

Report of the Working Group on Ecosystem Resilience, Biodiversity and Sustainable Livelihoods for the XII Five-Year Plan

Planning Commission – Environment & Forest Division
Steering Committee – Environment, Forests & Wildlife and Animal Welfare

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I. Introduction

India stands today at the cross-roads where it is becoming abundantly clear that not paucity of funds, but deficit in governance is the most significant challenge before the society. A frank assessment of the current functioning of Forestry and Wildlife Establishment brings out that:

1. Given the extremely weak base, often subject to deliberate manipulation, of empirical information, and lack of democratic culture of science, the management is far from scientific.
2. The management has been entirely non-sustainable.
3. The management has been socially unjust, resulting in grave unrest over much of the forested belt and seascapes of the country.
4. The management is economically inefficient and highly wasteful of resources.

We must therefore make new beginnings. We must empower people in sound management of natural resources to strengthen democracy and to ensure transparency and openness. We have an adequate framework of legislations (73rd and 74th Amendments to Constitution, Panchayats (Extension to Scheduled Areas) Act, Biological Diversity Act and FRA) that can potentially permit us to substitute the current system with a people-oriented system that would be genuinely environment friendly. Hence the focus of our XII FYP should be towards honest implementation of these Acts in their true spirit.

On the threshold of the XII Five Year Plan, it is an appropriate juncture at which to undertake a fresh assessment of the biodiversity sector from a scientific perspective. The spirit of science is captured well in J D Bernal's (1939) definition that "science is an organized enterprise of skepticism".¹ Professor Satish Dhawan, who served as Secretary, Space Department of Government of India from 1972-80 was such a true scientist. He was very skeptical of the claims of Forestry establishment that as much as 23% of the country's land was under forest cover. So he asked his colleagues in Space Department to undertake an independent assessment with the help of the satellite imagery. Their estimate was far lower, at 14%. This stimulated a healthy dispute leading to a so-called reconciliation at 19%. Unfortunately, the skeptical spirit was then buried, with handing over the job of continual monitoring of forest cover with the help of the satellite imagery to Forest Survey of India, an agency of the Forestry establishment itself, and naturally unable to act independently.

Another pithy statement of what the scientific spirit is, comes from the mathematician-philosopher Whitehead (1927): "Modern science accepts brute facts, whether reasonable or not!"² One such set of brute facts relates to existence of paper tigers. When tigers were no more being sighted at Sariska, despite the official claims that many existed, the PM set up a Tiger Task Force (2005). The Task Force could access information available with the field staff and could put together the following picture (Tiger Task Force 2005):

Table 1: Tiger population estimates in Sariska Tiger Reserve

Year	1998	1999	2000	2001	2002	2003	2004
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¹ Bernal, J D 1939 Social Functions of Science

² Whitehead, A N 1927 Science and the Modern World

Tiger population (official census)	24	26	26	26	27	26	17
Tiger estimates by field staff	17	6	5	3	0	1	0

Evidently, the establishment was deliberately circulating misleading information. In spite of the Tiger Task Force putting this on record, no action was ever initiated to penalize those responsible for this perjury. Whether deliberate omissions or simply a lack of imagination, these practices have resulted in a tremendous loss of biodiversity not just of landscapes but also of the coastal and marine social-ecological systems. There is thus abundant evidence that business as usual will simply not do. We need mechanisms and institutions for democratic governance that is transparent and accountable using the best that science and policy can provide. In this report we build on these guiding pillars as we make recommendations for the XII Five Year Plan.

II. Public Accessibility of Information and Research

Conservation and sustainable use of biodiversity require accurate data in space and time. This data needs to be constantly updated and the information generated needs to be quickly disseminated across stakeholders for adaptive management decisions at local, regional and national levels. The National Biodiversity Authority estimates that about 115 governmental and non governmental institutions are involved in the collection of data related to biodiversity and environment. This data is either spatial (e.g. species occurrence, water pollution), temporal (e.g. population trends of species, yearly harvest and trade of commercial species) or descriptive (e.g. species descriptions, habitat details, wildlife crime). The data generated by these agencies are currently used for specific objectives such as species inventory, pollution monitoring and wildlife crime control. Unfortunately, this data tends to not be available to multiple stakeholders or for meta-analysis across space and time which can then feed into management and policy reform.

We propose that a national information grid for biodiversity, ecology and environmental data sets for scientific documentation, monitoring and management of biodiversity and natural resources is developed. This database should be an open, transparent and comprehensive web-based Environmental Information System. The openness and transparency would allow for scrutiny as well as modifications/additions by members of the public and would greatly facilitate better management of environmental resources in the country. The resource will cover various landscapes including forests, coastal stretches, territorial waters of the country's EEZ, mountains and desert regions of the country.

The Western Ghats Ecology Expert Panel of the Ministry of Environment and Forests has made excellent progress in the development of such a spatial database, for over 2200 grids of 5'x5' or roughly 9 km x 9 km through compilation of all readily available information on topography, land cover and occurrence of biodiversity elements for the Western Ghats. XII FYP schemes should pursue vigorously further development of this database, and its extension to other parts of the country, by networking many available databases, such as the National Knowledge Commission endorsed Knowledge portals such as the India Biodiversity Portal (IBP), and other portals such as the Indian Bioresource Information Network (IBIN), and that prepared in connection with Zonal Atlases for Siting of Industries, and Goa Regional Plan 2021. the FYP should also sponsor further scientific inputs, as also by linking Environmental Education activities at school

and college level and the People's Biodiversity Register exercises to augment the database. For marine areas, databases and systems developed by the Central Marine Fisheries Research Institute, Indian National Centre for Ocean Information Services, Indian Ocean Census of Marine Life, the National Institute of Oceanography, and the National Institute of Ocean Technology can be used.

XII FYP schemes should encourage citizen involvement in continual development of such a database on the pattern of Australian River Watch schemes. In this context, the Ministry of Environment & Forests should help overcome the entirely unjustifiable difficulties that researchers encounter today in working in forest areas. The Ministry of Environment & Forests should pursue concerned Government agencies to make available all pertinent information proactively as provided in the Right to Information Act, and not wait for applications by citizens. For example the Ministry of Environment and Forests should immediately make public all district level Zonal Atlases of Industries in a searchable form on the Ministry's website, which may then be linked to the proposed national information grid for biodiversity.

The MOEF, the Department of Science and Technology, the Department of Biotechnology and other funding agencies should make it mandatory that after completion of a project, the scientific data along with meta data should be deposited in the National Biodiversity and Environmental Data Archive after a period of 3 years. During the 3 year period, scientists involved in the project should publish reports, papers and books and this also should be submitted to the data archive.

III. Monitoring and Adaptive Management of Ecosystem Services and Biodiversity

III.1. National Environmental Monitoring Programme

There should be a unified National Environmental Monitoring Programme as opposed to the separate, disparate programmes on forest monitoring, air quality and river and ocean pollution that currently exist. The NEMP should be focused on tracking status and change in socially relevant biophysical parameters, and their social impacts, and on making this information available as widely as possible; it should be a real-time sharing of data on environmental parameters. The NEMP will consist of a mix of national, regional and local programmes. It will be in compliance with the *suo moto* disclosure requirements of RTI of all MoEF agencies and subordinate offices as a part of MoEF's e-governance initiative and will be distributed from the bottom-up among governmental and non-governmental entities. The NEMP should consist of a special portal for environmental data from school and college student projects and there should be a Technical Support System for this portal. In order to ensure accessibility, all key information should also be available in Indian languages on the internet and in hard copy form.

III.1.1. National Forestry Information System

The National Forestry Information System should enable networking with states for tracking changes in forest development, harvesting, trade and utilization scenario with particularly focus on issues of ownership and rights over land and forests.

The Forest Survey of India should develop a culture of openness and collaboration and become an active partner with the National Environmental Monitoring Programme. Its present scope is limited to canopy cover density classes. It is to be supplemented by other aspects to provide better basis in planning for productivity, enrichment, biodiversity and regeneration of forests managed by state governments.

We urgently need to set up a collaborative, bottom-up forest cover monitoring system or programme involving independent research organizations, state remote sensing centers, civil society groups and FSI. In addition, this monitoring system should also include ecosystem service flows & values (hydrological regulation, soil conservation, carbon sequestration, pollination services of forests).

III.1.2. Forest Land Information System

We propose putting together a non-spatial database with records for each parcel of public land (forest and revenue) that indicate its settlement history and status. This would involve scanning, digitization, and eventual geo-spatial registration of forest survey and village cadastral maps. Frontline survey and working plan staff need to be trained, as well as community members, in the use of GPS and other instruments in their survey work, and in registering their survey work onto the geo-referenced database. We should experiment with manual and participatory GIS approaches in the micro-planning setting, and work on integrating these micro-plans into higher level working plans.

III.1.3. Invasive monitoring system

India lacks a national invasive species monitoring system to track the introduction and spread of invasives. Such a system should be linked to the state forest departments and field staff should be trained to collect information on invasives and feed it into the NEMP. Refer to later section titled “Invasive species management”.

III. 1.4. Building a knowledge base on coastal and marine resources

Coastal and marine conservation in India requires not just substantial information to inform management and policy, but there is a critical need to integrate science with traditional knowledge systems and facilitate greater involvement of communities/community based organisations in monitoring resource use, status, history and ongoing changes. This will lead to better information flow within and between target groups and ensure that the communities/resource managers are empowered to play their roles effectively in conservation.

a) Creating vital information on spatio-temporal trends in responses of ecosystem/species to human and climate induced variations by initiating long-term monitoring of ecosystems and to develop valuable baseline information that will be critical in taking informed management decisions

b) Understanding critical ecosystem processes, identifying and bolstering the inherent resilience of ecosystems to climate and manmade perturbations

- c) Evaluating impacts of resource exploitation (especially fisheries) on the functionality of coastal and marine ecosystems and evaluate efficacy of different management practices

III.2. Strengthening Taxonomy

Taxonomy, the science of discovering, naming and classifying living organisms, is crucial to biodiversity conservation and meeting development challenges of the 21st century, particularly in developing countries. Today, we are losing species faster than they can evolve or be discovered, which means that our scientific surmises on taxonomy, evolution, ecology, biodiversity and molecular biology are less robust than we assume. The implications are vast and serious for all enterprises ranging from forestry to medicine that require sound taxonomic foundations. For example high quality taxonomic research is vital for poverty reduction through sustainable agriculture, forestry, and fisheries, for combating insect pests and human diseases, and for sustainable national and international trade in biological products without endangering indigenous plant and animal species.

Less than 100,000 species have been described out of an estimated million species in India, showing the pressing need for strengthening taxonomic efforts in India. Despite this, the science of taxonomy in India has been declining for several years now, with very few qualified scientists. Indian taxonomists are also isolated from their counterparts in the country, the global community of taxonomists, international taxonomic networks, and global centers of taxonomic research due to restrictions on exchange of biological materials. The situation is much worse in the coastal and off-shore marine habitats of India with no specialists in identifying many of the invertebrate taxonomic groups. At the same time, access to natural habitats for collection and exploration is progressively getting curtailed due to bureaucratic hurdles. Thus the capacity of Indian plant and animal taxonomists to take up basic and applied research to respond to the country's needs in biodiversity conservation that include (a) meeting the United Nations Millennium Development Goals, and (b) the requirements of international agreements such as the Convention on Biological Diversity, is extremely limited.

Recommendations to strengthen the science of taxonomy in India:

- Establish centers of excellence in systematic biology that incorporate conventional and modern molecular, digital and computational tools and approaches of taxonomy in universities and other knowledge-based institutions. These centers should (a) facilitate the completion of inventories of the country's flora and fauna and compilation of People's Biodiversity Registers, (b) train systematic biologists in nation and international institutions of repute and provide financial support so that they can visit foreign natural history museums and collections to facilitate revisionary/monographic studies, (c) offer basic systematic biology courses in the curriculum for undergraduate biology students, (d) facilitate the use of information technology to organize and disseminate taxonomic data, and support public biodiversity portals to engage civil society in collating biodiversity information, and (e) encourage publication of field guides to identify our flora and fauna to draw students and young people to the study of taxonomy, and to create awareness about the importance of biodiversity.
- It should be required that a taxonomist is assigned to every wildlife sanctuary and national park in India. In protected areas that involve coastal and marine habitats, taxonomists with specific training in identification of marine fauna need to be assigned. Universities, in biodiversity-rich areas especially, should also have competent taxonomists in the faculty.

- Enable free access for researchers to natural habitats for study and collection of specimens to enable comprehensive taxonomic revisions of our flora and fauna following modern systems of classification.
- Establish state of the art national and regional repositories for preserving type specimens and other valuable biological material for posterity at suitable locations.
- Encourage national and international collaboration in taxonomic research and free exchange of specimens for basic, non-commercial research, and promote fundamental research in biology by suitably amending the Biological Diversity Act, 2002.
- A consortium of research organizations should validate and update the Biodiversity Information System (IBIS), the Indian Bioresource Information System (IBIN) and India Biodiversity Portal (IBP) and the Indian Ocean Census of Marine Life (IOCoML).. An effort to digitize and make available existing collections of taxonomic collections should be piloted.

III.3. Human-Wildlife Conflict

Conflicts between humans and wildlife occur where humans encroach into natural habitats and increasingly where wildlife expands into human-dominated landscapes. Such conflicts are increasing in India and areas not known for such conflicts are getting into the conflict map of India. Numerous ways have been tried to reduce such conflicts which include prevention of wildlife entering human dominated areas from forests and other wild areas, translocation or elimination of problem animals, providing greater food and resources within protected areas so that animals do not move into farm lands and so on. These have met with partial success and complete success is often elusive and may not be practical given the dynamic of such conflicts.

Compensation is widely used as a way to minimize the impact of conflicts on human livelihoods. However, existing procedures are too complex, too slow, too bureaucratic, or simply corrupt. Reform of the system is crucial if it is to serve its purpose and help reduce conflict impacts because at present the flawed system actually increases the level of conflict. Once this is resolved compensation amount has to be increased.

Recommendations to reduce conflicts:

- Human wildlife conflict has a profound effect, particularly in terms of elevating production risk in marginal farming and herding systems. Rather than merely focusing on material losses faced by these communities, it would be important to recognise that risk-affected marginal production systems usually make local communities more vulnerable, and force them to offset these risks by depending further, and often unsustainably, on the natural resources they neighbour. While conventional conflict mitigation measures such as barriers and compensations remain relevant, it is of utmost importance that these interventions emerge from local, rather than centralised, decision making. A whole raft of recommendations made by the Gol's Elephant Task Force Report, particularly on empowering local communities to be more resilient to conflicts need to be supported urgently.
- Need to develop new management frameworks that accepts that wildlife exists outside PAs. This requires a whole landscape approach to conservation that jointly considers both the PAs and the human-dominated matrix in which they are embedded.
- Adopt a large-scale (whole landscape and state or national scale) coordination of wildlife conservation activities that embrace both PAs and the surrounding landscapes. To be able to do this conflicts need to be monitored on a real-time basis through a network that

makes the information available to forest managers, veterinarians, conservationists, and local stakeholders in the landscape. In addition, local adaptation to conflict should be encouraged.

- Conduct more research on the behaviour of ‘conflict animals’ and translocate animals and increase awareness of conflicts, especially those that involve endangered and threatened species.

III.4. Invasive Species Management

Invasive species have been known to cause vast ecological and economic damage. *Lantana camara* is a prime example of invasive species invasion in India. Research and monitoring by ATREE has shown that over a 11 year period, the amount of lantana in Billigiri Rangan Hills, Karnataka has doubled and replaced endemic floral species to the extent that approximately one in every three stems is lantana. This spread is causing the moist deciduous forest ecosystem of BR Hills to transform into a predominantly lantana-dominated shrubland. The spread of lantana could have been controlled if the government had launched a coordinated monitoring programme to track the spread of lantana and taken early action to stop its cultivation.

The impacts of marine invasive species are very poorly studied and documented, especially in India. A number of marine invasives and pathogens are introduced through ballast water and hull fouling. Another mode of introduction of invasive species is for the purpose of aquaculture and some species have already been reported to be a threat. Despite the severity of threats, there are only a handful (<15) of peer reviewed publications that specifically deal with marine invasive species. On the other hand, a number of international studies have identified India as a potentially susceptible area for marine species invasions on account of its location and maritime trade history spanning across a number of centuries.

III.4.1. A National Programme on Invasive Species

A national programme specific to invasive species needs to be launched. One of the aims of this programme should be to compile a national inventory of invasive species. Efforts to do this by the MoEF, the Invasive Species Specialist Group of the IUCN, etc have been largely unsuccessful so far due to the lack of collaboration and inconsistent methodologies. Therefore, a standardized protocol needs to be developed for the identification of invasive species using GIS and remote sensing technology. Invasive species identification should not be limited to invasives in forests – it should also include invasives in aquatic and marine ecosystems, grasslands, wetlands, etc.

An open, transparent nation-wide invasive species database should also be created. The inventory should not only identify invasive species, but also their distributions, their origins, their mode of introduction, their ecological characteristics, and whether or not they are invasive elsewhere. Their environmental and economic impacts should be assessed. This information can then be used to develop a predictive weed-risk assessment protocol to assess future introductions, control the spread of and eradicate existing invasive species, and generally raise public awareness of invasives. Such an initiative should involve scientists, students, the forest department and other interested citizens.

III.4.2. Local-level Initiatives

Concerned officials should train frontline forest staff and community members to monitor and control invasive species spread. Locally relevant invasives management should be funded under the MNREGA. Community members should also be trained to manufacture and market products made from invasive species. In MM Hills, for example, members of the Soliga community manufacture furniture using lantana. This was initially catalyzed by ATREE, but since then several NGOs have taken this simple technology and have trained scores of artisans to put an invasive weed to good use.

III.5. Ecorestoration

Traditionally, restoration has been viewed primarily as a means to reset the ecological clock and return an ecosystem back to some past state, often what was there prior to disturbance or damage- a biocentric approach. Some of the examples include, habitat restoration, restoring a forest stand, or recovery of critically endangered species. Other activities that aim to repair damage or restore certain ecosystem functions like nutrient retention capacity of soil, but not necessarily return the historic ecosystem, have been termed rehabilitation or, when an alternative system or land use is aimed at, reallocation- an anthropocentric approach. There is increasing recognition that many forms of repair activity are needed that cover a variety of aims, including restoring ecosystem function and services as well as particular sets of species. For e.g. of lands that need to be restored are grassy banks in the Western Ghats. The survival of pastoralism is crucial for sustainable land use in these areas. Natural grass cover under a properly regulated grazing regime may be the healthiest form of ecosystem in this context. Hence, restoration covers a wide range of activities ranging from a purist perspective, which seeks to return an exact copy of the preexisting ecosystem and all its species to a degraded area, to a less ambitious but no less worthy goals to return a degraded area to some sort of functioning ecosystem, with the basic aims of returning some sort of vegetation for erosion control or food and fiber production. Although these anthropocentric approaches are need based and differ with respect to their goals, they essentially try to restore the ecological fidelity (Structural/ compositional, functional and durability) of the region. So it should be remembered that the health of an ecosystem is not necessarily fully captured by its tree cover. We need to look at ecorestoring degraded forest and revenue lands. This would mean that some land will have grass cover restored, others wetlands, and others pertinent diverse forest types. Further, in order to assess the fulfillment of the goals of the restoration projects, monitoring plans are incorporated into these restoration activities as an integral part and the scope of restoration evaluation should fit the goals of the programme or help to redirect them.

The National Afforestation and Eco-development Board should broaden its vision to incorporate Ecorestoration as well. It should enhance the health status of non-tree covered ecosystems best maintained under grass, lichen/moss and other relevant type of vegetation. The Board should also be focused on empowering all participatory institutions to promote forest development and ecorestoration. The FDA chairperson should be elected from the chairpersons of the JFMCs, community and village forest institutions.

III.6. Strengthening the National Biodiversity Act (NBA)

There is a provision under article 8 d of CBD to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings. The decline and loss of wild populations of a number of very valuable wild species is a result of the combined impact of habitat loss and degradation as well as over-exploitation of these wild resources. Climate change is also believed to be impacting such loss but there are no serious studies that have exposed this relationship. A few recent studies, outside India, have speculated about the fragmentation and decline of wild populations of some plant and animal species in the mountains ecosystems on account of climate change. IUCN and others have developed internationally accepted criteria, methods for estimation and defined threat categories. Today however no institutions in the country, specialized on specific group of taxa or of habitats, are being supported on a long term basis by the MoEF or NBA to implement these internationally accepted guidelines for threat assessment, monitoring or recovery of species or habitats.

In fact the Ministry of Environment and Forests, Govt. of India, has no long term program, strategy or dedicated funding for assessing monitoring and recovery of populations of threatened taxa or undertaking assessment of threatened habitats.

It is proposed that in the 12th FYP NBA should be supported to coordinate an appropriately funded all India coordinated scheme for assessment, monitoring and restoration of prioritized threatened taxa and habitats. This scheme should be coordinated by NBA, although it may be implemented by a network of reputed Institutions who have the competence to study the different groups of plants, animals and habitats. Assuming 10 national institutions will be involved in the program, it is recommended that in the 12th plan a budget to the extent of Rs. 100 Cr. may be allocated to support the network of 10 specialized institutes.

Kerala has also taken the lead in meaningful implementation of Biological Diversity Act through Biodiversity Management Committees, and XII FYP should provide for taking immediate steps to ensure establishment of Biodiversity Management Committees at all levels, namely, Gram Panchayats, Taluka Panchayats, Zilla Panchayats, as also Nagarpalikas and Mahanagarpalikas throughout the country. Furthermore, the Ministry of Environment & Forests should ensure that BMCs are motivated through empowerment to levy 'collection charges' as provided in the Biological Diversity Act. The BMCs may be involved in developing programmes on the model of 'Conservation of biodiversity rich areas of Udumbanchola taluk' in Kerala. The BMCs are expected to take care of agro-biodiversity as well, and in this context the provisions of Protection of Plant Varieties and Farmers' Rights Act 2001 are highly relevant. A National Gene Fund has been established under PPVFRA and has substantial amounts available. These funds can be utilized to build capacity at Panchayat level for in situ conservation of genetic diversity of indigenous crop varieties, and XII FYP schemes should facilitate such activities.

A program for accelerating creation of People Biodiversity Registers (PBRs) in the country with special focus on bio-geographic, socio-economic and regional priorities should be implemented. The PBR should not be an end in themselves but be used to encourage developmental programs for food, health and livelihood security of local communities. In order to demonstrate impact, this program should be implemented on a minimum size and scale of 100 development projects in rural India.

IV. Strengthening Structures and Capacities for Local Environmental and Forest governance

IV.1. Forest Rights Act

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, passed in 2006 is a landmark legislation that aims to undo the historical injustice done to tribals and other forest dwellers by recognition of their forest rights. The historic significance of the Act was because forest laws often deemed tribals and other forest dwellers “encroachers” or criminals for exercising their customary rights. The Forest Rights Act (FRA) was intended to address this situation by providing legal recognition to forest dwellers' rights, while making forest management more open and participatory.

However, it has not yet succeeded fully in achieving its objectives, because of some difficulties in implementation which have in turn resulted in the majority of claims by forest dwellers in many States being rejected: in some States, rejection rates are higher than 60%. The failures to recognize community rights, especially to minor forest produce, have been even more widespread. Due process in deciding on the claims has been compromised in many cases, and specific documentary evidence is being insisted upon, contrary to the letter and spirit of the law. The gram sabhas are not being held at the village or community level as required by the law, and where these are held, their recommendations are often not given sufficient weight. One of the key innovations of the Act was to provide recognition to communities' rights to use, protect and conserve community forest resources. This was intended to be a first step to shift towards a democratic frame of forest governance. Yet, these rights have not been recognized in almost all the states.

Accordingly, the Council for Social Development (CSD) in its report on the implementation of the FRA noted that ‘all non-land rights in the Act – most of which are community rights – have largely been ignored in implementation. The Central and State governments have treated the Act as if it is a land title distribution scheme.’ The barriers to the vesting and exercising of the CFRs have been at the level of the state, gram sabha and civil society. In addition to the reticence of local bodies in claiming CFR, the resistance by the state is based on a outmoded idea that local communities do not have the capacity to manage their resources and that all forms of local use are degrading. This is based on a colonial premise of traditional practices being unscientific and degrading and that expert knowledge is important for the conservation of biodiversity or the management of forests. We might look at a few current examples to show that nothing is farther from the truth. Using the case of Biligiri Rangaswamy Temple Wildlife Sanctuary (BRT) in the Karnataka Western Ghats where ATREE has been working for the last 15 years shows that Soligas have nuanced and contextual knowledge of local ecology.

Recommendations:

- Need greater clarity on the institutional structures that the gram sabhas and collaborative institutions can use to evolve their own mechanism for forest management. These institutional structures must provide space for local and contextual flexibility.
- Need to clearly define the roles of the gram sabhas versus the forest department.
- The gram sabha needs to be empowered and identified as the primary institution. In addition, it should not be mandated that they manage resources. This gives communities

that desire to manage their resources an opportunity to do so. By identifying the gram sabha as the primary institution, the FRA builds on nascent decentralization attempts.

- Need a prescribed institutional structure by which the gram sabha can claim and receive their rights to conserve and manage their community forest area.

IV.2. Consolidating Community Rights to improve Biodiversity conservation

The foundation of FRA is the assertion that only security of tenure and formalized recorded rights in favour of forest users would lead to its responsible management and sustainability. The Act and the Rules made under FRA therefore give details of institutional arrangements for the protection, management and regeneration of community forest resources (CFR), defined in section 2(a) of FRA as customary common forest land where the communities had traditional access, or which could be construed to be customary boundaries of a village, in other words, those areas where communities can demonstrate their traditional access.

Despite the fact that the main intention of FRA was to promote community participation and management, our field work shows that recognition of individual rights has taken precedence over community or group rights, and the focus seems to be confined only to land rights for agriculture - one amongst the thirteen sets of rights recognized under the Act. Out of the remaining 12, at least the following seven rights constitute community forest rights (CFRt), the formalization of which has unfortunately been ignored by the district administration:

1. Community rights such as nistar, by whatever name called, including those used in erstwhile Princely States, Zamindari or such intermediary regimes; (Section 3(1) (b))
2. Other community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant) and traditional seasonal resource access of nomadic or pastoralist communities; (Section 3(1) (d))
3. Rights including community tenures of habitat and habitation for primitive tribal groups and pre-agricultural communities; (Section 3(1) (e))
4. Right to protect, regenerate or conserve or manage any community forest resource which they have been traditionally protecting and conserving for sustainable use. (Section 3(1) (i))
5. Rights which are recognized under any State law or laws of any Autonomous District Council or Autonomous Regional Council or which are accepted as rights of tribals under any traditional or customary law of the concerned tribes of any State; (Section 3(1) (j))
6. Right of access to biodiversity and community right to intellectual property and traditional knowledge related to biodiversity and cultural diversity; (Section 3(1) (k))
7. Any other traditional right customarily enjoyed by the forest dwelling Scheduled Tribes or other traditional forest dwellers, as the case may be, which are not mentioned in clauses (a) to (k) but excluding the traditional right of hunting or trapping or extracting a part of the body of any species of wild animal (Section 3(1) (l))

In addition to these seven rights, section 3(1)(c) recognizes right of 'ownership, access to collect, use, and dispose of minor forest produce which has been traditionally collected within or outside village boundaries', and this right is both for individuals and communities of the village.

There are a number of issues where there is lack of clarity, on the relationship between the GS and the Forest Department, and the relationship between the FRA, IFA and WLPA, in relation to

CFRt. These are yet to manifest themselves across most of India, simply because CFRs have hardly become operational as yet.

Overall, given the serious inadequacies in implementation of CFRt at all levels, there is a need for a 2nd phase of FRA implementation in all states, in which primary focus is on CFRt. Such a course of action is indicated also by the 20 July 2010 letter of MoTA to all states. While this belated letter is appreciated, it is important for MoTA and all state nodal agencies to go beyond this by issuing clarifications and instructions. Progress with CFRt implementation needs to be monitored as a special exercise, as part of the overall monitoring process by the National Forest Rights Council suggested in Chapter 8. A simple, 'how-to' guide on CFRt needs to be produced by MoTA which can be adapted by state nodal agencies as appropriate, and issued in large numbers to communities and relevant officials.

Gram sabha, which has been conferred CFR should be given status of "Village Bio-Diversity Management Committee" (VBMC) under Sec.41 of the 'Bio-Diversity Act, 2002'. The capacity building of this VBMC shall be done to prepare People's Biodiversity Register (PBR) and use it in the planning process. To take up the Herculean task of Community Forestry, an urgent need for human resource development arises. The people are having vast know how of bio-diversity, natural phenomena and abundant sustainable techniques. If the community is given freedom and resources, it would readily come up with 'Knowledge Transfer Systems'. Our hand holding and blending of modern methods is only necessary.

There are currently conflicting laws and policies that increase the transaction costs and conflicts during implementation of JFM, MFP laws, transit permits, WLPA, PA management, and working plans. Setting up an independent committee with members from relevant ministries, academic and civil society institutions to review and recommend changes in the next 5 years.

Post-recognition of rights, communities need the necessary support, funding, and convergence of programs to assist them in manage community forest resources (CFR) effectively. Ministries and Departments to make use of laws like MGNREGA, PESA to support management and development of CFR. Marketing, technical support, and Minimum Support Price for NTFP-based collectives. Legal, technical and budgetary support is required for collaborative conservation and co-existence in PAs post FRA implementation.

There is currently a lack of knowledge, information and technical expertise at the gram sabha and panchayat to plan and manage forests lands. Capacity building programs for gram sabhas, implementing agencies and civil society groups to bridge knowledge deficiency and to strengthen local processes for identification and recognition of forest rights. Setting up spatial land use pattern mapping at gram sabha, panchayat and district level and linking the mapping to the CFR process and continuous local monitoring of diversion and acquisition of forest and village land. Implement special programs for CFR, documentation and recognition of PTG habitat rights, identification and documentation and recognition of rights of Nomadic, pastoralist communities.

IV.3. Environmental Impact Assessment

XII FYP schemes should lead a radical reform of Environmental Impact Analysis and Clearance process. It should revisit the list of projects that require Environmental Impact Analysis and Clearance and include certain items such as Wind Mills and small scale hydroelectric projects

that are excluded today. It should ask all project proponents to deposit an appropriate fee with the Authority and then select competent agencies to carry out the EIAs in a transparent fashion. Furthermore, it should link the Environmental Education activities at school and college level and the People's Biodiversity Register exercises to the EIA process. Equally urgent is the need to promote a more holistic perspective and organize a process of Cumulative Impact Analysis in place of the current project-by-project clearances. All EIAs and Government authorizations should be uploaded onto the National Environmental Monitoring website to promote transparency and accountability.

IV.4. JFM Plan to be integrated into FRA as Community Forest Management Plans

The purpose of Joint Forest Management (JFM) programmes was to spread the benefits of forestry to disproportionately poor marginalized citizens who live in the vicinity of forests. These programmes, to date, however, have suffered from several flaws:

- They do not entitle all residents of a village rights in the management and rights to the products of the forests under their control. There have been many instances in which the poorer inhabitants have been excluded from JFM programmes.
- The JFM groups do not have security of tenure since their control may be taken away through an administrative decision of the forest department of the state government at any time. This leads to insufficient incentive to invest in and safeguard forests.
- Too much control to interfere in management is still vested in the state forest departments.
- There is no provision for transparent monitoring of forest conservation. As a result, no systematic data exists from which to assess the effectiveness of JFM, only large numbers of unrepresentative case studies.

Recommendations:

- Using the Van Panchayat system of Uttarakhand as a model for decentralized management. It began in Kumaun in 1930 and there is strong evidence that this type of community management is far more cost-effective than state management (Somanathan, Prabhakar et al. 2009).³ Another study has found that tree damage in Van Panchayat forests from the lopping of branches is considerable less than that seen in Reserved Forests (Baland et al, 2008).⁴
- Convert JFM into a Community Forest Management (CFM) Plan. The 'jointness' in JFM is seriously limited in the field, with day-to-day decisions being controlled by the forest official who is usually ex-officio secretary of the committee. As a result of the divergence of interests over how to manage commonly held resources, between women, grazers, firewood headloaders, NTFP collectors, and those looking for profits from commercial timber/softwood production, marginalized groups are hurt.
- According to section 3(1)(i) of the FRA, all JFM areas as well as forests under exclusive village management should be claim by the community and managed as a community resource. To facilitate this process, the Forest Department should provide protection and

³ Somanathan, E., R. Prabhakar, et al. (2009). "Decentralization for cost-effective conservation." Proceedings of the National Academy of Sciences **106**(11): 4143-4147.

⁴ Baland, J-M., P. Bardhan, S. Das, and D. Mookherjee (2008). "Forests to the People: Decentralization and Forest Degradation in the Indian Himalayas."

technical support, and be responsible for ensuring compliance with sustainable use and conservation regulations. In case the gram sabha or the community is not keen to take over management of JFM forests under FRA, or management claims are not accepted under FRA, the government should take *suo moto* action to place JFMCs under the Gram Sabhas. This will ensure that the members of the JFMCs are democratically elected by the Gram Sabha. We expect the government to make JFM where relevant more democratic and participatory, giving highest priority to the livelihood needs of the poorest.

- Train CFM to undertake need based local micro planning for mixed species planting in degraded forests, ensuring assisted natural regeneration in harvested area or moderately stocked area with root and seed stock, raising and maintenance of bamboo areas, rubber plantation, pasture land development and agro-forestry for improving productivity and the biomass availability.
- To provide assistance and train CFM through research support in innovative measures for sustainable and timely harvesting, grading, local methods for improving the shelf life of the various NWFPs. Encourage value addition through local processing and help in marketing, if necessary, by fixing a support price for major products of the area. This will help in generating considerable off farm employment opportunities.
- All members of CFM are to ensure protection of the forest and wildlife in the area by devising procedure of patrolling by every household on rotational basis or appointing a local person to do so by raising funds collectively for the same. All acts of illicit felling, encroachments, deliberate starting fire in forest area, poaching etc should be immediately reported to the local forest official and also provide support to FD in tracing the culprit, confiscation of forest products and prosecution.

IV.5. Model Villages with Community Forest in violence-prone Districts

Developing Forest Based Development model to tackle the issues in these districts. To carry out the tasks, Village Gram Sabha would be primarily assisted by all the concerned departments within the prescribed time limit. As in the case of Govt. of Nagaland, Village Gram Sabha should be given status of 'Village Development Board' (VDB). VDB's should be given 'Un-tied Grant' to empower it in true sense.

Identify 100 Villages in the worse affected districts having Community Forest Rights over more than 500 ha of forest area and implement.

IV.6. Panchayats (Extension to Scheduled Areas) Act

The Panchayats (Extension to Scheduled Areas) Act (PESA) was passed in 1996 by the Indian Parliament as a means to recognize the dire need to protect the rights and resources of the communities in Schedule V areas and upholding their right to self-governance (Dandekar and Choudhury 2010). PESA recognized the gram sabha (a habitation was the natural unit of the community, and its adult members constitute the gram sabha, as against the elected gram panchayat) to be pre-eminent. The gram sabha was recognized as being *competent* to act on a range of powers.

However, in the decade-and-a half since it was passed, the experience of PESA has been tragically stilted. The legislative and executive work, which state governments were meant to undertake, still remains incomplete. Further, PESA envisaged a radical shift in the balance of power - from the state apparatus and from economic and political elites, to the community.

However, a community can exercise this wide range of powers meaningfully only when they have access to adequate information and capabilities, in alliance with other arms of the state. All this has been given inadequate attention. In a way thus, the entire effort of all organs of government ought to have been directed towards building up the necessary capabilities such that the 'constitutional/statutory' competence mandated in communities get fullest play. This does not seem to have happened; with the Forestry establishment playing a notably obstructive role. On the contrary legal and administrative subterfuge has kept the provisions of PESA as a set of aspirations and the agenda of self-governance remains postponed.

Given that the challenges to the tribal community's way of life have severely intensified in the past decade with a liberalizing economy, wooing of private capital for industry, the profitable rush for natural resources (in particular, minerals and farmland) along with the phenomenon of left-wing insurgency, which evokes people's problems, the neglect of PESA has had particularly tragic and violent implications. Having built up over the past decade, they now demand a sensitive and urgent redressal by us as a people.

We recommend that PESA be implemented to its full extent as a means to genuinely empower tribal people and invest in institutions that are responsible for capacity building, monitoring and regulatory activities involved in its implementation.

IV.7. Strengthening the Indian Forest Service for Collaborative Management

Since both FRA and JFM mandate close collaboration between foresters and the local forest dwellers, the need for sensitive and responsive Forest Service cannot be just over-emphasized. Unfortunately the internal culture of the Forest Service has continued to be hierarchical and authoritarian, and not participative. A paradigm shift in their outlook can be achieved by good training modules at the IGNFA and refresher/in-service courses at various institutions. This and other policy measures within the department should aim at the following outcomes:

- greater interaction with forest dwellers and ensuring their all-round economic and social development, involving them at all stages of planning and implementation of forestry programmes run by the Department, and supporting their own planning and implementation of community-based forestry programmes,
- increasing emphasis on environmental conservation and for strengthening the base for sustained agricultural production and water security,
- increasing role of watershed and landscape approach to forestry requiring integrated land management,
- increasing interaction between agriculture, animal husbandry and forestry,
- greater public awareness about forestry and the demand for peoples participation in forestry programmes,
- greater appreciation of the role of environmentalists in forest management,
- more adaptive, participatory and transparent planning processes, based on robust research that is open to independent expertise and knowledge including from local communities, and

- increasing focus on understanding and managing complex ecosystems with high level of uncertainty, helping sustain their resilience and adaptability in the face of multiple challenges including climate change, conserving a range of native biodiversity rather than only individual megafauna species, and helping revive/sustain threatened species of both plants and animals.

V. Strengthening Livelihoods of Communities Dependent on Forests and Biodiversity

V.1. Livelihood Support through NTFPs

Even the best of efforts to promote CFM and participatory JFM may still leave out vast tracts of forests where there is substantial use of forests by local communities but neither community management under FRA, nor JFM are in place. In such areas as well as in CFM/JFM areas, as per the 1988 Forest Policy, the government should promote such silvicultural practices that maximise the production of NTFPs and gatherable biomass. Legal safeguards of providing ownership over MFPs to communities under PESA and FRA may not be able to prevent deterioration in the quantity and quality of the gathered NTFPs, or their incomes. Some of the processes that may cause this are; deforestation, preference for man-made plantations in place of mixed forests, regulatory framework, diversion of NTFPs and forests to industries, nationalization of NTFPs, and exploitation by government agencies and contractors in the marketing of NTFPs.

