement and recognition of the fact that people dependent on biological resources have traditionally developed their own norms of sustainability, and limited understanding or documentation of how and why these norms are eroding.
- There are inadequate provisions in programmes, schemes, laws and policies to ensure sustainability in all forms of biological resource use.
- There are few efforts to explore and promote alternate livelihoods, where existing practices have become unsustainable and/or ecologically destructive practices have been adapted by communities.
- There are only scattered efforts to promote sustainable biodiversity based enterprises to enhance the livelihoods of local communities dependent on biodiversity.

In the case of domesticated biodiversity, *in situ* conservation and sustainable use are more or less synonymous as far as crop and livestock use is concerned. However, there are other aspects of agricultural sustainability, especially those related to land productivity and water use, which need to be considered. In the last few decades there has been an overall loss of agricultural productivity and sustainability. This is primarily due to soil loss, nutrient imbalance caused by excessive use of NPK fertilisers, chemicalisation and death of living matter in the soil, and waterlogging/salinisation. Attempts to offset this include changes in cropping patterns, better drainage, a switch to integrated systems using less chemicals, and so on. In addition, a critical consideration is the degree of self-sufficiency of the farmer, and the country as a whole. Increasing dependence on the market and the state has reduced the institutional sustainability of agriculture. Some initiatives that focus on these issues include government efforts at looking at optimal conditions for sustainable agriculture, Integrated Pest Management

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▲ *Women farmers in parts of Deccan Andhra have strongly asserted their rights to land, and have demonstrated viable organic and biodiverse farming options*

schemes, and many NGO and community efforts at promoting organic agriculture, education and awareness, and reworking of the Public Distribution System (PDS).

Some key *gaps* are as follows:

- The rice-wheat based centralised PDS has been a major factor in undermining the once-biodiverse agriculture of the country. The PDS is not even appropriately linked to the nutritional requirements of people, since it has displaced or does not encourage the consumption of a number of nutritious traditional foods.
- Public Health programmes rarely integrate traditional nutritious foods, as preventive measures.
- There are very low incentives and very sporadic subsidies for organic farming, despite some encouraging recent programmes of the central and state governments. Marketing initiatives promoting organic agriculture are not yet widespread.
- There are few supplementary livelihood activities developed for people dependent on agriculture, leading to over-use or neglect of land.
- Traditional cultured fisheries, both inland and coastal, have been displaced and destroyed by many factors including commercial intensive aquaculture, depriving many people of their livelihoods and reducing the sustainability of the land/water.

Equitable Access, Use and Sharing of Benefits

One of the root causes of biodiversity destruction, and the loss of biodiversity-based livelihoods, has been a range of inequities in access to decision-making, resource use, and sharing of benefits. This is also within the context of the growing international discussion on access and benefit-sharing (ABS). The Preamble of the Convention on Biological Diversity (CBD) states that the contracting parties recognise "the close and traditional dependence of many indigenous and local communities embodying traditional lifestyles on biological resources and the desirability of sharing equitably benefits arising from the use of traditional knowledge, innovations and practices relevant to the conservation of biological diversity and the sustainable use of it's components".

Article 8j of the CBD also requires equitable sharing of benefits with the holders of traditional knowledge and practices, and this would apply as much within India as outside. There continues to be discussion on the precise definitions of these terms, in particular the term "equitable".

For the purposes of this action plan, a broad concept of equitable access/use and benefit sharing has been used. This includes:

- The right of primary stakeholders, such as local communities who depend on biodiversity, and other direct managers of natural resources, to access and protect biological resources and related knowledge essential for ecosystem benefits and livelihood security. Since such access is meaningless without reference to the lands and waters on which these resources exist, this should also include the right to access and protect land and water;
- The right of primary stakeholders as also the country to which the resources belong, to an equitable share of the benefits being generated from access and use by others; in this case 'equitable' meaning that which is agreeable to all parties concerned with special focus on the needs of underprivileged sections such as women, 'lower' castes and classes, and *adivasis*;
- The responsibility of all such stakeholders to ensure the conservation and sustainable use of these resources, and in turn ensure equitable access and benefit-sharing from such use;
- The need to ensure the protection of traditional/indigenous/community knowledge related to biodiversity, and in particular to ensure that intellectual property regimes respect the rights of communities (and individuals within communities) to control such knowledge, and their rights to an equitable share of benefits being generated from the wider use of such knowledge.

The broad concept of equitable access, use and sharing of benefits would largely apply to wild as well as domesticated biodiversity. Some initiatives towards equitable access, use and sharing of benefits include: government initiatives in legal and policy measures such as the Forest Policy of 1988 and the 73rd and 74th Constitutional Amendments for decentralization of governance and related, Panchayat legislation, Plant Varieties and Farmers Rights Protection Act and the Biodiversity Act 2002; initiatives like the National Innovations Foundation set up by the Department of Science and Technology; NGO and community efforts such as community forest management, community-based fisheries, enterprise-based approaches, equitable sharing of benefits from indigenous knowledge, and others.

▼ *People's movement against big dams on the Andhra-Maharashtra border, which threaten to submerge parts of the Indravati Tiger Reserve and displace several hundred villages*

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Some key *gaps* include the following:

- A range of inequities continue in the control and the use of biodiversity in marine/coastal, forest, wetland, grassland and desert ecosystems. Centralised state control over large areas is compounded by the inequities within and between communities.
- The legal or institutional mechanism to secure improved common property resource access for tribal and other forest dwellers remains inadequate, despite the panchayat-related legislation mentioned above.
- In most states, the commitment to promoting 'Gram Swaraj' through *gram sabha* empowerment has progressed very slowly.
- In most states, marketable NTFPs have been treated as state property and the gatherers paid, at best, unskilled labour wages.
- Very few practical initiatives have been taken to acknowledge, value and protect the indigenous knowledge of NTFP gatherers or fisherfolk.
- Measures to protect traditional knowledge, and to ensure appropriate and equitable benefit-sharing from its wider use, are as yet almost non-existent.
- Land and water rights are still highly skewed, especially due to the failure of land reforms, and unchanged water ownership laws.
- Women's lack of independent land and resource rights has led to their disempowerment and marginalisation.

Capacity of Actors in Each Sector

All sections of society need to be involved in the colossal tasks of conservation, sustainable use, and ensuring equity. Yet, different sections have different skills and knowledge, and each has major gaps in the capability to handle the required tasks. Identifying these gaps, and what is needed to plug them, is a major challenge. Ways in which the capacity of various stakeholders can be built, include initiatives with public functionaries and governance institutions, rural communities, NGOs, urban residents, workers/labour unions, judiciary, armed forces, police and customs, corporate/ business sector, media, scientific community, religious institutions/leaders, and others. Initiatives include several government training institutions, ENVIS Centres under the Environment Information System network of the MoEF, schemes such as the National Green Corps, the All India Coordinated Project on Capacity Building in Taxonomy, and the National Environmental Awareness Campaign. Several NGOs are also involved in awareness, training, and other forms of capacity building at various levels.

▼ *Cycle rally in Delhi to create awareness about the degradation of Yamuna River*

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Some key *gaps* are the following:

- There is a marked decline in taxonomic expertise.
- There is serious lack of ecological orientation in sections of society like lawyers, judges, economists, financial experts, custom officials, and line departments other than environment/ forests.
- There is an inadequate capacity in current biodiversity related institutions to deal with new situations and challenges, e.g. participatory and joint management systems, socio-economic issues, climate change, decentralization, intersectoral integration and so on.
- Schools are presently not drawing upon the best available environmental education (EE) experiences in the country.
- The biodiversity component in various courses offered by universities and academic institutions is not holistic. It often tends to be too technical, ignoring the practical and social aspects of conservation, sustainable use, and equity; even where the syllabus is adequate, the necessary expertise to teach it is limited.

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▲ *Bullock carts used to generate awareness regarding agricultural biodiversity in the Deccan Andhra region*

– Serious erosion is taking place in non-formal and community forms of knowledge transmission, education, and training; everywhere in the country these means of education have been "devalued", considered irrelevant or primitive. Such being the case, the traditional institutions of learning are fast fading out.
– The urban community is strongly moving towards a global culture of consumerism, which further removes it from nature and ecological consciousness.

India has amongst the world's largest pools of biodiversity knowledge relating to agrobiodiversity. Some of the key initiatives in increasing the biodiversity-related capacities of various sectors for domesticated biodiversity, include training and research centers of the Indian Council of Agricultural Research, and many NGO efforts at increasing awareness about organic agriculture and domesticated biodiversity in general.

Some key *gaps* are the following:
– There is a lack of training of agricultural extension workers, and workers at government-run agricultural establishments like the Krishi Vigyan Kendras, on agrobiodiversity issues.
– Agrobiodiversity information is missing or meagre in all educational curricula and related text books.
– Consumer awareness regarding the benefits of organic, biodiverse produce is still very inadequate, especially in cities.
– There are few efforts to document the revival of agricultural diversity at local levels.

Inter-sectoral Coordination

Biodiversity is affected by myriad human activities. Such activities are the domain of a variety of official and non-official 'sectors': ministries, departments, academic and other institutions, NGOs, and communities themselves. While rural communities often tend to integrate different aspects of their life in somewhat seamless ways, or at least did so traditionally, the state and academic formal institutions are more fragmented and compartmentalised. Water, land, forests, air, minerals, and the human agencies and facilities necessary to deal with these nat-

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▲ *Joint meeting of NGOs, forest officials, and villagers at Periyar Tiger Reserve*

ural resources, are each the subject of a different department, or a different academic discipline. This results in two problems: (a) the lack of coordination amongst all these sectors, and, (b) the lack of integration of biodiversity into the non-environment sectors.

The realisation that this non-integration is one of the major causes of biodiversity loss (and more generally of the failure to achieve sustainable and equitable development and welfare) has prompted a number of initiatives to achieve inter and cross-sectoral integration. Initiatives for wild and domesticated biodiversity include government efforts such as biosphere reserves and lake development authorities, and guidelines for integrated watershed development, some NGO efforts, and some very innovative community initiatives that attempt integration at the village landscape level.

Some key *gaps* are:

- There is a lack of guidelines and capacity-building on inter-sectoral coordination, for local, district, and state level decision-makers.
- There is no institutionalised, statutorily mandated process at state or national levels, of integrating biodiversity into all the sectors of planning, welfare, and development.
- Integration of agrobiodiversity into sectoral planning and processes is extremely weak, and in most cases absent.
- There is a lack of documentation and learning from the successful formal and informal initiatives at achieving integration, and thereby inadequate upscaling and spreading of these initiatives.

Policy and Law

In recent times, attempts have been made to synergise the predominantly 'environmental' laws and policies with those dealing with human rights and welfare; as also to reconcile the serious differences that have conventionally existed between these two sets of statutes and those dealing with commercial and 'developmental' activities. India has one of the world's largest bodies of law and policy related to conservation of wild biodiversity. These include: The National Forest Policy, 1988 ; The Indian Forest Act, 1927; The Forest (Conservation) Act, 1980; The Joint Forest Management (JFM) Circular, 1990; The National Conservation Strategy and Policy Statement on Environment and Development 1992; The Wild Life (Protection) Act, 1972 ; The Environment (Protection) Act, 1986; The Ocean Policy Statement, 1982; The National Zoo Policy 1998; Science and Technology Policy, 2003; The National Policy for Indian Systems of Medicine and Homeopathy 2002; The Water (Prevention and Control of Pollution) Act, 1974; The Air (Prevention and Control of Pollution) Act, 1981. India also has an ancient history of customary law.

