

2011

Report of the
Western Ghats Ecology Expert Panel

Submitted to
The Ministry of Environment and Forests
Government of India

सत्यमेव जयते

जहाँ है हरियाली।
वहाँ है खुशहाली।।

Ministry of Environment and Forests
Government of India

westernghatindia.org

Report of the Western Ghats Ecology Expert Panel
Part II

Submitted to
The Ministry of Environment and Forests,
Government of India

31 August 2011

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Courtesy - Kerala State Biodiversity Board

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Preface

India is remarkable for the deep and abiding concern demonstrated by its people and its successive Central, State and local Governments towards halting the rapid pace of degradation of the environment. Our country has been a pioneer in the area of integrating the needs of development with the desire to protect the environment, as reflected in the emphasis on sustainable development as a key feature of the development strategy of the nation since the Fourth Five Year Plan of the country in the early 1970s. The constitution of the Western Ghats Ecology Expert Panel by the Ministry of Environment and Forests of the Government of India is yet another reflection of the seriousness with which our country views these significant challenges.

The Western Ghats are naturally an important focus of sustainable development efforts. The protector of the Indian peninsula, the mother of the Godavari, Krishna, Netravathi, Kaveri, Kunthi, Vaigai and a myriad other rivers, Kalidasa likens the Western Ghats to a charming maiden; Agastyamalai is her head, Annamalai and Nilgiri the breasts, her hips the broad ranges of Kanara and Goa, her legs the northern Sahyadris. Once the lady was adorned by a sari of rich green hues; today her mantle lies in shreds and tatters. It has been torn asunder by the greed of the elite and gnawed at by the poor, striving to eke out a subsistence. This is a great tragedy, for this hill range is the backbone of the ecology and economy of south India.

Yet, on the positive side, the Western Ghats region has some of the highest levels of literacy in the country, and a high level of environmental awareness. Democratic institutions are well entrenched, and Kerala leads the country in capacity building and empowering of Panchayat Raj Institutions. Goa has recently concluded a very interesting exercise, Regional Plan 2021, of taking inputs from Gram Sabhas in deciding on land use policies. Evidently, the Western Ghats constitutes an appropriate region of the country to attempt to make the transition towards an inclusive, caring and environment-friendly mode of development.

It is therefore with tremendous enthusiasm that the Western Ghats Ecology Expert Panel has approached its appointed task. The Panel embarked upon the assignment through a multi-pronged strategy which included (i) compilation of all readily available and accessible information on the Western Ghats, (ii) development of a geospatial database on ecological sensitivity for the entire Western Ghats region which would provide a multi-criteria decision support system for demarcation of ecologically sensitive areas, and (iii) comprehensive consultations with principal stakeholders which included civil society groups, government officials, and peoples' representatives, ranging from members of Gram Panchayats and Zilla Parishads to MLAs and MPs.

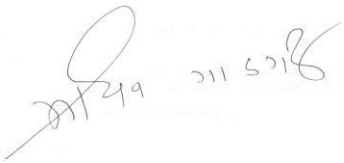
It is noteworthy that in all these endeavors special effort was made to have wide-ranging discussions with complete transparency. All the information generated by the Panel including the geospatial database is publicity available through a dedicated website created for the Panel.

During the course of the last one and half years, Western Ghats Ecology Expert Panel has had fourteen Panel meetings wherein the Panel deliberated at length on various issues related to the Western Ghats region. The detailed minutes of all these meetings are available on the Ministry's website. These meeting were interspersed with brainstorming sessions, public consultations and field visits. The central stream of thought was to develop a sound

scientific methodology/basis for arriving at decisions, with these decisions deliberated upon by adopting a participatory approach.

The report embodies among other things (i) categorization of the Western Ghats into three zones of varied ecological sensitivity, based upon careful analysis done by WGEEP, (ii) broad sectoral guidelines for each of these zones, and (iii) a broad framework for establishment of the Western Ghats Ecology Authority.

In this endeavor, the Panel has utilized the expertise of a number of people and organizations to whom the panel expresses its gratitude. The Panel thanks the Ministry of Environment and Forests, Government of India, for giving it this unique opportunity to be part of a very significant initiative directed at conserving the natural heritage of the Western Ghats – a global biodiversity hotspot.



Prof. Madhav Gadgil

Chairman

Western Ghats Ecology Expert Panel

Acknowledgements

The Western Ghats Ecology Expert Panel (WGEEP) acknowledges the valuable inputs provided by the Hon. Ministers for Environment and Forests, GoI, several Ministers of State Governments, and the Members of Parliament of the Western Ghats region.

The WGEEP acknowledges the help and cooperation provided by the State Environment and Forest Departments, as well as other departments including Rural Development and Panchayat Raj, and institutions such as KILA and KFRI of various Western Ghats States viz. Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu.

The WGEEP acknowledges the members of all the civil society groups who have interacted and shared their invaluable experience and information with the Panel. Many of them have played an important role in evolving policy and management formulations for the ecologically sensitive zones. Individual names of the members and the civil society groups appear at relevant places in the Annexures.

The WGEEP acknowledges with great pleasure the warmth with which people at the grass-roots welcomed it and shared their understanding, perceptions and concerns.