Therefore in addition to guaranteeing that FRA be implemented in letter and spirit, one would have to address three inter-related issues for ensuring that forest dwellers' livelihoods are supported and enriched by NTFPs:

1. Identify and implement mechanisms to increase NTFP production,
2. Assure access of the poor to NTFPs, and
3. Develop appropriate value-addition technology and marketing mechanisms and infrastructure to maximize their incomes.

Multiple objectives to maximise outputs from many products will require innovative and experimental silviculture, which must focus more on the management of shrub and herb layers, and on forest floor management to enrich the soil and encourage natural regeneration. For instance, FD's present management of sal in AP and MP seems to be for timber, and hence only one shoot is allowed to grow. Since sal is an excellent coppicer, degraded forests and hills close to a village should be managed under a coppice or a coppice with standard system for fuelwood and sal leaves.

V.2. NTFP conservation and use

NTFPs provide a source of subsistence incomes for forest dependent poor, however the institutions and policies required for its sustainable management are woefully lacking, except for the current provisions under FRA. Appoint a National Level Task Force on NTFP status, conservation and use – MoEF, MoTA, MoRD/ Panchayati Raj, Research Institutions, NGOs,

DONER. There needs to be broad-based consultative process, involving primary collectors, traditional institutions, local governance institutions.

Establish community resource centers across India, 2-3 in South, 3-4 in Central India and 2-3 in North, and 2-3 in the NE to build capacities of the community in monitoring and sustainable harvesting of NTFPs. These centers should be networked with civil society, academic, and other research institutions and the forest department.

We recommend incentivizing the growing of threatened species and other NTFPs on farms and marginal lands. Provide a minimum support price for such crops through a special conservation fund. Invest in schemes to encourage farmers to grow NTFPs in their farms, degraded lands also as mixed crops to generate cash income.

Appropriate and sustainable technologies to add value to NTFPS using local skills so benefits accrue locally will need to be developed in a participatory manner with local producers and collectors. Centers can be set up within established institutions with a provision for a programme of competitive grants to develop such technologies. Such centers will be set up in areas rich in NTFPs with the mandate to reach out to other locations through civil society institutional networks.

V.3. Eco-tourism

While mainstream tourism is geared towards tourist satisfaction, ecotourism focuses on conservation of nature and culture and generation of sustainable livelihood options, including economic and education benefits, in its region of activity. Ecotourism if effectively managed has the potential to generate income at national, state and local scales and also contribute to the conservation of biodiversity and ecosystem services. Examining policy documents relating to ecotourism nationally, as well as across selected states, reveals a clear discontinuity and a lack of consensus on the definition of ecotourism and the expectations from it. The policy gaps identified in the ecotourism policy sector are as follows:

- Ecotourism policies often conflict with policies of the tourism sector. For example, tourism policy promotes infrastructure development and minimal environmental regulations, whereas, ecotourism policy mandates minimising new infrastructures and implementing environmental norms.
- Role of government and other institutions are not specified – there is no nodal agency for ecotourism, except in Kerala.
- There is a conservation bias which ignores the need to protect and promote local livelihoods.
- It lacks clear and measurable indicators to monitor the impact of ecotourism on ecological and socio-cultural parameters.
- There is an absence of links between monitoring and regulation, and a lack of incentives for the same.

Recommendations:

- There needs to be an inter-ministerial effort, involving MoEF, MOTA, and the Ministry of Tourism, to streamline tourism policy to include ecotourism objectives so the twin concerns of local livelihoods and conservation benefit.
- In order to find solutions for the negative impacts of tourism and for effective ecotourism, there needs to be open and transparent dialogue between the interested local

stakeholders (this includes local communities, tourism businesses and consumers). An institutional mechanism needs to be set-up to allow this to happen.

- Ecotourism ventures should be assessed based on ecological, socio-cultural and economic indicators. Ecological indicators include topography, air quality, noise, water quality, water quantity, solid waste management, terrestrial flora and fauna, aquatic flora and fauna, and conservation efforts. Socio-cultural indicators include design, local art form, local handicrafts, local cuisine, culture, education/awareness, employment, leakages, multiplier effects on local economy, equity in benefit sharing, and proportion of domestic tourists. Finally, economic indicators include profit, gestation period, occupancy, living standards and competition. It should be noted that the role of economic criterion is only in ensuring that ecotourism is not a loss-making enterprise.
- A monitoring system with the appropriate tools, instruments and incentives needs to be in place so that the impact of ecotourism on livelihoods and conservation can be monitored. There is a need for an inclusive and informed regulating and monitoring institutional framework extending till the grassroots.

V.4. Certification and labeling for strengthening local livelihoods

With the growing market for certified foods and products, there is a need for both policy and institutions to govern the process so that consumers, producers and collectors can benefit. International versions of Bird-friendly, Fair trade, organic certification and other such ecofriendly and socially sensitive certification programmes need to be contextualized to meet growing urban demand for such food. Such programmes need to be evaluated based on the flow of benefits to consumers, producers and collectors in an equitable manner. This will call for institutional cooperation between the Ministry of Agriculture, Environment and Forests and Tribal Affairs.

V.5. Mission Village Forest

- Communities Based Panchayat Sasya Yojana
- Agro-Forestry Development & Private Forestry Initiatives to support farmers
- Northeast: Rotational agro-forestry
- Fresh set of policies and schemes to support decentralized, participatory, multi-stakeholder, interdisciplinary, eco-regional and adaptive management approaches
- Scheduled Tribes and other Forest Dwellers (Recognition of Forest Rights) Act
- Facilitate implementation of the Act's provisions in cooperation with the Ministry of Tribal Affairs and working with Gram Sabhas and forest right holders to develop forest management plans for their community forest resources.
- Link to planning by Biodiversity Management Committees through People's Biodiversity Registers

VI. Marine Biodiversity Conservation and Fisherfolk Rights

The presence of a vibrant fishing community on the coast is what has protected the vast coastal stretches of the country from being completely taken over by development. However not enough is being done to address their livelihoods needs. The conservation of marine resources and the

protections of coastal stretches has, on the contrary, resulted in negative social and economic impacts for many traditional fishing communities.

The sustainable and equitable development of the marine fisheries sector in the country will entail revising the existing plans for the development of coastal and marine resources. Present day plans targeting marine resources continue to be oriented towards their optimal exploitation rather than their sustainable use. This will entail strengthening the present Coastal Regulation Zone Notification 2011, to ensure that the concerns raised by fishworker organisations and environmental groups regarding unregulated development and participatory decision making are examined. Coastal spaces are contested spaces and strong and bold policies are required to safeguard the interests of the ten million fisherfolk who occupy these areas and are dependant on its resources. Coastal Zone Management Authorities will need to be comprised of local fishing community representatives at the district and state levels.

In the next XII FYP, the Central and State governments must invest in strengthening the mechanisms for implanting the CRZ Notification and the marine fisheries regulation laws. For the CRZ, this should include investing in mapping, in information flows (through website maintenance) and in building capacities for the exercise of identifying violations of all coastal regulations which are mandated to be completed by the end of the year 2011.

Marine areas have long suffered the ignominy of being treated with the land locked logics and terrestrial problem solving fixes. The coming FYP needs to invest in setting right these approaches and in revising legislations such as the Wild Life Protection Act, 1972 to take into account management measures that are appropriate for marine areas. A task force needs to be set up for reviewing legislations related to marine areas comprising of leaders of the fishworker associations and leading marine conservation organisations in the country.

VI.I. Identify gaps in coastal and marine biodiversity conservation - ecosystems, habitats and species

Identification of areas of significant marine biodiversity:

The first step to conserve marine biodiversity would be to identify areas of significant marine biodiversity in India, classify them on the basis of research and conservation/management requirements, record the threats they face, and undertake long-term surveys to document species diversity and trends in populations. The first requirement of such an exercise would be a systematic and exhaustive literature survey followed by a GIS-based mapping of available marine habitats and species in India. This largescale exercise should aim to identify gaps with respect to species, taxonomic groups and sites. The study would facilitate the identification of remaining sites in mainland India and help in prioritising sites for exploration in both island systems.

Research requirements:

India has generated large check-lists of marine species in the past century and some amount of information on their distribution and status. Marine biodiversity research in India has also moved onto bar-coding studies and is collaborating in large global projects such as the Census of Marine Life that aims at documenting marine biodiversity. Though important baselines, these lists, reports and bar-codes are of little value in undertaking conservation/management actions. To address the issue of marine biodiversity conservation we require a thorough understanding

of not just the species richness in a given area, but also of the ecological and ecosystem processes that lead to the observed patterns in diversity. Management of marine resources need to be undertaken at the level of ecosystems and seascapes for it to succeed. However, such an integrated approach to research on marine biodiversity is generally lacking in India. Research under this theme should focus on the following critical aspects of applied ecology:

- a. **Biogeography of marine organisms:** Biogeography deals with the distribution of species in space and time. The study of biogeographic patterns provides insights on species distribution across geographical areas which are brought about by a combination of historical and current processes. Our understanding of underlying processes play a crucial role in devising general frameworks for multiple species and taxonomic groups, identifying emergent patterns at the community level, and improving predictive capacities especially with respect of disturbances and distributional shifts. In this context, it is important to undertake research that will:
 - help understand the relationships between organisms and their environment at large spatial scales
 - identify critical processes that underlie the current distribution of species assemblages and taxonomic groups
- b. **Understanding ecosystem linkages:** Disjunct and juxtaposed marine and terrestrial systems are known to be highly connected and interdependent by diverse linkages and exchanges. These linkages could be at a physical, trophic, or functional level - e.g. buffering, habitat and refuges, allochthonous inputs, trophic subsidies, or nutrient exchanges. Managing such functionally and physically tightly interlinked ecosystems requires a seascape approach and also a thorough understanding of the various linkages between these ecosystems. Through a series of focused research programmes, it is important to understand how various ecosystems are linked in terms of:
 - the magnitude of trophic subsidies between ecosystems and their impacts on recipient habitats and species
 - the role of seagrass and mangrove ecosystems as nurseries for diverse species of fin and shell fish
 - the transport of nutrients across ecosystems and their effect on productivity of recipient ecosystems
- c. **Resilience and resistance of species/ecosystems:** Information on resistance and resilience is very critical in identifying and protecting habitats and species that are better adapted to dealing with natural and anthropogenic disturbances. Ecological explorations on resilience would involve long-term monitoring of critical habitats such as coral reefs, mangroves and sandy beaches to:
 - monitor and record responses of these ecosystems to local and global perturbations
 - monitor phase-shifts and changes in community composition
 - identify resistant and resilient patches based on monitoring

VI.II. Monitoring fisheries resource use:

India is the third largest contributor to fisheries in the world and earns foreign exchange valued at over Rs. 700 crore annually (a figure of Rs. 7621 crore was estimated for 2007-08; latest

available estimate). Global demand for marine resources, expansion of mechanised fishing fleets and unsustainable fishing practices have led to large-scale impacts on the marine resources. Although critical from the point of view of livelihoods and sustainability, the role of extraction process and their impacts on biodiversity and ecosystem function have not been documented accurately. While the contribution of research departments (such as the Central Marine Fisheries Research Institute and the Fisheries Department) which have the mandate of monitoring the resource exploitation on a long-term basis is commendable, a number of shortfalls remain. These include poor capacities among local field staff in field identification, a lack of spatio-temporal uniformity in data collection and a lack of taxonomic magnification which makes assessments of long-term trends in exploitation difficult. A review of monitoring protocols and their standardisation is urgently required.

Collecting useful information that is spatially and temporally widespread requires exorbitant resources and skilled man-power. Community based monitoring programmes that involve local community members in long-term monitoring programmes have been undertaken in many parts of the world and have been successful in generating information that has management value. Fishing communities often have intimate knowledge of the marine resources that they exploit, and therefore have immense potential to be active participants in monitoring resources that are critical to their well being.

With respect to developing monitoring protocols for institutions as well as communities, it would be important to:

- conduct workshops and training programmes that are aimed at building capacities of frontline staff of research institutions to undertake monitoring at a higher taxonomic resolution
- standardise protocols to bring about uniformity in data collection, improve comparability and enhance predictive capacities across species, sites and time periods
- design monitoring projects involving the communities themselves whereby resources are monitored with the active participation of the users, and benefits are transferred directly to local communities

VII. International Agreements and Commitments of India

India is hosting the 12th Conference of Parties of the Convention for Biological Biodiversity in 2012 and will play a leadership role of CBD for 4 years. This is an unprecedented opportunity for India to showcase its achievements in maintaining thriving biodiversity in the midst of dense human populations and sustainable forest use. In order to truly highlight our achievements we recommend that funds be made available to implement the provision of the FRA in its entirety throughout the country within the next year so this can be showcased as a remarkable and unique achievement by India as a megadiverse country while settling community rights over biodiversity. We recommend that funds be made available to gram sabhas across the country ready to develop and implement plans for community managed and monitored resource areas. We recommend that resources be made available for India to launch a Global award to atleast two countries in each bioregion that have set global bench marks in advancing local community rights over and local management of forests and biodiversity.

India is signatory to a number of international conventions regarding biodiversity and ecology. These commitments have a profound impact on India's development and management of its

natural resources. Given the importance of these obligations, the Twelfth Five Year Plan must allocate adequate resources to ensure greater participation of stake holders and civil society to represent the diverse needs and concerns of its population, particularly for major conventions like the UNFCCC and the CBD. GOI must also identify and or set up independent institutions of excellence that provide nonpartisan and researched inputs to the Government on the costs, opportunities and national capacities to implement these commitments.

The government, in consultation with civil society stake holders and researchers, should also identify and prioritize those specific commitments under various conventions that facilitate holistic development planning. For instance, as part of honoring its commitment to the CBD and to mainstream the environment into the development process, the Plan could adopt the ecosystem approach as a guiding framework for development and natural resource management. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.

One of the ways of operationalising this approach is to formulate environmentally sound development plans according to specific ecological boundaries (like watersheds and river basins) that are overlaid over administrative units. Such an ecosystem approach is easily understood by local communities and the needs of different stake holders can be addressed more equitably. Ecosystem planning therefore can help participatory planning and management at a scale that is more suited to decentralization and inter-sectoral cooperation. The Twelfth Five Year Plan should provide for a pilot project, which includes representative river basins in different ecoregions in India to rigorously study the implications and implementability of such an approach.

Recommendations:

- Government needs to hold mandatory stake holder consultation across scales for important conventions.
- Encourage in- house in depth research on impacts on India in terms of GDP, development goals and social objectives. How much resources diverted from national priorities.
- Ministries should explain nature of india's engagement with respective conventions they implement.
- Technology transfer and financial transfer mechanism- why and how much.
- India doesn't have a comprehensive policy on Biodiversity conservation and is following the plan it formulated in 1992. The Biodiversity Act, should be reviewed and amended accordingly.

VIII. Valuation of Ecosystem Services and Biodiversity

XII FYP schemes should strive to make a transition from regulations and negative incentives to promote nature conservation oriented activities to a system of use of positive incentives to encourage continued conservation-oriented action in the context of traditional practices such as sacred groves and to initiate other action in modern contexts. An example of the latter is the payment of conservation service charges by Kerala Biodiversity Board to a farmer who has maintained mangrove growth on his private land. We need to develop specific schemes to undertake a critical assessment of the efficacy of funds being deployed towards conservation

efforts today in the form of salaries and perks of bureaucrats and technocrats, including their jeeps and guns and buildings to house them. Very likely, it would turn out to be exceedingly low. These funds should then be redeployed over a period of time to provide positive incentives to local communities to maintain biodiversity elements of high value to conservation.

There are currently informational and institutional gaps which have hindered efforts to value ecosystem services and biodiversity. First, there is no accepted system of valuation, and second, there is no open information repository containing the values that have been calculated. All the states are demanding a green bonus, and therefore it is important that ecosystem services and biodiversity of ecosystems in the different states are valued using accepted and comparable protocols.

To value ecosystems and biodiversity:

- Stakeholders and services need to be identified
- The Millennium Ecosystem Assessment Framework should be used to generate the taxonomy of ecosystem services.
- A matrix of methodology needs to be created. The methodology will differ according to the use and the users.
- Valuation should be conducted using appropriate methods such as preference methods (i.e. dose response, travel cost) and stated preference methods (i.e. contingent valuation)
- India should be mapped based on ecological values. There are currently problems arising out of the fact that the ecosystem boundaries do not necessarily match political boundaries.

It should be noted that valuation techniques can only measure changes. Therefore, the Green Bonus given to states should be based on valuation.

In order to successfully and efficiently value ecosystem services and biodiversity, appropriate institutional mechanisms need to be developed, preferably by the Finance Commission, Planning Commission, Centre of Excellence in Environmental Economics and the Ministry of Environment and Forests. These institutional mechanisms should allow for effective implementation of compensation and green bonus schemes which aim to fix, monitor, negotiate and share payments. Any payments made should be based on negotiations between two parties.

VIII.1. Environmental Protection Index

The Planning Commission is in the process of developing an Environmental Protection Index (EPI) to recognize environmental performance by states and devolve central funds accordingly. The index includes biodiversity conservation as a criterion of environmental performance and identifies indicators of biodiversity. The indicators chosen should be able to be measured, updated at regular intervals and compared against a baseline. The EPI represents a positive incentive for the conservation and sustainable use of biodiversity.

The indicators that have been suggested by the Planning Commission so far include: rate of loss of forest cover, rate of opening up of forests, fish availability and percent catch, efforts towards elimination of invasive species, nutrient levels in water bodies, loss of wetlands and

lakes, loss of ecosystem services/livelihood because of mining, reduction in area/cycle under Jhum cultivation and percent change in livestock population.

The Planning Commission should include the following indicators:

- Efforts in maintaining habitat continuity (not only in forests, but also aquatic habitats)
- Formation and biodiversity of plantations
- Amount of endemic species in the overall biodiversity
- In the case of marine ecosystems, factors such as marine biodiversity, marine pollution, and coral reef and sea grass conservation efforts need to be measured
- Urban ecology

It should be noted that forestry-level indicators cannot be used as an evaluation of all states because ecosystems and geographies vary. Ladakh, for example, has no forest cover even though it has rich biodiversity. It should also be noted that direct estimates cannot be solely used as indicators as they do not indicate the extent of improvement. Therefore, state-level environmental reports should be used to assess relative improvement in biodiversity and conservation practices. It would be additionally beneficial to link the EPI process to long-term environmental monitoring so that more realistic estimates can be made.

IX. Conclusion

In summary the focus of our XII FYP should be on empowering people to ensure transparency, openness, participation and good governance of natural resources whether terrestrial or marine. Improving environmental governance at all levels will strengthen the resilience of ecosystems that support life on earth. Good science and strengthening democratic processes contribute to good environmental governance and it is therefore essential that the XII FYP builds these vital components into our plan. The XII FYP schemes should be oriented towards promoting transparency, openness and participation in every way. The XII FYP could provide for appointments of Environmental Ombudsmen in all districts. The schemes should vigorously promote institution of a social audit process for all environmental issues on the model of that for Mahatma Gandhi National Rural Employment Guarantee Act in Andhra Pradesh. An open, transparent, comprehensive web-based Environmental Information System providing for scrutiny as well as modifications/ additions by members of the public would greatly facilitate better management of environmental resources of the country. XII FYP schemes should encourage citizen involvement in continual development of such a database.

XII FYP schemes should lead a radical reform of Environmental Impact Analysis and Clearance process. Such EIAs should be based on protocols that are sensitive to specific social and ecological systems. The scope of projects and areas that require Environmental Impact Analysis and environmental clearances should include activities and regions that are often omitted such as ostensibly eco-friendly energy options such as wind mills and small scale hydroelectric projects or even cumulative impacts of a range of activities on a particular area. It should ask all project proponents to deposit an appropriate fee with the Authority and then select competent agencies to carry out the EIAs in a transparent fashion.

XII FYP schemes should strive to promote a participatory, bottom-up approach to conservation, sustainable development and ecorestoration through the length and breadth of the country. With this in view, it should encourage devolution of democratic processes as visualized in 73rd and

74th Amendments to the Indian Constitution. The Mahatma Gandhi National Rural Employment Guarantee Act has much potential for the task of ecorestoration. It also has the advantage that Gram Sabhas are expected to be involved in planning of the works to be undertaken. Other opportunities exist for capacity building and empowerment of Gram Sabhas through Extension of Panchayat Raj to Scheduled Areas Act (PESA) and Forest Rights Act, and XII FYP schemes should promote pro-active and sympathetic implementation of PESA and of the provision of Community Forest Resources under the Forest Rights Act. Ecorestoration should replace afforestation as the main activity of the NAEB. Ecorestoration will also provide provisioning (fuelwood, water, biomass, biofuel, medicines, pollination, etc) and regulatory (flood control, erosion control, stream flow, etc) ecosystem services.

The XII FYP should make it a priority to complete the inventory of all plant, invertebrate and vertebrate species in India within the plan period. It should invest in increasing the number of trained taxonomist by expanding the network of institutions beyond ZSI and BSI to complete this task. It should also invest in building capacities of colleges, schools, para-taxonomists, and amateurs. An open access national digital species repository using global protocols networked with other portals should be used to catalogue the species of India.

Finally, XII FYP schemes should strive to make a transition from regulations and negative incentives to promote nature conservation oriented activities to a system of use of positive incentives to encourage continued conservation-oriented action in the context of traditional practices such as sacred groves and to initiate other action in modern contexts. An example of the latter is the payment of conservation service charges by Kerala Biodiversity Board to a farmer who has maintained mangrove growth on his private land.

Technical inputs would be required to decide on a common system of assigning conservation value to specific elements of biodiversity and to organize a reliable, transparent system of monitoring biodiversity levels within the territories assigned to various local communities, in form of either Community Forest Resources assigned under FRA, or Panchayat areas assigned to Biodiversity Management Committees. Educational institutions at all levels, from village primary schools to universities, could play an important role in this effort. Indeed, these exercises could become very valuable components of environmental education curricula. In the long run, only a very lean bureaucratic apparatus should be retained to play a coordinating, facilitative role and to ensure that local communities can effectively enforce a desired system of protection and management of the natural resource base. Such a system would create a very efficient market for conservation performance so that funds earmarked to promote biodiversity would flow to localities and local communities endowed with capabilities of conserving high levels of biodiversity. This system would also channel rewards for conservation action to relatively poorer communities living close to the earth, thereby serving ends of social justice, and creating in the long range a situation far more favorable to the maintenance of biodiversity on the earth.

Annexure 1

Terms of Reference

- a. Question of national accounting of eco-services
- b. Comprehensive survey, monitoring and evaluation tools for eco-services and biodiversity
- c. Incentives for avoided deterioration of ecosystem resilience
- d. Institutional mechanism and schemes for management of eco-services, biodiversity and livelihood
- e. E-documentation of diversity and traditional knowledge of value addition, local skills, socio-cultural significance, etc
- f. Role of biotechnology, gene-mapping and enhancement of inventory through geo-referencing
- g. Management strategy, institutional mechanisms and schemes for wetland and biodiversity hot-spot management
- h. Participatory approach of management, marketing of minor forest products
- i. Convergence with schemes of other departments like Biotechnology, Ecotourism, Rainfed Area Authority, Soil and Water Conservation
- j. Improving marketability through eco-labeling, product and process patenting, encouraging green goods and services
- k. Livelihood and generation of employment as well as requirement of critical minimum finances along with scoping active role of corporate sector, NGOs and other civic bodies

Annexure 2

Proceedings of the First Meeting

Working Group on Ecosystem Resilience, Biodiversity and Sustainable Livelihood

(29th July, 2011, Room No. 228, Yojana Bhawan, Sansad Marg, New Delhi)

At the outset Shri Ranjan Chatterjee, Consultant (E&F) welcomed the Members and other Delegates. Thereafter he requested Dr. K. Kasturirangan to address the Group.

Dr. K.Kasturirangan:

- Briefly describing the background and procedure for preparing the report on Ecosystem Resilience, Biodiversity and Sustainable Livelihood and expected outcome, he thanked all Members for their participation
- Thanking the Chairman for accepting the invitation of Planning Commission to guide and lead the Group, he invited the Chairman to address the Group and set the stage for deliberation

Chairman:

- He welcomed the plea by Dr Kasturirangan to think out of the box. He began by quoting from the well-known book, 'Science and the Modern World' by the mathematician-philosopher, Alfred North Whitehead: "Modern science accepts brute facts, whether reasonable or not!" He suggested that in this scientific spirit we should confront facts on ground head on as they are, even if unpalatable. The XII FYP programmes will be shaped by two considerations, the values we accept, and our understanding of how the social-political-economic-administrative system operates. It is now becoming abundantly clear that a most significant aspect of the functioning of this system is what has now come to be called, "Governance Deficit", or in plain English, greed, corruption, and misuse of power. The recent report by Karnataka Lokayukta on mining in Bellary brings out dramatically how the harmony of nature and of society can be disrupted by such misgovernance. Hence an important focus in formulation of XII FYP programmes for the Environment and Forestry sector should be on deploying resources in such a fashion that greed, corruption, and misuse of power can be brought under check. One route to this is to inject maximum openness, transparency and participation in all programmes.
- He presented three case studies to illustrate his point. The Ministry of Environment & Forests constitutes certain "Ecologically Sensitive Zones" under the Environmental Protection Act. One such zone has been established some eleven years ago at Mahabaleshwar-Panchgani, a hilly tract of high rainfall and biodiversity-rich evergreen forest that is also the origin of Krishna and its major tributary, Koyna. A nine-year old resolution of Indian Board for Wildlife has called for constitution of another Ecologically Sensitive Zone surrounding the Bhimashankar Wildlife Sanctuary. The hill range of Bhimashankar is the origin of another of Krishna's major tributary, Bhima, and just like Mahabaleshwar to the south, is also an area of high rainfall and biodiversity-rich evergreen forest. However, no steps have been taken to constitute this Bhimashankar

Ecologically Sensitive Zone, despite repeated requests both from Centre and by head of Forest Department in Maharashtra.

- During its study of these two ESZs, one established, and the other expected to be established, the Western Ghats Ecology Expert Panel chaired by him came across several instances of grave misgovernance:
- [1] Both these regions have large populations of Scheduled Tribes and traditional forest dwellers. Hence, it was imperative that Forest Rights Act should have been implemented in these areas in its true spirit five years ago. Nothing is done, and it appears that this is to facilitate extortion from local people. People at Mahabaleshwar complain of very old roads to their villages being disrupted by trenches dug by Forest Department, and Madhav Gadgil has personally inspected some of these. The trenches are then filled on payment of bribes, to be dug again sometime later.
- [2] At the same time a major wind mill project has been cleared close to Bhimashankar WLS and a large number of wind mills have come up within the stipulated ten km zone on the periphery. This project should not have been cleared at all without completing the constitution of the Ecologically Sensitive Zone, as also implementation of FRA.
- [3] WGEEP Chairman Madhav Gadgil and member Prof Renee Borges visited this area around Bhimashankar. In fact, Prof Renee Borges has been engaged in scientific studies in this area for over two decades. It is clear that the hills where wind mills have come up are tracts of high rainfall and biodiversity-rich evergreen forest, contiguous with that in the Bhimashankar WLS, and home to Maharashtra's state animal, Giant Squirrel. The local Range Forest Officer had also clearly recorded these facts and recommended that the wind mill project should not be sanctioned. He was overruled by his superior officers who have cleared the project by patently misrepresenting the facts on ground.
- [4] Apart from substantive forest destruction, including by large roads cutting huge swathes through Reserve Forest, the wind mill project has triggered large scale erosion and landslides through poor construction of roads with steep gradients, and all this rubble is ending up on fertile farmland and in reservoirs of tributaries of Krishna.
- [5] The Forest Department is colluding with wind mill project operators in illegally denying citizens access to these hills. Boards and check-post have been put up by the company, falsely claiming to be authorized by Forest Department. There are many traditional forest dwellers on these hills. Not only are their rights under FRA not being recognized, they are being illegally restrained in their movements on hills they have inhabited for centuries.
- He recounted another experience as a member of Tiger Task Force. In this capacity he had extensive discussions with forest officials at all levels, from watchers and guards to Principal Chief Conservators of Forests. He asked them for their suggestions as to how the Departmental staff could work with local communities to enhance the efficacy of wild life conservation programmes. There are some excellent models of this, especially in case of Periyar Tiger Reserve in Kerala. But with the singular exception of officials from Periyar, none others had any interest in talking about working with people. Their constant refrain was: give us more guns, more allowances, more powers, declare Tiger Reserves disturbed areas like parts of Northeast and Kashmir. Give us the pay, the facilities and the powers of Army. This is indeed a tragedy for India's natural heritage.
- Madhav Gadgil pleaded that while these facts may be unpalatable, they must be put on record, just as Karnataka Lokayukta has done a great service to the nation by putting many facts, undoubtedly unpalatable to several people in power on record. We must derive lessons from these, and improve matters in the next Five Year Plan by seriously focusing on empowering people to ensure transparency, openness, and good management.
-

- He expected report on the subject be guided by values. Citing example of Forest Conservation and Forest Clearance Case related to construction of structures in Western Ghats for Wind Energy, and creditability of statistics collected by different organization on mal-nutrition etc. he sensitized all the Members and other Delegates of the group about the importance of carrying out works guided by value.

Dr. Rajan Chatterjee:

- He thanked the Chairman for giving him the opportunity to speak and also welcomed all the Members of the Working Group.
- Describing the Report of this group as one of the most important contribution to 12th Plan formulation he requested the group to recommend a comprehensive strategy for management of Water, land, soil, and biodiversity of 22% of forest land, in particular for which the owner of the land: Ministry of E & F is accountable as per its mandate and business allocation.

(As desired by the Chairman, copies of the key note address of Sri Chatterjee, as mentioned below, were distributed to all Members.)

· “This 22% area is the upper catchment area of the country receiving maximum precipitation. I don’t know what institutional mechanism and schemes we have in place for management of this vast sheet of precious water for our farmers and people. Management of this water is not limited to the improving availability of water for drinking and irrigation, but it is a bigger question of soil fertility, siltation, crop productivity, reduction of environmental pollution.

· Almost one-third population of the country, mostly tribal and living BPL, derives their livelihood from the ecosystem services offered by natural resources from these 22% areas of the country. These are the people who would be subjected to penury by depletion of ecosystem resilience. Their food base, economy, socio-cultural stability would be at stake, if we don,t have comprehensive schemes and institutional mechanism to manage sustainably these scarce resources.

· I also would like to share with you that this is the right time we need to conceive a bio-centric approach rather a totally anthropocentric one. For example Environmental Economics is anthropocentric whereas the Ecosystem Resilience is bio-centric. We the policy planner should strike a balance approach towards both approaches for inclusivity and inter-intra-generational equity.

· Having said these words, I would like to request the Chairman and the Members of the Group to consider recommending strategy on following challenges.

- a) Question of National accounting of eco-services
- b) Comprehensive survey, monitoring and evaluation tools for eco-services and bio-diversity
- c) Incentives for avoided deterioration of Ecosystem Resilience
- d) Institutional Mechanism and Schemes for management of eco-services, biodiversity and livelihood during 12th Five year Plan.
- e) E-documentation of diversity and traditional knowledge of value addition, local skills, socio-cultural significance etc.

- f) Role of bio-technology, gene-mapping and enhancement of inventory through geo-referencing
- g) Management strategy, institutional mechanisms and schemes for wetland and bio-diversity hot-spot management.
- h) Participatory approach of management, marketing.
- i) Convergence with schemes of other Departments like Bio-technology, Ecotourism, Rainfed Area Authority, Soil and Water Conservation.
- j) Improving marketability through eco-labeling, product and process patenting, encouraging green goods and services,

And most importantly –

- k) Livelihood and generation of employment as well as requirement of critical minimum finances along with scoping active role of corporate sector, NGOs and other civic bodies”.

Expert from State Bio-diversity Board

- Voiced concern over invasion of pasture land by weeds like Lantana, Prthenium etc. He suggested formulating a strategy for management of these pastures land - from being invaded by the weeds.
- He also informed the Group about the decrease in production of seeds of Chilgoza Pine: *Pinus gerardiana*. As a result the food base of monkeys got shrunken and they became depended on agricultural crops causing loss to the farmers. Reasons for such changes in the higher reaches were described to be fallout of climatic change phenomenon.

Mr. P. Venu, Additional Director, BSI

- He has indicated the need of Taxonomic inventory for non-timber forest produces in addition to collection of Statistics pertaining to production and collection of Minor Forest Produce.

Shri K A Subramaniam, ZSI

- He informed the group that a good amount of data on biodiversity are currently being collected and managed by governmental and non-governmental organisation which should be revamped as it could scope analysis of such data for formulation of effective strategies for their management in the next five years.

Chairman

- He opined to take less time for such data collection. He has also cited the example of progress made in modelling data for Western Ghats.

Dr. K. Kasturirangan, Member, Planning Commission

- He indicated the need for a comprehensive data policy for the country. The work can be carried out in a phased manner in the 12th Plan covering all bio-geographic regions of the country.

Shri S.K. Dhyani, Director, NRC for Agro Forestry, ICAR.

- He is in the opinion that very critical and valuable biological resources are available all over the country which can be further strengthened and developed for Climate Change adaptation. Mentioning the missing linkages in this regard, he stressed for the establishment of linkages. Tapping biodiversity resources for agriculture to make it resilient would be one of the strategy for 12th Five Year Plan. He has also informed that ICAR has started ecosystem resilient agriculture. It has also been informed by him that presently invasive weeds posing a great problem for agriculture in many parts of the country.
- The School curriculum of CBSE includes discourse on ecosystem and biodiversity whereas ICSE syllabus does not. He opined uniform mandatory inclusion of chapters on biodiversity and ecosystem in the school curriculum.
- Stating that fund is not a problem, he indicated the need for convergence of schemes of different line departments including Panchayati Raj.

Mr. LMS Palni, Director, GB Pant Institute, Almora

- He stressed the need for long term ecological monitoring of Himalayan regions which constitute 16.2% of the geographical area of the country
- 4% population of Himalayan region are affected and are moving to valleys from higher reaches for which we require a scheme for their alternate livelihood and managing this sort of unwanted migration.
- He also mentioned about eco-branding. Most of the poor people live on subsistence agriculture and the government requires developing a mechanism so that the people can grow their land races which are resistant to vagaries of climate. Patches of such land races would serve as future breeding block for climate change adaptation.
- He has also opined that real stakeholders are to have the requisite knowledge and their interests are to be taken care of.

Shri P A Azeez, Director, Salim Ali Centre of Ornithology and Natural History

- He advocated creation of National Repository for good amount of genomic data on ecosystem and biodiversity available with the SACON and other organisations.
- He stressed the need of going for more number of community reserves indicating the importance of people participation in the Sector.
- Expressing the current treatment of men animal conflict in disjunct manner, he advocated the need of mapping conflict areas and reasons of such conflict.
- He also supported addition of practical programme related to ecosystem and biodiversity with environmental education.

Chairman:

- In response to ideas of Mr. PA Azeez the Chairman has suggested that Western Ghat can be taken as a pilot area to which Dr. Kasturirangan gave his consent.

Shri V.N. Pandey, Secretary, Department of Forest, MP

- Suggesting development of National Grid for collation of information on ecosystem resilience and biodiversity, he indicated the need for benchmarking for change monitoring.
- He stressed the need for developing methodology for mapping of MFP.
- He expressed his concern on the neglect of forestry contribution to environmental services and indicated an urgent need for patronizing eco-tourism to sensitize people on eco-services and biodiversity

Shri Hem Pandey, Joint Secretary, MoEF

- Recalling Nagoya Protocol and role of the country, he mentioned conservation and sustainable use as two pillars for ecosystem. He also indicated the need for biodiversity mainstreaming.
- Expressing concern over budget crunch. He requested more finances for CoP-11 on CBD to be held in Delhi under the leadership of India where we need to showcase our strength and capability to lead international community in biodiversity management.
- He also informed the group about assignment of responsibility to IIFM for identification of ecological services (24 in number)
- He pointed out requirement for strengthening Biodiversity Management Committee (BMC).

Shri Bala Prasad, CEO, National Medicinal Plants Board

- He stressed the need of an agro biodiversity system and biodiversity resilience in areas shifting cultivation.
- He strongly advocated the need for institutional mechanism at the grass root level for collection, processing, marketing etc of NTFP. It has been his great concern that in most of the states Forest Department has not been made responsible and accountable for the management of biodiversity which is causing a serious dislocation in the system lacking motivation and organisational support.

Shri AK Mukerji, Former DG, Forest

- He indicated that during formulation of previous five year plan most of the points were considered and the group had given the recommendation for resource mobilisation/budget allocation, unfortunately, those recommendations were not taken into account. He has requested the chairman and the member to look into the matter and avoid such recurrence.

Shri Asad Rehmani, Director, Bombay Natural History Society

- He has mentioned about eco-restoration and requested attention of the group on animals outside protected forest, TEEB report for India, Emphasis for ex-situ conservation of birds, etc
- Mentioning about 14 critically endangered species, 16 endangered species, 66 vulnerable and 58 threatened species of the bird in the country. He requested the group for giving importance to more number of breeding centres for ex-situ conservation and recovery of species. Mentioning some success stories on Pygmy Hog and Vulture, he indicated the importance of conservation breeding the 12th Five Year Plan.

Ms Suprava Patnaik, Associate Professor, IIFM, Bhopal

- She informed the group that the IIFM has comprehensive data on wetland and forest and developed criteria and indicator for NTFP certification and paper for 'payment for ecosystem services'. They have also worked on sustainable livelihood enterprise development which she thinks an important area to be covered under 12th Five Year Plan.

Shri Srikara Naik, Department of Industrial Policy & Promotion

- He has drawn the importance of agro and forest diversity in tribal area and stressed the need of strategy for those areas in the 12th Five Year Plan.

Mr. Dipankar Ghosh, Director, SPECIES WWF-India

- He pointed out that human and wildlife conflict not necessarily indicate elephant and man or tiger and man or leopard and man conflicts, in fact it includes the conflict with the lesser creatures like squirrel, rats, birds etc.

Prof. Balasubramaniam

- He mentioned about the role of ecosystem and biodiversity in the economy and social wellbeing of the population of the country as a whole and linkages with green dividend/green bonus.
- He has also opined that we should identify new areas and new schemes for the areas where we could not do much and the areas where we have to move forward in the 12th Plan.

Dr. K. Kasturirangan, Member, Planning Commission

- Summing up the deliberation, he spoke on important issues like national repository for data management. He also appreciated the fact that few important issues relating to biodiversity board, biodiversity management committee, incorporation of changes in to the Forestry Working Plan/ Wildlife Management Plan etc to be brought to the notice of Chief Ministers of the concerned States. In this regard, letters from Planning Commission may be written to Chief Ministers.