Some key *gaps* that remain are the following:

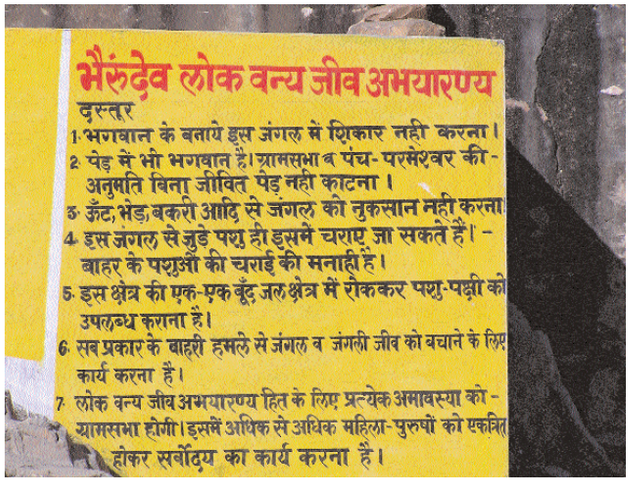
- Several of the existing laws and policies in the country are not oriented towards biodiversity concerns, or have a weak integration of such concerns.
- In many cases laws and policies of different sectors are in contradiction to each other.
- There is weak implementation of many relevant laws, which includes the lack of public empowerment and inadequate facilities/capacities of official agencies.
- There is inadequate recognition and encouragement given to customary laws.

There are a number of existing policies and statutes in India that have a bearing on the agricultural sector. Of these, the Central Government exercises its jurisdiction over a range of subjects, while some are essentially under the purview of the State Governments. Existing central legislation and policy include 'judge-made' law that has

a bearing on aspects of the conservation of agricultural ecosystems and domesticated taxa, and enactments such as: the National Agriculture Policy, 2001; The National Water Policy, 2002; The National Seeds Policy, 2002; Biosafety Regulatory Framework in India; The Seeds Act, 1966 as amended up to 1972; The Insecticides Act, 1968, as amended up to 2000; The Biological Diversity Act 2002; The Protection of Plant Varieties and Farmers' Rights Act, 2001.

Some key *gaps* are the following:

- There is a lack of a comprehensive legal regime to prevent conversion of prime agricultural land for non-agricultural purposes and weak implementation of state laws relating to such conversion.
- All the national germplasm collection efforts have taken place without an access and benefit-sharing arrangement with the farmers and pastoralists from whom the material and related knowledge have been obtained. Such a regime is still not in place.
- The concept and practice of farmers' rights is weakly developed; some element of it has come into the Plant Varieties and Farmers' Rights Protection Act (2002), but here too it is weak and inadequate.



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▲ *Bhairondev people's sanctuary in Rajasthan, protected by community rules; customary laws are often as powerful or more effective than statutory law, and are increasingly in use by communities to revive conservation*


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▲ *Gram sabha meeting in an adivasi village, the ideal local decision-making institutional structure in which all members of the settlement can take part*

Financial Measures

Policy and programmatic changes are the most important measures for biodiversity, especially the integration of biodiversity into sectoral plans and programmes, and the reorientation of budgets towards greater ecological sensitivity. However, there is also a need for extra funds for a series of actions. There has been a consistent demand by environmentalists and others for increasing the amounts within government budgets, for biodiversity-related actions. Existing initiatives includes various funding schemes in related ministries such as wildlife conservation in MoEF, multilateral and bilateral aid from international agencies and some innovative funding mechanisms like Trust Funds initiated by NGOs and other institutions.

Some key *gaps* are:

- India has a repertoire of economic incentives with a bearing on utilisation of biological resources; however, these traditional economic mechanisms are oriented more to 'revenue raising' and biomass augmentation, and are not necessarily oriented towards conservation.
- There is very little systematic work on the relationship between macro-economic growth measures and their precise environmental effects.
- Institutions at various levels of decentralised governance, are often not financially empowered. They do not often have the right to generate and control their own financial resources through the sustainable and equitable use of natural resources, the right to secure and control public funds, and the power to decide upon the priorities by which various line departments should spend their budgets in the area under their jurisdiction.

Although there are a few schemes that finance wild biodiversity-related work, financing in the domesticated sector has been largely directed towards increasing yields and production. Financial incentives and schemes are almost completely for conventional, input-intensive, chemical-based farming, and hybrids in pastoralism. Some innovative

schemes that reverse this trend by promoting biodiversity include programmes of related ministries which have the potential of funding agrobiodiversity, and some interesting funding mechanisms set up by NGOs and communities such as women's self help groups which are linked to micro-credit schemes.

Some key *gaps* are the following:

- Central and state financial schemes to support agriculture are being implemented with limited evaluation of shortcomings or impact especially on agrobiodiversity and on biodiversity-related traditional knowledge.
- A series of perverse financial incentives, such as subsidies on chemical fertilisers and pesticides, are encouraging forms of agriculture that are destructive of biodiversity.
- There is continued undervaluation, or neglect of the values of agrobiodiversity and of traditional farming/pastoral practices. Budgets do not reflect such values at all, and are not adjusted to reflect the enormous social, economic, and ecological costs of erosion in agrobiodiversity.
- There are few funds specifically earmarked for agrobiodiversity.

Technology

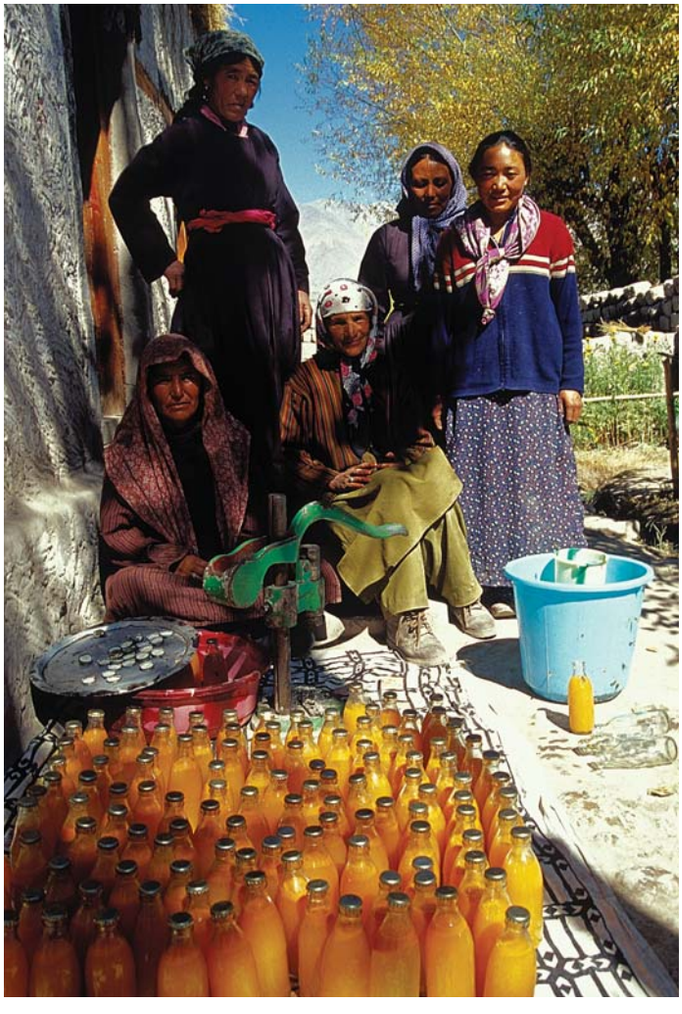
Lately there has been a growing emphasis on developing and using technologies which do not adversely affect the environment and are more socially acceptable as compared to the conventional technologies that have been/are in use. Environment friendly technologies can be classified as:

- Technologies that reduce environmental damage by reducing pollution through modifications in the process/products.
- Technologies that increase the efficiency of the production process, thereby reducing the amount of bioresource raw material used, or technologies that substitute threatened bioresources with alternatives.
- Technologies that turn waste into products that are not harmful to the environment.
- Technologies that increase the productivity of natural resources.

Broadly, there are two kinds of industries/processes that are relevant:

- Those that use bioresources as raw materials, e.g. pharmaceutical, agro-industries, tanneries, sugar mills, seed, NTFP-based, and so on.
- Those that do not use bioresources but impact biodiversity, e.g. steel plants, electronic industries, dams, mines, and so on.

Innovative uses of technology in wild biodiversity conservation include work on medicinal plants being carried out by the Department of Indian Systems of Medicine and Homeopathy, work on non-conven-



SUJATHA PADMANABHAN

▲ *Sustainable utilisation of seabuckthorn berries through local technology, Ladakh*

tional energy sources being carried out by the Department of Non-Conventional Energy Sources, and activities by institutions like the Indian Council of Forestry Research and the National Environmental Engineering Institute. There are also initiatives in innovative building technologies, rain water harvesting, and so on, carried out by NGOs and communities, including through the use of traditional technologies.

Some key *gaps* are the following:

- There is comparatively less promotion for technologies that efficiently use natural/ biological resources. There is little or no standardization in the use of these technologies.
- The dissemination of environmentally sensitive and socially acceptable technologies is very poor.
- Introduced technologies are rarely shared with local communities and their participation rarely sought, or they are often culturally inappropriate.

ASHISH KOTHARI

▲ *Wind and other non-conventional energy sources need much greater attention and resources, to replace conventional sources that are destructive of biodiversity*

As in the case of wild biodiversity, there is much to learn from the traditional technologies even in agriculture. For centuries farmers have used biodiversity friendly technologies, which are also in tune with productivity. There has been a trend in the last few decades towards the increased mechanization and homogenization of agriculture in India, which has unfortunately led to the loss of traditional farming practices. The major technological advances during the last three decades have been accompanied by a large increase in the consumption of artificial inputs like chemical fertilizers, pesticides, hybrids, and now, genetically engineered organisms. Though this trend continues to exist in policies and practice, there are several places in the country where biodiversity friendly agricultural technologies have been kept alive by communities, or innovated upon by government and non-governmental organizations. Increasingly, the government is also responding with larger policy and programmatic support to such technology. These include work carried out by the Department of Agriculture and Cooperation, Ministry of Agriculture and the Department of Biotechnology, Ministry of Science and Technology, on environmentally friendly agriculture technology, mainly biopesticides. There are also efforts by other ministries to promote innovative technologies. Several NGO efforts also exist, in using and promoting traditional agricultural technologies and innovative fishing technologies.

Some key *gaps* are the following:

- There is little integration and mutual synergism of traditional and modern agro-technologies, by farmer-led or participatory R&D.
- There is a lack of promotion of agro-based resource/waste utilization as an alternative to the conventional technologies, hampering potential incentives to sustainable agriculture.

International Fora

Other countries and international institutions affect the biodiversity of India in myriad ways. Some of the multilateral agreements that India is a party to, and that impact on India's wild and domesticated biodiversity, include environmental treaties such as the Convention on Biological Diversity, economic treaties such as those under the World Trade Organisation, and human rights treaties. Dimensions of the in-country implementation and effects of many of these agreements are covered elsewhere in this volume.

Some key *gaps* are the following:

- India has played an inadequate role in advocating conservation and sustainable use shared resources with neighbouring countries (both water and genetic resources) at South Asian fora like SAARC.

– There has been inadequate use of international human rights treaties and forums by India, to promote the cause of biodiversity and livelihood security.
– The links between human rights instruments and environmental treaties, as they impact on India, have not been clearly worked out.
– There are few safeguards in India regarding the ecological and social impacts of increasing trade in agricultural produce, especially the dumping of subsidized produce from outside and the conversion of small farmer oriented systems to capital intensive export and market-oriented ones.

Initiatives Linking Wild and Domesticated Biodiversity

Human societies with their various forms of domestication have traditionally co-existed with natural ecosystems and wild species, sometimes in conflict, sometimes in harmony. Unfortunately, the myriad inter-relations between the two worlds have been poorly understood; much of the attention they have got has been restricted to the conflicts between wildlife and crops/livestock, or the damage caused to wilderness areas by agricultural extension and livestock.

However, it is clear that there are a range of positive links between the two. This includes: pollination of crops by wild animals, cross-breeding between crops/livestock and their wild relatives, the use of semi-domesticated or semi-wild species/breeds/varieties, the use of a wide range of wild plants for manure, pest control, and other uses in agriculture, the refuge and corridor service that certain forms of traditional agriculture provide to wildlife, traditional pastoral practices (including grassland management and nomadism) that favour wildlife, and the use of diverse wild foods in organic farms such as aquatic fauna in organic rice fields.

ASHISH KOTHARI

▲ *Traditional mix of terraced farms and forests in Nagaland*

In India, there have been very few explicit attempts at encouraging such links. These include some initiatives by the National Centre for Integrated Pest Management, efforts by some state governments that are encouraging revival or adoption of mixed crop cultivation and fish culture systems, watershed and landscape level planning programmes being carried out by some NGOs, and continuation or revival of integrated land use systems by communities.

Some key *gaps* are the following:
– There are very few attempts at systematically linking natural and domesticated biodiversity in the country, either in understanding the links or in promoting the positive ones.
– There is very little documentation and dissemination of information about the few initiatives, which are currently underway.
– The practices by communities, which traditionally often integrated the wild and domesticated into a continuum, are not well-known in formal sector agencies, or encouraged by ongoing policies.
– There is no concerted effort to promote landscape or waterscape planning in the country.

7. Strategies and Actions

[*Note: for a detailed treatment of strategies and actions, please see Chapter 7 of the full report. The full report also presents an index of suggested lead agencies for the strategies and actions, in Section 7.5*]

It is from an understanding of the causes for loss of biodiversity, and the critical strengths and gaps in ongoing initiatives to address this loss that, a series of strategies and actions have been recommended. These are oriented to achieving the three objectives of the NBSAP: conservation of biodiversity, sustainable use of biological resources, and equity in dealing with various aspects of biodiversity.

Structure of the Strategies and Actions Chapter

The Strategies and Actions are divided into four sections:

- Overall **planning and governance directions**, and the broad framework within the context of which specific strategies and actions are to be seen.
- Strategies and actions for **wild biodiversity** (i.e. natural ecosystems and wild taxa);
- Strategies and actions for **domesticated biodiversity** (i.e. crops, livestock, and pets);
- Strategies and actions relating to the **links between wild and domesticated biodiversity**.

In each of these sections, there is a set of broad **strategies**, and within each strategy, specific **actions** that are required. Each action is accompanied by details on the *justification* for the action, the specific steps needed, the agencies recommended to be responsible for these steps, and the *time frame*. Also mentioned in many cases are ongoing initiatives that can be built upon or learnt from. Cross-references amongst strategies/actions that need to be read together, are also given.

In the case of many of the actions, existing **Government of India schemes/programmes** that are relevant and could therefore provide support to these actions, are also mentioned in a box at the end.

The above-mentioned details are not included in this Concise Version; readers are requested to refer to the full document.

A total of **101 strategies** and **345 actions** are recommended, with the following break-up:

- Overall planning and governance: 2 Strategies, 2 Actions
- Wild biodiversity: 65 Strategies, 250 Actions
- Domesticated biodiversity: 34 Strategies, 89 Actions (it may be noted here that a number of strategies and actions listed for Wild biodiversity are relevant to Domesticated biodiversity also, hence are not repeated).
- Links between wild and domesticated biodiversity: 4 Actions

7.0 Overall Planning and Governance

It is getting more and more clear that activities in one sector, or at one place, affect other sectors and places. There is growing recognition that India should have a long-term land/water use vision, plan, and policy, and that planning and management need to start at local levels and move towards much larger regional land/waterscapes. In addition, there is recognition that appropriate institutional structures for natural resource governance at all levels, from local to national, have to be empowered. Such governance needs to begin with and build on a fully empowered local community unit, where all members can, conveniently and in an informed manner, take part in decision-making. Ecological sustainability and social justice can only be striven for with a change from 'representative' forms of democracy to 'participatory' forms (such that people are able to take part in decisions that affect them), and where the State becomes a facilitator rather than a ruler.

The key strategies and actions are:

Strategy 7.0.1: Adopt a land/waterscape or ecoregional approach to planning

Actions:

1. Formulate a National Policy and Perspective Plan on Land and Water Use
2. Provide legal backing to the national land/water use plan

Strategy 7.0.2: Strengthen a decentralised natural resource governance structure

7.1 Wild Biodiversity: Strategies and Actions

7.1.1 Understanding and Information

There is a need to significantly increase our understanding and information levels on biodiversity, and on human interaction with biodiversity. The key strategies and actions are:

Strategy 7.1.1.1: Consolidate, increase and update the knowledge on ecosystems and taxa

Actions:

1. Undertake a comprehensive inventory and status survey of taxonomic groups
2. Monitor the status of representative ecosystems across the country
3. Conduct research on the structure, function, and interactions amongst and within ecosystems
4. Study ecosystem benefits provided by biodiversity
5. Conduct research on links between natural and domesticated ecosystems and taxa
6. Determine sustainable use levels and practices for ecosystems and taxa, keeping in mind diverse local contexts
7. Enhance the understanding and use of community traditions, knowledge, practices, and livelihoods related to biodiversity, amongst other sectors
8. Initiate and strengthen research on biodiversity impacts of climate change
9. Integrate monitoring and evaluation into ongoing schemes, projects, and processes
10. Encourage the widespread use of community methods and techniques for information generation
11. Spread the use of new information generation methods and technologies and dovetail these with traditional community methods

Strategy 7.1.1.2: Create a multi-layered database and information regime

Actions:

1. Create an Indian Biodiversity Information System (IBIS)
2. Prepare a Biodiversity Conservation Atlas of India
3. Digitise and photograph all existing specimens in herbaria, museums, and other collections (governmental and private)
4. Encourage community maintenance of biodiversity-related community knowledge repositories, and database of formal scientific information, in appropriate forms including oral, written, visual, audio, and electronic media.
5. Set up regional biological diversity repositories or museums

Strategy 7.1.1.3: Enhance knowledge of the links between cultural and biological diversity

7.1.2 *In Situ* Conservation

Given the continued erosion of wild biodiversity across India, the most critical need is to enhance conservation of biodiversity *in situ*, i.e. in its natural or near-natural state. Key strategies and actions are:

Strategy 7.1.2.1: Strengthen and expand the official protected areas network

Actions:

1. Review currently prevalent management practices, from the point of view of biodiversity, and prepare comprehensive management plans
2. Improve the effectiveness of protected area management

3. Settle rights of people inside protected areas (PAs)
4. Take action to tackle threats to PAs, based on a full review of their current status
5. Take special measures for PAs and other sensitive ecosystems affected by armed conflicts
6. Manage buffer areas around PAs as ecologically sensitive areas, within a landscape/seascape approach
7. Move towards a system of joint or participatory management
8. Analyse the current protected area coverage and suggest changes/additions to make it representative of India's biodiversity
9. Expand and modify the protected area network as per the suggestions from the above actions, to cover 10% of India (with minimum 2% as inviolate).

Strategy 7.1.2.2: Strengthen and support community conservation areas (CCAs), including sacred sites

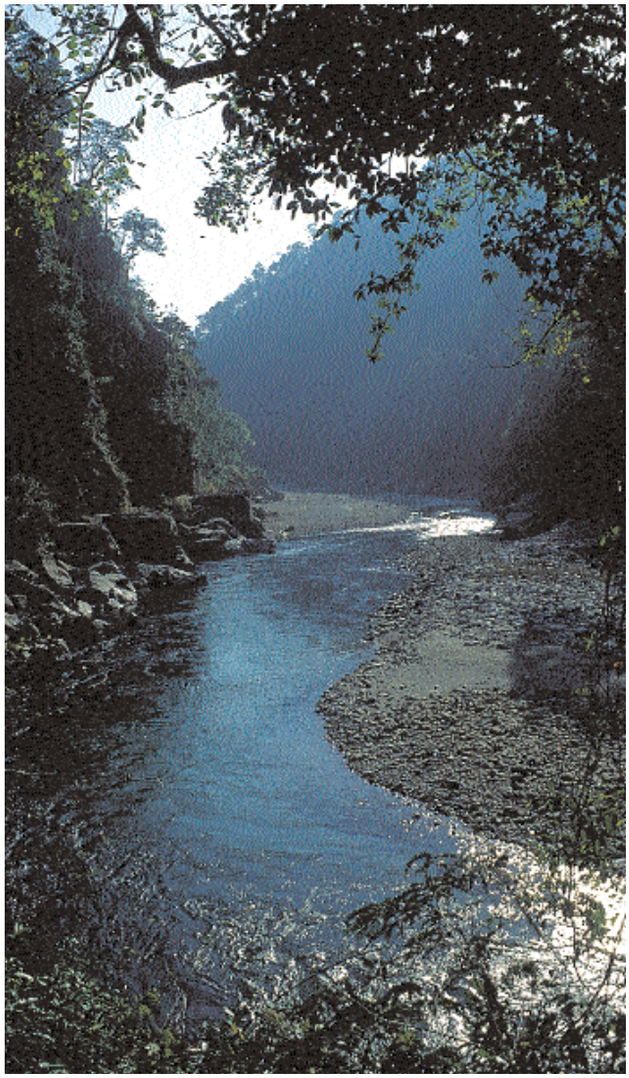
Actions:

1. Review the current status of CCAs, and strengthen them through appropriate means including legal declaration
2. Protect, revive, and revitalise sacred sites
3. Undertake an assessment of the biogeographic coverage, and ecological values, of CCAs
4. Expand the network of CCAs (including in 'hotspot' areas, and to cover 'hotspecks')
5. Assess the experience of CCAs for lessons to be applied to PAs, and vice versa
6. Facilitate a national CCA network

Strategy 7.1.2.3: Strengthen conservation outside PAs and CCAs, across the entire rural land/waterscape

Actions:

1. Strengthen and encourage community-based species conservation
2. Provide a range of incentives for community-based conservation across the land/waterscape
3. Conserve and sustainably manage critical ecosystems outside the PA and CCA network
4. Integrate biodiversity into organised bioresource use activities, e.g. commercial forestry and JFM, NTFP, fisheries, plantations, medicinal plants, marine bioresource use, and coastal management plans
5. Conserve biodiversity in areas under armed forces' jurisdiction
6. Conserve biodiversity in areas under the corporate sector
7. Conserve biodiversity in areas controlled by religious/spiritual institutions
8. Conserve biodiversity in educational and research institutional areas, including agricultural university campuses, and set up demonstration centres for conservation



ASHISH KOTHARI

▲ *Corbett, India's first national park, critical for elephant and tiger but also for the water security of surrounding areas; more such areas need conservation*

ASHISH KOTHARI

▲ *Several hundred hectares of forest have been regenerated and protected by villagers of Jardhargaon, Uttaranchal; hundreds of such initiatives exists, and need support and recognition*

9. Conserve biodiversity in other government institution lands, such as railway line strips and colonies

Strategy 7.1.2.4: Conserve threatened, endemic, and other species of conservation significance

Actions:
1. Develop conservation plans and projects for each of the seriously threatened, prioritised endemic, and other species of conservation significance, with special attention to hitherto neglected species/taxa
2. Update the schedules of the Wild Life (Protection) Act, to include all threatened and endemic species, and the species they are dependent on
3. Step up anti-poaching and anti-trade measures
4. Reintroduce, translocate, rehabilitate, and/or enhance the populations of, seriously threatened species/taxa

Strategy 7.1.2.5: Conserve biodiversity in urban areas

Strategy 7.1.2.6: Tackle 'non-utilisation' threats to natural ecosystems and species

Actions:
1. Take preventive and ameliorative measures relating to 'natural' disasters
2. Minimise the impacts of alien invasive species
3. Tackle pollution
4. Predict, and take pro-active steps to counter, the impacts of climate change