Chairman

[Plan of Action]

- He specifically brought to the notice of all members and other delegates about the timeline for preparation of the report.
- As desired by the Chairman resource groups are made on all the themes included in the terms of references. In this regard a list of thematic groups of resource persons has been circulated to all the members requesting them to consider joining the group for their valuable contribution.
- As agreed by the Chairman and the members it was decided a meeting of the resource groups would be held in Bangalore to be organised by ATREE where power point presentation (PPP) on each of the themes would be made by respective resource groups on 19th August, 2011. The Member, Dr. Kasturirangan also desired to attend the meeting.

- Also the Chairman in consultation with Member particularly from MoEF and IIFM desired to hold a meeting for deciding the criteria for ecosystem services, a way forward for showcasing strength of the country in biodiversity management during CoP-11.
- The Chairman also constituted a group for environmental data management issues and data policy with members from ZSI (Mr. Subramaniam as convenor), Mr. Ray from Indian Institute of Remote Sensing, similarly the Chairman has also constituted a resource group for environmental observational network which includes following member:

1. Prof. Satish, Indian Institute of Science.
2. Mr. Basu, Department of Earth Senses
3. Mr. Ray, Indian Institute of Remote Sensing
4. Mr. Subodh Kumar Sharma, Adviser, MoEF

· The Chairman also assigned the responsibility of organising next meeting on 19th August, 2011 at Bangalore to Dr. Joseph, ATREE for which the Chairman agreed to provide approved budget to ATREE.

· Chairman also desired to mail email ids of all resource group members and working group members so that after a constructive exchange of ideas all members and resource persons can give their feedback before 12th August, 2011 positively to ATREE (director@atree.org, info@atree.org) and Dr. Biswajit Banerjee, Director, Planning Commission (biswajit.banjerjee@nic.in)

Dr. Biswajit Banerjee

· He has mentioned about the Terms of Reference of the Group and the key note address given by Shri Ranjan Chaterjee which he thinks the domain and aspects on which the group is to contribute.

The meeting ended with thanks from Chairman.

Annexure 3

Proceedings of the Second Meeting

Working Group on Ecosystem Resilience, Biodiversity and Sustainable Livelihood

(19th August, 2011, Auditorium, ATREE, Srirampura, Bengaluru)

Morning plenary session

Introductory remarks

Dr. Biswajit Bannerjee, Director (Forestry), Planning Commission of India urged the members to focus on identifying what could not be addressed during the 11th Five Year Plan period, especially in the area of land, water and eco services, and to identify challenges, suggest strategies, and either use prior schemes or suggest new schemes (based on gap analysis). He

also spoke of the need to address the governance deficit and encourage greater openness, transparency and participation in the plan period.

Dr Indrani Chandrasekharan, Advisor (E&F), Planning Commission asked the members to come up with an exhaustive report, but also prioritize what can be achieved in the five year plan period. She also spoke of coming up with an ecosystem valuation and an Environment Performance Index for states - and wanted the group to come up with indicators on which states can be evaluated.

Opening remarks by Dr Madhav Gadgil, Chair

It is important to look at how much was given in the Plan outlay, why was it not given and for what purpose were the funds asked for and not given?

The National Biodiversity Act was aimed at devolving biodiversity management to communities through the Biodiversity Management Communities from the State Biodiversity Board down and to build up scientific and participatory models of management. The Act has a participatory scheme for biodiversity action at the local level. NC Saxena has stated that there have been serious deficiencies in the implementation of this Act and that there is a need for community-level participation.

A second issue is that of biodiversity information – the forest department doesn't allow researchers to work in protected areas. We need to make sure that good information is generated and highly recommend that the stranglehold of the Forest Department is broken– the Planning Commission needs to implement schemes and recommend funding for this. Also required is construction of open, transparent databases – there is the example of Goa putting together a database (using info from various government agencies) on land use across Goa state and making the database open to the panchayats and Gram Sabhas for the regional planning process.

States are demanding compensation for provisioning ecosystem services. The Kerala State Biodiversity Board is one example of where this incentive for local conservation is being paid as a 'green bonus' - individuals will be compensated for maintaining mangrove patches on their lands.

Dr. KA Subramaniam from the ZSI, Kolkata presented on the National Biodiversity and Environment Grid (NBEIG, Annexure 3.A). 115 governmental institutions are currently involved in data collection pertaining to biodiversity and the environment, but the data collected by these different institutions is not always collated. It would be beneficial to develop a national information grid on biodiversity and the environment. However, some national data sharing do exist, such as the NSDAP and the National Spatial Data Infrastructure. Some of the databases are also available to the public online.

Response/discussion:

Dr. Gadgil stated that the National Biodiversity Authority and local schools need to collaborate for local-level monitoring.

Dr. Indrani stated that datasets on pollution should not be confused as datasets on ecosystem services and that the two types of datasets need to be kept separate from each other. In

addition, she also emphasized that there needs to be a focus on generating data on microorganisms as India is currently lacking in such data.

Dr. Gadgil disagreed with Dr. Indrani. He accepted that generating new data is important, but also maintained that linking and sharing existing data is equally important. We need to develop a system which links the enormous datasets which are not currently available to the public.

A representative from the ZSI suggested that the data be made available to the public 3-5 years after it has been collected. He stated that a lot of ZSI and BSI archive data is not available in the public domain.

It was agreed that data needs to be reconciled on the national level and that scientifically correct data should be made available to the public.

There are currently tariff barriers to information sharing and access. Each agency asks for payment for datasets even when it is requested by another government agency. The suggestions were: that there should be no payment for inter-government collaborations; and, government data sets should be in the public-access domain, especially when the research is funded by public money. The other suggestion was that databases need to come under an umbrella so that people know what data is being collected and where it is been collected and where/how it can be accessed

It was brought up that there are compatibility issues with databases which contributes to their inaccessibility. Therefore, we need to streamline the reporting and recording systems (between universities, governments, NGOs, etc)

Dr. Archana Singh wanted to know what will be the system for dissemination of the datasets at the panchayat and gram sabha levels.

Dr. Gadgil mentioned that a system has been developed to allow bilingual access to databases and that the Unicode system has removed a lot of the technical difficulties of switching between languages. He stressed the importance of giving the databases multi-lingual capacity.

A working group member pointed out that we need to keep into consideration that these databases have been created for various purposes – this might pose a problem when trying to link all the databases together. Combining is useful but usability is important. Therefore, we need to figure out a way need to figure out a way of streamlining this data in a way that is useful and makes sense. In addition, the purpose for combining this data needs to be clearly defined. Lastly, this data should be linked with the purpose of monitoring long-term environmental change

Dr. Gadgil, however, stated that when good information accumulates, its use may be made clear at some point in the future when new scientific purposes and questions emerge.

Dr. Banerjee emphasized that institutional mechanisms implemented should be sleek and efficient, especially in regards to dataset linkage.

Dr. Prasad presented on the applications of GIS (Annexure 3.B). His presentation dealt with the experience of putting together databases, using the Western Ghats as a case-study. The main focus of his presentation was how existing data could be used to produce larger data sets. He explained that one aspect of the project was to interlink existing information on the Western

Ghats in a way that would be useful at the local-level. Overall, they found that spatial databases could be widely used to research a variety of research questions and this opened many new venues for collaboration with other institutions. Therefore, the datasets need to be kept open – a clear purpose does not have to be defined when the datasets are being collated. The whole Western Ghats database will be made publicly accessible, Currently there are pdf files available on the website that people can access. The eventual goal is to make the shape files available in the public domain.

Dr Gadgil mentioned that a report exists regarding how to identify ecologically sensitive areas; the report was accepted by the Ministry of Environment and Forests in 2000. The report provides a list of parameters which need to be considered. So far, all the parameters have not been considered because of difficulties with access to data. The report also recommended that a national mission be created for this purpose. The national mission was to collect data for each of the parameters – there needed to be multiplicity in this venture in the form of involvement from other institutions such as universities and governmental and non-governmental agencies. To a large extent, the platform has been created by the Western Ghats initiative. This should be included in the upcoming five year plan.

Dr. Satish presented on the All-India Environmental Observatory/Monitoring Network (ISRO Geosphere Biosphere Programme). (Annexure 3.C)

He explained that there is a network of surface observatories under the National Carbonaceous Aerosols Programme (NCA). The Ministry of Environment and Forests (MOEF) is interested in black carbon data and the ISRO in aerosols. It will take an enormous amount of time to collect the data from scratch; therefore, the more efficient alternative is to use already available data. Examples of existing data collection networks are ARFINET, a network of 31 sites of distinct geographies used for aerosol measurements, and the NCAP network, a network which includes IMD stations and has been used for climate modeling. The NCAP measurements are transmitted via satellite. Dr. Satish believes that the National environmental monitoring network should use NCAP network as a base. More stations should be added and more parameters should be measured to enhance the overall capacity of the network.

Dr. Indrani once again emphasized the need to collect information from all the different agencies and make linkages between the different datasets and make the databases available on the public platform.

Gadgil highlighted need to think about the system as a whole when looking at data. Holistic data is needed, not just extensive data on one particular parameter.

Professor Ribero made some comments on urban planning. He stated that 1/3 of districts in India are eco-sensitive and another 1/3 are developable. He stressed the importance redefining development to include conservation and preservation as key factors. Planning, until now, has referred sectoral and socio-economic planning. There was no comprehensive consideration of impact of development on ecosystem services.

He stated that India is looked upon as an area for investments; the vision of India is a metropolitan India, and not necessarily a vision which includes heritage and history. He claimed that statutory mapping of data is lacking. Dr. Ribero used Goa as a case study to show that urban planning can benefit from local knowledge – a regional plan of Goa was mapped and taken down to the Panchayat which provided a lot of useful contribution. The government, however, overcame the map decision because it seemed to contradict the government's notion of development.

Dr Ribero called for a new development planning law that fits into the constitution which requires every state of India to produce a spatial plan (from the state level down to the district level). Planners shouldn't prepare projects, but prepare frameworks. Planners are now taught to first look at the positive constraints on land (ie forests, wetlands, etc), and then look at development possibilities which do not negatively affect the positive constraints. He also maintained that each state should only have one act regarding land-use so that the state is held wholly accountable for any mischief related to land use.

Region needs to be defined as the district. The panchayat, gram sabha all become sub-districts.

Dr. Ribero emphasized that mapping is key as it addresses questions of development and demographics and collates all the acts related to development and planning.

Dr Gadgil stated that there is a need to look at inter-sectoral issues. Environmental perspective is missing in a lot of planning projects. Plans end up in locked cupboards and aren't accessible to people. District-level data is not available in the public domain either. The databases we have been talking about can be used to help with development planning. We can't restrict all conservation to national parks

Dr Ribero added that in Goa, there is a problem where annual reports are created without any inter-governmental communication. The reports are individually good, but are not comprehensive when looked at altogether. This is most likely an issue throughout India.

Banerjee mentioned that there is an act that calls for streamlining biodiversity information and having that information feed into rural development. The problem is that the acts exist, but not the implementation.

A working group member briefly mentioned that city biodiversity cannot be left out of the discussion.

Afternoon Session

Dr. Gadgil opened the afternoon session and stated that specific schemes were needed to deal with gaps and problems relating to ecosystem resilience, biodiversity and sustainable livelihood.

Group 1 presentation (Annexure 3.D)

Responses

Goals should be ecosystem-based, not purely based on wildlife numbers

Dr Gadgil stated that there is a need for a specific mechanism/scheme for accreditation i.e. who can research, what are the impacts?

Group 2 presentation (Annexure 3.E)

Responses

Dr Gadgil stated that we need to be able to provide models, i.e. BRT, Orissa, to strengthen the case for schemes on forest governance.

Dr Barik mentioned that Tripura is a good model for FRA schemes.

Group 3 presentation (Annexure 3.F)

Responses

Dr Gadgil asked why we need to revisit and revise the list of MFPs? He requested that the focal group members look at the FRA again and revisit idea of revising the list.

Banerjee stated that MFPs need to be mapped.

Dr Gadgil wanted the focal group to incorporate ideas from the report on the FRA into their suggestions. He wanted the members to try to include ideas from the national biodiversity act on how to incorporate traditional knowledge.

A working group member stated that biotechnological interactions needed to be supported.

Group 4 presentation (Annexure 3.G)

Group 5 presentation (Annexure 3.H)

Seema had some additional insights on this topic. She stated that establishing on what basis states would be compensated would be tricky. There is an inherent problem with dividing the value between political boundaries. The second problem is that valuation is done in a relative/incremental sense – placing a value on a species or service is not a correct thing to do. A decision/collective agreement needs to exist regarding what method they would like to use and what the ultimate objectives are

Gadgil advised the focal group to consult Dr. Kanchan Chopra to obtain a valuation formula.

Dr. Indrani – Presentation on EPI (Annexure 3.I)

EPI is in the process of putting together an index to incentivize the performance of states so that environmental performance can be recognized and so that money can be allocated accordingly. This index includes biodiversity conservation as a criteria of environmental performance and identifies indicators of biodiversity. The indicators chosen should show progress – they need to be able to be measured, updated at regular intervals, and compared against a baseline. The idea is to have positive incentives for the conservation of biodiversity.

Need positive incentives for the conservation of biodiversity

The indicators suggested are – rate of loss of forest cover, rate of opening up of forests, fish availability and % catch, efforts towards elimination of invasive species, nutrient levels in water bodies, loss of wetland and lakes, loss of ecosystem services/livelihood because of mining, reduction in area/cycle under Jhum cultivation, change in livestock population

Dr. Indrani opened the floor for any suggestions of parameters or comments on the overall EPI.

Gadgil stated that measures of the effort of maintaining habitat continuity is important (not only in forests, but also in aquatic habitats).

Dr. Subramaniam suggested that the formation and biodiversity of plantations be considered.

Banerjee suggested that the amount of endemic species in the overall biodiversity be measured.

Dr. Subramaniam additionally stated that marine ecosystems have to be considered in terms of marine biodiversity, marine pollution, coral reef and seagrass conservation efforts.

Tushar suggested that using indicators of forest cover and protected areas may lead to competitive processes which affect rights. He also wanted the Planning Commission to look at complicated land cultivation processes and this plays a role in sustainable livelihoods and forest rights.

Dr. Vijay emphasized that a state-level environmental report is required so relative improvement regarding the indicators can be seen. He stated that direct estimates could not be solely used as indicators as there's no indication of extent of improvement. He said that there was a need to assess the effectiveness of the state disaster management plans and how well they have been implemented.

Another working group member stated that urban ecology also needs to be a separate indicator.

Dr. Vijay additionally stated that forestry-level indicators cannot be used as an evaluation of all states because ecosystems and geographies vary i.e. Ladakh has no forest cover even though it has rich biodiversity

Dr. Gadgil added that the EPI is a good beginning, but that we should also think of linking the EPI process to long-term environmental monitoring as this allows for more realistic estimates to be made.

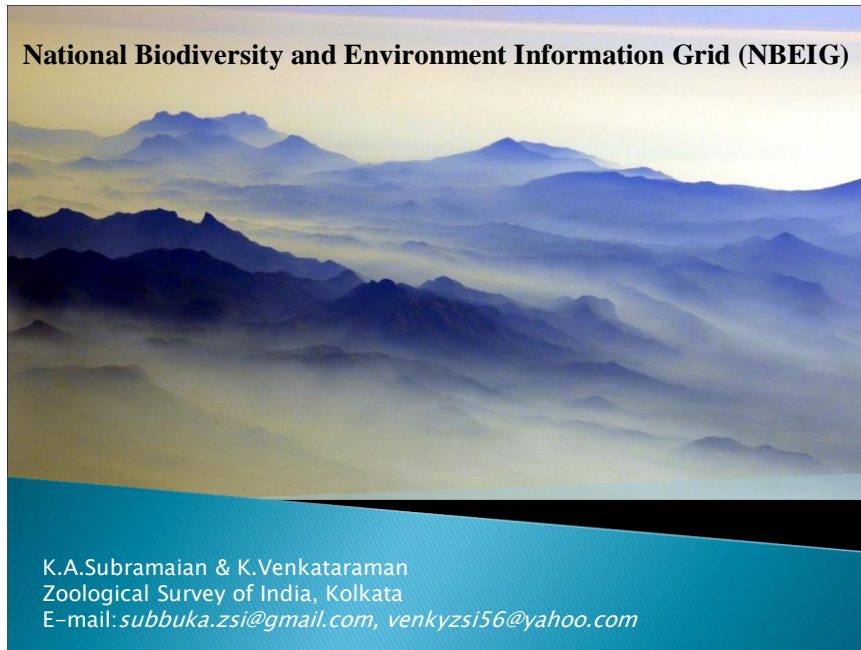
Closing Remarks

Dr Gadgil wanted all inputs to be emailed by Monday (22nd), definitely before the 25th

Banerjee stated that he would like to see a presentation on the 25th which includes figures and citations. These will ultimately enrich the working group report.

Dr. Gadgil wanted to sure that Kanchan Chopra and Somanathan would be attending the meeting on the 25th in Delhi.

Annexure 3.A



Background

- Conservation and sustainable use of biodiversity require accurate data in space and time.
- This data need to be constantly updated and information generated quickly decimated across stake holders for adaptive management decisions at local, regional and national levels.
- Data pertaining to physical and biological entities of environment and their interactions are collected by various governmental and non governmental agencies, educational institutions and individuals.

- NBA estimates that about 115 governmental and non governmental institutions are involved collection of data related to biodiversity and environment.

- This data is either spatial (eg: species occurrence, water pollution), temporal (eg: population trends of species, yearly harvest and trade of commercial species) or descriptive (eg: species descriptions, habitat details, wildlife crime).

- Currently, the data generated by these agencies are used for some specific objective (eg: species inventory, pollution monitoring, wildlife crime control) and have limited access to multiple stake holders or meta analysis across space and time.



The Proposal

To develop a national information grid on biodiversity, ecology and environmental data sets for scientific documentation, monitoring and management of biodiversity and natural resources.



•The proposed national information grid on biodiversity and environment is very well aligned with ongoing efforts on participatory Governance Reforms, National Data Sharing and Accessibility Policy (NDSAP)* and provisions of RTI Act 2005.

•Similar efforts are already initiated in collating and integrating spatial data through National Spatial Data Infrastructure (<http://www.nsdindia.gov.in>) and Geological Survey of India's Online Core Business Integrated System (OCBIS) project.

***NDSAP**: Proposes to shift from current "Open Series Model" to "Negative List" of classification of data. In the new paradigm, data owners and sources need to classify their data based on "features" and "exclusion principle" to prepare a negative list.

Current Initiatives with online access*

National Spatial Data Infrastructure (NSDI): <http://www.nsdindia.gov.in>

India Biodiversity Information System: <http://www.bisindia.org/>

National Natural Resource Management System: <http://www.nnrms.gov.in>

Western Ghats Biodiversity Open Information System: <http://thewesternghats.in>

India Biodiversity Portal: <http://indiabiodiversity.org>

Western Ghats Forest Biodiversity Portal:
(<http://www.ifpindia.org/biodiversityportal/index.php?lang=en>)

Indian Bioresource Information Network: www.ibin.co.in

Migrant Watch: <http://www.migrantwatch.in>

* NBA lists over 50 data bases from 115 institutions

Action Plan

- **Data Nodes and Infrastructure:** As a top priority data nodes, associated tools and infrastructure should be developed for Ministry of Environment and Forests and its subordinate offices, state forest departments, state biodiversity boards.
- **Data Archive:** National Biodiversity and Environmental data archive is to be created to deposit data from various sources, including historical data on biodiversity and environment.



Biodiversity and Environment Data Policy:

- Ministry of Environment and Forests, Department of Science and Technology, Department of Biotechnology and other funding agencies to make it mandatory that after completion of a project, the scientific data along with meta data should be deposited in National Biodiversity and Environmental Data Archive after a period of 3-5 years.
- During this 3-5 years period scientists involved in the project could publish reports, papers and books.
- Data related to intellectual property rights or other sensitive data need not be publically shared (negative listing of data).



- A team of experts from biodiversity, ecology, environment, space and information technology is to be constituted to develop detailed action plan and execution of the mission.

- A team of experts is to be constituted to develop detailed protocol for the use of data base and application of data base.



Annexure 3.B

Western Ghats Ecology Experts Panel Meeting

GIS Applications For Ecologically Sensitive Areas



Dr. S.N Prasad
Sr. Prindpal Scientist
SACON Deccan Regional Station
Hyderabad

A Fact file

- I. The Western Ghats are one of the world's biodiversity hotspots with over 5,000 flowering plants, 139 mammals, 508 birds and 179 amphibian species.
- II. At least 325 globally threatened species occur here.
- III. The range covers 60,000km² and forms the catchment area for a complex of river systems that drain almost 40% of India.
- IV. At 2695m, Mt Anamudi in Kerala, India is the highest peak in the Western Ghats.
- V. The Western Ghats are being considered as a UNESCO World Heritage Site.

Definition of ESA

Definition of Ecologically Sensitive Areas as those *ecological units that may be easily affected or harmed*

ESAs as those areas that are ecologically and economically important, but, vulnerable even to mild disturbances and hence demand careful management.

Synonymous with

Environmentally Sensitive Areas [3-7], Environmentally Sensitive Zones[8], Ecologically Sensitive Ecosystem[9], Ecologically Sensitive Sites

Criteria for Demarcating ESAs

1. Biological attributes: We propose that demarcation of an ESA shall consider the following components of biological and cultural uniqueness and richness :
 - a. Biodiversity richness: Richness in diversity at all taxonomic groups and hierarchies.
 - b. Species Rarity- Rarity in terms of population size, extent of geographical distribution and also rarity in taxonomic representation in terms of paucity of closely related taxa.
 - c. Habitat Richness: Spatial heterogeneity of Landscape elements
 - d. Productivity: Total biomass productivity
 - e. Estimate of ecological resilience: Level of persistence of original climax vegetation
 - f. Cultural and Historical Significance: Evolutionary- historical value and cultural- historical value of the area

2. Geo-climatic layers attributes: These include layers that permit assessment of the innate or natural vulnerability of the area. Obviously features such as slope, aspect, altitude, precipitation etc shall be used under the following two component attributes:

a. Topographic Features: Slope, altitude, aspect etc.,

b. Climatic Features: Precipitation, number of wet days etc.,

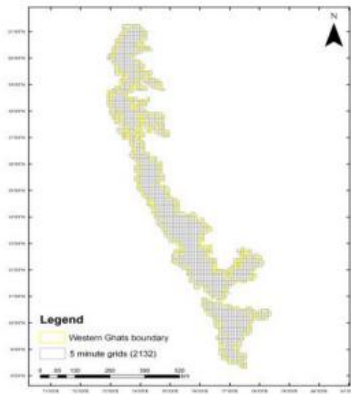
c. Hazard vulnerability: Natural hazards such as landslides and fires.

3. Stake Holders Valuation: It is important to take on board perceptions of the civil society and local bodies especially the Zilla, taluk and gram Panchayats, to decide on areas that they feel to be ecologically and environmentally sensitive. Of course these perceptions will very much depend on the proposed management regime.

Gridding the Area

Since the ESAs may be of very variable sizes, we propose that the region in question could be divided into grids of suitable size, depending upon the datasets available and vastness of the area. In case of Western Ghats we propose a 5' X 5' grids because most of the data sets available complement well at this scale .

Valuing Grids for their ecological sensitivity: Data and information could be obtained for the entire Western Ghats on each of the criteria listed and maps depicting the three attributes are being developed as below:



5 minute Grid Map for Western Ghats

Biological and cultural Layer:

a. Species Biological Richness: Areas that harbour high levels of biological diversity shall be assigned a higher score than those that are less diverse. Since taxa inventories are incomplete in the Western Ghats, rarity value may be initially calculated based on well studied taxa such as flowering plants, mammals, birds, freshwater fishes, butterflies and dragonflies. The diversity will be captured using the Avalanche Index[22,23] that integrates diversity at all levels of taxonomic hierarchy. Further in this particular situation, these values could be normalized from the lowest (1) to the highest (10) values of biological diversity and each grid shall then be attached with the normalized value corresponding to its level of biodiversity.

Rarity of species :

i. Distributional Rarity: Areas that contain the 'rarest' of the species are to be considered more important because the loss of these species is irreversible. For this, the rarity of each species needs to be defined quantitatively as the proportion of the total grids occupied by it (Pi) and for each grid these rarity values are summed over all the species in that grid. Accordingly, the rarity of species can range from 1/N for those that occur in only one of the total N grids to 1.00 for those that occur in all the grids. These rarity values of the species are then summed over all the species (S) for each grid to arrive at a Rarity Value for each grid. It is important to consider only the naturalized species to avoid the recently introduced invaders.

The Rarity Value of a grid (RVg) is given by

$$RVg = \sum_{i=1}^L (Pi)$$

Rarity of species :

Further these RVg values shall be normalized again from 1 (lowest) to 10 (highest) and assigned to the grids. Such quantification is fortunately possible now owing to the datasets accumulated on the distribution of species for several bio-rich areas.

Taxonomic rarity: Using the taxonomic hierarchy from the datasets available[24] taxonomically (and hence probably evolutionarily) rare species shall be identified as belonging to families that contain only one monotypic genus. Such families are counted for each grid and normalized between 1 to 10.

c. Habitat Richness: Habitat heterogeneity is well known to be correlated to the diversity of a range of organisms especially of animals including fishes [25, 26]. Therefore, in the absence of data on a wide range of animals, we propose that grids that contain high levels of habitat heterogeneity or landscape heterogeneity shall be regarded as biologically rich and hence assigned a higher score.

Rarity of species :

c. Habitat Richness:

The habitat richness of a grid (HRg) can be computed using an information theoretic measure such as Simpson Index where the species are replaced by the landscape element types and the frequency of the species by the proportion of the area occupied by the landscape element types as given below:

$$HRg = \sum_{i=1}^L (Pi)^2$$

Productivity : It has been demonstrated that productivity of an area, as represented by the cumulative greenness or NDVI over the year is a good surrogate for the vegetation diversity[27,28].

Estimate of biological /ecological resilience: The extent of deviations in the biological composition (plant composition) of an area from its original plesio-climax composition would reflect the resilience of the system over large time scale; those that have deviated more from the original composition can be considered to be least resilient and hence are ecologically highly sensitive. For this we propose to estimate the proportion of the existing vegetation that reflects the plesio-climax as an index of resilience[29,30]. These proportions are assigned to all the grids and then normalized to range from 1 (highest deviations) to 10 (least deviations).

Cultural Significance: Areas that harbour historical relics and cultural diversity also shall be assigned a higher score. While there is no easy way to value the cultural significance, we suggest that the oldest of the relics shall get the highest value (10) and the most recent a low value (1); if there are no relics the grid gets zero value.

Geo-climatic layers:

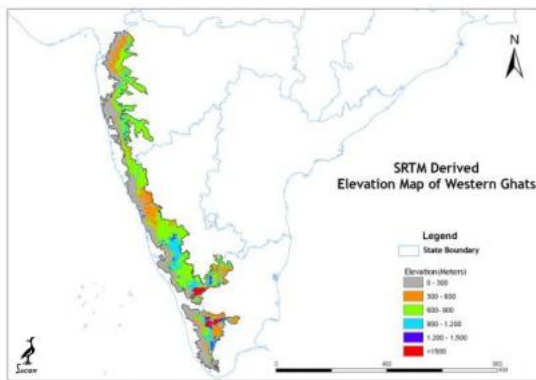
a. **Topographic Features:** Areas with steep slopes and high altitudes are likely to be eroded more easily, and hence vulnerable to natural degradation. Obviously such areas need to be considered as least resilient and hence assigned a higher

b. **Climatic Features:** Areas with high rain fall, and with a narrow window of wet or rainy season (actual length of dry season or number of rainy days in conjunction with total annual precipitation;

Hazard vulnerability: Available data on natural hazards such as landslides and fires shall be obtained wherever possible and attached to the grids, and normalized from 1 to 10.

3. **Stake Holders Valuation:** WGEPP has undertaken local consultations, and is also getting responses from wide section of civil societies

Topographic Layers



Shuttle Radar Topography Mission (SRTM)

The Shuttle Radar Topography Mission (SRTM) obtained elevation data on a near-global scale to generate the most complete high-resolution digital topographic database of Earth.

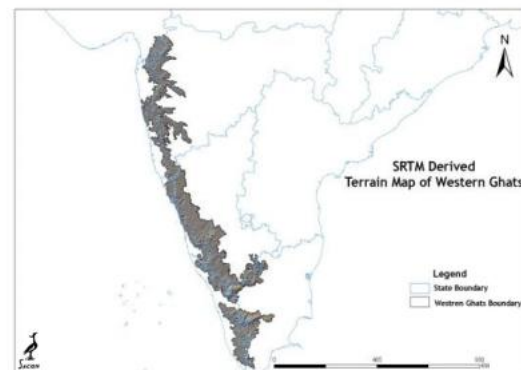
- ❖ There are three resolution outputs available, including 1 kilometer and 90 meter resolutions for the world and a 30 meter resolution.
- ❖ The SRTM data is available as 3 arc second (approx. 90m resolution) DEM's.
- ❖ 1 arc second data product was also produced, but is not available for all countries.
- ❖ The vertical error of the DEM's is reported to be less than 16m. It contains "no-data" holes where water or heavy shadow prevented the quantification of elevation.
- ❖ These are generally small holes, which nevertheless render the data less useful, specially in fields of hydrological modeling.
- ❖ SRTM Available website: <http://www.landcover.org/data/srtm/>, <http://srtm.csi.cgiar.org/>

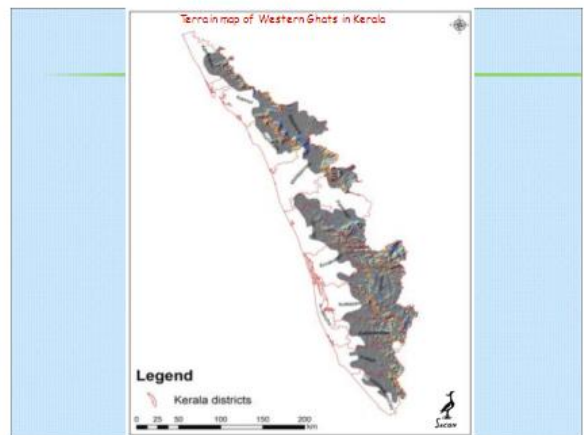
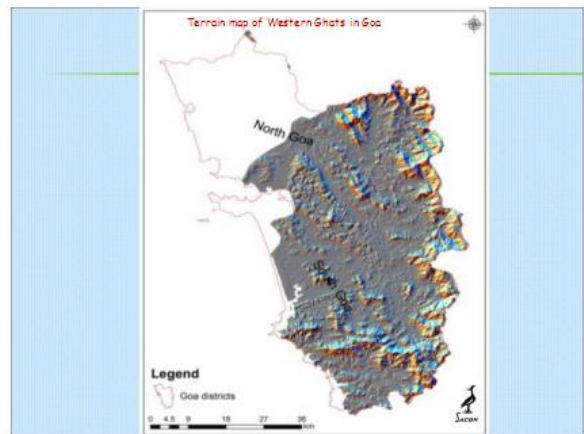
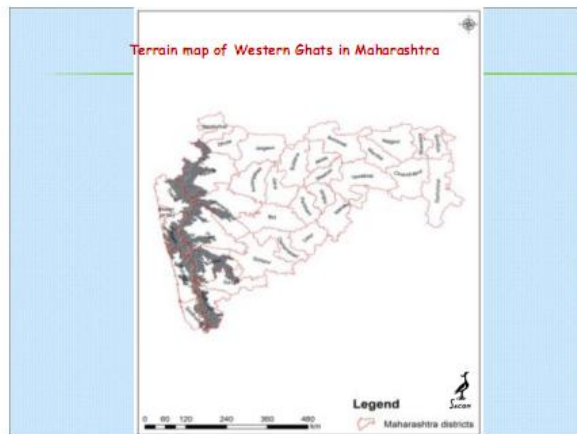
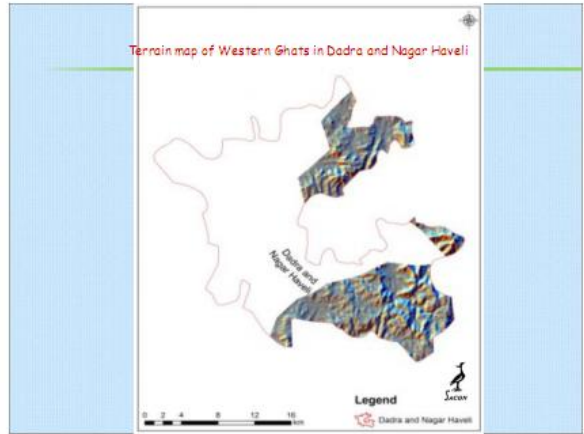
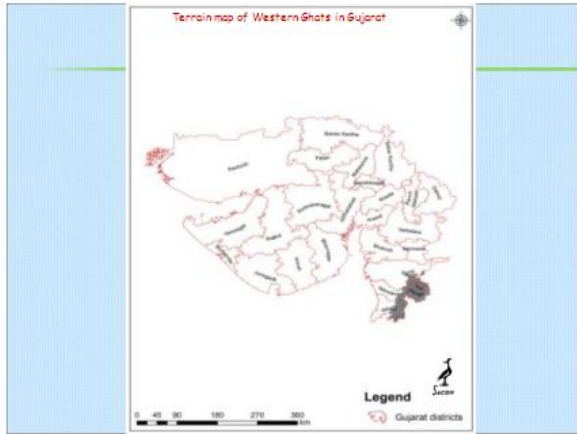
Digital Elevation Model (DEM) :

A DEM can be represented as a raster (a grid of squares, also known as a height map when representing elevation). The DEM dataset is also referred as a primary (measured) DEM, whereas the Raster DEM is referred as a secondary (computed) DEM. DEMs are commonly built using remote sensing techniques, but they may also be built from land surveying. DEMs are used often in geographic information systems, and are the most common basis for digitally-produced relief maps.

Tools used: ILWIS (Integrated Land and Water Information System)

In this project, SRTM data of 90m were used. In ILWIS, DEM visualization option was used to generate the visualization of elevation data. Subsequently, elevation map was exported to Geo Tiff format. (<http://www.itc.nl/>)







GIS Applications For Ecologically Sensitive Areas

Data sets available:

1. Western Ghats boundary (shape file) from WGEEP
2. India States, districts, Taluks (shape file) source : DIVA-GIS (<http://www.diva-gis.org/>)
3. SRTM data of India (TIFF)
4. Data used for das et al (2006) 25k grid from ATREE (shape file)
5. Forest Types of Western Ghats Cover (TIFF)
6. Forest types of India (TIFF)
7. Forest types of Western Ghats Cover (shape file) Source: French Institutes Maps
8. Protected Areas of Western Ghats Cover (shape file) Source: FERAL
9. Elephant Corridors of Western Ghats Cover (shape file) Source: FERAL
10. Endemic Vertebrates data of Western Ghats Cover (Spread sheet) Source: Ranjit Danials
11. Endemic Odonata data of Western Ghats Cover (shape file) Source: ZSI



GIS Applications For Ecologically Sensitive Areas

Open Source Software used:

- ✓ OpenJump
- ✓ Quantum GIS
- ✓ PostgresSQL+PostGIS database
- ✓ GDAL Library
- ✓ WKT Raster Plug-in for PostGIS
- ✓ OpenGeo Suite



GIS Applications for Ecologically Sensitive Areas

Data Cleaning Process:

1. Generated 5 X 5 minute grid file for Western Ghats Cover (shape file)
2. Generated 1 X 1 minute grid file for Western Ghats Cover of Goa state (shape file)
3. Generated raster files for each attribute of ATREE data by applying Surface method
4. Generated slope map in TIFF format using GDAL library
5. Generated shape files for following classes in Endemic Vertebrates data

- Amphibians
- Birds
- Reptiles
- Fish
- Endemic Odonata



GIS Applications on Ecologically Sensitive Areas

Methodology

a) Parameter Generation

1. Generated generic default sized (64 X 64) blocks along with their elevation values from SRTM data using WKT Raster Queries
2. Calculated average elevation values for each 5 X 5' grid for Western Ghats Cover and considered as a parameter
3. Calculated maximum slope values for each 5 X 5' grid for Western Ghats Cover and considered as a parameter
4. Generated generic default sized (64 X 64) blocks along with their endemic plants, lucn_max, unique percent, comp3 percent and first percent values from raster files of ATREE data using WKT Raster Queries
5. Calculated average values of endemic plants, lucn_max, unique percent, comp3 percent and first percent for each 5 X 5' grid for Western Ghats Cover and considered as parameters
6. Calculated area of Riparian forest for each 5 X 5' grid for Western Ghats Cover and considered as a parameter



GIS Applications for Ecologically Sensitive Areas

B) Rank generation example:

If the maximum value of endemic plant parameter is 100 then the following table taken as reference for ranking

Range	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90 & above
Rank	1	2	3	4	5	6	7	8	9	10

Calculated the average rank of all ranks for each grid.



GIS Applications for Ecologically Sensitive Areas

Grid statistics

Total Number of grids for Western Ghats cover : 2132

State wise :

Kerala	:383
Tamilnadu	:343
Karnataka	:737
Maharashtra	:749
Goa	:55
Gujarat	:90
Dadra Nagar Haveli	:12

GIS Applications for Ecologically Sensitive Areas

Grid statistics...

State wise ESA ranks and corresponding number of grids:

Tamilnadu		Kerala		Karnataka	
Rank	Count	Rank	Count	Rank	Count
1	4	1	73	1	20
2	58	2	86	2	152
3	101	3	89	3	244
4	94	4	75	4	192
5	36	5	35	5	81
6	14	6	19	6	9
7	4	7	9	7	9
Ranked Grids	311	Ranked Grids	388	Ranked Grids	678
Total Grids	343	Total Grids	383	Total Grids	742

GIS Applications for Ecologically Sensitive Areas

Grid statistics...

State wise ESA ranks and corresponding number of grids:

Kerala and Tamilnadu	
Rank	Count
1	77
2	120
3	171
4	145
5	54
6	28
7	10
Ranked Grids	603
Total Grids	652

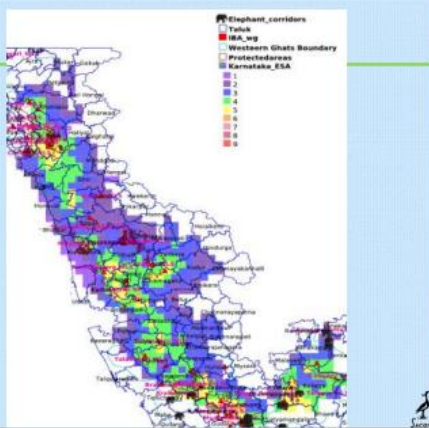
GIS Applications for Ecologically Sensitive Areas

Grid statistics...