Strategy 7.1.2.7: Regenerate and restore degraded ecosystems

Actions:
1. Regenerate and restore degraded common lands; review 'wasteland' development programmes from the biodiversity point of view
2. Restore mined lands
3. Regenerate and restore degraded inland water bodies, coastal areas and marine ecosystems

Strategy 7.1.2.8: Prevent and mitigate human-wildlife conflicts

Strategy 7.1.2.9: Strengthen trans-boundary cooperation for conservation

Actions:
1. Identify critical trans-boundary sites for priority action, and negotiate conservation action, including "Peace Parks", with neighbouring countries
2. Strengthen international measures to combat trans-boundary poaching and wildlife trade in other areas
3. Tackle other trans-boundary threats such as pollution, dams, erosion, and illegal immigration

7.1.3 *Ex Situ* Conservation

Complementary to *in situ* conservation, there is an important role for *ex situ* measures, i.e. away from the natural habitats. This could be particularly relevant for threatened and endemic species, whose survival in the wild is uncertain. The following key strategies and actions are recommended:

Strategy 7.1.3.1: Strengthen and enhance the role of zoological parks, aquariums, and other wild animal breeding facilities

Actions:
1. Enhance and expand captive conservation breeding of threatened and endemic species
2. Breed aquatic and other wild animals that are legitimately and without cruelty used in medicine or trade

Strategy 7.1.3.2: Strengthen and enhance the role of botanical, herbal and home gardens, and other *ex situ* plant collections

Actions:

1. Enhance and expand the cultivation of threatened and endemic plant species
2. Promote the use of home/terrace/kitchen/institutional gardens to cultivate threatened wild plants
3. Strengthen the use of botanical gardens, and other *ex situ* repositories, as seed banks for various biogeographic regions

Strategy 7.1.3.3: Strengthen culture collections of micro-organisms

Actions:

1. Consolidate information on existing culture collections, strengthen these, and carry out further collections
2. Set up new culture collection centers

ASHISH KOTHARI

▲ *The Pygmy hog conservation and breeding centre near Guwahati, Assam, hopes that some day the endangered hogs can be reintroduced into nearby natural habitats*

7.1.4 Sustainable Use

Given the considerable over-exploitation of many biological resources in India, there is an urgent need to ascertain levels of sustainability, and take regulatory and incentive measures to achieve these levels. For this, the following measures are recommended (building on Strategy 7.1.1.1):

Strategy 7.1.4.1: Integrate sustainability principles into all resource use policies, laws, and programmes

Action:

1. Ensure legal backing to sustainable and equitable use

Strategy 7.1.4.2: Ensure sustainability of aquatic biological resource uses

Actions:

1. Reassess fishery and non-fishery aquatic stocks
2. Develop harvest strategy for non-conventional and deep-sea fishery resources, based on stock assessment
3. Upgrade traditional fishing gear with appropriate technology
4. Revise existing fishing regulations and initiate innovative implementation
5. Regulate over-capitalization
6. Enforce a uniform ban on monsoon marine trawling, while monitoring its efficacy
7. Ensure the sustainability of aquaculture
8. Add value to catch and by-catch
9. Move all freshwater wetlands towards 'wise use'

Strategy 7.1.4.3: Ensure sustainability of terrestrial biological resource uses

Actions:

1. Ensure that all official forestry management practices integrate biodiversity concerns

ASHISH KOTHARI

▲ *Fishing in the floodplains of the Brahmaputra, Assam; such traditional or new ecologically friendly technologies need encouragement*

2. Ensure that biodiversity concerns are built into community uses of forests and other natural ecosystems
3. Assist private owners of natural forests to manage their forests sustainably
4. Ensure that biodiversity concerns are integrated into tree plantation activities

Strategy 7.1.4.4: Ensure and facilitate sustainable livelihoods

Actions:
1. Carry out a national survey of biodiversity-based livelihoods and traditional practices of sustainability
2. Encourage and facilitate traditional sustainable livelihoods
3. Facilitate appropriate adaptations in the case of traditional livelihoods that have become unsustainable but can be brought back to sustainability
4. Explore and introduce alternative livelihoods where regaining sustainability for an existing livelihood is not possible
5. Strengthen biodiversity-based artisanal (including medicinal plant-based) livelihoods
6. Introduce or strengthen bioresource-based enterprise amongst local communities
7. Enhance use of under-valued bioresources used traditionally, while ensuring their sustainability

Strategy 7.1.4.5: Ensure that tourism and pilgrimage are ecologically and socially sensitive, in both existing and new areas

Actions:
1. Draft guidelines and spread awareness towards the promotion of sensitive tourism and pilgrimage
2. Build capacity of stakeholders to work within the philosophy of sensitive tourism
3. Work towards a tourism policy that is both ecologically and socially sensitive
4. Ensure that local communities are the primary beneficiaries and managers of tourism to their traditional sites
5. Ensure that tourism and pilgrimage activities achieve the above objectives

7.1.5 Equity

As outlined in Chapters 5 and 6, inequities between communities and the state, amongst communities and their members, between men and women, and so on, are often at the root of the ecological crisis. Tackling such inequities therefore becomes a critical aspect of conservation and sustainable use. For this, the following are the key strategies and actions:

Strategy 7.1.5.1: Secure community tenure over natural resources

Actions:
1. Establish secure common property rights of traditional marine communities
2. Establish secure common property rights for freshwater wetland users including fisherfolk
3. Establish secure common property rights for traditional users of terrestrial ecosystems and their resources
4. Establish secure tenurial rights over forest lands traditionally used by communities
5. Develop a land classification system which records and considers ecosystems and the biodiversity harboured by them as well as the customary and current user groups and their livelihood systems
6. Endow ownership over NTFPs to communities, with conservation responsibilities and equitable rights

Strategy 7.1.5.2: Develop a socially and ecologically sensitive process for dealing with disputed claims and 'encroachments' on 'forest' lands

Actions:
1. Prepare an accurate database and maps of the legal status of notified forest lands and 'encroachments' on them according to official records
2. Tally Forest and Revenue Department land records
3. Complete survey and settlements for all forest lands yet to be demarcated or finally notified

SUJATHA PADMANABHAN

▲ *Farming community in Ladakh, making optimum use of harsh growing conditions; such practices need recognition and support*

4. Initiate systematic addressal of disputed claims and encroachments on lands finally notified as forest lands
5. Reclassify long-standing, traditional shifting cultivation lands as forest fallows
6. Use the database and mapping generated above, to 'freeze' any further illegal incursions into forests
7. Ensure secure land tenure to forest villages

Strategy 7.1.5.3: Ensure equity in ongoing ecosystem management initiatives

Actions:

1. Ensure that socio-economic and gender equity is mainstreamed into JFM, Community Forest Management (CFM), watershed management, and Forest Development Agencies (FDAs)
2. Initiate Participatory or Joint Protected Area Management
3. Integrate principles and practices of socio-economic and gender equity into all other community-based natural resource management programmes

Strategy 7.1.5.4: Protect traditional knowledge, and ensure equitable benefits from its wider use

Actions:

1. Build capacity of communities to value and protect their knowledge
2. Use traditional knowledge in biodiversity management programmes
3. Carry out community-based documentation of traditional knowledge

ASHISH KOTHARI

▲ *Ecologically and culturally sensitive tourism at Periyar, one of the few genuine examples of "ecotourism", the lessons of which can be used elsewhere*

4. Create a network of traditional knowledge holders and databases at district, state, and national levels
5. Develop community-based intellectual rights systems
6. Ensure equitable sharing of benefits from the use of traditional knowledge
7. Develop and apply a code of ethics for researchers using traditional knowledge

Strategy 7.1.5.5: Ensure equitable sharing of benefits from the use and marketing of community-managed or developed resources

7.1.6 Education, Awareness, Training

The lack of awareness and training about complex biodiversity issues is one of the biggest stumbling blocks to conservation, sustainable use, and achievement of equity. To overcome this, the following key strategies and actions are recommended:

Strategy 7.1.6.1: Build capacity of public functionaries and governance institutions to address biodiversity issues

Actions:
1. Build capacity of officials from all line departments
2. Build capacity of political leaders at state and national levels
3. Build capacity of planners at district, state, and national level
4. Increase the capacity of Panchayati Raj institutions to conserve and manage biodiversity
5. Increase the capacity of urban authorities and municipal ward committees to conserve and manage biodiversity

Strategy 7.1.6.2: Strengthen nature awareness and interpretation facilities at key biodiversity sites

Actions:
1. Enhance the use of existing interpretation facilities, and create new ones
2. Develop site-specific awareness material for diverse sectors, and enhance usage of existing material

Strategy 7.1.6.3: Strengthen capacity of NGOs

Action:
1. Orient NGOs in aspects of both wild and domesticated biodiversity

Strategy 7.1.6.4: Integrate biodiversity into the formal education system, convert it into "learning for life"

Actions:
1. Enhance biodiversity-related education in the formal school system
2. Enhance biodiversity related education in the formal college system
3. Integrate biodiversity into existing vocational courses, introduce biodiversity-related vocational courses, and link biodiversity education with relevant jobs
4. Develop specialised educational inputs for ecosystem and biodiversity-based communities
5. Integrate biodiversity into adult and continuing education programmes

Strategy 7.1.6.5: Strengthen non-formal education on biodiversity, including through folk media

Actions:
1. Maximise opportunities for non-formal education on biodiversity
2. Maximise the use of traditional and folk media
3. Build capacity of communities to handle new media technologies, and control local media networks

Strategy 7.1.6.6: Spread biodiversity awareness amongst urban residents

ASHISH KOTHARI

▲ *Outdoor learning is essential but rare, especially in urban schools of India, whose students need more field exposure to biodiversity*

Actions:

1. Enhance the educational role of municipal authorities and urban NGOs
2. Enhance the networking and functioning of urban nature clubs
3. Use creative methods to spread biodiversity awareness amongst urban populations, especially regarding the impacts of their consumerist lifestyles

Strategy 7.1.6.7: Build capacity of scientists and other academics

Strategy 7.1.6.8: Build capacity of workers and labour unions

Action:

1. Organise orientation and training sessions for workers and worker unions

Strategy 7.1.6.9: Build capacity of the judiciary and legal functionaries

Actions:

1. Increase the capacity of the judiciary and legal functionaries to deal with biodiversity related and environmental justice issues
2. Set up Biodiversity Law Resource Centres at the Supreme Court, High Courts, and District Courts
3. Introduce the system of Law Clerks for Judges of the Supreme Court and High Court

Strategy 7.1.6.10: Orient financial institutions to support biodiversity activities

Action:

1. Orient financial institutions for better support to biodiversity related activities

Strategy 7.1.6.11: Build capacity of the armed forces, police, and customs

Actions:
1. Strengthen current programmes and design new ones to orient the Armed Forces towards biodiversity conservation
2. Orient and strengthen capacity of police and customs, towards biodiversity conservation activities

Strategy 7.1.6.12: Build capacity of the corporate and business sector

Actions:
1. Design programmes and packages to orient industries to biodiversity related issues
2. Promote responsible advertising by the corporate and development sector

Strategy 7.1.6.13: Build capacity of the media

Actions:
1. Orient journalists to biodiversity related issues
2. Integrate biodiversity into journalism schools
3. Provide incentives to media persons for better coverage of biodiversity issues
4. Sensitise newspaper and magazine publishing houses, and radio/television companies, towards biodiversity issues

Strategy 7.1.6.14: Build capacity of religious and spiritual leaders and institutions

Strategy 7.1.6.15: Strengthen information dissemination systems

Actions:
1. Ensure proactive and strategic information dissemination through the existing environmental information systems, merge them into an Indian Biodiversity Information System (IBIS)
2. Bridge the information and capacity gap in critical areas like taxonomy
3. Integrate biodiversity into district gazetteers, and formulate district environment/biodiversity gazetteers
4. Make creative use of public transport as an educational tool

7.1.7 Inter-sectoral Coordination and Integration

The neglect of biodiversity concerns in most sectors of economy and society, especially in development sectors, is a cause for serious erosion of biodiversity and disregard of biodiversity-based livelihoods. Measures of the following kind are therefore needed to ensure that there is inter-sectoral and cross-sectoral integration of biodiversity:

Strategy 7.1.7.1: Integrate biodiversity concerns through inter-sectoral coordination, at all levels of planning

Actions:
1. Formulate guidelines for inter-sectoral integration of biodiversity at local to national levels
2. Ensure inter-sectoral integration of biodiversity at local settlement level
3. Ensure inter-sectoral integration of biodiversity at district level
4. Ensure inter-sectoral integration of biodiversity at state and central levels
5. Move towards ecoregional planning
6. Create state and national level institutional structures for inter-sectoral integration
7. Build capacity of officials, at all levels of governance, to integrate biodiversity concerns
8. Integrate funding for biodiversity concerns into each government agency's budget

Strategy 7.1.7.2: Integrate biodiversity into water planning

Actions:

1. Ensure that national and state water programmes integrate biodiversity concerns and values
2. Move away from mega-projects to decentralised water harvesting schemes

Strategy 7.1.7.3: Integrate biodiversity into energy and infrastructure planning

Action:

1. Ensure that all energy and infrastructure development is respectful of biodiversity concerns

Strategy 7.1.7.4: Integrate biodiversity into the mining sector

ASHISH KOTHARI

▲ *Water and power sectors need to focus much more on decentralised sources, rather than on destructive mega-projects*

Actions:

1. Taken general measures to ensure that mining is not detrimental to biodiversity
2. Enhance and expand the process of environmental clearances for mining projects
3. Enhance and expand the process of clearance of mining projects under the Forest (Conservation) Act, 1980
4. Ensure ecologically sensitive restoration and mine closure

Strategy 7.1.7.5: Ensure integration of biodiversity concerns in international relations

Actions:

1. Ensure that all external aid to India integrates biodiversity concerns
2. Ensure that all foreign investment in India integrates biodiversity concerns
3. Ensure that all bilateral and multi-lateral agreements India enters into, integrate biodiversity concerns

7.1.8 Policy and Legal Measures

India has a wide range of policies and laws relating to biodiversity, some of them very progressive. However, as noted in earlier chapters, there remain a number of deficiencies and contradictions that undermine efforts relating to biodiversity. To deal with these, the following key strategies and actions are recommended:

Strategy 7.1.8.1: Integrate biodiversity into existing policies

Actions:

1. Review and amend national and state level policies to integrate biodiversity
2. Reconcile laws and policies which are incompatible with each other and with principles of conservation, sustainable use, and equity

Strategy 7.1.8.2: Formulate new policies for aspects that have not been dealt with at a policy level so far

Actions:

1. Formulate a Wetlands Policy
2. Formulate a Marine Areas Policy
3. Formulate a National Urban Environment Policy

Strategy 7.1.8.3: Integrate biodiversity into existing statutes and associated rules, regulations and notifications

Actions:

1. Integrate biodiversity into the Constitution of India

2. Review, amend, and strengthen national laws to integrate biodiversity
3. Strengthen the Environment Impact Assessment procedure
4. Frame rules to strengthen conservation, sustainable use, and equity under the Biological Diversity Act 2002

Strategy 7.1.8.4: Formulate new acts for missing elements

Actions:
1. Enact a Wetlands (Conservation, and Sustainable and Equitable Use) Act
2. Enact a Marine Areas (Conservation, and Sustainable and Equitable Use) Act
3. Enact an Urban Natural Heritage Act
4. Enact a Traditional Knowledge Protection Act, or Traditional Knowledge Protection Rules under the Biological Diversity Act

Strategy 7.1.8.5: Integrate biodiversity and equity into panchayat legislation, and make it effective and accountable

Actions:
1. Integrate biodiversity and equity responsibilities into the central and state Panchayat laws, and the Representation of the People Act
2. Empower gram sabhas or appropriate village level institutions to implement laws
3. Build in customary governance structures into Acts in Sixth Schedule Areas

Strategy 7.1.8.6: Strengthen Customary Law

Strategy 7.1.8.7: Strengthen/create mechanisms for implementing existing legislation

Actions:
1. Set up participatory monitoring mechanisms at centre and state level
2. Set up Environment Courts or Environment Benches in existing courts, and strengthen other infrastructure for legal action
3. Review citizens' *locus standi* provisions, and make laws more accessible to local communities
4. Compile and assess court orders related to biodiversity, and use the lessons learnt
5. Broad-base membership of bodies set up under laws or by courts

Strategy 7.1.8.8: Make publicly accessible all governmental information and records on biodiversity

Actions:
1. Integrate right to information in biodiversity-related laws
2. Use the Right to Information Act to take measures for public provision of information

7.1.9 Financial Measures

Appropriate funding mechanisms are critical for biodiversity, but current arrangements are either acting as a disincentive, or are thoroughly inadequate. To change this situation, the following key strategies and actions are recommended:

Strategy 7.1.9.1: Review macro-economic policies, programmes, and incentive systems, from the biodiversity point of view

Actions:
1. Assess macro-economic measures from the biodiversity and livelihoods perspective
2. Phase out perverse subsidies
3. Introduce new, or widen existing, financial/fiscal incentives for biodiversity

Strategy 7.1.9.2: Reorient national and state budgets

Actions:

1. Assess central and state budgets from biodiversity and livelihoods perspective, and introduce the necessary changes
2. Introduce natural resource accounting/budgeting into the national and state budgets
3. Enhance the biodiversity budgets at centre and state
4. Integrate a biodiversity budget line into each ministry/department
5. Provide special budgetary consideration for ecologically fragile or critical areas
6. Provide special funds for preventing and compensating wildlife-related damage
7. Advocate the above changes at political levels

Strategy 7.1.9.3: Financially empower institutions of local governance

Action:

1. Financially empower governance institutions at community level

Strategy 7.1.9.4: Generate new and innovative financial resources for biodiversity

Actions:

1. Introduce an ecosystem benefit tax in urban areas
2. Introduce an industrial tax for biological resource and ecosystem use
3. Introduce a tourism tax for biological resource and ecosystem use
4. Forge agreements amongst states and regions within states, to pay appropriate compensation to each other for ecosystem benefits and for ecological damage caused
5. Introduce innovative funding and fund management mechanisms
6. Encourage banks and banking institutions to generate funds for biodiversity
7. Encourage insurance companies to provide cover to biodiversity-friendly livelihood activities
8. Encourage the corporate sector to generate funds for biodiversity
9. Encourage public charities, foundations, and religious institutions to generate funds for biodiversity
10. Encourage NGOs, academic institutions, and other citizens' organisations to generate funds for biodiversity
11. Mobilise external funding on indigenous terms
12. Set up dedicated biodiversity funds at local, state, and national levels

7.1.10 Technology

Inappropriate technologies in a whole range of activities, directly or indirectly cause biodiversity loss through pollution, inefficient and wasteful use of natural resources, and other such factors. Hence there is an urgent need for a series of technological measures. The following are some key strategies and actions recommended:

Strategy 7.1.10.1: Make existing technologies biodiversity-friendly, and introduce new eco-sensitive technologies

Actions:

1. Introduce/enhance materials efficiency in all existing technologies, especially to promote sustainability of resource use
2. Reduce, and where possible eliminate, pollution from existing technologies

ASHISH KOTHARI

▲ *Unsustainable construction technologies are a major source of ecological damage, and need to be replaced by more eco-friendly ones like this one using mud*

3. Find and enhance the use of alternative raw materials, especially in cases where the materials are currently coming from natural ecosystems
4. Promote a range of non-conventional and alternative energy sources
5. Promote alternative and localised technologies in construction
6. Promote alternative, decentralised water harvesting systems in villages and cities
7. Promote biodiversity-friendly alternative products, recycling, and waste reduction

Strategy 7.1.10.2: Introduce new conservation technologies, and enhance the use of available ones

Strategy 7.1.10.3: Promote traditional biotechnologies and ensure that new biotechnologies are safe

7.1.11 International Fora

India has generally taken a pro-active role in international agreements relating to environment, and those with a bearing on environment. This role needs to be enhanced, in the following ways:

Strategy 7.1.11.1: India to advocate strengthening of biodiversity integration into all environment-related agreements

Strategy 7.1.11.2: India to advocate biodiversity integration into non-environment related agreements

Strategy 7.1.11.3: Enhance civil society networking and participation relating to international issues and agreements

Strategy 7.1.11.4: Encourage joint use of international human rights and environmental instruments to further environment/biodiversity and livelihood agendas

Strategy 7.1.11.5: Use other international forums and processes to further environment/ biodiversity and livelihoods agendas

Action:

1. Join and influence the Global Biodiversity Information Facility

7.2 Domesticated Biodiversity: Strategies and Actions

7.2.1 Understanding and Information

Knowledge and information on the extent and dynamics of domesticated biodiversity is poor in India, with the formal sector lacking an understanding of indigenous or traditional farming and pastoral systems, and communities having inadequate understanding of the impacts of external policies and processes on domesticated biodiversity. A great deal needs to be done to enhance this understanding, amongst all sectors. The following key strategies and actions are recommended:

Strategy 7.2.1.0: Strategies adapted from Section 7.1.1, on Databases, and on Cultural and Biological Diversity.

Strategy 7.2.1.1: Consolidate, increase, and update knowledge on domesticated biodiversity

Actions:

1. Undertake comprehensive surveys of domesticated biodiversity
2. Document and disseminate indigenous knowledge, practices, and technologies relevant to domesticated biodiversity
3. Expand knowledge on the dynamics of crop and animal genetic diversity systems
4. Identify, map, and study hotspots of domesticated biodiversity and critical cultivated landscapes
5. Assess the value provided by indigenous domesticated biodiversity, to the agricultural, health, and livelihood security of the country

6. Assess the possible impacts of climate change on domesticated biodiversity, and the role of such diversity as a coping strategy

Strategy 7.2.1.2: Monitor the status of domesticated biodiversity across India

Action:

1. Monitor the status of domesticated biodiversity at the village level

7.2.2 *In Situ* Conservation

As in the case of wild biodiversity, the continuing decline of domesticated biodiversity requires very urgent steps to conserve it in situ, i.e. on farmers' fields, pastoralists' ranges and homesteads, home gardens, and so on. For this, the following key strategies and actions are recommended:

Strategy 7.2.2.1: Conserve biologically diverse cultivated and husbanded landscapes and sites

Actions:

1. Declare and conserve domesticated landscapes and agrobiodiversity hotspots (Agro-Protected Areas)
2. Conserve outstanding sustainable farms as "agrobiodiversity hotspecks"
3. Promote use and conservation of uncultivated foods
4. Create a National Network of Domesticated Biodiversity Conservation Initiatives

BULU IMAM

▲ *The Santal hound may be one of the world's first domesticated dogs, still maintained by adivasis in eastern India; several indigenous breeds need urgent conservation action*

ASHISH KOTHARI

▲ *Betelnut orchard in Karnataka, containing several associated species like banana, pepper, cardamom, jackfruit, breadfruit, and others*

Strategy 7.2.2.2: Conserve and re-introduce threatened domesticated biodiversity

Actions:

1. Conserve and re-introduce threatened indigenous taxa of crops
2. Conserve threatened livestock (including poultry) breeds
3. Conserve threatened domesticated pet breeds

Strategy 7.2.2.3: Promote *in situ* conservation through participatory crop and livestock development

Action:

1. Promote participatory crop and livestock development

Strategy 7.2.2.4: Revive domesticated biodiversity and regenerate diverse agro-ecosystems where they have eroded

Action:

1. Repatriate indigenous crop varieties and livestock breeds to places where they were once found

Strategy 7.2.2.5: Promote home and kitchen gardens

Actions:

1. Document and encourage existing home garden initiatives or networks
2. Facilitate new home gardens across India

Strategy 7.2.2.6: Tackle 'non-utilisation' threats to indigenous domesticated biodiversity

Actions:

1. Tackle invasive alien species that invade and affect crop land, pasture land, and wetlands in use for agriculture or pastoralism
2. Tackle serious diseases, especially when they affect already threatened species/varieties/breeds

7.2.3 *Ex Situ* Conservation

Conservation and propagation of domesticated biodiversity outside of their growing sites, in controlled conditions, is an important complementary activity to *in situ* conservation. This is especially so in a situation of continued erosion of biodiversity from fields and pastures, and destruction of the very conditions in which domesticated biodiversity can thrive. The following key strategies and actions relating to *ex situ* conservation are recommended:

Strategy 7.2.3.1: Create a network of gene banks and breeding centres

Actions:

1. Create and strengthen community gene banks
2. Create and strengthen state, agro-ecozonal, and national gene banks
3. Create and strengthen a network of domesticated animal breeding centers

▼ *ICAR camel breeding centre in Bikaner; such centres need greater support and community involvement*

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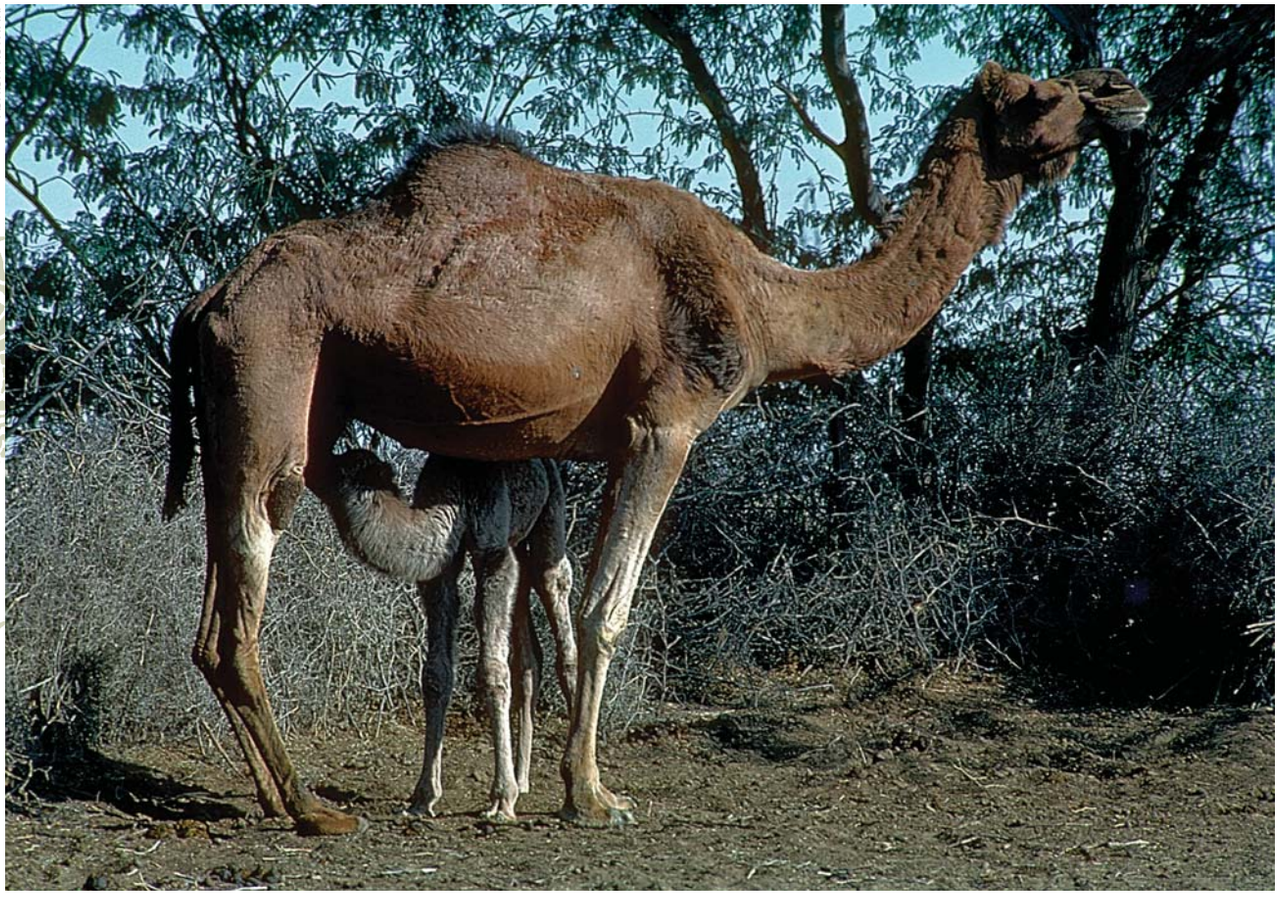

Strategy 7.2.3.2: Integrate domesticated biodiversity into existing zoological and botanical gardens

Actions:

1. Expand the scope of botanical gardens in each region, to include valuable and unique agicultural diversity
2. Expand the scope of zoological parks in each region, to include indigenous livestock and poultry

7.2.4 Sustainable Use

The survival of domesticated biodiversity is critically dependent on the sustainability of agriculture and pastoralism, which has been severely threatened over the last few decades by ecological degradation, chemical poisoning, reduction in the genetic base, the spread of monocultures, the shrinking of pastures, and so on. Large-scale efforts are, therefore, needed to bring agriculture and pastoralism back on to a sustainable footing. For this, the following strategies and actions are recommended:

Strategy 7.2.4.1: Use the public distribution system (PDS) to relate agrobiodiversity to food, nutrition, and livelihood security

Action:

1. Integrate agrobiodiversity and related livelihoods into the Public Distribution System

Strategy 7.2.4.2: Integrate agrobiodiversity into health and food related programmes

Actions:

1. Integrate locally available foods into the Food for Work programme
2. Integrate locally available foods into balwadis, anganwadis, mid-day meals, and other such governmental programmes
3. Integrate nutritionally superior local foods into public health programmes

Strategy 7.2.4.3: Ensure the sustainability of agricultural and pastoral lands

Actions:

1. Regenerate, maintain, and enhance the sustainable productivity of agricultural land
2. Ensure water security for agriculture through decentralised means
3. Ensure fodder security for pastoral and agricultural communities
4. Facilitate the availability of adequate organic manure and draft power

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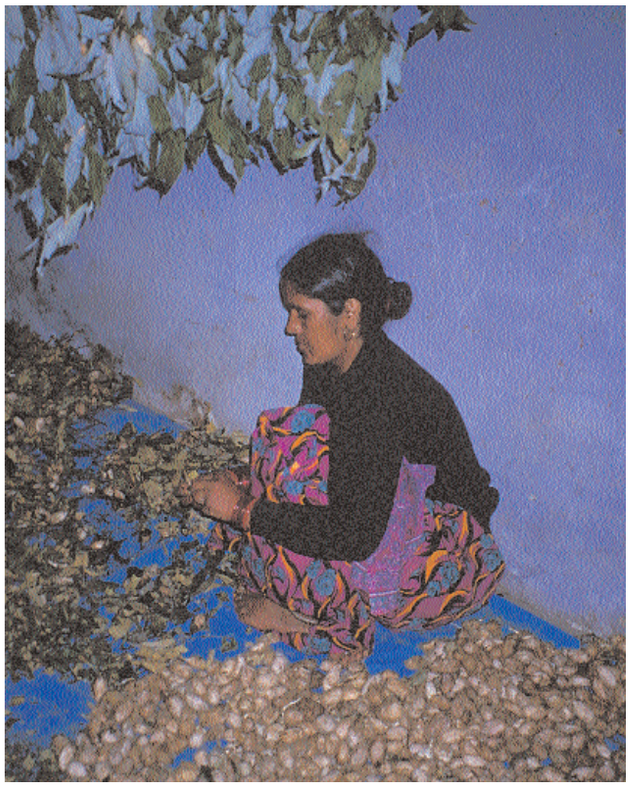
▲ *Soliga adivasi with traditional variety of bananas; women have a vast knowledge base that needs recognition*



SEEMA BHATT

▲ *Sericulture in Uttaranchal, using oak leaves, has become a key stake in the conservation of the Himalayan oak-rhododendron forests*

Strategy 7.2.4.4: Encourage sustainable pisciculture, apiculture, sericulture, and supplemental agriculture-based livelihoods

Actions:
1. Facilitate agrobiodiversity-based enterprise and livelihoods
2. Promote sustainable cultured fisheries
3. Promote sustainable apiculture
4. Promote sustainable sericulture
5. Promote sensitive tourism based on agrobiodiversity

Strategy 7.2.4.5: Promote organic consumer networks and markets

Actions:
1. Promote organic food and agro-produce markets
2. Encourage organic consumer networks

7.2.5 Equity

Inequities in the control over, access to, and benefits from, domesticated biodiversity (and the related land/water), is one of the root causes of the erosion of such biodiversity. India has traditionally had significant inequities in land-holding and other critical aspects of agriculture, and these have of late been increased by the models of agricultural development used. It is therefore important to move towards the achievement of equitable arrangements in a range of situations. The following key strategies and actions are recommended:

Strategy 7.2.5.0: Strategies adapted from Section 7.1.5.2 on Encroachment, 7.1.5.3 on Equity in Ecosystem Initiatives, 7.1.5.4 on Traditional Knowledge, and 7.1.5.5 on Equitable Benefit-sharing.

Strategy 7.2.5.1: Ensure secure tenure to farmers, pastoralists, artisans and fisherfolk, over land/water.

Actions:
1. Clarify and update land records
2. Provide secure and clear tenure based on the above update
3. Remove encroachments by vested interests on grazing lands, make legal land classification compatible with actual uses, and develop a pasture land policy

Strategy 7.2.5.2: Move towards land redistribution for disprivileged sections

Action:
1. Redistribute surplus lands amongst landless and marginal farmers

Strategy 7.2.5.3: Integrate gender equity into agriculture

Actions:
1. Introduce women's perspectives on yield and biodiversity into agricultural extension and information dissemination work
2. Move towards women occupying at least half of the agricultural extension personnel positions
3. Integrate gender aspects squarely into the national and state level policy and strategy documents
4. Secure land and water rights for women
5. Provide incentives to women for maintaining agrobiodiversity
6. Establish rural enterprises based on traditional crops
7. Take culturally and ecologically appropriate measures to reduce drudgery of agricultural practices

Strategy 7.2.5.4: Enhance livelihood security of nomadic pastoralists

Actions:

1. Ensure secure access to resources (pasture land and drinking water)
2. Review existing breeding policy through a consultative process involving all stakeholders
3. Develop role model facilitation for Government functionaries
4. Provide recognition and rewards for conservers of local breeds
5. Bring changes in the educational system
6. Enhance networking, documentation and dissemination

Strategy 7.2.5.5: Clarify ownership of seed collections, and ensure equitable benefit-sharing from their wider use

Actions:

1. Repatriate information on *ex situ* accessions to the communities of origin
2. Clarify ownership of the genetic material in *ex situ* collections, and ensure equitable benefit-sharing

7.2.6 Education, Awareness, Training

As in the case of wild biodiversity, there is a dire need for enhancing the capacity of all sectors to understand the issues relating to domesticated biodiversity. For this purpose, the following key strategies and actions are recommended:

Strategy 7.2.6.0: Strategies adapted from Section 7.1.6.1 on Public Functionaries and Governance Institutions, 7.1.6.3 on NGOs, 7.1.6.4 on Formal Education System, 7.1.6.5 on Non-formal Education, 7.1.6.6 on Urban Residents, 7.1.6.8 on Workers and Labour Unions, 7.1.6.9 on Judiciary and Legal Functionaries, 7.1.6.10 on Financial Institutions, 7.1.6.11 on Armed Forces, Police, and Customs, 7.1.6.12 on Corporate and Business Sector, 7.1.6.13 on Media, 7.1.6.14 on Religious and Spiritual Leaders and Institutions, and 7.1.6.15 on Information Dissemination through Public Transport.