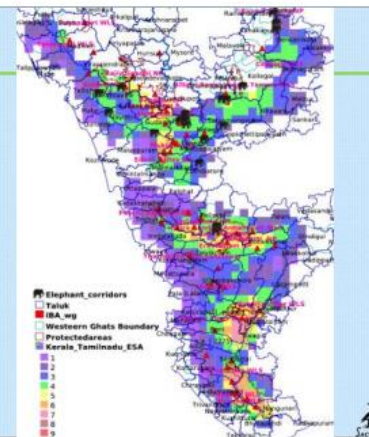
State wise Riparian Forest ranks and corresponding number of grids:

Kerala		Karnataka		Tamilnadu	
Rank	Grid_count	Rank	Grid_count	Rank	Grid_count
1	91	1	117	1	80
2	20	2	88	2	38
3	18	3	88	3	28
4	15	4	35	4	18
5	13	5	81	5	20
6	19	6	30	6	14
7	18	7	38	7	10
8	22	8	32	8	11
9	17	9	38	9	8
10	23	10	31	10	9
Ranked Grids	254	Ranked Grids	481	Ranked Grids	234

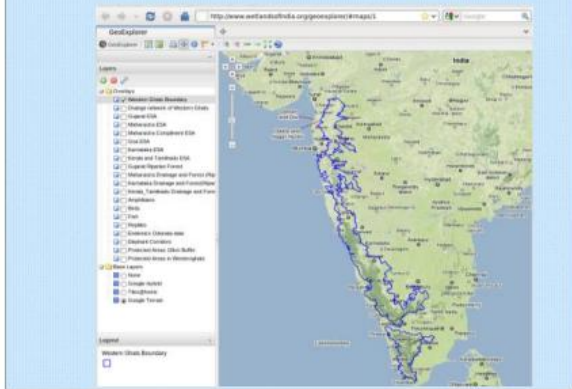
Karnataka
ESA
Prioritization



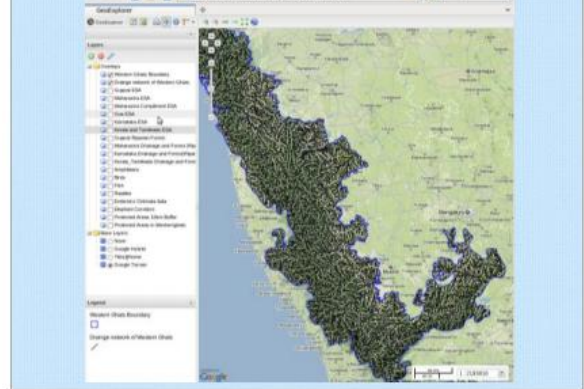
Kerala and Tamilnadu
ESA Prioritization



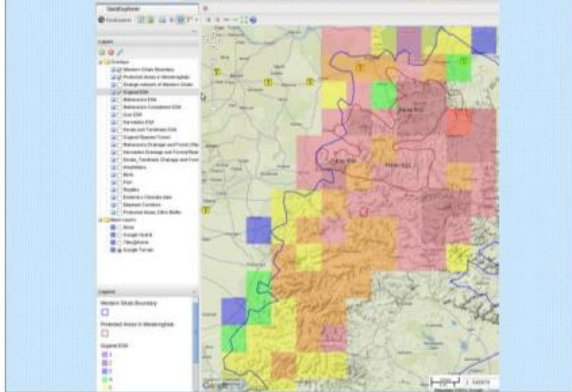
Western Ghats WEB-GIS Application GUI



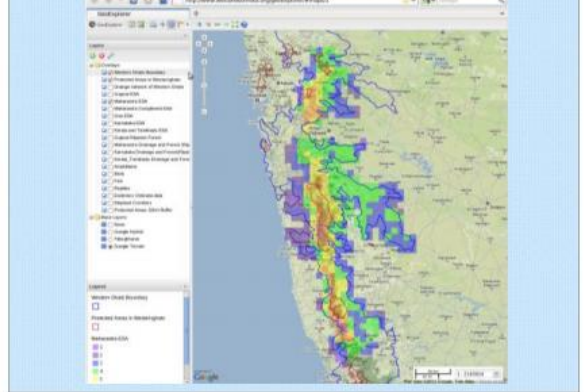
Western Ghats WEB-GIS Application : Drainage Network Map



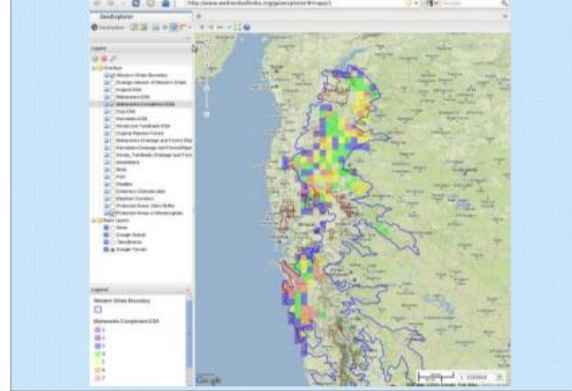
Western Ghats WEB-GIS Application : Gujarat ESA Map



Western Ghats WEB-GIS Application : Maharashtra (Lower) ESA Map



Western Ghats WEB-GIS Application : Maharashtra (Upper) ESA Map



Annexure 3.C

ARFINET

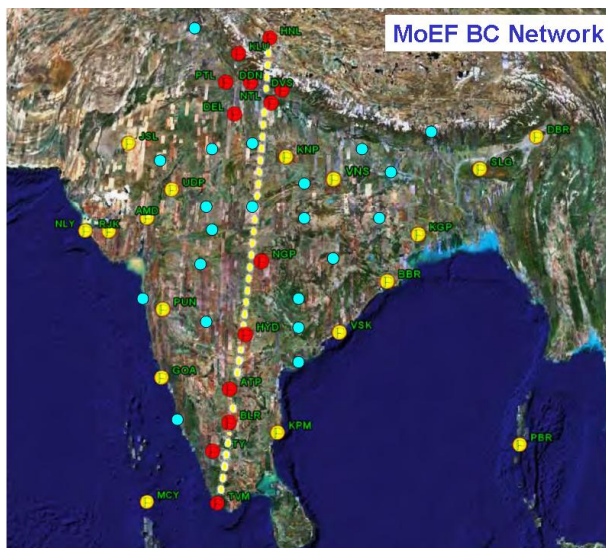
Network of Surface Observatories:
ISRO Geosphere Biosphere Program

31 sites



National Carbonaceous Aerosol Program (NCAP) NETWORK

60 sites



A Tentative List of Parameters

Net radiation balance (SW and LW)
PAR
Aerosol optical depth
Aerosol mass concentration
Black carbon mass concentration
Organic Carbon
Fluxes of CO₂ heat, energy, & momentum
Evapotranspiration
Wind speed and direction
Air temperature, Humidity
Land-use change
Precipitation
Soil moisture
Soil temperature
Soil nutrients
Leaf area index



Annexure 3.D

Focal group presentation on: Monitoring and adaptive management of ecosystem services and biodiversity

Wildlife outside PAs are neglected and have not been completely inventoried. Wildlife in PAs and corridor areas need to be protected. Wildlife should be managed on wildlife/habitat basis and not on forest/PA basis. Plants should be included in the umbrella term of wildlife.

A repository for wild plants needs to be created. Eventually plants of economic significance should be prioritized.

Invasive species are a poorly managed sector. All aspects of invasive species need to be investigated. Special attention needs to be paid to mapping distribution using GIS/remote sensing technology and assessing environmental and economic impacts of invasives (in terms of agriculture, economy, watersheds, biodiversity etc).

We should keep in mind that some invasive species have positive attributes i.e. some are known to be very good nitrogen fixers.

In order to manage invasive species, we first need to identify areas where invasive species are expected to thrive and pose the largest threat to biodiversity, economy, watersheds, agriculture, etc. Only after doing this can we monitor and manage them more effectively.

We should document invasive species in the benthos which is a largely ignored ecosystem in India.

The 'lower' plants, such as algae, and animals in marine and aquatic ecosystems should be treated as invasives.

Invasives should be removed under NREGRA.

Out of 36 animal phyla, 24 occur in India; the need to inventory India's is pressing. Marine species and micro-species are especially neglected in India

A potential way to address these issues is training and job-linked capacity building. Taxonomy should be made into a lucrative field. It could, for example, be required that a taxonomist is assigned to every wildlife sanctuary and national park in India. Universities, in biodiversity-rich areas especially, should also have competent taxonomists in the faculty. National training institutes should be formed which train researchers to obtain data from marine ecosystems and other ecosystems which are normally difficult to access – existing institutes such as the BSI/ZSI which have taxonomical expertise should spearhead this. Finally, there is a need to reevaluate/redefine the position of a field biologist, wildlife specialist and taxonomist.

We need to mainstream endemic species into plantation systems and greening programs.

Form national level consultation on human-wildlife conflict – its recommendations should be implemented

Dr. Vijay – Effective adaptive management requires defined areas which can be visualized and identified. Sub-basin areas of river catchments, especially, are amenable for adaptive management. Sub-basin area should be divided into a grid and these grid spaces will be managed as per a land-usage plan. The land-usage plan should integrate ecosystem (physical/ecological), sectors (line agencies), community (human agencies) and finance. Participation will be effective because the land can be visualized by the community. This is a step away from abstract planning.

There is a need to assess threats and prioritize conservation of floral and faunal biodiversity and the ecosystems that support them.

In which way can resources from different institutions be pooled? NREGRA as a way to monitor and manage invasive species should be used. IWMP is also a potential for link-up/convergence for biodiversity conservation – it provides a framework for a way to pool in the resources. IWMP was amended recently to include forest areas. There is potential for convergence with the National Green Mission.

Currently, most environmental planning is done on a watershed-basis – only soil-water conservation is done. We need an ecosystem approach which integrates different aspects of the environment, economy and livelihood. Budgets given to the various sectors need to be synergized/ optimized. Integration of resources from different institutions is difficult, but not impossible – the Sundarbhan is an example of this. A holistic plan needs to be made after discussion with the different stakeholders. Once the plan is made, it needs to be tested through pilot studies (testing on the ground and analyzing the resulting data). Holistic plans can only be formed if there is a national or stakeholder consultation.

Effective mechanisms for independent/third-party monitoring of research/conservation projects that are using government funding need to be formed and implement.

We need to pay attention to ecosystems other than forests i.e. wetlands. There need to be financial incentives to encourage participatory conservation of endemic species in vulnerable ecosystems. Myristica swamps were brought up as a specific example of a vulnerable ecosystem needing requiring urgent action.

One particular threat that needs to be assessed is the potential of hypoxia in aquatic ecosystems. This can be done partly by looking at waste treatment schemes and quality standards.

In terms of national environmental monitoring, there are 60 MOEF sites. More sites and parameters should be added to this network. Currently, there are no forest sites within the 60 sites. Monitoring should be multi-level (minimum of 3 levels).

We should think of urban landscapes which help conserve biodiversity.

There should be measures to monitor the carrying capacity of forests and not just the populations of large mammals. There should be nation-wide management of large mammals. Management should be local-specific. Planning should, once again, be ecosystem-wise and not PA-wise. Overall, we need broad-scale biodiversity monitoring.

Other considerations were brought up briefly towards the end of the focal group meeting. This included: payment for ecological services, creating a river regulation zone and treating pollutants as threats.

Annexure 3.E

Focal group presentation on: Strengthening structures and capacities for local environmental/forest governance (BMC, CFM, PESA, FRA)

1. What is the context of proposed programs/schemes? Mention:

- a. Gaps
- b. Magnitude of the problem
- c. Issues that need to be focused upon
 - Lack of focus on recognition of community forest rights
 - Exclusion of rights of OTFDs, PTGs, pastoralist and nomadic communities
 - Support institutions (like National FRA council) and necessary funding for supporting the process of recognition of rights
 - Knowledge deficit (training programs for implementing agencies and civil society groups)
 - Information deficit (information on claims, status of implementation. Records of rights recognized)
 - Lack of planning and monitoring the process of implementation (baseline information, micro planning, district level planning, activating the district planning committees)
 - Lack of technical inputs such as maps, records, evidence to support rights recognition process
 - Non-implementation of FRA in PAs and tiger reserves, issues in declaration of critical wildlife habitats
 - Conflicting laws and policies (JFM, MFP laws, transit permits, WLPA, PA management, working plans)
 - Forest land use, diversion of forest land is not in compliance with the FRA, PESA
 - Management of community forest resources post recognition of rights and necessary support mechanisms and funding and convergence programs. Making use of laws like MGNREGA, PESA to support management and development of CFR.
 - Marketing and technical support, MSP for NTFP based collectives
- d. Challenges
- e. Potential solutions and limitations of these solutions (as related to programs/schemes)
 - Special programs for CFR, documentation and recognition of PTG habitat rights, identification and documentation and recognition of rights of Nomadic, pastoralist communities
 - Setting up institutions at the national and state level
 - Capacity building programs for gram sabhas, implementing agencies and civil society groups to bridge knowledge deficiency and to strengthen local processes for identification and recognition of forest rights.
 - Setting up spatial land use pattern mapping at gram sabha, panchayat and district level and linking the mapping to the CFR process and continuous local monitoring of diversion and acquisition of forest and village land.

- Support process for management of community forest resources, technical and budgetary support for management plans for community forest resources and other natural resources
- Legal, technical and budgetary support for collaborative conservation and co-existence in PAs.

Annexure 3.F

Focal group presentation on: Strengthening livelihoods of communities dependent on forests/biodiversity

- Sustainable use of biodiversity – NTFP, fuelwood (community rights, CFM)
- Value addition, certification, ecolabeling, ecotourism, role of biotechnology

Sustainable use of biodiversity - NTFP status, conservation and use

(Monitoring, impacts on regeneration, recruitment and mortality,)

Background

- There is local knowledge related to the status of species and these need to be captured
- The FRA clarifies community control and stewardship over NTFPs

Title

- Assessing status of Non timber forest products for conservation and sustainable use

Central objectives

- Establish what constitutes sustainable levels for harvesting
- Status of the populations of species being harvested and conservation action plans

Scale of funding

- Large

Limitations

- Weak baselines
- May not be able to do this all over for all species on list – could be complemented by traditional knowledge
- Institutional capacities – need to network and leverage support from various institutions, mine existing databases

Preferable approach for implementation

- Bring ownership on NTFP
- Appoint a National Level Task Force on NTFP status, conservation and use – MoEF, MoTA, MoRD/ Panchayati Raj, Research Institutions, NGOs, DONER
- Sample assessment of species to determine status, followed by ecological studies
- Needs to be broad-based consultative process, involving primary collectors, traditional institutions, local governance institutions

- Set up resource Centers for different regions for NTFP monitoring and use
- Institutes need to be identified across India to conduct research on monitoring, impact studies on main NTFPs. Net working with these institutions need to be planned.
- establishing community resource centers across India, 2-3 in South, 3-4 in central India and 2-3 in north to build capacity of the community in monitoring and sustainable harvest
-
- Incentivizing growing of threatened species and other NTFPs on farms and marginal lands
- Schemes to encourage farmers to grow NTFPs in their farms, degraded lands also as mixed crops as cash income.

Stakeholders

- Forest department, TRIFED, collector societies, community/traditional institutions, gram sabha, local NGOs, research institutions

Outputs

- Task force report on NTFP status survey
- Conservation status and harvesting protocols
- Data/information base on ecological status of key NTFPs

Outcomes

- Sustainable harvesting of NTFPs based on status information
- Local conservation action and stewardship for threatened species

Certification and labeling for strengthening local livelihoods

Background

- Resources are coming from natural, default organic areas – scope for certification, labeling and value addition
- Very little value addition – most NTFPs sold/exported in raw form
- Exploitation and poor returns for primary collectors
- Add value and returns for local communities, primary collectors and cooperatives/societies
- NTFP rights to gram sabha – four major MFP can be the focus - bamboo, tendu, lac and mahua
- Transit passbook

Central objectives

- Better returns for primary collectors/producers - minimum support price for NTFP
- Reduce exploitation at the local level
- Incentivize local conservation action through better returns

- Encourage household level processing
- Inventory of potential NTFPs and then business development plans from micro level: on pilot basis this can be done in specific areas and with specific resources

Scale of funding

- Large

Limitations

- Institutional capacities – need to build local capacities
- Internal control systems

Preferred approach to implementation

- Central agency for organic certification, conservation labeling
- MFP Board
- Implemented through TRIFED/ LAMPS/ Federations
- Involve institutions like CFTRI, NGOs and research institutions; set up processing plants
- Training for value addition at the local level

Annexure 3.G

Focal group presentation on: International Commitments of India

1. What is the context of proposed programs/schemes? Mention:

Gaps

International Conventions and India

Little coherence between various international conventions.

No consultation with stake holders or civil society on major international negotiations like CBD and UNFCCC.

What cost does the country incur in honoring international commitment. Little R&D on other impacts of implementing international commitments

Unit of Planning

Unit of planning is incorrect. Unit should be river basin

That will **cross cutting** admin boundaries.

Community involvement- understand the area for which plan is being made. Ecol niche more easily identifiable

India doesn't have a comprehensive policy on Biodiversity conservation and is following the plan it formulated in 1992. Biodiversity Act , should be reviewed and amended accordingly.

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Possible model for planning.

India is a signatory to the Convention on Biodiversity which states that the ecosystem approach is the primary framework for action under the Convention. It defines 'ecosystem' as a 'dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit'.⁵ See <http://www.cbd.int/ecosystem/> for more information) Pilot on landscape approach, basin district.

The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. **It recognizes that humans, with their cultural diversity, are an integral component of ecosystems.**

1.Focus on the relationships and processes within ecosystem.

⁵ Article 2, Convention on Biodiversity.

2. Enhance benefit-sharing.
3. Use adaptive management practices.
4. Carry out management actions at the scale appropriate for the issue being addressed, with decentralization to lowest level, as appropriate.
5. Ensure intersectoral cooperation.

2. Specific schemes/programs recommended by sub-committee members for implementation. For each scheme, list:

Conventions:

1. Government needs to hold mandatory stake holder consultation across scales for important conventions.
2. Encourage in- house in depth research on impacts on India in terms of GDP, development goals and social objectives. How much resources diverted from national priorities.
3. Ministries should explain nature of india's engagement with respective conventions they implement.
4. Technology transfer and financial transfer mechanism- why and how much.

Planning

Pilot scheme for planning

Basin district or ecol district. Cross sectoral planning, locally more recognizable unit.

Forest biomass for local use as fertilizer, or forest localized bio mass energy.

Annexure 3.H

Appendix I

Focal group presentation on: Valuation of Ecosystem
Services and Biodiversity

WG on Ecosystem Resilience, Biodiversity and Livelihoods for 12th FYP
August 19th, 2011 – ATREE, Bangalore

Methodology:

- Identification of services or stakeholders.
- Millennium Ecosystem Assessment Framework to be used to generate the taxonomy of ecosystem services.
- Come up with a matrix of methodology. Methodology will differ according to the use and users.
- Conduct valuation using appropriate methods like revealed preference methods (Dose response, Travel Cost) and stated preference methods (Contingent Valuation).

- Map India on ecological values. Problems arising out of the fact the ecosystem boundaries don't match political boundaries.
- Valuation techniques can only measure changes.
- Green Bonus based on valuation.

Institutional Mechanisms:

- Finance Commission, Planning Commission, centre of excellence in environmental economics and MoEF should develop a strategy to develop an institutional mechanism.
- Develop compensation schemes.
- Institutional Mechanism to fix, monitor, negotiate and share payments.
- Payments should be based on negotiations between two parties.

Gaps:

- Information and Institutional Gap.
 - No accepted system of valuation.
 - No information repository.
-

Magnitude of the Problem:

- All states are demanding green bonus.
(Himachal Pradesh, North East, Kerala)

Issues that need to be focused upon

- National Accounting of Eco-Services.
- Biodiversity Act.
- Signatory to international conventions.
- Access and Benefit Sharing.

Challenges:

- Institutional Mechanism.
- Finance.
- Awareness amongst stakeholders.
- Formulating national grid system for biodiversity related information with forward backward linkages.
- Develop centre of excellence.
- Sustainability
- Political and Livelihood conflict.
- Scarce Land resources.

Annexure 3.1

Towards Inclusion of Environmental Performance as a Criteria in the Allocation of Central Assistance to State Plans

**Planning Commission
GOI**

Proposal

- Construct Environment Performance Index.{PC-EPI} as proposed and Rank States & UTs .
- Devolve funds , to incentivise Environmental Performance , based on EPI ranking of the States/ UTs.
- Include “ Bio-diversity Conservation” as a criteria and identify indicators.

PC-EPI		
Criteria	Indicators	No.
AIRPOL	NO _x , SO _x , SPM/RSPM	3
WATER - quality	% Sewage Treatment and River water quality(DO & TFC) .	3
FOREST	TFC as % of state GA & contribution to National average, increase in forest cover, area under Protected Area Network (PA) and Afforestation efforts	4
WASTE	% MSW, Bio-med., and Industrial Haz. Waste collected and disposed.	3
Climate change	Existence of SDMAs, % of Renewable Energy including Hydel Prod. in Total Energy Consumption, and GHG emissions- (CH ₄) entric.	3
	TOTAL	16

Air Quality

- Ambient Air Quality indicators considered for measuring the performance are sulphur dioxide (SO_x), nitrogen oxide (NO_x) and Respirable Suspended particulate Matter (RSPM) for which standards have been notified.

Water Quality

- Percent Sewage disposal and water quality of rivers viz; Dissolved Oxygen (DO) and Total Feecal Coliform Count (TFC) have been considered under water quality.

Forestry- Indicators

- 1. percent forest cover(TFC) of state GA and contribution to national forest cover
- 2. change in forest cover during 2003 to 2009,
- 3. Protected Area (PA) network of the state GA & contribution to national average, and
- 4. yearly average afforestation effort during 2006 to 2009.

-

Waste Management- indicators

- 1. **Municipal Solid Waste Collection efficiency,**
- 2. **Treatment and disposal capacity for hazardous wastes , and**
- 3. **Biomedical waste capacity set up for treatment**

Climate Change-Indicators

- 1. Existence of a separate State Disaster Management Authority (SDMAs),
- 2. Percentage of Non-conventional Energy including Hydro in Total Energy Consumption, and
- 3. State's GHG emissions i.e CH₄ (Methane) from enteric sources.

Identify indicators under the criteria “Biodiversity Conservation” for inclusion in the PC-EPI

- The Aichi bio-diversity target (Strategic Goal A, No.3) mandates that incentives for conservation and sustainable use of bio-diversity be developed and is as under.
- “ By 2020 , at the latest,, incentives, including subsidies ,harmful to bio-diversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and **positive incentives for the conservation and sustainable use of bio-diversity are developed and applied**, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.”

Indicators suggested

- Rate of loss of forest cover, bio-diversity,?? endangered species in the state.
- Alt --Rate of opening up of forests,
- Fish availability and % catch i.e efforts made for sustainable fishing in the state .
- Efforts towards elimination of invasive species by the state.
- Nutrient levels in water bodies in the state.
- Loss of Wetland and lakes.
- Loss of eco-system services/livelihood due to mining
- Reduction in area/cycle under Jhum Cultivation
- Change in livestock population.

Annexure 4

Proceedings of the Third Meeting

Working Group on Ecosystem Resilience, Biodiversity and Sustainable Livelihood

(25th August, 2011, New Delhi, Chaired by Dr. Indrani Chandrasekharan)

The following were the highlights of the meeting :-

Theme I. FOREST GOVERNANCE, FRA, PESA, CFM, BDA

- Tushar Dash, Program Officer, Vasundhara gave a thematic representation on the topic emphasizing the essentials of FRA and community rights and their role in the process of forest conservation suggesting potential solutions and schemes which can be helpful for the 12th plan. He also stressed on the need for bringing about gradual institutional changes in order to facilitate community management and forest governance.
- Mr. A. K. Srivastava, Director, Ministry of Tribal Affairs, stressed on the fact that there is no dearth of plan schemes as well as commensurate funding at Gram Sabha and at District level. He further elaborated by stating that each state has been allotted funds and there exist mechanisms to empower the local communities. He also said that conservation and development programs for Primitive Tribal Group already exist and these can be strengthened in order to protect the rights of locals.
- Mr. A.K. Mukherji, Former D.G., Forests, Govt. of India, said that Panchayati Raj should be made responsible for growing cattle and fodder as well as management of water. He was of the opinion that JFMC needs to work with the Gram Sabhas in order to work effectively thereby protecting the rights of the people. He further stated that land should not be distributed as per the Land Distribution Scheme. "It is important to make sure that when rights for a particular set of land are given to people, these communities should be sensitized towards maintaining it." He also stressed on the need for a comprehensive GIS mapping which will serve as an important tool for the planning process.
- Prof. Vijay Paranjpye, Chairman, Gomukh Environmental Trust strongly advocated that a position paper from all forest departments must be submitted to the Planning Commission so that it helps us plan in a way that we target the loopholes of already existing schemes. He stressed that fund allocation must be process targeted. He was of the opinion that ecosystem approach must include habitat conservation and a fragmented or a sectoral approach is mandatory.
- Representatives of SACON said that all policies and developmental approaches must look at conservation as the larger motive. They proposed that some schemes and projects can be collaborated with the existent UN schemes.

- Ms. Meenakshi Negi from the National Medicinal Plant Board also stated that disrupting existing policies and replacing them with new ones does not offer any solution to the problem but it is important to build on existing schemes.

Theme II. ECOSYSTEM SERVICES

- Dr. Indrani Chandrashekharan, Advisor, (E&F Division) initiated the discussion on Ecosystem Services and asked the members to present their views on the concept. She stated that the purpose was not to compensate the states but to incentivize them for sustainable management of their natural resources. She explained the importance of evaluating ecosystem services essentially a tool for green accounting and Green-GDP for sustainable growth
- Prof. H.Y. Mohan Ram was of the opinion that ecosystem services are very difficult to monetize, since there exists no perfect method to find out the existence value of ecological assets. He also stated that most of the ecologically gifted states have a strong foundation because of presence of these resources and can optimize their resources on their own without a government incentive or subsidy.
- Prof. Vijay Paranjpye, Chairman, Gomukh Environmental Trust said that incentives should only be given for incremental growth i.e. for a project or an initiative that a state has taken up in order to increase the ecosystem resilience of that region.
- Dr. Suprava Patnaik, Associate Professor from IIFM said that IIFM would overlay the Planning Commission's requirements in order to supplement them with information related to Ecosystem Services.

III. Special Gr. On National Biodiversity Information and Environmental Grid.

- Mr. J. C. Dagar from ICAR said that there a group dealing with agro-biodiversity must be instituted because it is important to understand the impact of climate change on these species and they need to be preserved.
- Prof. Vijay Paranjpye, Chairman , Gomukh Environmental Trust said that a national policy on biodiversity is needed in order to conserve and protect all flora and fauna .
- Mr. Yogesh Shouche from NCCS Pune stressed that it is essential to preserve microbial biodiversity and therefore microbial biodiversity data must be included in the N.B.I.E.G. data base.

OTHER DISCUSSIONS

- Notes received from **Dr. Madhav Gadgil, Chairman**, Working Group
- Sub group format – Tentative Format for Structuring/presenting Report.

Annexure 5

Suggestions for adoption of a holistic approach for formulation and implementation of forest and biodiversity development programme and sustainable use with people's participation.

A.K.Mukerji [Former D.G.Forests-MOEF]

1. The **integrated management of natural resources** has assumed great significance in the light of emerging challenges in the field of climate change, ecological security, biodiversity conservation and livelihood issues especially the food and water security of the country. The sound and efficient management of the natural resources is essential for a healthy environment. The mandate of the Ministry of Environment & Forests is to ensure a pollution free environment and conservation of forests for land and water development in the country, which are keys to meet the demands of rising population especially for the poverty reduction. Therefore, for sound management of the natural resources, it is essential to give sufficient importance to the conservation of forest resources including wildlife, which constitutes 23% of the country's geographical area.

2. **Ecological Services of forests** like hydrological benefits, soil conservation, flood control, carbon sequestration, fresh air generation, climate stabilization, bio-diversity conservation and amelioration of overall environment, urban and semi-urban amenity, eco-tourism etc. are being increasingly recognized and planners have started thinking in the direction of developing green budgeting of the economy in the country. **Apex Court** has interpreted that fundamental Right to Life is not mere survival right but also include right to good environment, and forests ensure this uninterruptedly

3. Key Challenges to the Forestry Sector in India:

- With 17% of world population and 18% livestock over 2.4 % of world total geographical area, India's forests are facing severe biotic pressure.
- The per-capita forest in India is 0.06 hectare as against the world average of 0.64 ha.
- The forests are meeting 40% of domestic fuel-wood needs of the people and 30 % of the fodder needs of the cattle in our country.
- The demand and supply gap of timber, fuel-wood and fodder is widening in the country.
- Shifting cultivation practiced over about 1.2 million ha, though associated with socio-cultural, legal and bio-physical characteristics, is also cause of degradation of forests predominately in Eastern and North-Eastern India.
- Honeycombing of forests caused by encroachments and its regularization and allotments under FRA.

4. In view of the facts stated above emerging situation is summarized and suggestions made for future sustainable management and development of forest and conservation of biodiversity-

a) The foresters had originally initiated the concept of JFM [joint forest management with local stake holders as equal partners in a caring and sharing mode] in W.Bengal, Himachal etc states in mid 70s onwards. The outcome impressed **the then PM Shri Rajiv Gandhi so much that while presiding over the meeting of the CBF in 1988** [I was present] he not only approved

the 1988 Forest Policy but **also gave directions for Creating JFM units in all forest fringe villages in all states leading to issue of the JFM guidelines by MOEF on 01/06/1990.**

b] The FDs earnestly carried out this directive and to date there are more than 100,000 JFM committees, which are managing more than 20 million Ha of forests. The fund flows from MOEF through FDAs to the accounts of the JFM. The JFM's developed a 5 years Micro-plans for the forest area of their village with the technical help of the FD to blend local knowledge and latest technical inputs for ensuring sustainable management and improved productivity. They further carried out forest development and harvting activities as approved by the executive committee from time to time and made all payments at their own level. They also protected the area under their control and ensured equitable sharing of the forest products and other benefits.

c] **The forest rights are traditionally enjoyed by the village stake holders in forests falling within the revenue village boundary and are not shared with rest of the panchyat members as many villages may not have similar forest wealth.** There is no provision even in the FRA 2006 of sharing forest rights by all members of Panchyat, but such title is to be only given to local right holders who had been enjoying it since long. **The Gram -sabha in such areas can be declared as legal title holders for specific forest rights under FRA and not the entire panchyat.** The local JFM can serve as the executive unit for all forest development programmes as per the well tried and tested present practice. The same units can also be made the local biodiversity conservation units which will encourage them for sustainable use the forest wealth for meeting their livelihood needs and also self regulated sale of forest products for economic gain without damaging the local ecology.

d] **In View of the enactment of PISA and the FRA2006 it the right time to review the power and responsibilities assigned to the JFM committees** in various states and to develop a common minimum criteria for all states. **I am enclosing a set of such criteria's developed** and field tested during my recent field visits connected with various projects and interactions with various JFM members and forest field functionaries in Tripura, Orissa, UP, HP etc **This may also be considered by the group during the meeting on 19/08/11.**

A.K.Mukerji [Former D.G.Forest]
anumira@airtelmail.in [011-26273254]

Annexure 6

Policy support for empowerment of at JFM and FDA level for ensuring effective and transparent people's participation and equity.

[A.K.Mukerji]

To achieve the goal of sustainable management and utilization of goods and services from forests leading to poverty reduction, as provided in the National Forest Policy of 1988, people's participation has been adopted as the main strategy by the Government of India. It was operationalised vide MOEF's directive of June 1990. It is now being implemented through the establishment of Joint Forest Management Committees [JFM] at village level and Forest Development Agencies [FDA] at the Forest Divisional level in all states. Most of the states have established village level JFM [or VSS or FPC etc] and Forest Divisional level FDA organizations for implementing the proposed project.

Following issues need to be addressed under the state forest policies to ensure effective implementation of forest protection and development activities through phased empowerment at the field or JFM level.

Empowerment will come in stages in keeping with level of capacity building and of awareness of the benefits of micro planning in sustainable management and harvesting of forest resources, team work, equity in sharing of the responsibilities and gains at JFM level , mutual cooperation, conflict resolution, monitoring and evaluation etc aspects at the FDA level.

The way ahead :-

i] Encourage people to protect the forests by giving them well identified lead roles in forest management and clearly defined benefits to the community from the same.

ii] Train them to undertake need based local micro planning for mixed species planting in degraded forests, ensuring assisted natural regeneration in harvested area or moderately stocked area with root and seed stock, raising and maintenance of bamboo areas, rubber plantation, pasture land development and agro-forestry for improving productivity and the biomass availability.

iii] Forest resources being one of the major contributors of the household income, it's development should not be seen or managed by the community in isolation as an income generating source, but they should be allowed make it an integral part of the whole village development process in association with other land based development schemes.

iv] provide people access to technical help to develop dams for water storage, on small streams within and in forest fringe areas without felling of trees and large submergence, for water for cattle and small irrigation projects, rainwater harvesting to improve ground water near villages.

v] Facilitate planting of trees, bamboos, NWFPs and rubber in jhum areas etc of their choice in community and private lands. Decentralize the authority for sustainable harvesting, sale and transport of such products, within the Divisional boundry and to the nearest timber sales depot, to the local chairman of the JFM committee. For trees and NTFPs from forest area

managed by JFM committees both the chairman and local range officer may jointly issue such transit permission [within the division] for harvesting done under the micro-plan approved by the DFO.

vi] To provide assistance and train them through research support in innovative measures for sustainable and timely harvesting, grading, local methods for improving the shelf life of the various NWFPs. Encourage value addition through local processing and help in marketing, if necessary, by fixing a support price for major products of the area. This will help in generating considerable off farm employment opportunities.

vii] Provide technical inputs so that balance could be achieved between exploitation and conservation of forests and protected areas specially of the endangered plant and wild life species for community management of the natural resources.

Encourage and Empower :- This will inculcate a sense of ownership of forest products and true partnership with the FD in protection and sustainable management of forests.

i] Encourage them to develop and implement innovative methods and procedures for equitable distribution of usufructs [with each family taken as one unit] from the rehabilitated areas and regenerated forests, taking special care of the poor stakeholders.

ii] Encourage development of a community corpus fund from part of the sale proceeds, contribution by members, voluntary labor etc for future management and maintenance of the JFM area and even to grant micro-credit to a local stake holder .

i] Empower the JFM committee to open it's own Bank account to receive the approved grant in aid from the Project authority and operate the same under a double signature of the chairman of the Ex. Committee and the local designated forest official.

ii] Empower the Ex. Committee to approve expenditure on due micro plan activities in each month for timely implementing the various work to achieve the targets approved in the micro plan.

iii] Authorise the JFM committee to frame rules and collect membership fee from members and also reasonable fee for harvesting of NTFPs like Bundles of grass, fuel-wood , honey, fruits, medicinal plants etc for even self use. All such collections will help in development of corpus fund for future.

iv] Empower JFM executive committee to impose and collect small fines, as prescribed by the FD, for petty offences eg unauthorized grazing, lopping for fodder or fuel wood, removal of NTFPs, wildlife products etc and confiscate the product for sale for depositing the sums so collected in the corpus fund.

Responsibilities . Empowerment also brings in the concurrent responsibilities, of proper and objective management of funds and generated bio-resources, specially for the Ex. Committee and also the general house of the JFM members. Some of these are indicated below :-

i] Taking interest and active part in development of the micro plan and entry point activities in collaboration with the forest field staff and local NGO and it's follow up actions throughout the project period and beyond.

ii] Preparation of the agenda listing out the items to be discussed, financial implications, if any for the meetings of the general house and the Ex committee and it's timely [at least on week] intimation to members.

iii] Recording of the proceedings giving details of items discussed , and final decisions taken [specially on work component and financial matters] on each issue through consensus or voting. It is also imperative to clearly record the feelings of the community regarding the progress of works and actual benefits derived in shape of jobs, higher level of usufructs, soil and water conservation etc.

iv] Maintenance of Measurement book for actual work done for entry point activities and other small engineering works and plantation journals giving details of no.of saplings of various species planted, technique adopted, time of planting, nursery of origin, soil and water conservation works done, etc.as well as amount spent for each operation. Similar records to be maintained for the subsequent years for maintenance works.

v] Record of all Forest products sold with details of quantity, price , method of sale, to whom sold, in forest area or from depot, details of export permits issued. etc.

vi] Maintenance of up to date accounts of all funds received and expenditure incurred [with details of authorization] for submission on monthly basis on the lines to be prescribed by the project authority.

vii] Ex. Committee should meet regularly as prescribed and ensure transparency in its deliberations and decisions taken by recording it in the proceedings in a register as well as ensure regular and timely meeting of the general house to maintain active interest in the project works of all the members and stake holders.

viii] All members of JFM are to ensure protection of the forest and wildlife in the area by devising procedure of patrolling by every household on rotational basis or appointing a local person to do so by raising funds collectively for the same. All acts of illicit felling, encroachments, deliberate starting fire in forest area, poaching etc should be immediately reported to the local forest official and also provide support to FD in tracing the culprit, confiscation of forest products and prosecution.

The FDAs should a] ensure timely submission [approved micro plan based] of request for annual funds from project authority and make need based equitable distribution of budget to JFM committees .b] It should effectively serve as conflict resolution authority specially if it is between two JFM areas.c] It must provide market information to JFM committees and help in sale of products at best available prices by keeping in touch with bulk buyers and consumers within and outside the state. d] It should serve as a forum for exchange of views amongst the representatives of various JFM committees for their mutual benefit , e] ensure and help in periodic monitoring & evaluation of all project activities .f] ensure inter departmental coordination with other land based development agencies e.g. DRDA, Tribal Development, PM rural rojgar yojna etc for integrated development with forestry as one of the core sectors for ensuring adequate fund flow from these projects for forestry development activities.

Annexure 7

Contribution to the Second Task Force Meeting on Ecosystem Resilience, Biodiversity and Sustainable Livelihoods

Ecosystem Resilience, Biodiversity and Sustainable Livelihoods

Balakrishna Pisupati, National Biodiversity Authority

Introduction

In ecological terms, the concept of resilience deals with issue of capacity of an ecosystem to respond to disturbance (both natural and man-made) by resisting damage as well as recovering quickly. The thresholds and limits to resilience of ecosystems depends on various factors including the status of biodiversity that it harbors to rate of continued pressure on the ecosystem from external factors. Examples of climate change research have shown how biodiversity rich ecosystems better respond to climate variability and change (UNEP 2009). Biodiversity underpins the rate at which ecosystems and its goods and services can respond to both internal pressures ranging from incidence of invasive alien species to anthropogenic pressures.