ASHISH KOTHARI

▲ *Adivasi museum in Kerala, creating awareness regarding traditional medicinal practices; such field-based educational techniques are vital*

Strategy 7.2.6.1: Build capacity of scientific community to address domesticated biodiversity issues

Actions:

1. Make necessary modifications to the curriculum of all courses in agricultural and health education
2. Build capacity of agricultural extension workers

Strategy 7.2.6.2: Build capacity of rural communities to address domesticated biodiversity issues

Actions:

1. Enhance awareness of larger biodiversity issues amongst local communities
2. Organise local, state, and national biodiversity festivals
3. Promote the documentation and revival of traditional knowledge through agrobiodiversity contests
4. Document traditional knowledge through Community or People's Biodiversity Registers (CBRs) while ensuring its protection

7.2.7 Inter-sectoral Coordination and Integration

Since agriculture and pastoralism are an integrated part of larger land/waterscapes, their harmonious linkages with other aspects of land and water use are critical in ensuring the survival of domesticated biodiversity. A lack of inter-sectoral and inter-departmental coordination in the past has meant that many developmental

activities have ended up eroding domesticated biodiversity and sustainable farming or pastoral systems. Hence the need for steps to integrate domesticated biodiversity into different sectors. The following key strategies and actions are recommended:

Strategy 7.2.7.0: Strategies adapted from Section 7.1.7.1 on Inter-sectoral Coordination, 7.1.7.2 on Water Planning, 7.1.7.3 on Energy and Infrastructure Planning, 7.1.7.4 on Mining, and 7.1.7.5 on International Relations.

Strategy 7.2.7.1: Integrate domesticated biodiversity into relevant sectoral plans and programmes, other than those in 7.2.7.0.

Actions:
1. Integrate agrobiodiversity into watershed development
2. Integrate agrobiodiversity into horticultural programmes

7.2.8 Policy and Legal Measures

Domesticated biodiversity suffers from a serious lack of policy and legal coverage, much more so than wild biodiversity. High priority needs to be given to this gap. For this, the following strategies and actions are recommended:

Strategy 7.2.8.0: Strategies adapted from Section 7.1.8.5 on Panchayat Laws, 7.1.8.6 on Customary Laws, 7.1.8.7 on Implementing Existing Laws, and 7.1.8.8 on Right to Information.

Strategy 7.2.8.1: Integrate domesticated biodiversity into existing policies

Actions:
1. Integrate domesticated biodiversity into policies relevant to agriculture
2. Introduce reforms in forest and wildlife related policies to protect the agricultural livelihoods of tribal and other forest-dwelling communities, and in agricultural policies to conserve forests, wetlands, and their wildlife
3. Reorient Water Policy 2002 towards domesticated biodiversity and decentralised water harvesting/use

Strategy 7.2.8.2: Formulate new policies for aspects not yet covered at policy level

Actions:
1. Formulate a comprehensive policy on domesticated biodiversity
2. Formulate a National Grazing Policy

Strategy 7.2.8.3: Integrate domesticated biodiversity into laws and associated rules, regulations and notifications

Actions:
1. Review and revise laws relevant to agriculture, to integrate agrobiodiversity into them
2. Integrate agrobiodiversity into EIA and clearance procedures
3. Make EIAs relating to agrobiodiversity mandatory for agricultural projects and processes
4. Provide legal protection to agrobiodiversity rich areas, including hotspots and hotspecks
5. Enhance biodiversity and farmers' rights protection in the Plant Varieties and Farmers' Rights Protection Act 2002 and Geographical Indications Act 1999

Strategy 7.2.8.4: Formulate new acts for missing elements

Action:
1. Enact legislation on protection of domesticated biodiversity

7.2.9 Financial Measures

Even more than in the case of wild biodiversity, there are thoroughly inadequate financial resources going to domesticated biodiversity; indeed, most funding to agriculture is oriented towards activities that further erode this diversity. Financial reforms and changes, and generation of additional funds, both for biodiversity purposes, are therefore very necessary. Some key strategies and actions that are recommended are:

Strategy 7.2.9.0: Strategies adapted from Section 7.1.9.1 on Macro-economic Policies, 7.1.9.2 on Re-orienting Budgets, 7.1.9.3 on Financially Empowering Local Institutions, and 7.1.9.4 on Generating New Resources.

Strategy 7.2.9.1: Re-orient credit and lending policies in agriculture

Actions:

1. Re-orient public sector lending to agriculture and animal husbandry
2. Provide crop and livestock insurance for organic, biodiverse farming and sustainable pastoralism
3. Introduce micro-credit schemes to encourage biodiverse farming

Strategy 7.2.9.2: Provide financial incentives to biodiverse farming

Actions:

1. Provide financial incentives for sustainable and biodiverse farming
2. Explore domestic and international markets for organic, biodiverse agricultural produce, keeping in mind ecological and equity imperatives

Strategy 7.2.9.3: Set up agrobiodiversity funds

Actions:

1. Create Domesticated Biodiversity Promotion Funds
2. Create a shifting cultivation and nomadic pastoralism fund

7.2.10 Technology

While many traditional technologies relating to agriculture and animal husbandry have been pushed out, or are in the current context ineffective, there has not been adequate replacement by culturally appropriate, ecologically sensitive technologies for farmers and pastoralists. There is, therefore, a need for exploring and spreading the use of appropriate technologies to help in moving towards sustainable, biologically diverse farming and pastoralism. The following key strategies and actions are recommended:

Strategy 7.2.10.0: Strategies adapted from Sections 7.1.4.4 on Agrobiodiversity Based Enterprise, 7.1.7.3 on Energy and Infrastructure Projects, and 7.1.10.1 on Eco-sensitive and Alternative Technologies.

Strategy 7.2.10.1: Promote technologies for organic and biodiverse agriculture

Actions:

1. Promote organic and biodiverse agricultural technologies

Strategy 7.2.10.2: Ensure that genetic engineering products and processes do not cause adverse impacts to biodiversity, health, and livelihoods

Action:

1. Ensure that genetically engineered or modified organisms used in agriculture and health, are safe for biodiversity and human health[1]

[1] The original draft of this document recommended a moratorium on GMOs. This was modified at the request of MoEF which pointed to the government's existing policy as being in contradiction to such a recommendation.

7.2.11 International Fora

As in the case of wild biodiversity, India has been fairly pro-active in various international forums relevant to agriculture and agrobiodiversity. However, in some cases it has not adequately pushed the cause of sustainable agriculture and of the rights of small-scale farmers, pastoralists, and fisherfolk. To enhance its role at international forums, the following key strategies and actions are recommended:

Strategy 7.2.11.0: Strategies adapted from Section 7.1.11.3 on Civil Society Networking; and 7.1.11.4 on Using Human Rights and Environment Instruments.

Strategy 7.2.11.1: India to advocate strengthening of biodiversity integration into agriculture-related agreements and forums

Strategy 7.2.11.2: India to advocate integration of biodiversity concerns into non-agricultural agreements and forums

7.3 Positive Links Between Wild and Domesticated Biodiversity

Considering that most of India's landmass is under some kind of domestication, and that even "wilderness" areas have considerable interspersal of domesticated landscapes and species, it is critical that positive links between the wild and the domesticated are encouraged. This is a seriously neglected arena of research, action, and policy-making. The following actions are suggested:

Actions:

1. Study the positive relationships between wild and domesticated biodiversity
2. Provide incentives to farmers and pastoralists that have pro-wild biodiversity practices
3. Generate awareness amongst different sectors, of the actual and potential synergism between wildlife and agriculture
4. Conserve the wild relatives of crops and livestock

7.4 Prioritisation of Strategies

Since it is not possible for all the strategies in the National Action Plan to be taken up simultanously or with equal resources, an exercise has been done to prioritise them. For this, the following three criteria have been used:

- **urgency**, denoting the immediacy of the strategy, including strategies that need immediate initiation even if their execution may take long;
- **overall impact**, denoting the level to which the strategy will have a significant, national-level impact, including localised impacts of national significance, such as the conservation of a highly endemic species;
- **current neglect**, denoting the adequacy or inadequacy with which the strategy is currently being addressed.

Based on this, the following strategies are considered to be the highest priority:[1]

7.0.1	Adopt a Landscape/Waterscape or Ecoregional Approach to Planning
7.1.1.3 and 7.2.1.4	Enhance Understanding of Links Between Cultural (Including Linguistic) Diversity and Biological Diversity
7.1.2.3	Strengthen Conservation Outside PAs and CCAs, Across The Entire Rural Land/ Waterscape
7.1.4.1	Integrate Sustainability Principles into all Resource Use Policies, Laws, and Programmes
7.1.4.4	Ensure and Facilitate Sustainable Livelihoods
7.1.5.4 and 7.2.5.0 (iii)	Protect Traditional Knowledge, and Ensure Equitable Benefits from its Wider Use
7.1.6.1 and 7.2.6.0 (i)	Build Capacity of Public Functionaries and Governance Institutions to Address Biodiversity Issues
7.1.6.10 and 7.2.6.0 (viii)	Orient Financial Institutions to Support Biodiversity Activities
7.1.6.11	Build Capacity of the Armed Forces, Police, and Customs

[1] This prioritisation was done as a collective activity by the NBSAP Technical and Policy Core Group.

7.6.1.12	Build Capacity of the Corporate And Business Sector
7.1.6.13 and 7.2.6.0 (xi)	Build Capacity of the Media
7.1.6.14 and 7.2.6.0 (xii)	Build Capacity of Religious and Spiritual Leaders and Institutions
7.1.7.1 and 7.2.7.0 (i)	Integrate Biodiversity Concerns Through Inter-Sectoral Coordination, at all Levels of Planning
7.1.7.2 and 7.2.7.0 (ii)	Integrate Biodiversity Into Water Planning
7.1.7.3	Integrate Biodiversity into Energy and Infrastructure Planning
7.1.7.4	Integrate Biodiversity into the Mining Sector
7.1.9.1 and 7.2.9.0 (i)	Review Macro-economic Policies, Programmes, and Incentive Systems, from the Biodiversity Point of View
7.1.9.2 and 7.2.9.0 (ii)	Re-orient National and State Budgets
7.2.1.2	Monitor the Status of Domesticated Biodiversity Across India
7.2.2.1	Conserve Biologically Diverse Cultivated and Husbanded Landscapes and Sites
7.2.2.3	Promote *In Situ* Conservation Through Participatory Crop and Livestock Development
7.2.2.4	Revive Domesticated Biodiversity and Regenerate Diverse Agro-Ecosystems where they have Eroded
7.2.4.1	Use the Public Distribution System (PDS) to Relate Agrobiodiversity to Food, Nutrition, and Livelihood Security
7.2.4.2	Integrate Agrobiodiversity into Health and Food Related Programmes
7.2.6.0 (iii)	Adapted from 7.1.6.4 (Formal Education System)
7.2.6.2	Build Capacity of Rural Communities to Address Domesticated Biodiversity Issues
7.2.7.1	Integrate Domesticated Biodiversity into Relevant Sectoral Plans and Programmes
7.2.8.0 (i)	Adapted from 7.1.8.5 (Panchayat Laws)
7.2.8.3	Integrate Domesticated Biodiversity Into Existing Laws and Associated Rules, Regulations and Notifications
7.2.9.1	Re-Orient Credit and Lending Policies in Agriculture
7.2.9.2	Provide Financial Incentives to Biodiverse Farming
7.2.11.2	India to Advocate Integration of Biodiversity Concerns into Non-Agricultural Agreements and Forums
7.3	Strengthen the Positive Links between Wild and Domesticated Biodiversity

In addition, a second list of high priority strategies (which scored just below the ones above) is as follows:

7.0.2	Strengthen a Decentralised Natural Resource Governance Structure
7.1.1.1	Consolidate, Increase and Update the Knowledge on Ecosystems and Taxa
7.1.2.2	Strengthen and Support Community Conservation Areas, Including Sacred Sites
7.1.2.4	Conserve and Rehabilitate Threatened, Endemic, and Other Species of Conservation Significance
7.1.2.6	Tackle 'Non-Utilisation' Threats to Natural Ecosystems and Species
7.1.4.2	Ensure Sustainability of Aquatic Biological Resource Uses
7.1.4.3	Ensure Sustainability of Terrestrial Biological Resource Uses
7.1.4.5	Ensure that Tourism and Pilgrimage are Ecologically and Socially Sensitive
7.1.5.1	Secure Community Tenure over Natural Resources
7.1.5.2 and 7.2.5.0 (i)	Develop a Socially and Ecologically Sensitive Process for Dealing with Disputed Claims and 'Encroachments' on 'Forest' Lands
7.1.5.3 and 7.2.5.0 (ii)	Ensure Equity in Ongoing Ecosystem Management Initiatives
7.1.5.5 and 7.2.5.0 (iv)	Ensure Equitable Sharing of Benefits Arising from the Use and Marketing of Community-Managed or Developed Resources
7.1.6.4	Integrate Biodiversity into the Formal Education System, Convert it into "Learning for Life"
7.1.6.6 and 7.2.6.0 (v)	Spread Biodiversity Awareness amongst Urban Residents
7.1.6.9	Build Capacity of the Judiciary and Legal Functionaries
7.1.7.5	Ensure Integration of Biodiversity in all International Relations

7.1.8.2	Formulate New Policies for Aspects that have so far not been Dealt with at a Policy Level
7.1.8.3	Integrate Biodiversity into Existing Statutes and Associated Rules, Regulations, and Notifications
7.1.8.4	Formulate New Acts for Missing Elements
7.1.8.5	Integrate Biodiversity and Equity into Panchayat Legislation, and Make it Effective and Accountable
7.1.8.6	Strengthen Customary Law
7.1.8.7	Strengthen/Create Mechanisms for Implementing Existing Legislation
7.1.9.3 and 7.2.9.0 (iii)	Financially Empower Institutions Of Local Governance
7.1.11.2	India to Advocate Biodiversity Integration into Non-Environment Related Agreements
7.2.2.2	Conserve and Re-Introduce Threatened Domesticated Biodiversity
7.2.4.3	Ensure the Sustainability of Agricultural and Pastoral Lands
7.2.5.1	Ensure Secure Tenure to Women & Men Farmers, Pastoralists, Artisans and Fisherfolk over Land/Water
7.2.5.2	Move Towards Land Consolidation and Redistribution for Disprivileged Sections
7.2.5.3	Integrate Gender Equity into Agriculture
7.2.5.4	Enhance Livelihood Security of Nomadic Pastoralists
7.2.6.0 (iv)	Adapted from 7.1.6.5 (Non-formal Education)
7.2.6.0 (x)	Adapted from 7.1.6.12 (Corporate and Business Sector)
7.2.6.0 (xiii)	Adapted from 7.1.6.15 (Information Dissemination through Public Transport)
7.2.7.0 (iii)	Adapted from 7.1.7.3 (Energy and Infrastructure Planning)
7.2.8.1	Integrate Domesticated Biodiversity into Existing Policies
7.2.8.4	Formulate New Acts For Missing Elements
7.2.8.5	Strengthen/Create Mechanisms For Implementing Legislation
7.2.9.0 (iv)	Adapted from 7.1.9.4 (Generating New Resources)
7.2.10.0 (i)	Adapted from 7.1.4.4 (Agrobiodiversity Based Enterprise)
7.2.10.0 (ii)	Adapted from 7.1.7.3 (Energy and Infrastructure Projects)
7.2.10.1	Promote Technologies for Organic and Biodiverse Agriculture

8. Implementation Mechanism for NBSAP

[*For a more detailed description, pl. see Chapter 8 of the full report.*]

Implementing this action plan is going to require the sustained effort of all sections of Indian society. Specific responsibilities are stated in the case of each strategy/action in the preceding chapter (in the full report). However, there is a need for an overall implementation mechanism, which could help to facilitate and coordinate the actions being taken. Necessarily, and leading on from the recommended Planning and Governance structure proposed above, this implementation mechanism needs to be rooted in ground-level institutions and processes of participatory decision-making.

The suggested implementation mechanism for the NBSAP incorporates the institutional structures of the Biological Diversity Act 2002 (BD Act), and adds to it some other institutional mechanisms to ensure the participation of as widespread a section of India's population as possible.

Implementation is suggested at the following levels:

1. Local Level Implementation

Primary implementation of several strategies and actions will need to be done by local level bodies. These would include Gram Sabhas or village assemblies or corresponding bodies in tribal areas, or Biodiversity Management Committees proposed under the BD Act (with the clear proviso that such committees should be set up by Gram Sabhas or full village councils, and not by outside agencies or even by panchayats). Also important here would be larger land/waterscape institutions or district level bodies such as District Planning Committees, to ensure coordinated action by the local level bodies, as suggested earlier.

2. State Level Implementation

It is suggested that at the state level, implementation is coordinated through State Biodiversity Boards (SBBs). SBBs have also been recommended as coordinating bodies in the BD Act.

3. Ecoregional (Inter-State) Implementation

It is suggested that there be inter-state Ecoregional Authorities (EAs) with representatives of Biodiversity Management Committees or other village-level institutions (especially from communities residing near the state border or those migrating back and forth between relevant states), State Biodiversity Boards (SBBs), NBSAP executing agencies, and others.

4. National Level Implementation

4.1 National Biodiversity Authority (NBA) and NBSAP Implementation Committee

The BD Act proposes that the coordination and regulation of biodiversity-related work in the country be done by the NBA. It is suggested that the same authority also be responsible for the implementation of NBSAP through a NBSAP Implementation Committee set up for the purpose, consisting of representatives of communities and people's networks that have taken initiatives in biodiversity, relevant ministries, state governments by rotation, the Planning Commission, selected NBSAP nodal agencies and coordinators, representatives of the Indian Board for Wildlife and other relevant national boards/committees. Its composition should ensure a balanced representation of officials, NGOs/institutions, community members, and other sectors.

4.2 Government of India Ministries

To ensure that inter-sectoral coordination is taking place, it is essential that all the relevant ministries also be involved in the process. Specifically, it is recommended that each ministry appoint a high-level officer to deal with biodiversity issues as relevant to the subject of the ministry.

4.3 Planning Commission

It is suggested that a separate Working Group on Biodiversity be set up within the Planning Commission, with a

mandate to ensure implementation and revisions relating to biodiversity in the 10th Five Year Plan (2002-2007), and work towards fuller integration of biodiversity issues in the 11th Five Year Plan.

5. State and National Biodiversity Networks

There now exists an extensive informal network created as a result of the NBSAP process, at local, state, and national levels. Many of the NBSAP executing agencies and participants have time and again requested that this network be recognised, sustained, and involved in the implementation of NBSAP. It is suggested that this entity, titled the National Biodiversity Network (NBN), function as an independent but complementary and linked body to the NBA. Its major mandate should be to facilitate, and act as a lobby and watchdog for, the implementation of NBSAP by the proposed Implementation Committee of NBA.

6. Implementation Indicators and Monitoring

The proposed NBSAP Implementation Committee of NBA and the National Biodiversity Network should jointly prepare a series of implementation indicators, for the purpose of monitoring the success (or otherwise) of implementation measures. Some suggested indicators are quantum of research and documentation, area brought under effective conservation, number of relevant institutions set up, level of integration of biodiversity into various economic sectors, level of involvement of disprivileged sections in relevant programmes, quantum of budgets dedicated to biodiversity, and so on.

Of the various measures that would facilitate the implementation of the NBSAP, one of the more powerful would be the Biological Diversity Act, 2002. In turn, the NBSAP would help to carry out the provisions of the BD Act.

List of Material Produced as Part of NBSAP Process

(Note: This refers only to material produced by the central team of NBSAP. A lot of material, including in local languages, was produced by the various local, state, ecoregional, and thematic groups, which is not listed here.)

1. *NBSAP India: Guidelines and Concept Papers*. 2000. (containing a set of 19 methodological and cross-cutting notes on topics such as Guidelines for Process Documentation, Integrating Biodiversity in Sectoral Planning, Role of Armed Forces, International Issues, and concept notes for 13 thematic BSAPs, etc.)
2. Other concept papers subsequently produced: District Planning and Biodiversity Integration; Guidelines for Conducting Public Hearings; Threat Assessment for NBSAP; Consolidated Intersectoral Integration Matrix from Regional Workshops; Issues of Gender and Biodiversity in NBSAP; Note for Involvement of Politicians.
3. *Proceedings of the Inaugural National Workshop*. June 2000.
4. Mid-term National Workshop Papers. June 2001.
5. *Proceedings of the Mid-term National Workshop*. June 2001.
6. *Call for Participation* (in 16 languages). 2000.
7. *NBSAP News* (14 issues, October 2000 to December 2002)
8. Posters on NBSAP (English, Hindi and blank with NBSAP logo)
9. 2001 Calendar (with information and illustrations related to NBSAP)
10. *Hindu Folio* (special issue on biodiversity by *The Hindu* newspaper). May 2001
11. NBSAaaanP Tales (monthly story on biodiversity in the English version of *Chandamama* - a children's magazine). Starting February 2002, 26 stories were published.
12. *Vasudha* (special supplement on biodiversity for *Chandamama* - a children's magazine, in 12 languages). June 2002.
13. NBSAP Compact Disc (CD) with various guidelines and concept papers, 5 issues of NBSAP News, photographs etc.
14. Proceedings (in draft or final form) of the 5 regional workshops. 2001 and 2002
15. Several articles in newspapers and magazines, journals and magazines (full list available on request).
16. Guidelines and methodological notes in several local languages.
17. *Securing India's Future: The National Biodiversity Strategy and Action Plan*. A brochure in English and Hindi, produced mid-term through the process.
18. The Communication Challenge in India's NBSAP, an analytical write up.
19. Final National Workshop Papers. December 2002
20. Executive Summaries of BSAPs and sub-thematic papers, December 2002
21. *Good Earth*, a monthly column in Hindu Young World (12 articles, May 2003- April 2004)

A documentary film entitled *Securing India's Future: On the Trail of the National Biodiversity Strategy and Action Plan* has also been produced on the NBSAP process; this is available with Vijendra Patil, Bars and Tone Films, Pune (vppatil@vsnl.com), or with Kalpavriksh (kvbooks@vsnl.net), at Rs.100 plus postage.

A detailed document of the NBSAP process is also going to be published separately.

The most comprehensive compilation on India's biodiversity

This CD contains the following:

1. *Full text* of the Final Technical Report of the National Biodiversity Strategy and Action Plan (NBSAP), in two volumes (see box on Structure of the Final Technical Report, pg. 4 of this publication).
2. *Concise version* of the above (soft copy of this publication)
3. *Biodiversity Strategy and Action Plans* (BSAPs) for the following (for a full list, see pg. 2 of this publication):
   - 28 states and union territories
   - 16 sub-state or local sites
   - 12 thematic areas
   - 10 ecoregions (cutting across state boundaries)
4. *Points of commonality* between the strategies of the state, sub-state, ecoregional BSAPs and those of the national report
5. *Subthematic papers* for 35 topics (see full list on pg. 2 of this publication)
6. Over 20 *conceptual and methodological notes* used in the NBSAP process (see "List of Material Produced as Part of NBSAP Process", behind inside cover of this publication)
7. *Images* of the NBSAP process

Together, this runs into several hundred pages packed with information and analyses, on all the thematic and geographical aspects of biodiversity in India. This is the most comprehensive such compilation ever put together for this country.