Discourse on resilience now includes consideration of the interactions of humans and ecosystems via socio-ecological systems, and the need for shift from the [maximum sustainable yield](#) paradigm to environmental management which aims to build ecological resilience through "resilience analysis, adaptive resource management, and adaptive governance"(Walker et.al. 2004).

Role of ecosystem resilience on securing livelihoods

Based on research related to links between local livelihoods and ecosystem resilience, the following key hypothesis can be highlighted:

1. The rate of dependence of human well-being on ecosystems is ever increasing with limited focus on how the interactions could affect sustainable development (Global Biodiversity Outlooks 3 [2010], Draft Global Environmental Outlook 5 [2011]).
2. Ecosystems (including their goods and services) are the basis for economic and social development (TEEB, 2010).
3. The rate of loss of ecosystem resilience is increasing with limited indications for recovery (GBO3)
4. Building resilience underpins efforts at national, regional and global levels to deal with environmental challenges such as climate change, land degradation and sustainable economic development.
5. Biodiversity offers the 'insurance' against sudden changes in ecosystem resilience buffering changes. However, the length of provision of such buffer will be limited with chances for irreversible loss many times.

Policy responses

1. Design an active and adaptive management approach to deal with ecosystem resilience and livelihood securities that acknowledges uncertainty where the policies can treated as hypothesis and management experiments are possible from which practitioners can learn and unlearn.
2. Develop a ecosystem and biodiversity management system that support enhancing not just ecosystem resilience but also related social and economic resilience systems. After all, sustainable development is about an inclusive approach that is responsive.

3. Identify options for strengthening and networking institutions, initiatives focusing on conservation and development that stimulates flexible and open opportunities for learning and influencing policy development and implementation.
4. Identify biodiversity governance challenges and provide incentives for participation by stakeholders and incorporates their ecological knowledge into institutional structures in a multi-level governance system.
5. Develop a national science-policy interface initiative that helps translate facts of science with sound policy making.
6. Encourage, where available, and develop biodiversity and ecosystem friendly approaches and technologies to enhance resilience and adaptive capacity with incentives for their adoption, incubation and transfer.
7. Develop inter-institutional, multi-disciplinary approaches for enhancing capacities and awareness at national, regional and local levels.

Annexure 8

A note for strengthening NBA in the 12th FYP

Submitted by Darshan Shankar

The Govt. of India in line with CBD obligations has been amongst the first countries to enact the BD Act and establish an NBA. However the NBA today functions in a sub-critical way and is only engaged in regulatory functions related to access and benefit sharing. In the 12th FYP it is important to strengthen NBA so that it can perform critical functions related to all the three pillars of the BD Act viz; conservation, sustainable use and ABS. My proposal is to encourage NBA in 12th FYP to coordinate two national programs. These are outlined below;

Supporting creating of PBRs and *development-action* arising from their creation

In the 12th FYP, we should support a program for accelerating creation of PBRs in the country with special focus on bio-geographic, socio-economic and regional priorities. The PBR should not be an end in themselves but be used to encourage *developmental programs* for food, health and livelihood security of local communities.

For this program I believe we should allocate around Rs. 1 Cr. per PBR and for related development projects for food, health and livelihood security. In the 12th FYP in order to demonstrate impact this program should be implemented on a minimum size and scale of 100 development projects in rural India. In the 12th FYP, a budget of Rs. 100 Cr. should therefore be allocated to NBA for this program.

Proposal for NBA to seek funding of Rs. 100 Cr in 12th Plan for supporting a network of specialized institutes for undertaking a) threat assessments, b) monitoring of wild populations and c) designing species recovery plans

There is a provision under article 8 d of CBD to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings. The decline and loss of wild populations of a number of very valuable wild species is a result of the combined impact of habitat loss and degradation as well as over-exploitation of these wild resources. Climate change is also believed to be impacting such loss but there are no serious studies that have exposed this relationship. A few recent studies, outside India, have speculated about the fragmentation and decline of wild populations of some plant and animal species in the mountains ecosystems on account of climate change. IUCN and others have developed internationally accepted criteria, methods for estimation and defined threat categories. Today however no Institutions in the country, specialized on specific group of taxa or of habitats, are being supported on a long term basis by the MoEF or NBA to implement these internationally accepted guidelines for threat assessment, monitoring or recovery of species or habitats.

In fact the Ministry of Environment and Forests, Govt. of India, has no *long term* program, strategy or dedicated funding for assessing monitoring and recovery of populations of threatened taxa or undertaking assessment of threatened habitats.

It is proposed that in the 12th FYP *NBA should be supported to coordinate an appropriately funded all India coordinated scheme for assessment, monitoring and restoration of prioritized threatened taxa and habitats*. This scheme should be coordinated by NBA, although it may be implemented by a network of

reputed Institutions who have the competence to study the different groups of plants, animals and habitats. Assuming 10 national institutions will be involved in the program, it is recommended that in the 12th plan a budget to the extent of Rs. 100 Cr. may be allocated to support the network of 10 specialized institutes.

Annexure 9

SEARCH FOR VALUES

(A Note for 12th Five Year Plan: Ecosystem resilience, Biodiversity and Sustainable Livelihood)

R. S. Pirta

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(*Part-I* of this note may well be a preamble to the Gandhian approach outlined by Prof. Madhav Gadgil.

Part-II highlights some issues pertaining to challenges raised in the meeting of the working group on 29th July 2011)

Part- I

1. Need for ethical and moral codes!

The emphasis on ethical and moral codes in human life is a contentious issue and creates uproar as it is perceived a hindrance to openness. However, it is not easy to deny the vital role of ethical and moral codes in individual and social life. These codes may be acquired by self experience, and are also innovated by social and religious institutions for its smooth functioning. Perhaps we can learn them through our transactions with Nature.

A major issue that has significance here is **the scale of violence** that our policy decisions (e.g., 12th Five Year Plan) would have through human interactions with the natural world, of which the impact on the resilience of the biotic component should be in our mind. The violence inflicted on Nature is single major negative aspects of scientific revolution that has endangered the planet earth, but it is not explicit in the policies of human development.

The decrease in the biodiversity is an important indicator of the human violence on Nature, of which we have recently taken cognizance. Our main concern has been the violence between human territorial groups, which often engage in conflicts over the resource use. Today we are face to face with the glaring consequences of this violence. It may not be entirely wrong to say that the violence upon Nature is inherent in our economic policies.

Therefore the major task for us is **to explore social mechanisms that lower the scale of violence in the economic policies** so that the biotic components of the ecosystem thrive, or there is lesser threat on the resilience of the ecosystem. These social mechanisms may involve humanistic principles of interaction with its environment. The important question therefore is, from where to acquire these principles or values, the moral and ethical codes that help us to lower the scale of violence in our economic policies while we make these behavioral transactions. Perhaps the Nature is the best friend to guide us.

2. The Gandhian way!

A moral action has to be free from fear or compulsion, and should not involve any self-interest behind it. These ideas became part of Mahatma Gandhi's way of life, and are essentially based in **Salter's Ethical Religion** published in 1905. They are equally appealing to rationalists and religious people.

Gandhi ji summarized them as early as 1907 for the Gujarati audience with an introductory note on "**Darwin's Views on Ethics.**" Strangely enough, a century after Gandhi, the champion of Darwinian Theory, Richard Dawkins' deliberates on this issue in two chapters of his recent book, **The God Delusion**—on religion, and about morality, drawing from the current views on the evolution of altruism.

The Editorial in the science journal **Nature**, 12 February 2009, on Darwin's 150th anniversary, underlines how much Darwin valued moral and ethical beliefs, beyond his thesis of a common human ancestry that was fatal to religious world-views. But the tragedy is that evolution and religion have been propagated to perpetuate violence as much as enhancing human cause.

Mahatma Gandhi's search for peace astonishingly rests on religious as well as Darwinian roots. In Pyarelal's *Towards New Horizons* (1959) one finds that Gandhi was aware of **Peter Kropotkin's** study on mutual aid in nature, and the discovery of innate mechanisms for controlling aggression in animals by **Konrad Lorenz**, who later received the Nobel Prize.

In a beautiful synthesis of sensual and affectional currents, Mahatma Gandhi went a step ahead. Consolidating what Salter and Thoreau have already said, through askesis he paved way for the 'God of Love' using tools of *Satyagraha* (truth) and *Ahimsa* (non-violence). This according to his close associate Vinoba was an astonishing experiment on the resolution of conflict between competitive and cooperative forces through reconciliation.

At the same time naturalistic studies on animal social groups by ethologists provided a sound basis for the idea that mother-infant interactions have survival function, and the foundations of love lay in this affectional system. After the experiences of World War II, and particularly on the basis of the observations on the institutionalized children, scientists have strongly contended the Freudian theory, which forms the basis for an alternative view having long standing in India.

3. Alternative view!

This has particular relevance to us in context of the promotion of peace in the tribal heartland to which Madhav Gadgil has referred in his article. Because of the religious and spiritual ethos and the non-violence inherent in Gandhian approach, it stands in stark contrast with the alternative approach that some other groups have been advocating. The latter refers to Freudian psychoanalytic model, such as advocated by Sudhir Kakar and Ashish Nandy in India.

The passion of Gandhi to search an antidote for violence was so deep that he did not hesitate to approach psychoanalysts in Calcutta if they had any answer to the religious conflicts between Hindus and Muslims during the partition of India. The jocular explanation of psychoanalysts of that day may have died, but for rationalists the psychoanalytic imagination is still a panacea. In their view, religion breeds violence. But it is also a fact that for the masses religion guides moral and ethical codes and is an open issue for the policy makers.

For long, a major focus of the debate has been **the concept of secularism**—keeping religion separate from politics—as it is defined in the West. However, in territories, where religion and polity has long history of congenial association, to seek religious independence from the politics would have needed something like a total transfusion of blood in the body. A long article in **Economic & Political Weekly**, September 25, 2010, by Patrick Hoenig is a grim reminder of this debate. Using the controversial psychoanalytic insight, he wonders "*If the Constitution turned into a totem, the institution of secession was made a taboo.*" As a result, Hoenig contends, it has become difficult to reap all the benefits of democracy in India.

Today, the globalization would require ever more stringent and elaborate ethical and moral codes to regulate interactions between living and non-living world so that cooperation, help and altruism prosper. Therefore a new look on human nature, away from rationality, where emotions and motivations have significant role to play, seems imperative.

4. Emotions anyway!

Extreme forms of materialism, as has been conceptualized in selfish cost/benefit games in **behavioral economics**, including **sociobiology**, have come under severe criticism. In this rational economic human nature, the cultural route of love, empathy, altruism, and help among individuals and groups, have no scope. The economist Amartya Sen in *Identity and Violence* underlines that the rational economic approach to human nature, "*makes huge idiots out of Mohandas Gandhi, Martin Luther King Jr., Mother Teresa, and Nelson Mandela, and rather smaller idiots out of the rest of us, by thoroughly ignoring the*

variety of motivations that move human beings living in a society, with various affiliations and commitments.”

For, our common future lies in imbibing moral and ethical values that guarantee prudent use of nature. Acknowledging Henry Thoreau as the prophet of conservation movement and mentor of Gandhi and Martin Luther King Jr., the Harvard biologist Edward Wilson in ***The Future of Life*** reveals Thoreau's unique way to embrace natural world where our outside obligations are stripped to the survivable minimum.

Part- II

1. Resilience of human community as well?

If prudent use of forest resource is our priority, the next important policy decision involves how to maintain a friendly relationship between the villagers and the forest in their vicinity. This is amply clear from the sentiments of the late Prime Minister Shrimati Indira Gandhi expressed in a letter following the moratorium on the commercial felling of trees in the Himalayas. Though the conflict between the natives of the Himalayas and the forest department was amicably resolved in 1983, she was worried about the hardship that local communities would face because of the shortage of firewood. Therefore Mrs. Gandhi, directed the forest officials that the “*availability of firewood for the local population*” was assured to the villagers.

In this historic struggle the people in the Himalayas followed non-violent approach, the war of *dharma*, to save their forests, rivers and the culture from the greedy contractors. The movement was known as the Chipko, hug-to-the-tree, which later transformed into a broad based Himalaya Bachao Andolan (the Save Himalaya Movement).

The main components of the movement articulated by Pirta from native wisdom suggest that for the normal functioning of the individual head (knowledge), heart (compassion) and hands (actions) must function in harmony with one another during the mundane activities and to achieve self-enlightenment, the ultimate goal (they are components of empowerment). At the community level, ‘humanitarian’ scientists, compassionate poets and writers, and social activists should work towards the attainment of welfare of all and sundry (see point # 4 below). Moreover we find how values evolve as we look for ways of interaction with the natural world.

Our focus here is on the resilience of the natives of the Himalayas. The Gandhian social workers in the Himalayas underlined the resilience of the local people as a peculiar biological and cultural adaptation to the mountain ecosystem and the large-scale interventions were threat to it. These developmental activities, in fact, were increasing the vulnerability of the highlanders. Researches in medical and psychological sciences consider resilience-vulnerability dimension as a significant factor in health. It has relationship with the wear and tear occurring in the mind and body (allostasis) of a person.

Displacement of people from their terrains makes them vulnerable to health problems, and the World Health Report 2001 on Mental Health reports a huge accumulation of the displaced persons from their native areas. The displacement of people from forest tracts and river valleys is a major problem in our country. For, it is now clear that a healthier and happier person is an asset to national economy, for this we need resilient ecosystems which take care of the generations to come.

2. Are not eco-services anthropocentric?

Once I was accompanying Shri Sunderlal Bahuguna in an environment awareness campaign, about three decades ago, in the Himalayas. He has borrowed a copy of E. F. Schumacher's film “**On the Edge of the Forest**” from Dr. Salim Ali, and was showing it to the villagers. In a few villages near Shimla, Bahuguna ji

asked me to explain the message of the film to the villagers in the local dialect. A scene from the film that made a long lasting imprint in my memory was Schumacher explaining how diversity of life thrives even on a dead, decaying tree, lying on the ground.

While our emphasis is on a bio-centric approach, but as many as eight challenges out of eleven outlined in the meeting (29 July, 2011 by Sri Chatterjee) are apparently market oriented (**see a, b, d, e, h, i, j, k**). How does it reconcile with the three components on which we are focussing. It may not be wrong to draw a conclusion that, the greater the extraction of ecosystem components to meet the demands of eco-services, the greater the threat to “ecosystem resilience” and “biodiversity.” The past experience shows that it becomes extremely difficult for the local communities to compete with the external pressures on herbs in the alpine zone of the Himalayas. Consider, for example, the growing demand for the extraction of herbs used for incense.

To sum up, the strategy, for emphasis on eco-services, appears to deviate from the four basic principles on which we can frame our moral and ethical codes with regard to “ecosystem resilience”, “biodiversity” and “sustainable livelihood.” The four basic principles based on research in biological and social sciences are: (a) Diversity of organisms is good; (b) Ecological complexity is good; (c) Evolution is good, and (d) Biotic diversity has intrinsic value. Since these principles have a scientific basis and one can stand up morally if there is any negative deviation. In other words they become part of a human value system. When there is an attempt to put a price, an economic tag to a plant or animal as a whole, or a derivative from its parts or its use as an artifact, the fourth principle is to be kept in mind first of all.

3. Are sheep and goats the culprits?

The association of pastoralism with the forests is another important issue, whether it comes under eco-services, or not, is a matter of discussion. In India, the sheep and goats thrive in every ecosystem from the Kashmir to Kanya Kumari and pastoralism is a livelihood of the poorest among the poor. Living under the open sky, they cater to two basic needs of humanity, food and clothing.

The FAO (2001) report suggests four major policy orientations for the protection and support of pastoralism in the twenty-first century. They suggest the integration of pastoralism with the new world order in such a way that the supply of traditional needs of meat, milk and wool become secondary and certain other needs such as biodiversity and conservation of ecosystems take precedence.

Some of the essential ingredients of these new world order needs are: (a) advertisement and sale of products produced in unique ecosystems, from unique species, and free from contaminants, (b) exploring new symbiotic relations with horticulture farming—the sheep and goats grazing in well-grown orchards where they reduce weeds, eat grass and provide manure fertilizer to the soil, (c) acceptance of the damage done to biodiversity, and take it as a challenge to involve in conservation activity, and (d) using the rich cultural complexity in various ways to ecologically sensitive, low volume but financially remunerative tourism.

How to prioritize the access of, local communities, pastoralists, and other eco-service users, to the forest areas is important.

4. Empowering people or judiciary?

Professor Gadgil and I never imagined that an exercise of counting monkeys in Himachal Pradesh may sometime become such a big issue that the inferences drawn from these numbers are cunningly used as a basis for social movement. Our interest in 1986 as researchers was to collect objective information about the impending man-monkey conflict and suggest some measures. In later years the issue took political flavors, the matter for some reason went to the High Court at Shimla, which ordered the State and Central governments to take immediate steps to resolve the man-monkey conflict.

None of the departments, wildlife, forestry, revenue and agriculture, was ready to own the monkeys. A solution to reduce the number of monkeys, adopted by the Himachal Pradesh Government, and perhaps

accepted by the judiciary, was the shooting and sterilization of the innocent victims who had no cognizance of their crime. Amazingly, the Gyan-Vigyan Smiti, an enlightened NGO had been mobilizing peasants and authorities for such inhuman actions. Not to mention the misuse of public money in this project and utter inefficiency of the wildlife, forest and environment departments in this regard.

On another occasion, an orchardist, having long experience in animal husbandry, came to me with a problem that his apple crop was damaged by flocks of parrots. The problem was even trickier. He was not ready for behavioral solutions to avoid attacks on the apple crop; he wanted quick solution in the form of chemicals that would remove these flying creatures forever. On similar lines, a reputed daily from Delhi carried a story on the front page of its newspaper, quoting an officer from the horticulture department from Shimla, that the mosquitoes have entered his drawing room, unlikely for a hill station, for, the global warming was on the prowl. As if this was not enough, a scientist has even questioned the intelligence of people involved in watershed projects, since they thought or believed that trees conserve water.

These stories have a very important lesson for us when we hope setting examples through empowerment of village level institutions. **While we wish the Gandhian dream comes true, as we proceed to empower the marginalized populations by enacting laws, I am afraid it may turn out to be the empowerment of the judiciary.** We need to think about it with cool minds. And we must not forget that the laws are simply remedial measures, and in most of the cases beyond the reach of an average person or group.

Another major lesson from the preceding stories is that **our sources of information rest on shaky grounds, not even beliefs based on wisdom. To me the major challenge remains empowerment of people through cognitive enrichment.** There is enormous scientific wisdom behind it, and we only need to develop strategies at three levels: for the generation of requisite information; for carrying this information to specific destinations, and for the efficient use of information. For this my suggestion is to integrate information component in the role of, a forester, a village level institution, and a central agency. These agencies need to develop modules of information that villagers can understand, which deals with their problems, and are feasible enough. All this may require liberal allocation of budget and I am sure it will not go in vain.

A forest guard in its new role becomes a channel of communication between the village body, the recipient of information and the agency providing information. The village body may have to devise mechanisms for the storage, collection and dissemination of information. We must not forget that this was the most important aspect of the Chipko Movement (see above) and a major way for the empowerment of people engaged with it. Another more important step was to discuss the issues at village level so that the information can be efficiently used. Although we may claim to have taken information technology to every corner of India, but one wonders if there is flow of requisite information in these channels. The cognitive enrichment lights us from within which is the key for a sustainable future.

Annexure 10

Promoting peace and prosperity in tribal heartland: a Gandhian approach

Madhav Gadgil

Much in modern India might pain Mahatma Gandhi, but nothing more than what is happening in our tribal heartland. The whole region is wracked by greed and violence; greed for the rich natural resources of the tract, and violence for control over land and people. Mahatma Gandhi believed in putting the last first; he firmly believed that furthering the interests of the weakest segments of the society should be the highest priority of independent India. The tribal populations of this tract are amongst the most malnourished, most illiterate segments of our polity; yet there are abundant signs that over sixty years of independence their quality of life has, in fact, deteriorated.

1) Self-reliant villages

Mahatma Gandhi advocated strengthening autonomy and self-reliance of India's villages, and it is to our credit that we have attempted to take democracy down to the grass-roots through the Panchayati Raj Institutions. The most progressive law in this context has been the Panchayat (Extension to Scheduled Areas) Act, 1996 (PESA). Its passage—an act of great political commitment—attempted to shift the balance of power towards the communities in the predominantly tribal tracts of Schedule V areas by providing a mechanism for self-protection and self-governance. PESA recognized the gram sabha (a habitation is the natural unit of the community, and its adult members constitute the gram sabha, as against the elected gram panchayat) to be pre-eminent. The gram sabha was recognized as being *competent* to act on a range of powers, including:

- power to prevent alienation of land in the Scheduled areas and to take appropriate action to restore any unlawfully alienated land of a Scheduled Tribe
- ownership of minor forest produce
- power to exercise control over money lending to the Scheduled Tribes
- power to exercise control over institutions and functionaries in all social sectors
- power to control local plans, and resources for such plans including tribal sub-plans
- power of prior recommendation in granting prospecting license or mining leases for minor minerals as well as for grant of concessions for the exploitation of minor minerals by auction
- right to be consulted on matters of land acquisition
- power to issue utilisation certificates for government works undertaken in their village.

We have subsequently enacted other laws that visualize an important role for the gram sabha or the gram panchayat in management of natural resources. These include the Biological Diversity Act (BDA) that confers rights over management of local biodiversity resources, including the right to levy collection charges on Gram Panchayat level Biodiversity Management Committees and the National Rural Employment Guarantee Act (NREGA) that authorizes the Gram Panchayat to plan all the works to be undertaken and execute a minimum of 50% of them. Regrettably little progress has been made in translating any of these provisions into reality.

The Indian National Congress, under the leadership of Mahatma Gandhi had promised the people of British India that their natural rights over the forest resources would be restored on independence. That Tribal rights in land and forest should be respected was also amongst the principles enunciated by Pandit Jawaharlal Nehru as part of his Panchasheel for the tribal communities. Yet, the inexorable march of alienation of tribal communities from forest resources accompanied by rapid degradation of these resources continued unabated even after the passage of PESA. This prompted the Parliament to pass in 2006 the Scheduled Tribes and other Traditional Forest Dwellers (Rights over the Forest) Act (TFRA) to redress the historical injustice done to tribal people. Yet four years after its passage, we find that as with PESA, little progress is being made in translating this into reality.

2) Empowering gram sabhas

These repeated betrayals are no doubt an important underlying factor for the troubled state of the tribal heartland. Yet, in Gandhi's India some have been advocating meeting violence by counter-violence, of using army, air force against our own people. Others are more soberly talking of aggressive development. But the brand of 'development' that is being touted is not development in tune with the Gandhian ideal of promoting self-reliant village communities, but development grounded in patronage, where powers that be outside the community decide on how the thousands of crores are to be spent. By now we know from vast experience that just throwing money at problems will not work; on the contrary it is bound to be counter-productive. It is vital that how the money is to be spent is primarily decided by those for whose benefit it is earmarked. Only then will there be appropriate schemes, only then will people own them and ensure that the money is spent prudently. In the current scenario, people have the feeling that whatever that is flowing their way is largesse, so they do not care if it is not spent to good purpose; breeding corruption, so that as the late Shri Rajiv Gandhi had once remarked, hardly 15% of the funds serve the purpose for which they were intended.

The only solution then is that the decision as to what the money should be spent on, where and when should be in the hands of those for whom the money is being spent. Such collective decisions are best arrived at in small face-to-face communities; hence such decision making should be made the responsibility of gram sabhas, as has been fittingly provided for in PESA as well as in TFRA. By translating these provisions into reality, modern India will pay a long overdue tribute to Mahatma Gandhi. But this requires that nurturing human resources at this grass-roots level should become a key priority of our development efforts in tribal regions. The activities undertaken through the National Employment Guarantee Act (NREGA) could be a vital component of these development efforts, helping to rebuild the capital of natural resources. But despite the provisions that the Gram Panchayats will plan these activities, they are currently being thrust on the people from outside, because it is required that the plans and estimates are prepared by formally trained professionals. This should be done away with by training local youth in preparing plans and technical estimates on a war footing.

It is necessary that the functioning of Forest Protection Committees, Biodiversity Management Committees, Watershed Committees, and EGS work planning and implementation takes place in a coordinated fashion. Hence, it should be stipulated that the gram sabhas should perform all these functions at base level; and each gram sabha should elect one man and one woman as members to the various gram panchayat level committees. Both gram sabha and gram panchayat committees should have their own bank accounts to which funds should be directly credited. Furthermore, we should extend the scope of the significant practice of social audit introduced in the NREGA programmes. Hence, there should be monthly social audit of functioning of all gram sabha committees and six-monthly audit of all gram panchayat

committees. Additionally, all Gram Panchayats should be provided with 25% of development funds as untied grants, to be deployed as appropriate to serve public purpose. This will greatly help bolster people's self confidence and competence at planning and executing appropriate development projects. Further encouragement should be provided to local level initiatives by giving special incentives to those communities willing to assume responsibility; while those who do not wish to do so; who do not wish to work for planning, and implementing development programmes on their own should be funded at a lower level.

3) Community forest resources

The provision of community forest resources through TFRA is a particularly significant opportunity to promote the Gandhian ideal of constructive community action. TFRA confers secure community tenure on "Community Forest Resources", defined as customary common forest land within the traditional or customary boundaries of the village or seasonal use of landscape in case of pastoral communities, including reserved forests, protected forests and protected areas such as Sanctuaries and National Parks to which the community had traditional access. On such land, they will enjoy:

- Right of ownership, access to collect, use or dispose of minor forest produce which have been traditionally collected within or outside village boundaries;
- Other community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled and trans-humant) and traditional seasonal resource access of nomadic or pastoralist communities
- Right to protect, regenerate or conserve or manage any community resource which they have been traditionally protecting and conserving for sustainable use
- Right of access to biodiversity and community right to intellectual property and traditional knowledge related to biodiversity and cultural diversity

TFRA very specifically visualizes empowering Gram Sabha and village level institutions to protect the wild life, forest, and biodiversity. It confers on the forest dwellers the responsibilities and authority for sustainable use, conservation of biodiversity and maintenance of ecological balance. TFRA establishes links to the Biological Diversity Act through its clause 2(n), by stating that "sustainable use shall have the same meaning as assigned to it in clause (o) of section 2 of BDA. BDA visualizes the establishment of Biodiversity management Committees at the level of all local bodies to implement its objectives. Hence it would be appropriate that the gram sabha under TFRA should perform the functions assigned to the Biodiversity Management Committees under the Biological Diversity Act, including documentation, management and levying collection charges. The community could then very effectively use the NREGA provisions to restore a diverse plant cover on Community Forest Resource lands employing a variety of species that would support livelihoods. They may additionally agree to set aside 5-10% of Community Forest Resource lands for regeneration and conservation of natural biota on the traditional pattern of sacred groves.

In the highly defective ongoing process of implementation of this Act, people are expected to prepare all individual as well as community level claims. It is tragic that today they do not have this capacity; they are poor, and with little education, because the system has kept them suppressed all these years. At present, it is the administrative machinery that can prepare proper claims, after all, that is what they are trained and paid for. But unfortunately this machinery is in many cases using all its might only to strike down the claims prepared by the greatly handicapped people. We must now turn things around and put the onus of preparing proper claims, especially fore community resources, on the official machinery. For this purpose there is often good documentary evidence, for example, in census reports. Of course, the Gram

Sabha should remain supreme, and the claims so prepared should be submitted to gram sabha for scrutiny, necessary amendments and approval.

We should go further ahead and facilitate CFR management through the following amendment to Indian Forest Act 1927: Chapter III of Village and Village Community Forest

28(A): Village Community Forest

28(A) [1]: Village Community Forest means all forest recognized under TFRA Section 3(1) and specified as per rule 8(h).

28(A) [2]: The Village Community shall on its own make rules for the management of Village Community Forest. The Government will only provide guidelines and directions.

28(A) [3]: The Village Community shall on its own prepare the working plan for the management of Village Community Forest.

28(A) [4]: All Working Plans and any agreements entered into by the Government before the constitution of the Village Community Forest shall stand nullified and the Forest Department shall incorporate in *Toto* the working plan for the management of Village Community Forest in its own Working Plans.

28(A) [5]: Village Community Forests have been recognized so as to rectify historical injustice, and as such no such assignment shall be cancelled

28(A) [6]: A Taluk Panchayat level Community Forest Management Committee will be constituted by one male and one female representative from each Village Community Forest. This Committee will oversee the management of all Village Community Forests and take action to rectify any mismanagement.

Annexure 11

Brief writeups/points for the proposed Second Group Meeting on 19 August, 2011

Submitted by L.M.S. Palni

- There is an urgent need to consider and set up long term ecological monitoring stations in representative biogeographical regions of the country. Initially selected biosphere reserves (core zone area) could be used to set up such stations; climate towers/profilers also need to be placed in such locations to fill the gap, as pointed out so clearly by the IPCC (2007) Report.
- Supportive infrastructure and policy framework is required to arrest (and hopefully reverse) the trend of de-population from high to mid altitude areas, sensitive also from national security angle.
- Special incentives may be provided to all those working in difficult areas, such as high mountains, glaciers, cold deserts, coastal and marine areas (involving four or more months of field work per year).
- The Himalayan States of India are endowed with vast Hydro Potential, out of which approximately 90% still remains to be harnessed. It is therefore essential that development of Hydro Power Potential, continues to be accorded priority. However, such projects should not be in ecologically sensitive areas (say 4000m and above) and should be cleared only after comprehensive strategic environmental assessment.
- As a result of the melting of the glaciers of the Himalayas due to climatic change and consequential global warming, the rain fall pattern as well as the hydrology of the glacier fed rivers would perhaps be altered. It is, therefore, important that a greater thrust is given to the construction of storage based hydro electric projects, wherever feasible, in order to store sufficient water during monsoon months and regulate the same during lean flow months both for power generation as well as for meeting the requirements of drinking water and irrigation.
- Long term data sets are required for assessing impact of climate change on variability of river inflow and recession of Himalayan Glaciers and its impact on downstream hydrological regimes. Accordingly studies are required, so that impact of changed pattern of flows and increased level of silt on hydropower generation could be assessed more accurately. An initiative may also be needed to develop a regional cooperation to quantify effects, assess vulnerability and tackle climate change impacts on the glacial ecosystem to evolve mitigation and adaptation measures.
- As there are several trans boundary and regional issues closely interwoven with the resilience of the Himalayan Eco system, there is a requirement for improving trans boundary exchange of information through mutually agreed mechanism and processes. In such efforts, lead participation of Ministry of External Affairs and collaboration of Ministry of Environment and Forests, Ministry of Defence and Ministry of Water Resources, is essential. Accordingly strengthening of International co-operation in the National Mission on Sustaining the Himalayan Ecosystem can be recognized. Special

Strategies need to be devised after consultations with other Ministries coordinated and led by Ministry of External Affairs.

- Most Protected Areas (PAs) in the Himalayas, esp. the NWH are located above the treeline i.e. >3650 metres. The working / growing season in these areas is from April to September, about 6 months. State funding for these areas is mainly as "salaries" of the meagre staff that is posted in / near these difficult areas. All the money for works, wildlife surveys and monitoring etc. comes under CSS. However, funds under CSS reach the DFO in the field earliest by July and generally in August. That is when only 2 or 3 months of the working season is left. Resultantly, for decades now most of the few CSS funds that do reach these PAs remain unspent and have to be revalidated each year; which is another cumbersome process. It is therefore suggested that CSS funding for PAs in the Himalayas should either reach the DFO in April itself or even better if it is released in the previous financial year and automatically the unspent funds be allowed to be carried forward in the next financial year. It is understood that there already exists such an arrangement for certain Border Areas schemes under the Ministry of Home Affairs. It is critical that with all the concern about Biodiversity Conservation and Sustaining the Himalayan Ecosystem, such an arrangement be put in place forthwith beginning with the 12 FYP.
- Further, because of their remoteness and difficult terrain and distance from habitations, PA staff is unable to work in these areas for want of appropriate mechanisms, equipment and service conditions. If conservation work is to be carried out in any effective way, it is critical that PA staff should be enabled to stay and work in such remote and difficult terrains for extended periods of time, say for the entire summer months. This would require suitable changes and re-structuring in the organisational and service format of the Forest Department and also of related research institutions. Forests and Wildlife being a concurrent subject, it is for the MoEF to initiate urgent action in this regard followed by appropriate up-scaling of funding levels. For example, the Project Snow Leopard which commenced two years ago, has yet to take off in terms of any meaningful ground work because the forest department is simply not geared to work for any substantial period of time in the snow leopard habitat areas. This is particularly true of negligible officer visitation to these areas.
- Right now the mandate to look after and conserve the high altitude wetlands in the Himalaya is with the state Councils of S&T. However, the CS&Ts do not have any field presence and are therefore compelled to work through field agencies like the forest department. This arrangement, besides the inherent delays mentioned in 1.above, gets further complicated with two or more departments vainly trying to get their act together for implementation of plans in very remote areas where communication is anyway a nightmare. As things stand conservation of Himalayan wetlands needs to become the mandate of the Wildlife Wings of the forest department for any systematic and effective and continuous action to commence.
- Degraded forest land around villages may be leased to village community for cultivation of fodder, fuel wood, timber and medicinal herbs, etc. for specified period. All household of a village should be encouraged to be members of such a village based Society. The village society should prepare an action plan before getting the land on lease, and forest officials should be involved while preparing the action plan. Lease can be renewed at certain time intervals. Villagers should be allowed to harvest fodder, fuel wood, timer, medicinal herbs cultivated on the land, with a token annual payment of land to the Forest

Department. Land ownership shall remain unchanged, *i.e.*, under the Department of Forest. The Society should be empowered to receive some payment for ecosystem services, particularly for water, if larger areas are involved.

- As recommended by the Task force on the Mountain Ecosystems during the 11th plan, special provisions should also be made for providing subsidy for fossil fuel to the hill communities, modernizing forest and wildlife management, and more research on the ecosystems functioning and services in the mountain areas in the 12th Plan.
- Based on the “Shimla Declaration” made during the Himalayan Chief Ministers’ Conclave on Oct. 29-30, 2009, each Himalayan state is setting-up the Council for Climate Change under the Chief Minister’s Office. This council needs to be adequately supported in 12th Plan so that this Council can also act as the convener of Himalayan Sustainable Development Forum (HSDF) in the respective states. GBPIHED being the technical secretariat should also be supported.
- The IHR region will need adequate policy and resource support from GOI for promoting **Green Industries and creation of Green Jobs**, etc. Special provisions for technology development and transfer for the same may be considered.
- Adequate attention to the socio-economic sector is very important for the sustainability of Himalayan ecosystem. Some of the key sectors of economy like tourism and ecotourism, land based livelihood activities, migration and employment, etc. can be covered under this sector.

Some Important points for consideration

- Special funding for undertaking research and develop expertise on mountain farming systems (agri, horti and animal husbandry) in the wake of climate change and adaptive measures. Encourage traditional crop varieties and on farm cultivation of land races (live gene banks).
- Comprehensively address the environmental, fuel and food security supported by livelihood security issues. Inculcating the appreciation of indispensability of elements of nature for synergistic development of mountain ecosystems encompassing all the inhabitants.
- Diversification of farming system with the inclusion of fruit trees, floriculture, medicinal and aromatic plants, pisciculture, etc. be promoted through loans on very low interest rates.
- Withdrawal of use of chemicals fertilizers and pesticides to realize Organic State in true sense.
- Easy and flexible micro-credit facilities for farm-based enterprise development. Electricity on low tariff for local processing, preservation, value-addition, packaging and marketing of farm produce.
- Abandonment of prime agricultural land and or its utilization for commercial purposes should be brought under strict law framework.

- Intensive development of Forest and Farm based Livelihood Skills and Enterprises.
- Land tenure issues and massive land development efforts in mountain region by suitably adopting the Land Development Corporations of other states.
- Women being the real custodians of mountain farming, forestry and related activities increase in their number in extension departments. And awards/rewards to those farmers who adopt best management practices.
- Policy that leads to more area being put under annual crop cultivation is bound to place extra pressure on already low forest cover of the State in terms of fodder, composting leaves etc. Perennial crops be promoted over annual crops.
- Promoting Knowledge based nature dependent Integrated Farming Systems and Allied Livelihoods with aggressive HRD right from the stage of schooling.
- Integration of Village Commons, Non arable and Fallow lands; Community Forests with respect to Environment and Livelihood Security of the entire Rural Community.
- Rewarding communities for carbon forestry, maintenance of green cover in community land, soil conservation, water management and activities those lead to minimize carbon foot-print-payment for ecosystem services.
- Single window clearance system for mountain environment-friendly renewable natural resources based entrepreneurship/industries including small hydro-projects.
- Compensatory afforestation and submerged vegetation in HEPs need to be valued for ecosystem services rather than on price of growing stock of wood alone.
- Subsidies on LPG should be continued for hill states in order to offset pressure of fuelwood collection from forests.
- Catchment-based approach should be implemented to tap water sources for drinking/irrigation schemes to effect water conservation and quality control and equity measures.

Major points for consideration

Setting up of the following:

1. Himalayan Eco-development Commission (TF; 1981: M.S. Swaminathan)
2. Himalayan Development Authority (TF; 1992: S.Z. Qasim)
3. Ministry of Mountain Development (TF; 2006: R.S. Tolia)
4. Upgradation of an existing Institute or the establishment of a new Institute for Natural Resource Analysis and Advisory Centre (NRAAC) (TF; 2010: G.B. Mukherjee)
(TF refers to Task Force set up by the Planning Commission of GoI)

Annexure 12

Working Group on Ecosystem Resilience, Biodiversity and Sustainable Livelihood for preparation of XII Five Year Plan, 3rd Meeting, 25 August 2011

(Submission from Madhav Gadgil)

India stands today at the cross-roads where it is becoming abundantly clear that not paucity of funds, but deficit in governance is the most significant challenge before the society. A frank assessment of the current functioning of Forestry and Wildlife Establishment, as detailed in the note circulated by me earlier, brings out that:

1. Given the extremely weak base, often subject to deliberate manipulation, of empirical information, and lack of democratic culture of science, the management is far from scientific.
2. The management has been entirely non-sustainable.
3. The management has been socially unjust, resulting in grave unrest over much of the forested belt of the country.
4. The management is economically inefficient and highly wasteful of resources.

We must therefore make new beginnings. We must empower people to ensure transparency, openness, participation and good management of natural resources. We have an adequate framework of laws (73rd and 74th Amendments to Constitution, PESA, Biological Diversity Act and FRA) that can potentially permit us to substitute the current system with a people-oriented system that would be genuinely environment friendly. Hence the focus of our XII FYP should be towards honest implementation of these Acts in their true spirit.

(A) Since we are hosting CBD next year and wish to showcase our achievements, let us begin to honestly implement the provisions of Biological Diversity Act, and link this to activities under other related acts. We should launch a mission to establish Biodiversity Management Committees in every Gram Panchayat, Taluk Panchayat, Zilla Panchayat and Nagarpalikas and Mahanagarpalikas. There should be programmes of capacity building of these institutions on the pattern of capacity building campaigns for decentralized planning by PRIs launched in Kerala. The BMCs should be motivated by operationalizing the power for levying of “collection charges” for collection of biodiversity resources.

(B) Community rights provisions of FRA should be implemented in their true spirit to cover the full territory, within and outside Panchayat areas, including RFs, and PAs. Local Biodiversity Management Committees should then be empowered to manage these areas, as also levy “collection charges” for collection of biodiversity resources over these areas.

(C) Gram Sabhas are empowered to plan for works under MGNREGA. This planning should be linked to documentation of local landscape and biodiversity resources by Biodiversity Management Committees in the form of People’s Biodiversity Registers. These works should be firmly oriented towards eco-restoration activities. Fragmentation of such works because of refusal of Forestry establishment to co-operate should be countered by the assignment of Community Forest Resources.

(D) Forestry establishment has refused to work with PRIs. In the interest of promoting transparency, openness and participation, these should also be made accountable to Zilla Panchayats beginning with XII FYP.

(E) A great weakness of Forestry and Wildlife sectors is absence of any information, and indeed wide-spread prevalence of fraudulent information. The Forestry and Wildlife Establishment wishes to ensure that such frauds are not detected by almost totally refusing to permit anybody outside the Forestry and Wildlife Establishment from conducting scientific research in RFs and PAs. This situation must change during XII FYP. To this end, we must activate State Biodiversity Boards, ensure that they have substantial involvement of non-officials, and authorize them to scrutinize and promptly decide upon all requests for research in RFs and PAs.

(F) Educational institutions should be encouraged to actively involve themselves in environmental research as a part of Environmental Education activities.

(G) Citizens should be encouraged to actively involve themselves in environmental research on the model of Australian River Watch schemes.

(H) Ministry of Environment and Forests must proactively disclose all information available with them as required by the RTI Act, and not wait for enquiries by citizens.

(I) Full advantage must be taken of modern ICT tools, including Web2.0 technologies to create a transparent, publicly accessible and participatory database on Indian environment. In this connection the **National Biodiversity and Environment Information Grid (NBEIG)** proposal from Zoological Survey of India and Indian Institute of Remote Sensing should be supported fully. The Western Ghats tract would be an appropriate focus for operationalizing such a system by building upon the Western Ghats database already developed by the Western Ghats Ecology Expert Panel.

(J) A well-planned network of long term environmental monitoring sites should be organized over the country. With this in view, the **National Environmental Monitoring Network** proposal may be supported fully.

(K) The XII FYP schemes should be oriented towards promoting transparency, openness and participation in every way. An excellent tool for this could be the revival of the scheme of Paryavaran Vahinis, or committees of concerned citizens to serve as environmental watchdogs and undertake selective first hand monitoring of the environmental situation in the district, an All India scheme that had proved highly effective in Karnataka in 1990s. These Paryavaran Vahini volunteers could also play a significant role in building capacity of people at the grass-roots for conservation, sustainable development and ecorestoration.

(L) Similarly, XII FYP could provide for appointments of Environmental Ombudsmen in all districts. The schemes should vigorously promote institution of a social audit process for all environmental issues on the model of that for Mahatma Gandhi National Rural Employment Guarantee Act in Andhra Pradesh.

(M) XII FYP schemes should lead a radical reform of Environmental Impact Analysis and Clearance process. It should revisit the list of projects that require Environmental Impact Analysis and Clearance and include certain items such as Wind Mills and small scale hydroelectric projects that are excluded today. It should ask all project proponents to deposit an appropriate fee with an appropriate Government Authority, such as Zilla Panchayat level Biodiversity management Committee, which may select competent agencies to carry out the EIAs in a transparent fashion. Furthermore, it should link the Environmental Education activities

at school and college level and the People's Biodiversity Register exercises to the EIA process. Equally urgent is the need to promote a more holistic perspective and organize a process of Cumulative Impact Analysis in place of the current project-by-project clearances.

(N) Finally, XII FYP schemes should strive to make a transition from regulations and negative incentives to promote nature conservation oriented activities to a system of use of positive incentives to encourage continued conservation-oriented action in the context of traditional practices such as sacred groves and to initiate other action in modern contexts. An example of the latter is the payment of conservation service charges by Kerala Biodiversity Board to a farmer who has maintained mangrove growth on his private land. XII FYP should include a specific scheme to undertake a critical assessment of the efficacy of funds being deployed towards conservation efforts today in the form of salaries and perks of bureaucrats and technocrats, including their jeeps and guns and buildings to house them. Very likely, it would turn out to be exceedingly low. These funds should then be redeployed over a period of time to provide positive incentives to local communities to maintain biodiversity elements of high value to conservation. Technical inputs would be required to decide on a common system of assigning conservation value to specific elements of biodiversity and to organize a reliable, transparent system of monitoring biodiversity levels within the territories assigned to various local communities, in form of either Community Forest Resources assigned under FRA, or Panchayat areas assigned to Biodiversity Management Committees. Educational institutions at all levels, from village primary schools to universities, could play an important role in this effort.

Indeed, these exercises could become very valuable components of environmental education curricula. In the long run, only a very lean bureaucratic apparatus should be retained to play a coordinating, facilitative role and to ensure that local communities can effectively enforce a desired system of protection and management of the natural resource base. Such a system would create a very efficient market for conservation performance so that funds earmarked to promote biodiversity would flow to localities and local communities endowed with capabilities of conserving high levels of biodiversity. This system would also channel rewards for conservation action to relatively poorer communities living close to the earth, thereby serving ends of social justice, and creating in the long range a situation far more favorable to the maintenance of biodiversity in the country.

Annexure 13

**Forestry in XI FYP:
Towards a new paradigm
Madhav Gadgil
madhav.gadgil@gmail.com**

Talk delivered at a meeting at TIFAC, DST, New Delhi on 27 April 2007

Inclusive growth

- India's economic fundamentals have improved, yet growth has failed to be inclusive
- Sharp increase in unemployment (from 9.5% in 93-94 to 15.3% in 04-05) among agricultural labour households
- Need a new deal that rebuilds hope about farming, and other rural livelihoods, including herding, fishing, forest produce gathering, basketry and artisanal activities.

Business as usual won't do

- Must focus on making a decisive impact on the quality of life of the poor and the marginalized.
- 28% of India's villages relate directly to forest ecosystems; these harbour highest levels of poor people
- Their livelihood security should be a major focus of the 11th Plan.
- Rural-urban divide
- National Rural Employment Guarantee Act attempts to ensure a social safety net as it provides guaranteed employment in rural areas.
- Forestry sector can play a very significant role in linking NREGA with augmenting the ecological resource base.

Village and small-scale enterprises

- Will have to provide most of the new employment during the 11th Plan, at least half of which will have to be created in rural areas.
- Many problems faced by VSE units and home based workers, particularly women.
- Forestry sector replete with many remnants of the control regime that need drastic overhaul.

Knowledge management

- Codification, quantification in Forestry has served to impose hegemony, not to promote informed resource management
- Hardware: Poor base of empirical information
 - Parcels of land: 69 or 75 million ha?
 - Canopy cover: FD vs DoS figures
 - Most preservation plots destroyed
 - Resource stocks: Bamboo overestimates, only 27 out of 300 medicinal plants of
 - Karnataka
 - Tigers of Sariska
- Software:
 - Not an open, participatory system in spirit of science
 - Does not follow a hypothetico-deductive approach

National Forestry Commission & National Environment Policy 2006

- Establish democratic forestry institutions everywhere in the country at the village/hamlet level and above
- Promote decentralization and secure access to environmental resources for poor communities

- Create a secure basis for conservation by ensuring that people dependent on particular resources obtain better livelihoods from the fact of conservation

Monitorable target: increase in the forest and tree cover by 5 percentage

- Objective of enhancing India's tree cover to be viewed in terms of effort to enhance ecosystem health
- Not necessarily fully captured by its tree cover.
 - Grassy blanks in southern Western Ghats
- Survival of pastoralism crucial for sustainable land use.
 - Natural grass cover under a properly regulated grazing regime may be the healthiest form of ecosystem in this context.
- Add "Ecorestoration" to complement "Afforestation"

National Afforestation, Ecorestoration and Eco-development Board

- Broaden vision to incorporate enhancing health status of non-tree covered ecosystems best maintained under grass- lichen/ moss- other type of vegetation.

National Afforestation/ Ecorestoration Programme

- Degraded forest rehabilitation and non-degraded forest improvement programmes through Forest Development Agency mechanism.
- Focused on empowering all participatory institutions to promote Forest Development/ Ecorestoration.
- FDA Chairperson to come from chairpersons of the member JFMCs/ community/ village forest institutions
- Mission Village Forest
- Communities Based Panchayat Sasya Yojana
- Agro-Forestry Development & Private Forestry Initiatives to support farmers

Northeast: Rotational agro-forestry

- Fresh set of policies and schemes to support decentralized, participatory, multi-stakeholder, interdisciplinary, eco-regional and adaptive management approaches

Scheduled Tribes and other Forest Dwellers (Recognition of Forest Rights) Act

- Facilitate implementation of the Act's provisions in cooperation with the Ministry of Tribal Affairs and working with Gram Sabhas and forest right holders to develop forest management plans for their community forest resources.
- Link to planning by Biodiversity Management Committees through People's Biodiversity Registers

National Forestry Information System

- Networking with states for tracking changes in forest development, harvesting, trade and utilization scenario.
- Will particularly focus on issues of ownership and rights over land and forests.
- Will be linked to the National Environment Monitoring Programme

Forest Land Information System

- Putting together a non-spatial database with records for each parcel of public land (forest and revenue) that indicate its settlement history and status.
- Scanning, digitization, and eventual geo-spatial registration of forest survey and village cadastral maps
- Training of frontline survey and working plan staff as well as community members in the use of GPS and other instruments in their survey work, and in registering their survey work onto the geo-referenced database.

- Experimenting with manual and participatory GIS approaches in the micro-planning setting, and on integration of these micro-plans into higher level working plans.

Forest Survey of India

- Should develop a culture of openness and collaboration
- Present scope limited to canopy cover density classes.
- To be supplemented by other aspects to provide better basis in planning for productivity, enrichment, biodiversity and regeneration of forests managed by state governments.
- Become an active partner in the National Environmental Monitoring Programme.

National Environmental Monitoring Programme

- A unified NEMP instead of separate, disparate programmes on forest monitoring, air quality and river pollution
- Focus on tracking status and change in socially relevant biophysical parameters, and their social impacts, and on making this information available as widely as possible.
- Will consist of a mix of national, regional and local programmes.
- Will be distributed, bottom-up, Governmental plus Non-governmental and flexible.
- Compliance with the suo moto disclosure requirements of RTI of all MoEF agencies and subordinate offices as a part of MoEF's e-governance initiative.
- Real-time sharing of data on environmental parameters collected under the NEMP.
- One-time archival, legal, research and other information to be made available through various 'knowledge portals' or clearinghouses including the biodiversity portal.
- Special portal for environmental data from school and college student projects and Technical Support System for the same.
- All key information should also be available in Indian languages, including in hard copy form.

NEMP sub-programmes

Biodiversity Inventory and Monitoring

- Completion of People's Biodiversity Registers at a number of sites, and their validation by taxonomists and other concerned scientific experts.
- Pilot effort on digitization of collections
- Indian Biodiversity Information System (IBIS) and Biodiversity Knowledge Portal through a consortium of research organizations

Forest cover monitoring:

- Setting up of collaborative, bottom-up forest cover monitoring system involving independent research organizations, state remote sensing centers, civil society groups and FSI

Ecosystem Service Flows & Values (Hydrological regulation, soil conservation, carbon sequestration, pollination services of forests)

- Collaborative network of research organizations, colleges, schools and grassroots groups

Annexure 14

Suggestions for the 12th FYP

Subodh Kulkarni

Title of scheme	Central objective	Scope of specific activities	Preferable approach
1.Immediate and time-bound implementation of the provisions under 'Community Forest Rights' vested to people in the Forest Right Act, and thereby benefiting the common man in these remote and backward areas.	By acquiring the clear and comprehensive CFR through proper procedure, Village Mendha(Lekha) and Marda in Gadchiroli district of Maharashtra have already proved that all the Village Communities in the country are entitled to similar rights. Historic injustice is being done again by asking remote and backward villagers to prepare the meticulous claims and documents themselves and pursue for approval. Instead of this, Government should own the responsibility of preparing the claims along with the proofs in their office records and present before Gramsabha for consideration and approval. The authorities should implement time-bound campaign to achieve this task.	Gramsabha, which has been conferred CFR should be given status of "Village Bio-Diversity Management Committee" (VBMC) under Sec.41 of the 'Bio-Diversity Act, 2002'. The capacity building of this VBMC shall be done to prepare People's Biodiversity Register (PBR) and use it in the planning process. To take up the Herculean task of Community Forestry, an urgent need for human resource development arises. The people are having vast know how of bio-diversity, natural phenomena and abundant sustainable techniques. If the community is given freedom and resources, it would readily come up with 'Knowledge Transfer Systems'. Our hand holding and blending of modern methods is only necessary.	Regional level
2.Model Villages with Community Forest in Left Wing Extremism Districts	Developing Forest Based Development model to tackle the issues in LWE districts	To carry out the tasks, Village Gram Sabha would be primarily assisted by all the concerned departments within the prescribed time limit. As in the case of Govt. of Nagaland, Village Gram Sabha should be given status of 'Village Development Board' (VDB). VDB's should be given 'Un-tied Grant' to empower it in true sense.	100 Villages in the District having Community Forest Rights over more than 500 hect. Of forest area.
3.Village Gramsabha (GS) should be empowered by providing financial assistance and appropriate training for preparing 'Integrated Watershed	Planning and implementation at the grassroot unit for feasibility and impact	A team of youths selected by GS should be given technical training for preparation of work designs & budget estimates; getting them sanctioned by the authority and then implementation under MNREGA. GS should be granted with 5% amt of the total sanctioned budget directly for this activity. Training for utilization of PBR in village	Block level and District level

<p>Development Programme' and implement the same on priority under MNREGA.</p>		<p>level planning should be arranged.</p>	
<p>4.To establish the principle of benefit sharing in Natural Resource mgmt.</p>	<p>Gaining confidence and trust of the people</p>	<p>In the section 9(b) of the GR about Joint Forest Management Programme of the Govt. it has been mentioned clearly that- "50% of the total amount gained from the auction of forest produce (Excluding the amount of Sales Tax, Forest Development tax and Income Tax) will be transferred in cash to the respective Joint Forest Management Committee (JFMC) of the village." Mendha(Lekha) and many other villages in Gadchiroli as well as in whole country are actively participating in the programme from 1992 till date and eligible for this share as certified by the Forest Department. This long pending amount should be immediately released to the respected JFM Committees to gain trust amongst the communities.</p>	<p>District level</p>
<p>5. Confluence of sustainable ecosystem and livelihood</p>	<p>Building forest based economies along with the sustainable community based practices.</p>	<p>The village councils which have been vested Community Right, should be given training and necessary working capital support for Bamboo cutting/value addition activity and other Minor Forest Produce collection, processing and marketing. The people should be provided the required procedural documents such as Transit Pass Book (TP). This will build trust that the Acts and Laws for the benefit of backward people are not only on paper.</p> <p>For marketing of MFP government should not have a monopoly, nor create such a monopoly for traders and mills. Govt should set up promotional Marketing Boards, with responsibility for dissemination of information about markets and prices to the gatherers. The Boards should provide a Minimum Support Price (MSP) for all MFPs. There should be MSP based aggressive buying of MFPs by state agencies, as has been done for wheat and rice, with GOI subsidising the storage and marketing of such produce.</p>	<p>Regional level</p>

Annexure 15

Draft Approach paper on 'Focusing on the River Basin as a management unit for building 'Ecosystem Resilience'

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24th August, 2011

Context of Proposal:

a) Gaps:

Conservation of environment and biodiversity is one of India's constitutional responsibilities, and we have an effective policy and legal framework for enabling conservation and protecting biodiversity, along with implementation of various schemes and programs at National and State level for protection and conservation of the environment. India has managed to maintain and at times enhance its forest cover and density, protect flagship/ key stone species like the Tiger, Elephant, Rhinoceros, etc.

Although individual schemes have seen moderate success, no ecologist/ environmentalist would agree that India's ecosystems have been conserved. The primary reason for this failure lies in the existing approach to conservation, which although identifies 'species protection' and 'climate change planning' as its objectives, **does not take the 'Ecosystem Perspective'. This absence or exclusion of 'Ecosystem Approach' remains a major gap.** e.g. In Pune District, there are a minimum of three schemes which are implemented in the Western Ghats region including the Joint Forest Management Scheme, Drought Prone Area Program, and Western Ghats Development Program which focus on the similar objectives like watershed development, plantation, forest protection, and livelihood development. Further, there are other programs like the Self-Help Groups, Tribal Area Development Plan, National Rural Employment Guarantee Scheme, etc. being implemented in the same region by different Governmental Agencies often with conflicting objectives. Apart from this, the Bhimashankar Wild Life Sanctuary is also located in the region and receives Central/State funding for its protection. The irony is the absence of **synergies and co-ordination between the schemes. This disconnected and fragmented nature of the schemes makes them highly unscientific, decreases their efficiency to build ecosystem resilience and provides little or no livelihood generation and augmentation.**

As most of the schemes proposed are either 'species' centric, i.e. focused on conservation of endangered and vulnerable species or 'forest' centric, i.e. conservation of virgin forest patches; community conserved areas like Sacred Groves and sacred springs, sustainable agricultural practices and traditions have been largely ignored in these schemes. In spite of volumes of research been conducted and several community management techniques been suggested for conservation and restoration of sacred groves, they are not covered under any law, policy or notification pertaining to environment protection. **Hence the absence of a 'sacred grove conservation and restoration scheme' is a big lacuna. This appears to be a 'Howler Gap' in 'traditional', heritage biodiversity conservation.**

While a lot of funding is being poured for the protection of the forests in the Western Ghats region of Pune District, the Pune Urban area has been slowly expanding into these regions, and a rapid industrial development is taking place. The present schemes have no provision for either stopping the development of the Pune Urban region or for integrating environment conservation and protection in the development of Pune Urban region. In one sense, we have created large 'zoos' for biodiversity and traditional communities in form of reserved or protected forests and 'exploitation zones' in urban regions both of which are disconnected from the surrounding regions. Hence, **absence of schemes regarding conservation of urban biodiversity is a major gap.**

It has been proven over and over again that there is an urgent need to have a National River Policy. The Water Resources Department (WRD) is totally bereft of the 'ecosystem approach' and manages rivers as

a resource which is subject to exploitation. **The nonexistence of a River Policy and the subsequent absence of river regulation zones create a huge gap in the existing schemes.**

It has been repeated often in the last two decades that biodiversity cannot be protected in isolation. We would continue to experience failure in biodiversity conservation or environment protection unless we remove the boundaries between 'protected' and 'exploited', and create a wholesome 'conserved' that integrates rural with urban, forests with grasslands, lakes with rivers, etc.

The biggest gap therefore, lies in the fact that, **we have no overarching rationale for the numerous small and large schemes that addresses 'Ecosystem Conservation'**. Another major lacuna is that although 'Ecosystem Resilience' has been stated as an objective in National Action Plan for Climate Change (NAPCC) and would be included in the 12th Five Year Plan, **there is no clarity on what is involved in building 'Ecosystem Resilience'**.

b) Magnitude:

If we consider only the schemes of the Ministry of Environment and Forests, then the 11th Five Year Plan had allocated Rs. 10,000 crores of investment for over 22 schemes, including pollution abatement, monitoring, Coastal Management, River Conservation Plan, Capacity building, Tiger and Elephant protection, Aforestation schemes, etc. Apart from this investment of over Rs. 2,43,460 crores allotted in developing animal husbandry, dairies, fisheries, watershed development, rainfed areas development, water resource development and management has been allocated. This does not include the investments in schemes like the MNREGA (watershed program, Aforestation programs), SGSY (rural livelihood development), Rural Sanitation, JNNURM schemes for sanitation, water treatment and solid waste management, which ultimately are meant to improve the quality of the environment and therefore for the conserve of ecosystems and build up ecosystem resilience.

However, the efficiency with which the programs are being implemented and the actual resultant of these schemes on the protection of biodiversity and ecosystems is very poor. There are also numerous regions and issues, which are left to fend for themselves and receive no investment either for undertaking research or for conservation activities, like (regions example), issues like agro-biodiversity, restoration (and not Aforestation) of degraded ecosystems.

These **disconnected and fragmented schemes cannot create resilience as resilience increases with integration and synergies**. A major outcome of such sectoral schemes is a mosaic of land use classes which are disjointed from the ecosystems within which they are sustained, leading to an entirely unsustainable growth trajectory.

c) Issues that need to be focused on:

All the schemes initiated by the ministries and departments point out the need for integration and holistic ecosystem approach, however practical expression of this approach is never achieved in their schemes. All the schemes reflect near absence of the 'Ecosystem Approach'.

The three major points of view in biodiversity conservation are;

a) **Water Resources Department** point of view which is limited to only water use efficiency, augmentation and infrastructural and developmental projects. Even the National Water Policy only talks about 'Planning, development and management of water resources' and the need of 'River Basin Organization's, but completely misses out on the 'river ecosystem' perspective.

b) **Ministry of Environment and Forests (MoEF)** promotes schemes which are sectoral, fragmented and aimed at species and forest protection and not ecosystem conservation.

The National Action Plan for Climate Change (NAPCC) which intends to provide systematic plan and approach for combating climate change has identified 8 missions, none of which express the 'river ecosystem' perspective or point out the need of Conservation and Restoration of Riverine ecosystems.

As this critical approach is overlooked, the NAPCC will not in reality achieve the objective of climate change resilience.

Some of the prominent schemes initiated in the 11th Five Year Plan for Biodiversity Conservation such as the 'National Biodiversity Action Plan', 'National Ganga River Basin Authority (NGRBA) set up under the National River Conservation Plan (NRCP)', 'National Lake Conservation Plan', 'National Aforestation Program' etc. are all fragmented schemes with little or no interlinkages and absolutely no ecosystem approach. E.g. the National Ganga River Basin Environment Management Plan (NGRBEMP) which is being prepared by the consortium of seven IIT's focuses on abatement of pollution of river Ganga and is extended to a few tributaries. The plan mentions activities to be taken for maintaining the river ecology and to consider river as an ecological entity, maintaining minimum ecological flows, but the approach of biodiversity conservation through riverine ecosystem conservation is missing in the NGRBEMP and therefore will not maintain, improve and increase ecosystem.

The National Lake Conservation Plan (NLCP) under the National River Conservation Directorate (NRCD) lays emphasis on maintaining an integrated ecosystem approach for conserving and restoring the urban and semi urban lakes; however the activities carried out under NLCP focuses exclusively on pollution abatement, catchment area treat and desiltation. There is no activity of upstream and downstream sub-ecosystem conservation and restoration, which truly reflects the 'integrated ecosystem' approach, flood plains and wetlands interlinks, interlinks between artificial lakes (dams) and rivers etc.

e.g. Chilika Lake is a brackish water lagoon on the eastern coast of India in the state of Orissa at the mouth of the River Daya. It is one of the lakes that are to be restored and conserved under the NLCP. In absence of an integrated riverine ecosystem approach, building ecosystem resilience in terms of biodiversity adaptation, livelihood generation, prevention of disasters such as floods will not be achieved. Hence the rational concept is to work on conservation and restoration of the entire Mahanadi-Koyakhai River basin to ultimately build resilience in the Chilika lake sub-ecosystem.

c) Of all the schemes the ones initiated by **Ecologists and Environmentalists** focus on the 'ecosystem approach' and advocate for the community led biodiversity conservation. However, the concept of riverine ecosystem as a tool for planning and biodiversity conservation is still not approached in the schemes. The communities easily recognize the river basin boundaries and enthusiastically participate in biodiversity conservation and livelihood generation and augmentation in terms of tourism, fisheries, agro based industries etc.

d) Challenges:

Formerly, there was a certain inability to perceive ecosystem as a whole and it has led to creation of an administrative framework which cannot integrate 'ecosystem approach'. e.g. Physical entities like Water (Groundwater, Surface Water, Lakes, etc.) are divided between States, and therefore are governed by separate laws and policies. Therefore, problems like groundwater pollution in one State creating quality problems in another State lead to tremendous conflicts on who takes the responsibility of clean-up rather than a collective action. Similarly, States enter into a power-conflict with the Central Governments when certain areas are demarcated as 'Protected Areas' or 'Eco-sensitive Zones'. Such conflicts bog down the larger issues like 'ecosystem resilience'.

The 'ecosystem' approach' necessitates therefore to break free from the administrative boundaries such as the district, state or taluka/tahsil boundaries and adhere to physical and biological boundaries created by the ecosystem, the watersheds probably being the smallest unit of planning in the River ecosystem. Since all the past and existing schemes consider the administrative boundaries, it will pose a challenge to think and plan in terms of physical and biological boundaries created by River basins.

No position has been taken by ecologists or planner about Urban Ecosystems. With increasing Urbanization, it will be a challenge to integrate Urban Ecosystem as a legitimate arm in the environmental planning exercise else we may risk leaving a large portion of the country unaccounted for in terms of the environment. There is a large resource pool of urban biodiversity, urban forests, and diversity in human-

dominated areas (including private gardens, industrial gardens/ plantations) which are often left undocumented, unacknowledged and therefore perpetually in the crisis of being taken over and exploited.

There are an enormous number of fire-fighting schemes and regulations, or great discourse of principles and vision statements. However, a daunting task would be to connect these two in form of deliverable action plans. There is an urgent need for identifying negotiating bodies/persons/agencies which would enable the exchange that would be required for shifting to 'ecosystem based planning' in order to build ecosystem resilience.

e) Potential Solution:

The rational approach to biodiversity conservation is to adopt the 'ecosystem approach'. If we look at the Earth as a discrete and dynamic system, then the river basin will be the largest ecosystem having a succession of sub ecosystems which are interlinked and interconnected. **Hence, adherence to the River Basin as a unit of implementing the ecosystem approach in conserving biodiversity and building ecosystem resilience seems to be a prime solution.**

The entire concept of this 'River Ecosystem' approach is to fine-tune the existing fragmented schemes in order to improve the resilience of discrete ecosystems defined by the river basins and to implement the schemes using a bottom up method with community led conservation and restoration.

Proposed Scheme/ program

a) Title and Rationale:

Focusing on the River Basin as a management unit for building 'Ecosystem Resilience'

The proposed scheme is based on the fact that river basins are a discrete, physical manifestation of climatic conditions prevailing over a region, and rivers are a living link between the successive sub-ecosystems in the river basin. Rivers, being the receptacle of the various products of the basin and being ecosystems themselves also serve as a litmus test of the success or failure of the conservation efforts in their basins.

The river network is also an excellent example of the principle 'part to whole and whole to part'. Each tributary is a complete whole as also a part of the larger whole (ecosystem). Therefore, river basins could also function as administrative units in the context of building ecosystem resilience.

Integration of National and State objectives, Inter-departmental, Inter-ministerial and inter-sectoral objectives would be possible only if a discrete physical unit becomes the basis of planning and implementation.

b) Objectives:

A. Identifying the factors which constitute Ecosystem Resilience at the river basin level

1. Identify River Basins for which the Ecosystem Resilience study could be undertaken
2. Develop appropriate methodologies and procedures in order to inventorise, document describe and understand sub ecosystems, and the interdependencies and interlinks between sub ecosystems.
3. Identify anthropogenic and other factors which negatively impact on the sustainability between the sub ecosystems and species within the sub ecosystems.
4. Identifying the potential magnitude or intensity of Climate Change in case of the selected River Basins
5. Identifying threats to and gaps between ideal land use pattern based on the matrix of sub-ecosystems and the current land use pattern
6. Identify techniques, mechanisms for correcting negative interventions.

7. Carrying capacity studies for the River Basin within the context of Ecosystem Resilience for deciding the principles for growth of the region

Rationale:

In order to build ecosystem resilience and sustainable livelihoods, especially in the context of climate change one needs to identify the degree and types of impacts that could be experienced by a region and its sub-ecosystems

It would also be necessary to find the balancing factors in case of disastrous climate change impacts, e.g. when a region A is undergoing a drought situation, will there be an opportunity for animal migration downstream/ upstream of the region; will there be an opportunity for restoring disturbed habitat by using a repository in the surrounding regions?

Base data on various parameters like climate studies, hydrology, land use, urbanization, industrialization, proposed projects, human development indicators, species conservation data, at sub-basin level will be collected and organized at the sub-basin unit.

B. Planning for improving Ecosystem Resilience in the River Basin units

1. Preparing broad principles (and not guidelines or schemes) for improving ecosystem resilience within River Basin unit. These principles may include principles for integrating sustainable livelihoods, disaster preparedness, ecosystem restoration, habitat protection, and schemes for enhancing inherent resilience in species and habitats.
2. Creating an administrative and legal framework for planning and implementing the Ecosystem Resilience Program with River Basin units
3. Developing a platform for community based planning and management of River Basin units
4. Identifying strategies for land use correction, correction of existing management strategies

Rationale:

There would be a need to re-frame the current administrative framework to allow sub-basin wise and basin wise administration that is able to take decisions about resources and resource use within the 'basin context' and not at the district/State context. Some conflicts like water sharing may need to be revised to suit the ecosystem framework.

While 'river basin' and 'ecosystem resilience' as concepts have a tendency to be planned at the central levels, it would be important to make efforts to share data at the lowest level and allow for local plans (at sub-basin level) to emerge from community involvement. Sharing principles, base data, capacity building for NGOs/CSOs, creating a strong network of peoples' groups, farmer groups, industry representatives, business consortia, and developing a platform for negotiations and tradeoffs based on *scientific understanding of the region* would be key to developing these plans

C. Action Plans for ecosystem resilience

1. Conversion of broad principles to schemes, management strategies and tangible action plans at sub-basin levels with community involvement
2. Implementation of bottom-up Action Plans for building ecosystem resilience

These Action Plans may include specific activities like land use correction, ecosystem restoration schemes, infrastructure development in urban and rural areas, developing urban-rural gradation, boosting small scale agro-based industries, climate responsive agricultural practices, diversity in rural self-employment, use of sustainable energy options, monitoring and research programs, etc.

Rationale:

- The Action Planning Stage would involve several iterations and discussions among stakeholders. An important aspect of this process would be conflict resolution and negotiations among stakeholders. This is a crucial process in making bottom-up plans and would require the Governmental agencies to take the role of a facilitator.
- The Government would need to recognize the role of urban ecosystems, and need to encourage the participation of urban bodies in Action Planning. Further it needs to be recognized that some schemes and projects of the Government or Private Sector would need to be scrutinized in the context of ecosystem resilience and would need to incorporate changes, restructuring, etc.

c) Scope of specific activities to be undertaken

1. Establishment of a nodal Institute which facilitates research, provides training and capacity building for 'River Basin perspective for Ecosystem Resilience'

Rationale: The nodal Institute will function in converging and analyzing the data received from the various Departments, Institutes, Projects, Organizations, National and International Scientific Journals for selected river basins. It will host research scholars from various National/ International institutes working on 'ecosystem resilience' and related subjects. It will commission specific empirical research for supporting observations, queries, etc. raised in the process by community contributors. It would also function as a training and capacity building institute, especially as a link for training personnel from various related Departments and Organizations in 'ecosystem resilience' and 'ecosystem approach'. This would enable preparation of 'ecosystem conscious' development proposals.

2. Public portal with open database on climate, policies, livelihood opportunities/programs, success-failure, etc.

Rationale: The public portal will provide as a platform for exchange of ideas, data and research. Research conducted in the basins could be made available for scrutiny and further analysis.

3. Identify management practices, traditional principles/methods for proposing schemes for river ecosystem resilience

Rationale: Empirical research on the traditional principles and practices that are sustainable and adaptive to climate change needs to be conducted and documented. Efforts must be made to research, contemporize, and promote traditional knowledge, practices, strategies and principles that build resilience in traditional livelihoods.

4. River Create River Ecosystem model for Biodiversity Conservation by conducting pilot study on three sub-basins namely: Teesta, Wainganga, Arkavathy Rivers.

Rationale:

1. Teesta River

River Teesta originates from the Cho Lhamu Lake in the verdant Himalayan Ranges, flows for almost the entire length through the State of Sikkim and forms the border between Sikkim and West Bengal before joining the Brahmaputra as a tributary in Bangladesh. The total length of the river is 315 kilometers.

The Teesta River is the lifeline of the Sikkim district as it harbors several indigenous deciduous forests at the lower elevations and alpine forests in its upper reaches. It provides livelihoods by means of fisheries, mode of transport, tourism (white water rafting on the Teesta is an internationally famous adventure sport).

In recent times, a series of dam projects have been proposed on the Teesta River for production of 50,000MW of electricity. Creation of such reservoirs will lead to deposition of the huge amount of silt from the upper reaches of Himalaya will lead to increased pressure on the active fault area, thereby increasing

the river induced seismicity. The altered flow patterns will have substantial impact on fisheries and livelihood patterns. Already a less populated states, much of its civilization is in the ravines and gorges through which the Teesta flows. Construction of a series of dams will displace all these populations.

Studies have proven that these hydropower projects are becoming even more hazardous due to Climate Change. Increase in rainfall, high rate of soil erosion and landslides all can result in the landslide dam outbursts floods, which will lead to tremendous property and life losses (N. Vagholikar and P.Das, 2010). Hence, the Teesta Basin becomes an ideal River Basin to study the impact of climate change on various sub ecosystems, to carry an inventory of endangered and vulnerable species and the reason behind the threatened status, to conduct Cumulative impact assessments (CIA) of the proposed dams and decommission them if necessary, to develop a platform for community led conservation and restoration and eventually build resilience in the Teesta River ecosystem which will enhance livelihood generation.

2. Wainganga River

The origin of the river is located at Mundhara, which lies at the foothills of Ambagad Hills an outlier of the Satpuda Mountains, near the town of Gopalganj, Dist. Seoni in Madhya Pradesh. Initially it flows northwards, takes a turn to the east and then flows down to the border of Maharashtra, after passing through the districts of Seoni and Balaghat in Madhya Pradesh. The total length of Wainganga River from origin to confluence with Godavari about is 580 kms.

Wainganga River Basin was a host to one of the oldest forest civilizations in India, the 'Dandakaranya'. It is one of the largest forested areas in the state of Maharashtra and harbors flagship species such as Royal Bengal tiger and Elephants. Tribals such as Kohlis, Gond, Halba and Govari dominate the region. The nomadic tribes called Dhiwar are settled along the river and all of them practice fishing as their principle profession. The major contribution of the Kohlis was the construction of water tanks called the 'Maalguzari tanks'. In the 17th and 18th century the Gond kings commissioned large scale construction of these water tanks for irrigation purposes. There are about 10,000 such tanks and a few hundred are still functioning. The Wainganga river basin is a water surplus region lying in the rainfall assured region of Central India.

Despite being a rich in natural resources and traditional knowledge, this area features among the least developed regions of Maharashtra and ranks last in the Human Development Index (HDI) among all the districts.

It is a classic example of resources and traditional knowledge going to waste. 'Gomukh Environmental Trust for Sustainable Development' is commissioned by the Water Resources Department, Govt. of Maharashtra to prepare a Master Plan for Integrated Water Resources Development and Management of the Wainganga sub basin (Within Maharashtra). Gomukh Trust has adopted the 'River ecosystem' approach for preparing this plan.

A few notable features of the Master Plan are as follows:

- The first step in preparation of the Master Plan was stakeholder consultation.
- Instead of proposing large scale impounding structures, Revival of traditional water conservation structures such as the 'Maalguzari Tanks'
- Consultation with the tribal communities regarding community forest rights
- No separate planning for Ground water and Surface water and to consider aspects such as sub-surface water.
- Augmenting the livelihood of the rural communities by providing option such as heritage tourism, wildlife tourism, farm ponds, and pisciculture.
- To consider forests, wetlands, grasslands and scrublands as an equal stakeholder in terms of water requirement and supply.
- Reservoir Operation Schedules(ROS), Gate operation Schedules (GOS), Guide Curves, Regulation Schedules of the selected major and minor dams would be studied and Gaps and loopholes in the current system would be identified

- Management techniques and advanced management technologies for decision making would be discussed
- Best Practices for ROS and GOS would be developed
- A preliminary survey to identify the traditional flood warning systems and consultation with stakeholders and victims of the 2005 floods regarding disaster preparedness.
- To prepare a flood/ Disaster Management Plan and circulate among all stakeholders for iteration.
- Documentation of traditional climate adaptive agricultural practices
- Planning through watersheds and then scaling up at the sub-basin and ultimately basin level planning.

3. Arkavathy River

Arkavathy River originates at Nandi Hills in the South Western Ghats. It is a tributary of the Kaveri River. The Bangalore city lays in the watershed of Arkavathy River and till a few years ago was totally dependent on it for urban water supply. The Bangalore Water Supply and Sewerage Board provided 135 million liters of drinking water per day to the city of Bangalore by extracting water from the two reservoirs Hesaraghatta, built in 1894, and the Tippagondanahalli Reservoir (or T G Halli), built in 1933 .

The Arkavathy River has almost dried up because of the extensive diversion of water to meet the needs of the Bangalore city. The Arkavathy River basin being water scarce can be a good pilot study for identifying climate change impacts and to formulate a riverine ecosystem restoration plan. The interlinkages between the various sub ecosystems within the Arkavathy river basin should be studied and conservation techniques should be applied both upstream and downstream of the river for restoration and rejuvenation of the Arkavathy River.

d) Preferable approach

The preferable approach for implementation could be at the regional level, with the stakeholders, CSO's and NGO's providing the strategies and plans that can be implemented for building ecosystem resilience. Building Ecosystem Resilience would entail working simultaneously on multiple fronts - it should ideally operate with bottom-up approach in terms of planning and implementation at sub-basin level. However, tasks like sectoral integration, changes in administrative framework to suit river basin need to be performed in a top-down approach. Essentially, it would need complementary changes at both levels of governance.

e) Eligibility Criteria for implementation of scheme

The implementing agency may be a governmental organization working with nongovernmental organizations. The governmental organizations can commission Civil Society organizations or nongovernmental organizations to implement the scheme/ program. Eg. 'Gomukh Trust' a nongovernmental organization is commissioned by the Water Resources Department (GoM) to prepare an integrated water resources development and management plan for Wainganga River Basin. In such an agreement, rather than providing 'Guidelines', principles and approach can be provided by the Governmental agencies and the implementation plans and strategies can be determined by the civil society and nongovernmental organizations. However, the NGO's and CSO's will be given considerable flexibility and liberty to operate within the principles recommended by the governmental organizations.

f) The scale of funding up to Rs. 50 crores (large scale)

g) Anticipated Output:

- Broad criteria/definition for ecosystem resilience and procedures/principles for its enhancement
- Draft National River Policy which will include criteria for identification and demarcation of River Regulation Zones.
- Establishment of an National Institute which will act as a center for integrating viewpoints in river basin based ecosystem management

- Identification of Research areas based on pilot studies and promotion of studies through the Institute
- Model Ecosystem management Plan for Biodiversity conservation
- Climate sensitive livelihood pattern in selected River Basins
- Platform for Ecosystem based planning and legitimately negotiated tradeoffs

j) Anticipated outcome:

- Biodiversity conservation through 'ecosystem approach' by integrating Sustainable Livelihoods and eventually leading to increased social and ecological resilience.

Annexure 16

Forestry Biodiversity

*Note prepared by Madhav Gadgil for Working Group on
Ecosystem Resilience, Biodiversity and Sustainable Livelihood for preparation of
XII Five Year Plan*

Introduction

On the threshold of the XII Five Year Plan, our nation is evidently at cross-roads, with grave misgivings on continuing with business as usual. This then is an appropriate juncture at which to undertake a fresh assessment of the forestry- biodiversity sector from a scientific perspective. The spirit of science is captured well in J D Bernal's(1939) definition that "science is an organized enterprise of skepticism". Professor Satish Dhawan, who served as Secretary, Space Department of Government of India from 1972-80 was such a true scientist. He was very skeptical of the claims of Forestry establishment that as much as 23% of the country's land was under forest cover. So he asked his colleagues in Space Department to undertake an independent assessment with the help of the satellite imagery. Their estimate was far lower, at 14%. This stimulated a healthy dispute leading to a so-called reconciliation at 19%. Unfortunately, the skeptical spirit was then buried, with handing over the job of continual monitoring of forest cover with the help of the satellite imagery to Forest Survey of India, an agency of the Forestry establishment itself, and naturally unable to act independently.

Another pithy statement of what the scientific spirit is comes from the mathematician-philosopher Whitehead (1927): "Modern science accepts brute facts, whether reasonable or not!" One such set of brute facts relates to existence of paper tigers. When tigers were no more being sighted at Sariska, despite the official claims that many existed, the PM set up a Tiger Task Force (2005). The Task Force could access information available with the field staff and could put together the following picture (Tiger Task Force 2005):

Table 1: Tiger population estimates in Sariska Tiger Reserve

Year	1998	1999	2000	2001	2002	2003	2004
Tiger population (official census)	24	26	26	26	27	26	17
Tiger estimates by field staff	17	6	5	3	0	1	0

Evidently, the establishment was deliberately circulating misleading information. In spite of the Tiger Task Force putting this on record, no action was ever initiated to penalize those responsible for this perjury. There is thus abundant evidence that business as usual will simply not do.

Scientific basis of forestry and biodiversity management

The British introduced the current system of Forest Management in India some 150 years ago with claims that it was a scientific system that would result in sustainable harvests. Both these claims of scientific basis and of sustainability are of dubious validity. Science must stand on solid bedrock of empirical facts. An important weakness of so-called scientific forestry

is the lack or poor quality of its data base, as the two examples cited in introduction make abundantly clear.

In 1960's the Forestry establishment decided to abandon the "cautious" approach of conservation forestry and become "aggressive"- clearfell and raise plantations, such as those of exotic tropical pine or *Eucalyptus* species (Gadgil, Prasad and Ali 1983; FAO, 1984; National Commission on Agriculture, 1976). Regrettably, there was no careful scientific research on which species would succeed and what productivities could be realized. The best of our natural forest was clearcut, on the supposition that the new plantations of Eucalyptus would annually produce biomass of between 14 to 28 tonnes per hectare. A significant proportion of these plantations were a dismal failure, especially in the high rainfall tracts due to fungal diseases cutting down their productivity to just 1 to 3 tonnes per hectare (Prasad, 1984). Many steep slopes of Western Ghats of Kerala were laid waste as the magnificent old stands of evergreens gave way to miserable stands of sickly eucalyptus.

Similarly, an assessment of bamboo resources of Karnataka on the basis of the data available from the State Forest Resources Survey, Paper Mills, and extensive field work showed that the stocks were overestimated by a factor of ten times (Gadgil and Prasad 1978, Prasad and Gadgil 1981). Scientific management also calls for knowledge of growth pattern to decide on a harvesting regime that will make the most of the growth potential. Yet, a majority of the preservation plots set up in early 1900s to collect data on girth increments of different tree species under different environmental conditions in the country are either poorly maintained or destroyed (Gupta 1981). Similarly, Karnataka Forest Department's prescriptions on the number of bamboo culms to be extracted from a clump were flawed because of a failure to appreciate the exponential nature of the growth of a bamboo clump and consequent excessive harvests from smaller sized clumps (Kadambi 1949). Furthermore, the practices involved cleaning of the thorny covering developing naturally at the base of a bamboo clump. This was supposed to promote better growth of new shoots. In fact, removal of the thorny covering rendered the young shoots readily accessible to grazing by a whole range of animals so that the recruitment of new culms to the clumps remained very poor and the bamboo stocks remained stagnant. In contrast, the local villagers were fully aware of this difficulty attendant on clump cleaning and left the thorny cover intact while harvesting bamboo for their own use (Prasad and Gadgil 1981).

Working Plans as hypotheses

The modern scientific method has been termed as the "hypothetico-deductive" method. Hence, a truly scientific enterprise would treat documents such as "Working Plans" as scientific documents to be made available for peer review by all interested parties, not as official secrets. The yields expected to be realized, and the stocks expected to be left behind after the harvests would be treated as hypotheses to be tested. If the yields do not materialize, or the stocks are not sustained, then a scientific enterprise would acknowledge that there are obvious errors of fact or logic, and attempt to look for and correct them. It would also try to bring on board all interested parties, technical experts, as well as other stakeholders from the civil society, in the effort to understand the mistakes and correct them.

In its place, all that happens is occasional remarks on the efficacy of earlier Working Plans when new ones are prepared. To quote one such: "*In the Yekkambi - Sonda area the A coupes under Edie's plan and replacement felling areas under Garland's plan have resulted in total exploitation of all valuable species.... Most of the overwood of valuable species had been removed under the so - called "uniform system" over large stretches of reserve forest area in the false hope of inducing natural regeneration of teak and other valuable species. ... Garland's replacement fellings under uniform system was a total failure as it failed to induce or establish natural regeneration of teak or other valuable species* (Wes

ley, 1964).” But such observations are not shared widely, exposed to scrutiny, and followed up as should routinely happen in any scientific exercise.

Non-sustainable forest use

It is, of course, the responsibility of the Forest Research Institute at Dehra Dun to review the information so generated and build up a consolidated picture. That would have brought out the utter lack of sustainability. But no such exercise has ever been undertaken. An exception is an FAO sponsored study of the history of Quilon division in Kerala by Dr. C.T.S. Nair (198*). The area under investigation was initially divided into a “selection circle”, from which harvests were meant to be organized so as not to eat into the forest capital, and a “protection circle” encompassing steeper hill slopes, where the forest was expected to be kept intact in perpetuity to serve its watershed functions. The study revealed that the capital of tree growth in the selection circle had been declining progressively. The response had been to convert it into “Clearfelling Circle” and completely liquidate all tree growth, replacing it by monoculture plantations. At the same time, part of hill slope “protection circle” that was supposed to be perpetually left untouched, was brought under selection circle. As this addition to the selection circle was also overexploited, these steep hill slope areas were also clear felled, and the selection circle was extended to yet steeper slopes.

Sequential overexploitation

Indeed, India’s forest resources have been continually subjected to a process of sequential overuse. Prasad and Gadgil (1981) illustrate this process of non-sustainable use of pulpwood resources by paper mills along several dimensions. The contractors supplying bamboo rarely adhered to prescriptions. Instead of removing a fraction of culms from all clumps throughout a block, they removed all culms from the clumps most accessible from the road. Next year a fresh road would be made further inside the block and all roadside clumps clearfelled, and so on in a sequence reaching into less and less accessible terrain. Secondly, as the forest areas nearby the mill were depleted, supplies were drawn from further and further away. Thus WCPM in Karnataka first went to neighbouring Andhra and then further afield to Garhwal, to Assam, and finally to Nagaland. Thirdly, as the supplies of bamboo, the most suitable species for paper making, dwindled other harder and harder woods were tapped. Fourthly, the mills moved from reserve forest land, from which they acquired supplies subsidized by the state to the tune of 1.50 rupee per tonne of bamboo (when the market price was 5000 rupees per tonne), to use of bagasse from sugarcane, or to eucalyptus grown on farm lands (Gadgil, M. and Guha, R.1992 Gadgil,M. and Rao, P.R.S. 1998).

Knowledge management

The system of knowledge management of the Forestry establishment is not an open, participatory system in the spirit of science. Rather, it is a system emphasizing monopoly over collection and interpretation of data. Thus the Tiger Task Force (2005) recorded the following statement by Raghunandan Chundawat, a wildlife researcher. “Unfortunately in last three decades no system has been created that encourages or institutionalizes access to available professional research in protected areas nor that takes advantage of the growing body of professionals with expertise in relevant areas who work outside the government. We need to change the attitude of our management from a guard protecting jewels to a librarian who is

managing library of unexplored knowledge and inviting people for learning. These problems occur now and again because we have failed to create a system, which supports and provides protection to independent research in the country.”

Just to cite an example of an experience of mine from the pre-RTI era, at a meeting in early 1980s in Kolkata, presided over by the Finance Minister of West Bengal to discuss environment and forest issues, the PCCF asserted that Working Plans are technical documents that must never be made available to general public. In early 1980s I was informed that a full set of Working Plans for India was not available at any institution in India, including FRI at Dehra Dun. Subsequently, I could access and study them at the Commonwealth Forestry Institute at Oxford. When the proposal to clear large tracts of natural sal forests of Bastar and plant them up with tropical pine was opposed by many tribal groups, I came to serve on a committee looking into the whole programme. The choice of tropical pine was being pushed on the basis of supposedly high production of a pilot plantation of the species. As a committee we discovered that this pilot plantation lay in ruins, and there were no proper records available of the performance of tropical pine at all. The whole affair was a gigantic fraud.

Are forests / wildlife being genuinely protected?

On conquering India, the British described the land as an ocean of trees, teeming with wildlife. This heritage has been liquidated under the so-called scientific management, initiated under the colonial rule. The pace of destruction has only accelerated on independence – through liquidation of private forests, through large scale felling as roads connected hitherto inaccessible regions on account of development projects, through decimation of the resource base of forest based industries that have been practicing excessive, undisciplined harvests. All this served the interests of the ruling classes; it was in no way being driven by the marginalized rural, tribal communities, who were being blamed all the time by the officials.

A classic case of how these groups were victimized was that of the village forests of Uttara Kannada district, earlier a part of the Bombay State. The village forests of Chitragi, Muroor-Kallabbe and Halakar were established in 1930 as a rare example of implementation of the provision for handing over reserve forests as village forests in the Indian forest Act 1927. This was done on basis of recommendations of a Forest Grievance Enquiry Committee of the district in 1922, which had praised the age old, excellent community level management of these three villages. They were functioning well till the linguistic reorganization of the state brought Uttara Kannada district to Karnataka. Promptly, the Karnataka forest Department served notice on these Village Forest Committees liquidating them on the pretext that the Karnataka Forest Rules had no provision for village forests. Tragically, the Chitragi villagers totally destroyed their dense forests within fifteen days of receiving the notice, those of Halakar and Muroor-Kallabbe appealed. Finally, people of Halakar won the court case after 28 years of litigation and have continued to manage their village forest very well to this day.

Some six years ago, a CBI enquiry ordered into the Sariska tigers debacle reached the conclusion that the tigers could not have been poached without official connivance. Nevertheless, no official was ever brought to book, while many local villagers were arrested and beaten up by the police.

Consider also the following recent news item in ** 2011**:

Box 1: Patch of Shola forest cleared in violation of laws: probe

A patch of Shola forest in Kodaikanal has been cleared in violation of forest protection laws and a road was unauthorisedly laid to facilitate construction of a resort, a departmental probe by senior forest officials has revealed.

According to Forest department sources, local forest officials cleared a patch in Tiger Shola (evergreen forest) Reserve Forest in Perumalmalai division in Perambukkandal beat in Kodaikanal forest division. A team of officials led by K. Palani, District Forest Officer, Sirumalai Interface Forest Division, Kodaikanal, conducted an inquiry into the incident and submitted a report to the Department.

The report submitted by the team led by Mr. Palani said the Dindigul district administration issued orders to cut 3,000 eucalyptus trees on a private land in Adukkam village. Following this, the private land owner laid a new road for a distance of 362 meters with a width of 3.50 meters. Earth-moving equipment was used to lay the road and the obstructing Shola forest trees were uprooted. Rocky patches in the area were destroyed using dynamites.

According to the report, the incident came to light on March 24 this year (2011) when the Assistant Conservator of Forests, Kodaikanal, inspected the Tiger Shola Reserve Forests. He immediately intimated the violation to the District Forest Officer, Kodaikanal.

A case was registered by the Forest officials, who secured two labourers in this connection. When they were about to be produced before the magistrate one of them escaped. This was the official version of the local Forest officials, the report said.

Non-inclusion of real offenders in the case, delayed registration of the case, failure to seize the vehicles used for laying the road, the failure of the Forest Ranger to submit a timely report about laying of road to the District Forest officer were some of the findings of the report.

Even after realizing the importance of Shola forests, these were allowed to be destroyed to lay the road in Reserve Forests and the District Forest Officer failed to conduct a field inspection before allowing the cutting of eucalyptus trees.

These were some of the major violations found by the special team, which conducted the investigation, the report further said.

S. Subashkar, Forest Guard, Perambukkandal beat; D.A.S. Nathan, Forest, Perumalmalai division; N. Musthafa, Forest Ranger, Kodaikanal; M.Chandru, Forester, Hill Area Protection Range, Kodaikanal; R.Paramasivam, Range Officer, Hill Area Protection Range, Kodaikanal; and the District Forest Officer D. Sampath were indicted in the report for failing in their duty.

“It is condemnable that there was an attempt to show that much of the extent on which the road was laid in Tiger Shola Reserve Forest land belonged to privately-owned patta land, thereby seeking to surrender reserve forest land in favour of private parties,” the report said.

It estimated that an extent of 20 hectares of forest land was sought to be projected as patta land.

Economic efficiency of performance

All public sector and government operations are notoriously wasteful of India's limited economic resources. But we have few careful studies. One such is Somanathan's work on relative efficiency of efficacy of State versus Van Panchayat management in the state of Uttarakhand. There is strong evidence from Kumaun that this type of community management is far more cost-effective than state management (Somanathan, Prabhakar et al. 2009). Van Panchayats have been at least as effective at conservation as the state has, and at one-tenth the cost. Another study, currently under review, (Baland et al, 2008) strengthens this finding, by concluding that tree damage in Van Panchayat forests from the lopping of branches is considerably less than that seen in Reserved Forests, while other measures are not significantly different.

Quality of governance

Extortion

Finally, we need to consider the quality of governance by the Forestry and Wildlife establishment. That too leaves much to be desired. The Forest officials have notoriously used their regulatory powers to harass and extort from the rural and tribal communities. While all are aware that this has been going on all over the country, there is little proper documentation of the process. So, I interviewed a number of forest fringe villagers from Nandurbar and Gadchiroli districts of Maharashtra. They report that every such family ends up losing between 1500 to 3000 rupees per year in the form of cash, grain, chicken, liquor or forced labour such as supply of fuelwood as bribes to Forest Department personnel. Some 2 crore families in India thus live in forest vicinity. If they pay an average of even Rs. 1000 per year, this amounts to an underground economy of 2 billion rupees, rooted firmly for at least 150 years.

Failure to implement official programmes

In India today it is in the tribal and other forested lands that nature is most bountiful. Sadly, the human communities coexisting with this wealth of nature are afflicted by poverty and malnutrition. Clearly we must transform the system that has created this equation of riches of nature with deprived human communities. Of course, we must conserve, and, indeed, rejuvenate nature; but surely not by treating our own people as enemies. The many different components of our own society and our system of governance are undoubtedly inflicting wounds on the natural world today. So, all of us must learn to deal with natural resources in a disciplined and prudent manner. But this cannot be achieved merely through imposing restrictions on communities living close to nature. After all, such communities do have a greater stake in the health of the environment. However, it is only in exceptional cases that local people are today taking good care of the natural world. This is because, beginning with the British times, people have been deprived of all rights over natural resources, and these have been dedicated, initially to meeting colonial demands and lately to serving the industrial and urban interests. We have made available to plywood industry giant wild mango trees, which yielded fruit famous for pickles worth hundreds of rupees every year, for as little as sixty rupees. Such perverse incentives have destroyed people's motivation for guarding nature.

Fortunately the tide is turning. Joint Forest Management (JFM), Extension of Panchayat Raj to Scheduled Areas (PESA), Protection of Plant Variety and Farmers' Rights Act (PPVRF), Biological Diversity Act (BDA) and the Scheduled Tribes and other Traditional Forest Dwellers (Rights over the Forest) Act (FRA) have conferred substantial rights over natural resources to local communities. Along with the rights, of course, comes the duty, the responsibility of using this natural wealth prudently, in a sustainable fashion. At the same time the National Rural Employment Guarantee Scheme has opened up opportunities to earn a livelihood, while protecting nature, and rejuvenating natural resources. If we employ the provisions of all these various acts in an integrated fashion, it is surely possible to accomplish a great deal.

It must be admitted of course that many people have misgivings about these people-oriented acts, especially, FRA. They fear that:

- The rights conferred on tribals and traditional forest dwellers would result in large scale tree felling.
- The implementation of this act will adversely affect wildlife and biodiversity.

- Tribals and forest dwellers would not be in position to prudently manage Community Forest Resources.
- Outsiders will capture the land of forest dwellers and encroach on lands rich in natural wealth.

But let us ask, what may we expect, if in place of local communities, we give more powers to the state machinery? Will this lead to better protection of the forest cover, of wildlife, and halt encroachment of outsiders? Consider our experience of last six decades of the independence, leaving aside the awful destruction of the continent, which the British described as an ocean of trees on their first arrival, during the colonial period.

- When nearly 11 % of the country's land surface under privately owned forests was made over to forest authorities, delays and corruption resulted in destruction of the bulk of this tree cover
- Whenever roads reached earlier inaccessible forest areas due to developmental projects, there were large scale fellings of state forests
- Forest based industries were made available bamboo, or huge trees for pulpwood, at throw away prices and promptly exhausted these resources
- Forest Development Corporations turned themselves into (in words of Dr. Salim Ali and Mrs. Indira Gandhi), Forest Destruction Corporations and clear felled huge tracts of rich natural forest without ensuring its replacement by productive forests.
- Forest departments played a major role in destroying the sacred groves under many guises
- With people viewing forest authorities as their enemies, the notorious criminal Veerappan remained at large for two decades, despite killing several government officials, and devastated the sandal wood trees and tuskers of Karnataka and Tamilnadu.
- All tigers were poached out of the very well funded Sariska Tiger Reserve. Yet the government machinery did nothing beyond disseminating false information on the number of tigers.
- The anti-people policies of forest authorities have landed rich wildlife habitats like the Keoladev Ghana National Park in serious trouble.
- Consider, on the other hand, what our people have accomplished, despite the powers that be continually giving them false promises, trying their best to weaken people's organizations, and trying to co-opt people in the corrupt system.
- All over the country keystone ecological resources like pepal, banyan, gular trees survive in good numbers.
- Even today we are discovering new flowering plant species like *Kuntsleria keralensis* in sacred groves protected by people in the thickly populated coastal Kerala.
- Monkeys, peafowl still survive in many parts of our country.
- Numbers of chinkaras, blackbuck, nilgai are actually on increase.
- People play a leading role in arresting poachers of animals like blackbuck.
- In many parts of Rajasthan people are protecting community forest resources like "Orans".
- In Nagaland many community forests are under good management.
- Many Van Panchayats of Uttaranchal are managing forest resources prudently.
- Many village communities of Central Indian belt are managing well forest resources over which they earlier enjoyed nistar rights.
- Village like Halakar in Karnataka is still preserving its village forest well in spite of many attacks by state machinery.
- Peasants of Ratnagiri district have ensured good regeneration of their private forests

- Thousands of self initiated forest protection committees of Orissa have regenerated forest brought under community protection.
- One must also emphasize that the excellent present day forest cover of Switzerland has regenerated entirely on community forest lands.
- After all it is the local people that benefit truly by sustaining the health of the local ecosystem. It is them that can guard and nurture these ecosystems most effectively. It is also they who possess locality specific knowledge of these ecosystems to manage them in a flexible fashion. Today we have a tremendous opportunity to work with the people and to protect and rejuvenate our natural resources, while, at the same time enhancing the quality of people's lives.

Joint Forest Management

Joint Forest Management programmes, now about twenty years old, were meant to spread the benefits of forestry to disproportionately poor marginalized citizens who live in the vicinity of forests. However, they suffer from several flaws:

- They do not entitle all residents of a village rights in the management and rights to the products of the forests under their control. Many instances where the poorer inhabitants have been excluded from the JFM groups have been seen.
- The JFM groups do not have security of tenure since their control may be taken away through an administrative decision of the forest department of the state government at any time. This leads to insufficient incentive to invest in and safeguard forests.
- Too much control to interfere in management is still vested in the state forest departments.

There is no provision for transparent monitoring of forest conservation. As a result, we have no systematic data from which to assess the effectiveness of JFM, only large numbers of unrepresentative case studies. A much better model for decentralized management is the Van Panchayat system of Uttarakhand that began in Kumaun in 1930. There is strong evidence from Kumaun that this type of community management is far more cost-effective than state management (Somanathan, Prabhakar et al. 2009). Van Panchayats have been at least as effective at conservation as the state has, and at one-tenth the cost. Another study, currently under review, (Baland et al, 2008) strengthens this finding, by concluding that tree damage in Van Panchayat forests from the lopping of branches is considerably less than that seen in Reserved Forests, while other measures are not significantly different.

The Forest Rights Act of 2006 allows for community management of forests for tribal people and other forest dwellers as a matter of right, but leaves the design and powers of the community management institution unclear. As the work of last year's Nobel laureate in economics, Elinor Ostrom shows (Ostrom 1990), it is crucial that there be ***good design of the community management institution so that it provides the incentive for wise use of forests.***

It follows that a well-designed community management system should be put in place throughout India wherever there are people living in the vicinity of forests. **This would result in savings in expenditure on the administration of Reserved and Protected Forests of the order of 90%, and would greatly contribute to the welfare of people living near forests.** These savings will be realized over time as the forest staff employed in administration and policing duties can be reduced in number.

Box 2: JFPM - An Experience from Western Ghats

Nagarika Seva Trust, Belthangadi, Dakshina Kannada, from the Western Ghats was very much involved in the initial stages (1993) of JFPM in Kundapura division of Karnataka. Two officers of KFD Mr.M.L.Ram Prakash (CCF) and Mr.K.N.Murthy (DCF) were really interested in forming the Village Forest Committees (VFC) so that the people's participation in the Development and Protection of forest is ensured in letter and spirit. The first VFC was formed at Shirlalu village of Belthangady Taluk. NST facilitated formation of 11 VFCs in Venuru Range.

There was high resistance by the officers of FD in this process because they felt they lose their power/control. Because of the commitment of these 2 officers more than 100 VFC's were formed in Kundapura Division. But adjacent Mangalore Division formed 25 VFCs with great pressure, ignoring NGOs/NST but involving Timber Merchants. Subsequently all these VFC's functioned just under FD without any people's participation.

Federation of Voluntary Organizations for Rural Development (FEVORD-K) was instrumental in bringing many changes in the ODA funded JFPM. Mr.Ranjan Rao Yerdoor who is the founder Trustee of NST as Secretary of Fevord-K did a lot of work with KFD and he was also the member of a Committee for evaluation of the Project. Overall observation of this programme is that the attitude of the FD has not changed. The VFCs are under their control and there is little or no scope for people's participation. In Belthangady Taluk now (2011) there are 4 presidents of VFC's who are the office bearers of NST's Peoples Organisation. They have shared their experience with NST which is negative. VFC's Management Committee is just a puppet in the hands of FD. Decisions are taken by RFO/Forester. Accounts are manipulated. Planning is not done according to the demand/need!

There is no coordination between VFC and Biodiversity management Committees (BMC) set up under BDA. The functions and powers of these 2 bodies are to be clearly defined. BMC's are more democratic and participatory, though they too are not up to the expectations. But at least there is scope for people's participation with Grama Panchayats linked to it. BMC's scope should be expanded even to cover areas of VFC's or VFC's may be merged with BMC's. This will have better result with peoples participation and there will be more accountability.

EDC's formed in National Parks in Belthangady too have not contributed much for the protection or development of Forest because it is under control of FD (wild life). Unless the attitude of Forest Department is changed no matter what name is given to these committees-it will be just under their 'CONTROL'.

PESA

In 1996, the Indian Parliament passed the Panchayats (Extension to Scheduled Areas) Act or PESA, with the political class acknowledging the dire need to protect the rights and resources of the communities in Schedule V areas, by recognizing and upholding their right to self-governance (Dandekar and Choudhury 2010). The law, according to Dileep Singh Bhuria, the Chairman of the committee that worked on it, could 'mark the beginning of a new era in the history of tribal people...'

How was this act a departure? PESA recognized the gram sabha (a habitation was the natural unit of the community, and its adult members constitute the gram sabha, as against the elected gram panchayat) to be pre-eminent. The gram sabha was recognized as being *competent* to act on a range of powers, including:

- the power to prevent alienation of land in the Scheduled areas and to take appropriate action
- to restore any unlawfully alienated land of a Scheduled Tribe
- **the ownership of minor forest produce**
- the power to enforce prohibition, or to regulate or restrict the sale and consumption of any intoxicant

- the power to exercise control over money lending to the Scheduled Tribes
- the power to exercise control over institutions and functionaries in all social sectors
- the power to control local plans, and resources for such plans including tribal sub-plans
- the power of prior recommendation in granting prospecting license or mining leases for minor minerals as well as for grant of concessions for the exploitation of minor minerals by auction
- the right to be consulted on matters of land acquisition
- the power to issue utilisation certificates for government works undertaken in their village

PESA thus constructs tribal self-governance around certain key features. The first feature through Sec. 4 (b) fundamentally departs from colonial praxis by affirming that an organic self-governing community rather than an administrative unit like a village is the basic unit of self-governance.

PESA also recognizes a habitation to be a natural unit of the community, whose adult members constitute the gram sabha. In Sec. 4 (d) and 4 (m)(ii), communities are declared competent to safeguard and preserve their culture and tradition, exercise command over natural resources, enjoy ownership of minor forest produce and adjudicate their disputes. Under Sec. 4 (m) (vi), the village assembly is empowered to monitor all state institutions within its jurisdiction e.g. schools, health centres etc, with the functionaries under its control.

Sec. 4 (i), (j), (k) & (l) mark a departure from colonial laws like the Land Acquisition Act, Forest and Mining Acts, and ordain that communities must be consulted on acquisition of, or access to land and land based resources. They also affirm that the tribal community has the capability and competence to adjudicate on, and act in its wisdom to put an end to all exploitative relations including land alienation, money lending, market relations and alcohol trade. This establishes the supremacy of the gram sabha, whose power cannot be usurped by a superior body.

Thus PESA is a unique legislation, often described as a Constitution within the Constitution, which attempts to bring together in a single frame two totally different worlds - the simple system of tribal communities governed by their respective customs and traditions, and the formal system of the State governed exclusively by laws. The second important aspect of PESA is that it spells out a general frame of reference for governance in the Scheduled Areas. It envisages a number of options that may be exercised in each case by the concerned authorities depending on the local situation. It is presumed that the alternative chosen will not violate the general spirit of PESA. In the words of a key figure involved in the grassroots movement for the passing of the legislation, '**PESA moved from development delivery to empowerment; from implementation to planning; from circumscribed involvement to conscious participation** (Prabhu, 2004).'

However, in the decade-and-a half since it was passed, the experience of PESA has been tragically stilted. The legislative and executive work, which state governments were meant to undertake, still remains incomplete. Further, as the above reading of the law shows, PESA envisaged a radical shift in the balance of power - from the state apparatus and from economic and political elites, to the community. However, a community can exercise this wide range of powers meaningfully only when they have access to adequate information and capabilities, in alliance with other arms of the state. All this has been given inadequate attention. In a way thus, the entire effort of all organs of government ought to have been directed towards building up the necessary capabilities such that the 'constitutional/statutory' competence mandated in communities get fullest play. This does not seem to have happened; with the Forestry establishment playing a notably obstructive role. On the contrary legal and administrative subterfuge has kept the provisions of PESA as a set of aspirations and the agenda of self-governance remains postponed.

Given that the challenges to the tribal community's way of life have severely intensified in the past decade with a liberalizing economy, wooing of private capital for industry, the profitable rush for natural resources (in particular, minerals and farmland) along with the phenomenon of left-wing insurgency, which evokes people's problems, the neglect of PESA has had particularly tragic and violent implications. Having built up over the past decade, they now demand a sensitive and urgent redressal by us as a people.

The Western Ghats region has a few Scheduled V areas such as the district of Nandurbar in Maharashtra where the experience of implementation of PESA has also been very negative, so that we need to move ahead to genuinely empower tribal people using the path-breaking provisions of PESA.

Forest Rights Act

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, passed in 2006 is a landmark legislation that aims to undo the historical injustice done to tribals and other forest dwellers by non-recognition of their forest rights. However, it has not yet succeeded fully in achieving its objectives, because of some difficulties in implementation.

Lands classified as forest constituting about 23% of the country's land area, are inhabited by some of India's poorest and most marginalized communities, who traditionally have depended on these areas for cultivation, collection of minor forest produce, use of water bodies, grazing of animals, etc. The historic significance of the Act was because forest laws often deemed tribals and other forest dwellers "encroachers" or criminals for exercising their customary rights. The Forest Rights Act was intended to address this situation by providing legal recognition to forest dwellers' rights, while making forest management more open and participatory.

The difficulties in implementation of this Act have resulted in the majority of claims by forest dwellers in many States being rejected: in some States, rejection rates are higher than 60%. The failures to recognize community rights, especially to minor forest produce, have been even more widespread. Due process in deciding on the claims has been compromised in many cases, and specific documentary evidence is being insisted upon, contrary to the letter and spirit of the law. The gram sabhas are not being held at the village or community level as required by the law, and where these are held, their recommendations are often not given sufficient weight.

One of the key innovations of the Act was to provide recognition to communities' rights to use, protect and conserve community forest resources. This was intended to be a first step to shift towards a democratic frame of forest governance. However, these rights have not been recognized in almost all the states.

Box 3: N.C.Saxena committee report (2010) on status of implementation of FRA

The current state of implementation (of FRA) is characterized by a series of serious problems, including in particular:

1. Constitution of Gram Sabhas is at the panchayat level, rather than at the village/hamlet level. **As is evidently clear from section 2(g) and 2(p) of the Act, the gram sabhas are to be convened at the hamlet level in schedule V areas, and the revenue village level in other areas. However, in a number of states, such as AP, WB, and UP, these are being called at the panchayat level, which is illegal.** As is evidently clear from section 2(g) and 2(p) of the Act, the gram sabhas are to be convened at the hamlet level in schedule V areas, and the revenue village level in other areas. However, in a

number of states, such as AP, WB, and UP, these are being called at the panchayat level, which is illegal.

2. Extensive and wrong rejections, primarily due to hasty enquiries and lack of a thorough examination of the rejected cases by senior officials. Claimants whose cases are rejected are not given any “reasonable opportunity”, as provided in Rule 4(c). Decision rejecting the applications has not been communicated to the claimant in writing anywhere, with the result that the people have not been able to exercise the right to appeal. The Tribal Development Departments of the state governments have neither cross-checked the work being done at the village level by the revenue and forest officials, nor did they engage any outside agency to do independent assessment.
3. Powers of the FRC and GS are exercised by the village level officials, and the non-officials of the FRC and GS are just putting their signatures to the reports written by the officials. The village level enquiry reports have not been verified (not even one percent) by block or district level officials.
4. As per rule 10, the State Level Monitoring Committee has to devise criteria and indicators for monitoring the process of recognition and vesting of forest rights; and monitor the process of recognition, verification and vesting of forest rights in the State. It was for the Tribal Department in the States to develop qualitative indicators, call meetings with peoples’ representatives, hold public consultations, put pressure on the Revenue and Forest Departments at the district level to do justice to the forest dwellers, and improve communication between officials and the people. In most states, on the other hand, it appears that monitoring has been only statistical with a focus on quick disposal, rather than on ensuring that all occupations are regularized as per law, fair play is observed in the field, and adequate field verifications lead to enhanced satisfaction and improved livelihood opportunities.
5. In almost no instance has the SDLC and DLC pro-actively provided maps, documents, and evidence to FRCs and GSs, though this is required by the FRA.
6. Though the FRA provides for multi-stakeholder verification and decision-making at various levels, in many places the opinions of forest staff/officers appear to have over-riden all else. This is due to lack of interest and capacity in Tribal Department officers to handle matters of forest rights. These departments are used to giving scholarships and grants to beneficiaries, but have no experience of dealing with programmes that require inter-departmental coordination. Most nodal officers were thus quite happy collecting statistical information (often from FD) on FRA, but took no initiative in verifying the figures, arranging for a supervision infrastructure, or assessing the quality of performance of districts.
7. Evictions are taking place in violation of Section 4(5) of the FRA, which states: “Save as otherwise provided, no member of FDST or OTFD shall be evicted or removed from forest land under his occupation till the recognition and verification procedure is complete”. There have been widespread reports of evictions in violation of this provision, before and during the tenure of the Committee. There is little evidence that such illegal actions have been dealt with seriously by either state governments or by MoEF and MoTA.
8. OTFDs: The committee has observed that, in all the states where FRA is being implemented, OTFDs have been generally excluded from the claims process on the grounds that they have not been cultivating the claimed plot for 75 years. MoTA needs to clarify that the requirement “for at least three generations prior to December 2005” applies to the residency clause only, and relates to the recognition of a non-Scheduled Tribe person as an OTFD under the Act; this requirement does not relate to the parcel of land for which a claim is being made, or to the forest on which other rights are being claimed. The claimant need not have occupied the land, or been using the forest, for 75

years. If s/he was dependent on the forest as of 13 December 2005 for her/his bona fide livelihoods needs as defined in Rule 2(b) of the FRA Rules, s/he would be eligible under the Act.

9. Non-recognition of community forest resource rights and other non-land rights .

Progress on community rights(CFRt)

The foundation of FRA is the assertion that only security of tenure and formalized recorded rights in favour of forest users would lead to its responsible management and sustainability. The Act and the Rules made under FRA therefore give details of institutional arrangements for the protection, management and regeneration of community forest resources (CFR), defined in section 2(a) of FRA as customary common forest land where the communities had traditional access, or which could be construed to be customary boundaries of a village, in other words, those areas where communities can demonstrate their traditional access.

Despite the fact that the main intention of FRA was to promote community participation and management, our field work shows that recognition of individual rights has taken precedence over community or group rights, and the focus seems to be confined only to land rights for agriculture - one amongst the thirteen sets of rights recognized under the Act. Out of the remaining 12, at least the following seven rights constitute community forest rights (CFRt), the formalization of which has unfortunately been ignored by the district administration:

1. Community rights such as nistar, by whatever name called, including those used in erstwhile Princely States, Zamindari or such intermediary regimes; (Section 3(1) (b))
2. Other community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant) and traditional seasonal resource access of nomadic or pastoralist communities; (Section 3(1) (d))
3. Rights including community tenures of habitat and habitation for primitive tribal groups and pre-agricultural communities; (Section 3(1) (e))
4. Right to protect, regenerate or conserve or manage any community forest resource which they have been traditionally protecting and conserving for sustainable use. (Section 3(1) (i))
5. Rights which are recognized under any State law or laws of any Autonomous District Council or Autonomous Regional Council or which are accepted as rights of tribals under any traditional or customary law of the concerned tribes of any State; (Section 3(1) (j))
6. Right of access to biodiversity and community right to intellectual property and traditional knowledge related to biodiversity and cultural diversity; (Section 3(1) (k))
7. Any other traditional right customarily enjoyed by the forest dwelling Scheduled Tribes or other traditional forest dwellers, as the case may be, which are not mentioned in clauses (a) to (k) but excluding the traditional right of hunting or trapping or extracting a part of the body of any species of wild animal (Section 3(1) (l))

In addition to these seven rights, section 3(1)(c) recognizes right of 'ownership, access to collect, use, and dispose of minor forest produce which has been traditionally collected within or outside village boundaries', and this right is both for individuals and communities of the village.

The reasons for neglect of the community perspective in the implementation of the Act are summarized below:

- FRA has largely been portrayed as a legislation to provide individual land rights, especially during its promulgation and in its first phase of implementation. At several sites the Committee was told that the SDLCs or DLCs were first dealing with IFRs and would only then get into processing CFRt. Many officials stated lack of staff as one reason for this, though it is not clear why they cannot deal with CFRs which are always going to be much less in number than IFRs.

- MOTA has not collected information on cases and area for which community rights under section 3(1)(b) to (m) have been granted by the states, and thus has not been able to build any pressure on the states for ignoring to recognize these rights. It is simply not known how many claims have been made/accepted/rejected at various levels, of each subsection of section 3 that provides for community rights.
- The data are further complicated by the confusion prevailing in the field between Section 3(1) and Section 3(2); several states appear to be reporting the latter for the former; many of the claims currently being classified as CFRt claims in the State or MoTA databases, are actually claims for development facilities under Section 3(2). Even MoTA is unable to provide figures separately for the two sub-sections.
- There is a lack of baseline information on the existence of rights (recorded or unrecorded), and existence of customary practices relating to management, use, and protection, in most places. This makes difficult any robust comparative assessment of the situation prior to and after the FRA's promulgation.
- The number of applications received for CFRt is very low, and acceptance abysmally lower, compared to the potential if judged by the number of villages that are living within or adjacent to forests.
- Where CFRt claims have been claimed or accepted, the extent is often much less than actually used or managed by the community.
- There is little thinking on the status, management, and conservation of areas with CFRt, and specifically CFRe, including issues of relationship of the Gram Sabha with existing agencies managing these areas, and of the complementarities and contradictions with other laws operating in such areas.
- Even where there is knowledge about the fact that CFRt can be claimed, at many sites communities or relevant officials are not clear on how to determine and verify such rights, and so have not started the process. There is also confusion on how to determine the boundaries of CFRt (especially in the case of the claim to CFRe); or on whether CFRt can be claimed over more than 4 hectares, even though the FRA is clear that this limit is only for rights claimed under Section 3(1)(a). The process has also got stuck in places where more than one village has a claim on the same forest area, and no process has been put in place to reconcile such overlapping claims (though the FRA has provided for such a procedure).
- Amongst the various kinds of CFRt, the right to manage/protect CFR given in Section 3(1)(i) is one of those with the least awareness. One reason for this is that this sub-section is not specifically mentioned in Claim Form B that is attached with the Rules; this inexplicable and unexplained omission has caused many communities to not claim this right even when they have claimed other CFRt.
- At many sites, misleading information on CFRt has been provided by officials or civil society organizations, to communities (not necessarily deliberately, since in many cases such officials or NGOs have themselves misunderstood the FRA's provisions). Amongst the most common of these is that CFRt relate only to development facilities listed under Section 3(2). Also widespread in some states is the belief that CFRt need not be applied for, since people are already benefiting from existing arrangements such as nistar rights, JFM/CFM agreements, Van Panchayat agreements, etc.
- At many places where communities have attempted to make CFRt claims, they have encountered various kinds of obstructions, such as refusal to give relevant records, such as maps, refusal to accept claims because the land being claimed is located in "Joint Forest Management" areas, etc.

There are a number of issues where there is lack of clarity, on the relationship between the GS and the Forest Department, and the relationship between the FRA, IFA and WLPA, in

relation to CFRt. These are yet to manifest themselves across most of India, simply because CFRs have hardly become operational as yet.

Overall, given the serious inadequacies in implementation of CFRt at all levels, there is a need for a 2nd phase of FRA implementation in all states, in which primary focus is on CFRt. Such a course of action is indicated also by the 20 July 2010 letter of MoTA to all states. While this belated letter is appreciated, it is important for MoTA and all state nodal agencies to go beyond this by issuing clarifications and instructions.

Progress with CFRt implementation needs to be monitored as a special exercise, as part of the overall monitoring process by the National Forest Rights Council suggested in Chapter 8. A simple, 'how-to' guide on CFRt needs to be produced by MoTA which can be adapted by state nodal agencies as appropriate, and issued in large numbers to communities and relevant officials.

Convert JFM into CFM

It may be recalled that the National Forest Policy way back in 1988 had recognized the meeting of local needs as an important goal of forest policy, and explicitly de-prioritized revenue generation as an objective. It gave a clear push for participatory forestry, and recommended creating a massive people's movement with the involvement of women for achieving objectives of the policy which included conservation of biological diversity, increasing forest/tree cover, increasing productivity of forests etc. One of the immediate impacts of this policy was the 1990 circular from MOEF asking states to initiate Joint Forest Management for regenerating degraded forests.

The JFM experiment has generated many positive outcomes in different locations, but there are limitations too. The 'jointness' in JFM is seriously limited in the field, with day-to-day decisions being controlled by the forest official who is usually ex-officio secretary of the committee. The silvicultural decisions rest with the FDs, and their focus remains on tree planting (often fast-growing exotic species), thereby adversely affecting graziers and not necessarily meeting even firewood or NTFP augmentation goals. Being implemented as part of bilateral/multi-lateral projects, JFM has tended to be funding-driven and therefore funding-dependent, with activities dropping dramatically after the project is over.

A serious problem is that of elite capture. This problem be-devils all 'participatory' government programmes (such as watershed development), not just JFM. But it is particularly problematic in forest management because there is often divergence of interests over how to manage commonly held resources, between women, graziers, firewood headloaders, NTFP collectors, and those looking for profits from commercial timber/softwood production. Consequently, elite capture actively hurts marginalized groups. FDs often find it convenient to allow elite capture, and in fact to actively use the elite to achieve these objectives while bypassing true participation, which is a difficult and messy process.

FRA provides an opportunity, as all JFM areas as well as forests under exclusive village management should be claimed by the community under section 3(1)(i) of the Act and managed as a community resource. To facilitate the process, FD should provide protection and technical support, and be responsible for ensuring compliance with sustainable use and conservation regulations.

In case the gram sabha or the community is not keen to take over management of JFM forests under FRA, or management claims are not accepted under FRA, the government should take *suo moto* action to place JFMCs under the Gram Sabhas. This will ensure that the members of the JFMCs are democratically elected by the Gram Sabha. We expect government to learn from the past experience, as discussed in section 8.3, and make JFM more democratic and participatory, giving highest priority to the livelihood needs of the poorest.

Livelihood support through MFPs

Even the best of efforts to promote CFM and participatory JFM may still leave out vast tracts of forests where there is substantial use of forests by local communities but neither community management under FRA, nor JFM are in place. In such areas as well as in CFM/JFM areas, as per the 1988 Forest Policy, government should promote such silvicultural practices that maximise the production of NTFPs and gatherable biomass. Legal safeguards of providing ownership over MFPs to communities under PESA and FRA may not be able to prevent deterioration in the quantity and quality of the gathered NTFPs, or incomes therefrom. Some of the processes that may cause this are; deforestation, preference for man-made plantations in place of mixed forests, regulatory framework, diversion of NTFPs and forests to industries, nationalization of NTFPs, and exploitation by government agencies and contractors in the marketing of NTFPs.

Therefore in addition to guaranteeing that FRA is implemented in letter and spirit, one would have to address three inter-related issues for ensuring that forest dwellers' livelihoods are supported and enriched by NTFPs:

1. how to increase NTFP production,
2. how to improve access of the poor to NTFPs, and
3. how to maximize their incomes through marketing.

Multiple objectives to maximise outputs from many products will require innovative and experimental silviculture, which must focus more on the management of shrub and herb layers, and on forest floor management to enrich the soil and encourage natural regeneration. For instance, FD's present management of sal in AP and MP seems to be for timber, and hence only one shoot is allowed to grow. Since sal is an excellent coppicer, degraded forests and hills close to a village should be managed under a coppice or a coppice with standard system for fuelwood and sal leaves.

Sensitising the forest service

Since both FRA and JFM mandate close collaboration between foresters and the local forest dwellers, the need for sensitive and responsive Forest Service cannot be just over-emphasized. Unfortunately the internal culture of the Forest Service has continued to be hierarchical and authoritarian, and not participative. A paradigm shift in their outlook can be achieved by good training modules at the IGNTFA and refresher/in-service courses at various institutions. This and other policy measures within the department should aim at the following outcomes:

- greater interaction with forest dwellers and ensuring their all-round economic and social development, involving them at all stages of planning and implementation of forestry programmes run by the Department, and supporting their own planning and implementation of community-based forestry programmes,
- increasing emphasis on environmental conservation and for strengthening the base for sustained agricultural production and water security,
- increasing role of watershed and landscape approach to forestry requiring integrated land management,
- increasing interaction between agriculture, animal husbandry and forestry,
- greater public awareness about forestry and the demand for peoples participation in forestry programmes,
- greater appreciation of the role of environmentalists in forest management,
- more adaptive, participatory and transparent planning processes, based on robust research that is open to independent expertise and knowledge including from local communities, and

- increasing focus on understanding and managing complex ecosystems, helping sustain their resilience and adaptability in the face of multiple challenges including climate change, conserving a range of native biodiversity rather than only individual megafauna species, and helping revive/sustain threatened species of both plants and animals.
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Box 4: Note on FRA Implementation for Kadars, a Primitive Tribal Group, in Vazhachal Forest Division

SUMMARY OF ISSUES

- *Kadar being a PTG, community or habitat rights have not been discussed or established*
- *The FRC for each settlement was selected without following the rules and not through the grama sabha.*
- *There is minimum level of awareness amongst the Kadars or tribal promoters or the Tribal Department and the Forest department on the nuances of the Act and the Rules or its significance and implications.*
- *There is lack of co-ordination between the concerned departments regarding effective implementation*
- *Training programs for creating awareness seem to have either been not carried out properly or not percolated down to the lowest appropriate level.*

Professor Hutton (1946) stresses the importance of Kadar tribes in his book , ‘The Caste in India’ thus; “Perhaps the most primitive of the South Indian forest tribes is that of the Kadars of the Cochin State , a tribe which shows more traces of a Negrito ancestry than any other, though that is not a great deal, the proto – Australoid element predominating”.

The significance of the Kadar tribes has been highlighted in many anthropological studies. They are a primitive hunter and food gatherer tribe originally restricted to the forests and hill tracts of Chalakudy river basin. Census figures show that they are less than 1500 in number. They have been leading a life completely dependent on the forests, small wild life and the flowing river for fish, tubers, collecting honey and other minor forest produce. After one and a half centuries of constant forced translocation across the river basin due to clearance of forests for plantations and submergence of their settlements due to dam reservoirs, they are more or less stabilized along the main valley of the river. There are 8 Kadar settlements in the 413 sq.km Vazhachal Forest Division. Two of their settlements, Vazhachal and Pokalapara are within the range of serious impact by the proposed Athirappilly HEP. In turn much of their original forest habitat has been destroyed and become degraded. Presently two of these impact area settlements are trying to make a living with the help of the Vana Samrakshana Samithi activities under the Kerala Forest Department.

The level of awareness of the Kadar tribe on the FRA and its procedures

Except for very few, most of the members at Pokalapara and Vazhachal Settlements are not aware of the FRA and its implications for the tribals. The two or three amongst the tribe who know about the Act are aware that such an Act is there and it is for the recognition, restoring and vesting of their rights. However they were not aware of the different types of forest rights that they are entitled to as per section 3 of Chapter II of the Act based on which the claims can be made at the FRC. Hence the basic premise of the rights establishment as claimed by the Tribal Department officials at the site visit is flawed. Since they are a PTG, they should have been made aware of the section a, c, d, e, i, j, k, and l by the SDLC as per the section 6 (k) of the FRA Rules outlining the functions of the SDLC before seeking claims. This has not happened.

The Kadars are not at all aware of their community rights. They were asked to claim for 8 to 10 acres of land by the Tribal Department and fill the claims accordingly which they obliged without knowing the law.

The process of implementation and where it stands now

As per the evidence gathered from various departments and the Kadar tribes, Forest Rights Committees were formed without conducting gramasabhas. In the first meeting itself, the tribal department formed FRCs without taking serious efforts to enlighten the tribes on the why and what of the Act. During the selection of FRC members, they said that there would be training programs for these selected members. However, they claim that no such training program was conducted for them and for the tribal promoters. Staff from the District Collectorate, tribal department, and Athirappilly grama panchayat visited all tribal settlements, organized meetings and selected the FRC members instead of through grama sabha process. They never mentioned about the community rights that is specified in the law. They asked the tribes to claim for some forest land and they promised them to give that land.

In some colonies, FRC members filled the FRA form for the tribals and in most of the colonies, promoters filled the form. As per the instruction of tribal dept., every family claimed for 8 to 10 acres near to their settlements. The filled claim forms were submitted in the panchayat and then it was transferred to the tribal dept. Revenue department started survey in each colony without informing the FRC members of the settlements, so that disputes occurred in some colonies while surveying.

Forest department was not involved in any crucial steps of the implementation process. As per the Act, gramasabha should be given guidance from the Sub-Divisional Level Committee. The first Sub-Divisional Level Committee meeting was convened only after the selection of FRC members and claiming of forms in the Vazhachal Division. In this meeting, no tribes and block Panchayat members participated. Hence before forming FRCs, no such meeting at the SDLC seems to have occurred. The Forest department was also unaware of the selection of FRC members. The Sub-Divisional Level Committee did not give any information or map to the FRCs before filling the FRA forms. Since the Forest Department is the custodian of forest resources, has micro plans for each settlement and is aware of the details of the land in which the tribes are settled, how these forms can be filled and forest area be claimed properly without their involvement remains the larger question.

Kerala Institute of Local Administration (KILA) seems to have provided training for tribal officers and Panchayat Presidents. Unfortunately, the results of these trainings have not reached the tribes.

According to the Athirappilly Grama Panchayat, they conducted the gramasabha. But such gramasabhas or Oorukkoottam were never held specifically for discussing FRA or selecting FRC. Even after the selection of FRC members, the FRA related matters were never discussed in the later gramasabhas

As it stands now, the individual rights over the forest land on which they are presently living in settlements seems to have been somehow established by record. However, as revealed from above, even this is implemented without following the proper procedure, without creation of awareness amongst the Kadars on the law and without any co-ordination between the Forest and Tribal Department.

Community or habitat rights has not even been discussed amongst the Kadar tribes and is yet to be taken up seriously in the project area as well as other Kadar settlements in the Division.

Biligiri Rangan Temple (BRT) hills

While the social impacts of denying rights to forest dwellers are high, there have also been high costs to the conservation of biodiversity that have not been as widely discussed. Centralized systems of forest management have resulted in the production of standardized responses to local ecology and contexts. The application of a single management system (such as bans on fire, shifting cultivation and forest produce harvest) has meant that local understanding and knowledge of tribals on forest history and ecology has been completely ignored, resulting in a collapse of forest function, particularly well documented in the case of BRT hills in Mysore district of Karnataka. At the same time, local people have constantly argued for the re-introduction of customary practices that produced the forest that is now valued for its biodiversity. Giving rights to the forest and to forest conservation will enable local and contextual management of the forests. The systematic separation of people from the forest, the labeling of historic dwellers as encroachers, and complete denial of rights has resulted in local people becoming antagonistic to wildlife and forests. There have been increasing examples of subversion of state efforts to protect forests. Forest dwellers therefore set fires during the dry season to cause maximum damage, rather than the traditional early season burns that only burnt the understory. To spite the forest department, disenchanting local people align with timber and poaching mafias to gain some reward from the forest, which they have been denied through draconian forest policy. In the rare cases that conservation has shown any success it has been through the use of state enforcement and not through any willing compliance with laws by local communities. The state has often stifled local protest by increased funding for staff, patrol vehicles and arms. The militarization of conservation is a growing global trend.

Using the FRA to slow-down diversification of forests

One of the most beneficial outcomes of the FRA for conservation is that it is slowing down the diversification of forests for development purposes. In 2009 The Ministry of Environment and Forests issued a circular instructing state forest departments to obtain written consent from gram sabhas in areas where forest was being diverted for non-forest purposes. That people live in most forests that are being acquired from mines, dams, and major development projects and therefore require their right under the FRA to be settled has posed a huge hurdle to the until now speedy clearance of projects. Environmental clearance process was and continues to be a poorly undertaken effort, but now with the requirement of gram sabha consent and the implementation of FRA, development projects are facing a stiff challenge from an unexpected quarter.

Community Forest Rights and conservation

While much has been written about the FRA, this section will focus on the opportunities in the act for biodiversity conservation by local communities, using a case of Biligiri Rangaswamy Temple Wildlife Sanctuary especially in the Western Ghats. The FRA is an unprecedented law that aims to provide rights to forest land, forest produce and rights to management and customary practices. The focus of the act is to ensure that forest dwellers whose lives have been impacted by forest policy are now able to secure an existence in forests. It recognizes that individual rights to land are only a small part of livelihoods in forests. The suite of community forest rights that might be claimed are numerous and reflects the dependence of local people on forests, as well as their historical marginalization and denial of rights.

Section 3 (1) of the FRA lists the rights that might be claimed by forest dwellers. Out of the 13 rights listed, two pertain to rights to land (forest land currently being cultivated and *in situ* or alternative land in case of illegal eviction in the past), and the rest are community rights ranging from forest produce harvest, fishing, to conversion of forest to revenue villages. The biodiversity related rights are to 'protect, regenerate, or conserve or manage any community forest resource, which they have been traditionally protecting and conserving for sustainable

use' and 'right of access to biodiversity and community right to intellectual property and traditional knowledge related to biodiversity and cultural diversity'. Once vested with rights, the act empowers rights holders to 'constitute Committees for the protection of wildlife, forest and biodiversity'. The act is however silent on the process by which these committees will interact with the forest department and other agencies which have so far had control over wildlife, forest and biodiversity management. This has caused some tension between the forest administration whose responsibilities under the Forest Conservation Act 1980 and the Wildlife Protection Act 1972 continue in forest lands leading to resistance from state forest departments across the country to the vesting of community forest rights.

The FRA provides space for local and contextual flexibility that might be used by gram sabha and collaborative institutions to evolve their own mechanism for forest management. Some authors have argued that the lack of an institutional structure results in a lack of clarity on the functioning of these committees and on the relationship between the gram sabha and the forest administration (Lele 2008). The FRA does not give a clear road map for the roles of gram sabhas versus the forest department. A committee set up by the Ministry of Environment and Forests tasked with redefining the role of the forest department in the light of the FRA did not succeed in fully accomplishing this effort. Earlier decentralization attempts that laid down detailed institutional structures often resulted in intense bureaucratic control and usurpation of local institutions and efforts. By empowering gram sabhas and not mandating that they manage resources, the FRA gives communities that desire to manage their resources an opportunity to do so. By identifying the gram sabha as the primary institution, the FRA builds on nascent decentralization attempts. The lack of a prescribed institutional structure however means that only those gram sabhas that are politically aware will be in a position to aspire to manage resources on their own. It is not surprising therefore that in the several years since the notification of the act there has been only one instance of a *gram sabha* claiming and receiving rights to conserve and manage their community forest area, as occurred in Mendha-Lekha gram sabha of Gadchiroli district of Maharashtra. This is as much a result of state resistance as much as local reticence, clearly itself a result of long decades of centralized control.

The Council for Social Development (CSD) in its report on the implementation of the FRA noted that 'all non-land rights in the Act – most of which are community rights – have largely been ignored in implementation. The Central and State governments have treated the Act as if it is a land title distribution scheme.' As I have note above the barriers to the vesting and exercising of the CFRs have been at the level of the state, gram sabha and civil society. In addition to the reticence of local bodies in claiming CFR, the resistance by the state is based on a outmoded idea that local communities do not have the capacity to manage their resources and that all forms of local use are degrading. This is based on a colonial premise of traditional practices being unscientific and degrading and that expert knowledge is important for the conservation of biodiversity or the management of forests. We might look at a few current examples to show that nothing is farther from the truth. Using the case of Biligiri Rangaswamy Temple Wildlife Sanctuary (BRT) in the Karnataka Western Ghats shows that Soligas have nuanced and contextual knowledge of local ecology.

Rights, local knowledge and culture in a protected area

The BRT forest has faced a series of policy changes that have impacted both tribals and the forest. The establishment of the sanctuary in 1975 displaced Soligas from their shifting cultivation sites to settled colonies. This was accompanied by a major change in land-use management. The agricultural practices of Soligas were altered from shifting cultivation to settled agriculture, and their forest management practices ceased abruptly including the use of early season fire that was until then widely used for a variety of purposes. The collection of non timber forest produce was however allowed for several years until 2005 when following the

amendment to the Wildlife Protection Act the collection of NTFP was banned. This had an immense impact on the livelihoods of Soligas who were heavily dependent on forest produce (Hegde et al 1996, Setty et al 2008, Sandemose 2009). The enactment of the FRA and continued campaigning by Soliga welfare groups resulted in the forest department agreeing to unofficially permit the collection of *Phyllanthus spp.* (amla) fruits and honey. The FRA has been successful in producing a strong sense among the Soliga that their previous tenuous existence in the sanctuary will be strengthened through rights to forest produce harvest and to cultivable land.

As is obvious to even the most casual visitor to BRT, the forest is smothered by the invasive species *Lantana camara*. Soligas have for long claimed that the suppression of fire has increased lantana density and coverage due to a lack of management. Soligas used customarily managed habitat using fire, which promoted the growth of tubers and controlled the understory. Fires were set early in the season and maintained the forest in a state of flux. Invasive species were therefore kept in check. 'Scientific' forest management and the resulting ban on fires and customary management led to increased density of lantana. Another observation by the Soligas is regarding the increased spread of hemi-parasites on amla trees resulting in the mortality of adult trees. They suggest that hemi-parasites which are sensitive to ground fires are no longer controlled by fire and thus have increased. The spread of lantana is truncating the population growth of tree species by preventing seedlings from growing through the dense lantana growth, while hemi-parasites are killing adult trees. They have long held that ground fires kill hemiparasites thereby reducing tree mortality and additionally reduces lantana growth. Soligas have thus highlighted the intricate interactions between fire, hemiparasites and tree mortality. The cessation of traditional practice has given rise to an entirely avoidable ecological outcome. This is clear demonstration of how local communities have the capacity to manage forests. If the forest department had been open enough to incorporate local understandings into their management plans, the forests of BRT would have been in better shape than they are in today. The provision in the FRA about gram sabha committees and their role in forest management could be the appropriate structure for Soligas to apply their knowledge about forest dynamics. They have in the recent times offered their assistance to the forest department in identifying areas that should first be cleared of lantana, and suggesting ways that hemiparasite density could be reduced during amla fruit harvest.

Modern forest management has also erased people from the forests by ignoring their location, history, culture and knowledge. Soligas have demarcated areas of the BRT forest into *yelles*. Each *yelle* contains five sacred sites that are specific to a *kula* and are protected and guided by the presence of gods and spirits. *Yelles* are thus *kula* specific boundaries within which forest areas have been named. Forest patches within each *yelle* have been named, making it possible for Soligas to orally demarcate the boundary of each *yelle*. *Yelles* are cultural spaces that housed the five sacred sites and were subdivided amongst the clans based on requirement for the cultural practice of members of particular clans that did not have a cultural space close to their dwelling. Mapping has revealed that the entire forest area within the sanctuary is comprised of 46 *yelles*. The counter mapping effort in BRT is the first such attempt in India and has generated enormous interest amongst the Soligas. While there was unanimous agreement on the mapping of the sacred sites there were differential perceptions of the mapping of *yelle* depending on age and role within the community. Soligas who are part of the customary institutions saw the identification of *yelle* boundaries as an opportunity to rejuvenate the *Kula* system with its traditional office and cultural practice. They hoped to see Soliga customary law reinstated. Soliga elders visualised the *yelle* as a boundary within which the five elements - *devaru*, *kallugudi*, *veeru*, *samadhi* and *habbi* - were present. The younger Soligas, who being aware of the recent legal provisions for claiming rights under the FRA are excited about using the sacred site maps as evidence to reassert local control in the landscape for livelihoods and identity.

Implementation of the Forests Rights Act in BRT

Soon after the notification of the rules for the FRA in 2008, Soligas in BRT began to actively constitute forest rights committees in the forest areas of Chamrajanagar district. A total of 105 committees were constituted in the district. The first claims filed by Soligas were community forest rights under section 3(1)c specifically for NTFP collection and trade within the BRT sanctuary. While across the country the initial claims were for land rights, Soligas chose to first apply for Non-timber forest produce (NTFP) collection rights as they had been banned from NTFP collection after the amendment to the Wildlife Protection Act which banned NTFP collection from national parks and sanctuaries. The impact of the ban on household income and well-being has been severe.

Although the Sub-divisional Level Committee approved the claim for NTFP rights, the District Level Committee has not granted NTFP rights even after three years of intense parleying by Soligas and the officers of the tribal and district administration. The forest department representative on the committee has prevented the granting of community rights citing the WLPA provisions that ban the collection of NTFP. This is a violation of the FRA and the Soligas are planning to appeal this decision with the State level monitoring committee which is headed by the Chief Secretary of the state.

In 2009, Soliga households in BRT and surrounding areas applied for rights to individual land and by early 2011 a total of 1438 Soliga households were granted individual rights to cultivated land, but not habitation. Nearly half the Soliga households are landless, so the grant of land does not in itself ensure better livelihoods for Soligas. Community forest rights are essential for their livelihoods and poverty alleviation. In addition to claiming rights to NTFP, eight Gram sabhas have applied for rights to fishing, grazing, conservation, and management. The BRT case reflects a country-wide pattern in the vesting of individual rights in forests but a great reluctance to grant community rights of any kind.

Tiger reserve status for BRT affects local rights and livelihoods

To make matters worse for Soliga rights and livelihoods, the Karnataka state government obtained in principle approval from the Ministry of Environment and Forests to declare BRT a Tiger Reserve in September 2010 and notified the reserve in January 2011. There were wide spread protests from all quarters when news of the in-principle approval was received. The Soligas wrote to ministers and bureaucrats at the state and central governments, including to the Minister of Environment and Forests and to the National Tiger Conservation Authority (NTCA), many of whose members were against the notification. The declaration was done in haste and without the final approval from the NTCA. This development nullifies the gains under FRA and threatens Soliga with dislocation, curtailment and loss of livelihoods. Although the FRA is clear that all rights should be vested before any modification of rights can occur, the forest department is continuing to deny Soligas access rights to NTFP and the forest. The declaration of core and critical tiger habitats within the sanctuary will lead to the eventual relocation of about 10 podus to establish inviolate areas for tiger conservation. This will have an immense impact on the socio-cultural and economic condition of the Soligas. The conflict between the forest department and the Soligas has been increasing over the past decade. The strict enforcement of exclusionary conservation policy and the denying of rights under the FRA are fueling resentment towards the state forest department, the forest and wildlife.

Mainland and north-east

Constituting about eight per cent of the total population of India, the tribal peoples are among the most vulnerable groups in the country. Not only do they share with other disadvantaged groups the common travails of economic deprivation, they are also faced perennially with grave threats to their cultural integrity and socio-political freedoms. But not all; there are two main streams within India's tribal populations: Schedule V areas of mainland where the tribals have been long oppressed, and the Schedule VI areas of Northeast, where they have enjoyed much greater autonomy, dignity, and access to natural resources. The contrast among the tribal peoples of the two regions in health, and literacy is staggering. Of course, there have been problems with Northeast, of separatism and insurgency, of population explosion, of not finding viable solutions to shifting cultivation. Yet the people are well nourished, education is progressing apace. Especially remarkable is the state of Mizoram that has been at peace since 1984. In Mizoram we are moving towards assimilation, ending isolation, while, at the same time, conferring substantial autonomy and dignity on the people.

Table I: Demographic, Socio-economic and Health profile of Mizoram State as compared to India figures

S. No.	Item	Mizoram	India	Mainland S.T.
1	Total population (Census 2001) (in million)	0.89	1028.61	
2	Decadal Growth (Census 2001) (%)	28.82	21.54	
3	Crude Birth Rate (SRS 2008)	17.8	22.8	
4	Crude Death Rate (SRS 2008)	5.1	7.4	
5	Total Fertility Rate (SRS 2008)	NA	2.6	
6	Infant Mortality Rate (SRS 2008)	37	53	
7	Maternal Mortality Ratio (SRS 2004 - 2006)	NA	254	
8	Sex Ratio (Census 2001)	935	933	
9	Population below Poverty line (%)	19.47	26.10	
10	Schedule Caste population (in million)	0.0003	166.64	
11	Schedule Tribe population (in million)	0.84	84.33	
12	Female Literacy Rate (Census 2001) (%)	86.7	53.7	

Mizoram presents a shining example of a region where the local communities are well-organized right down to grass-roots level, have substantial authority over their own natural resource base, and have used it to take good care of the environment. Particularly notable is the Mizo Youth Association, with active branches in almost every village. The Environment Wing of MYA spearheads the campaign to protect and sustainably manage village forests. The XII FYP may provide special support to strengthen MYA further, and to spread its activities on a wider scale.

Problems of tight control over PAs

There is a wide-spread belief amongst urban conservation activists, endorsed wholeheartedly by the Forestry establishment, that it is the local community members and their subsistence requirements that are the main threat to India's wildlife. The case study of BRT hills brings out how erroneous this line of thinking has been, as does the experience of the Bharatpur wetland.

The tragic blunder of Bharatpur

Unfortunately, even so knowledgeable a scientist as Dr. Salim Ali subscribed to this perspective without examining the issues in depth. The Bharatpur wetlands, famous for the large heronries in the rainy season and the enormous flocks of migratory birds visiting in winter, was one of the first wildlife sanctuaries to be created after independence at the instance of Dr Salim Ali in the 1950s. He had worked for years at Bharatpur, banding thousands of migratory birds. Bharatpur had been subject to grazing by buffaloes and other uses such as collection of khus grass by local people for centuries, and had remained a biodiversity rich habitat. However, Dr Salim Ali felt that the habitat would greatly benefit from a cessation of buffalo grazing and was supported by experts of the International Crane Foundation. These recommendations led to the declaration of the locality as a National Park in 1982. The rigid regulations applicable to a National Park called for total cessation of livelihood activities of local people, so buffalo grazing was banned without any alternatives being offered. There were protests; seven people were killed in the firing that followed, but the ban was enforced.

This intervention led to a totally unexpected outcome. It turned out that buffalos were keeping under check a water loving grass *Paspalum*. When grazing stopped this grass grew unchecked, rendering the wetland a far worse habitat for waterfowl, the prime objective of the National Park management. The numbers of visiting Siberian cranes have also been declining. Residents of the village Aghapur adjoining the National Park have an intriguing suggestion in this regard. They believe that Siberian cranes earlier had better access to underground corms and tubers, their major food, because the soil used to be loosened while digging for khus roots. Since this collection was stopped on declaration of National Park, the soil has been compacted reducing their access to this food. This is a plausible hypothesis worth exploring further (Gadgil et al 2000).

Ecologically Sensitive Zones

The Ministry of Environment & Forests constitutes certain "Ecologically Sensitive Zones" under the Environmental Protection Act. One such zone has been established some eleven years ago at Mahabaleshwar-Panchgani, a hilly tract of high rainfall and biodiversity-rich evergreen forest that is also the origin of Krishna and its major tributary, Koyna. A nine-year old resolution of Indian Board for Wildlife has called for constitution of another Ecologically Sensitive Zone surrounding the Bhimashankar Wildlife Sanctuary. The hill range of Bhimashankar is the origin of another of Krishna's major tributary, Bhima, and just like Mahabaleshwar to the south, is also an area of high rainfall and biodiversity-rich evergreen forest. However, no steps have been taken to constitute this Bhimashankar Ecologically Sensitive Zone, despite repeated requests both from Centre and by head of Forest Department in Maharashtra.

During its study of these two ESZs, one established, and the other expected to be established, the Western Ghats Ecology Expert Panel chaired by Madhav Gadgil came across several instances of grave misgovernance:

[1] Both these regions have large populations of Scheduled Tribes and traditional forest dwellers. Hence, it was imperative that Forest Rights Act should have been implemented in

these areas in its true spirit five years ago. Nothing is done, and it appears that this is to facilitate extortion from local people. People at Mahabaleshwar complain of very old roads to their villages being disrupted by trenches dug by Forest Department, and Madhav Gadgil has personally inspected some of these. The trenches are then filled on payment of bribes, to be dug again some time later.

[2] At the same time a major wind mill project has been cleared close to Bhimashankar WLS and a large number of wind mills have come up within the stipulated ten km zone on the periphery. This project should not have been cleared at all without completing the constitution of the Ecologically Sensitive Zone, as also implementation of FRA.

[3] WGEEP Chairman Madhav Gadgil and member Prof Renee Borges visited this area around Bhimashankar. In fact, Prof Renee Borges has been engaged in scientific studies in this area for over two decades. It is clear that the hills where wind mills have come up are tracts of high rainfall and biodiversity-rich evergreen forest, contiguous with that in the Bhimashankar WLS, and home to Maharashtra's state animal, Giant Squirrel. The local Range Forest Officer had also clearly recorded these facts and recommended that the wind mill project should not be sanctioned. He was overruled by his superior officers who have cleared the project by patently misrepresenting the facts on ground.

[4] Apart from substantive forest destruction, including by large roads cutting huge swathes through Reserve Forest, the wind mill project has triggered large scale erosion and landslides through poor construction of roads with steep gradients, and all this rubble is ending up on fertile farmland and in reservoirs of tributaries of Krishna.

[5] The Forest Department is colluding with wind mill project operators in illegally denying citizens access to these hills. Boards and check-post have been put up by the company, falsely claiming to be authorized by Forest Department. There are many traditional forest dwellers on these hills. Not only are their rights under FRA not being recognized, they are being illegally restrained in their movements on hills they have inhabited for centuries.

Must improve governance

India stands today at the cross-roads where it is becoming abundantly clear that not paucity of funds, but deficit in governance is the most significant challenge before the society. Hence the focus of our XII FYP should be on empowering people to ensure transparency, openness, participation and good management of natural resources. The XII FYP schemes should therefore be oriented towards promoting transparency, openness and participation in every way. An excellent tool for this could be the revival of the scheme of Paryavaran Vahinis, or committees of concerned citizens to serve as environmental watchdogs and undertake selective first hand monitoring of the environmental situation in the district, an All India scheme that had proved highly effective in Karnataka in 1990s. These Paryavaran Vahini volunteers could also play a significant role in building capacity of people at the grass-roots for conservation, sustainable development and ecorestoration. Similarly, XII FYP could provide for appointments of Environmental Ombudsmen in all districts. The schemes should vigorously promote institution of a social audit process for all environmental issues on the model of that for Mahatma Gandhi National Rural Employment Guarantee Act in Andhra Pradesh.

An open, transparent, comprehensive web-based Environmental Information System providing for scrutiny as well as modifications/ additions by members of the public would greatly facilitate better management of environmental resources of the country. The Western Ghats Ecology Expert Panel of the Min of En & F has made excellent progress in the development of such a spatial database, for over 2200 grids of 5'x5' or roughly 9 km x 9 km through compilation of all readily available information on topography, land cover and occurrence of biodiversity elements for the Western Ghats. XII FYP schemes should pursue vigorously further

development of this database, and its extension to other parts of the country, by networking many available databases such as that prepared in connection with Zonal Atlases for Siting of Industries, and Goa Regional Plan 2021, by sponsoring further scientific inputs, as also by linking Environmental Education activities at school and college level and the People's Biodiversity Register exercises to augment the database. XII FYP schemes should encourage citizen involvement in continual development of such a database on the pattern of Australian River Watch schemes. In this context, the Ministry of Environment & Forests should help overcome the entirely unjustifiable difficulties that researchers encounter today in working in forest areas. The Ministry of Environment & Forests should pursue concerned Government agencies to make available all pertinent information pro-actively as provided in the Right to Information Act, and not wait for applications by citizens. For example the Ministry of Environment and Forests should immediately make public all district level Zonal Atlases for Siting of Industries in a searchable form on the Ministry's website, which may then be linked to the Western Ghats database.

XII FYP schemes should lead a radical reform of Environmental Impact Analysis and Clearance process. It should revisit the list of projects that require Environmental Impact Analysis and Clearance and include certain items such as Wind Mills and small scale hydroelectric projects that are excluded today. It should ask all project proponents to deposit an appropriate fee with the Authority and then select competent agencies to carry out the EIAs in a transparent fashion. Furthermore, it should link the Environmental Education activities at school and college level and the People's Biodiversity Register exercises to the EIA process. Equally urgent is the need to promote a more holistic perspective and organize a process of Cumulative Impact Analysis in place of the current project-by-project clearances.

XII FYP schemes should strive to promote a participatory, bottom-up approach to conservation, sustainable development and ecorestoration through the length and breadth of the country. With this in view, it should encourage devolution of democratic processes as visualized in 73rd and 74th Amendments to the Indian Constitution. Kerala has made substantial progress in this direction, and XII FYP should promote the emulation of Kerala example throughout the country. Kerala has also taken the lead in meaningful implementation of Biological Diversity Act through Biodiversity Management Committees, and XII FYP should provide for taking immediate steps to ensure establishment of Biodiversity Management Committees at all levels, namely, Gram Panchayats, Taluka Panchayats, Zilla Panchayats, as also Nagarpalikas and Mahanagarpalikas throughout the country. Furthermore, the Ministry of Environment & Forests should ensure that BMCs are motivated through empowerment to levy 'collection charges' as provided in the Biological Diversity Act. The BMCs may be involved in developing programmes on the model of 'Conservation of biodiversity rich areas of Udumbanchola taluk' in Kerala. The BMCs are expected to take care of agro-biodiversity as well, and in this context the provisions of Protection of Plant Varieties and Farmers' Rights Act 2001 are highly relevant. A National Gene Fund has been established under PPVFRA and has substantial amounts available. These funds can be utilized to build capacity at Panchayat level for *in situ* conservation of genetic diversity of indigenous crop varieties, and XII FYP schemes should facilitate such activities.

The Mahatma Gandhi National Rural Employment Guarantee Act has much potential for the task of ecorestoration. It also has the advantage that Gram Sabhas are expected to be involved in planning of the works to be undertaken. Other opportunities exist for capacity building and empowerment of Gram Sabhas through Extension of Panchayat Raj to Scheduled Areas Act (PESA) and Forest Rights Act, and XII FYP schemes should promote pro-active and sympathetic implementation of PESA and of the provision of Community Forest Resources under the Forest Rights Act.

Finally, XII FYP schemes should strive to make a transition from regulations and negative incentives to promote nature conservation oriented activities to a system of use of

positive incentives to encourage continued conservation-oriented action in the context of traditional practices such as sacred groves and to initiate other action in modern contexts. An example of the latter is the payment of conservation service charges by Kerala Biodiversity Board to a farmer who has maintained mangrove growth on his private land. XII FYP should include a specific scheme to undertake a critical assessment of the efficacy of funds being deployed towards conservation efforts today in the form of salaries and perks of bureaucrats and technocrats, including their jeeps and guns and buildings to house them. Very likely, it would turn out to be exceedingly low. These funds should then be redeployed over a period of time to provide positive incentives to local communities to maintain biodiversity elements of high value to conservation.

Technical inputs would be required to decide on a common system of assigning conservation value to specific elements of biodiversity and to organize a reliable, transparent system of monitoring biodiversity levels within the territories assigned to various local communities, in form of either Community Forest Resources assigned under FRA, or Panchayat areas assigned to Biodiversity Management Committees. Educational institutions at all levels, from village primary schools to universities, could play an important role in this effort. Indeed, these exercises could become very valuable components of environmental education curricula.

In the long run, only a very lean bureaucratic apparatus should be retained to play a coordinating, facilitative role and to ensure that local communities can effectively enforce a desired system of protection and management of the natural resource base. Such a system would create a very efficient market for conservation performance so that funds earmarked to promote biodiversity would flow to localities and local communities endowed with capabilities of conserving high levels of biodiversity. This system would also channel rewards for conservation action to relatively poorer communities living close to the earth, thereby serving ends of social justice, and creating in the long run a situation far more favorable to the maintenance of biodiversity on the earth.

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