The WGEEP acknowledges the significant and critical inputs provided by Shri Sanjay Upadhyay, Advocate, Supreme Court and Managing Partner, ELDF, regarding the modalities for setting up the proposed Western Ghats Ecology Authority.

Most importantly, the Western Ghats Ecology Expert panel puts on record its gratitude to Dr. S.N. Prasad and its deep appreciation of his effort in preparing the geospatial database for arriving at ecological sensitivity levels for the whole Western Ghats region. This database is the basis for defining the proposed ecologically sensitive zones across the Western Ghats.

The Panel would also like to acknowledge the following persons for their invaluable help and assistance in accessing the data and information required for the geospatial database used by WGEEP:

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List of Abbreviations

ACF	Assistant Conservator of Forests
ADC	Autonomous District Council
AOFFPS	Area Oriented Fuel wood and Fodder Projects Scheme
APEDA	Agricultural and Processed Food Products Export Development Authority
AQ	Air Quality
ARC	Autonomous Regional Council
ASCAS	Australian Soil Carbon Accreditation Scheme
ASTRP	Association of Scheduled Tribes and Rural Poor in Regeneration of Degraded Forests
ATREE	Ashoka Trust for Research In Ecology and the Environment
BDA	Biological Diversity Act
BEE	Bureau of Energy Efficiency
BMC	Biodiversity Management Committee
BOD	Biochemical Oxygen Demand
CAA	Constitutional Amendment Act
CAMPA	Compensatory Afforestation and Management and Planning Authority
CCA	Community Conservation Areas
CCF	Chief Conservator of Forests
CDM	Clean Development Mechanism
CES	Centre for Ecological Sciences
CFM	Community Forest Management
CFRe	Community Forest Resources
CFRt	Community Forest Rights
CPCB	Central Pollution Control Board
CPFFZ	Chemical Pesticide and Fertilizer-Free Zones.
CRPF	Central Reserve Police Force
CRZ	Coastal Regulation Zone
CSD	Council for Social Development
CSR	Corporate Social Responsibility
DBT	Department of Biotechnology
DC	District Collectorate

DCF	Deputy Conservator of Forests
DDT	Dichlorodiphenyltrichloroethane
DFO	District Forest Officer
DLC	Divisional Level Committee
DPC(s)	District Planning Committee (s)
DSAs	Defined Sequestration Areas
DTEPA	Dahanu Taluka Environment Protection Authority
EAC	Environment Appraisal Committee
EC	Environmental Clearances
EIA	Environmental Impact Assessment
ENRM	Environmental and Natural Resource Management
EPA	Environment Protection Act
ESAs	Ecologically Sensitive Areas
ESLs	Ecologically Sensitive Localities
ESZ	Ecologically Sensitive Zone
FAA	Food Adulteration Act
FAO	Food and Agriculture Organization
FC	Forest Clearance
FD	Forest Departments
FDC	Forest Development Corporations
FEVORD	Federation of Voluntary Organizations for Rural Development
FGD	Flue Gas Desulphurisation
FGEC	Forest Grievance Enquiry Committee
FRA	Forest Rights Act
FRC	Forest Rights Committee
FRI	Forest Research Institute
GA	Gram Sabhas
GALASA	Group Approach for Locally Adapted and Sustainable Agriculture
GDP	Gross Domestic Product
GIM	Green India Mission
GIS	Geographic Information System
GM	Genetically Modified
GN	Goa-Nilgiris
GoI	Government of India

GSPCB	Goa State Pollution Control Board
HEP	Hydro Electric Project
IAEPS	Integrated Afforestation and Eco-Development Projects Scheme
ICAR	Indian Council of Agricultural Research
ICDS	Integrated Child Development Services
ICF	International Crane Foundation
ICT	Information and Communication Technologies
IFA	Indian Forest Act
IFRs	Individual Forest Rights
IGNFA	Indira Gandhi National Forest Academy
IISc	Indian Institute of Science
IMD	Indian Meteorological Department
IUCN	International Union For Conservation Of Nature
JFM	Joint Forest Management
JFMCs	Joint Forest Management Committees
KAU	Kerala Agricultural University
KFD	Karnataka Forest Department's
KILA	Kerala Institute of Local Administration
KSBB	Kerala State Biodiversity Board
KSSP	Kerala Sastra Sahithya Parishath
KVK	Krishi Vigyan Kendra
LAMPS	Large Area Multi Purpose Societies
LEISA	Low External Input Sustainable Agriculture
LPG	Liquefied Petroleum Gas
LSG	Local Self Government
MEA	Millennium Ecosystem Assessment
MFPs	Minor Forest Products
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MIDC	Maharashtra Industrial Development Corporation
MILMA	Kerala Co-Operative Milk Marketing Federation
MMSC	Mining Monitoring Sub Committee
MoEF	Ministry of Environment and Forests
MoRD	Ministry of Rural Development
MoTA	Ministry of Tribal Affairs

MPCB	Maharashtra Pollution Control Board
MP	Member of Parliament
NAEB	National Afforestation and Ecodevelopment Board
NAP	The National Afforestation Programme
NAPCC	National Action Plan on Climate Change
NCA	National Commission on Agriculture
NCC	National Cadet Corps
NCERT	The National Council of Educational Research and Training
NCR	National Curriculum Review
NEERI	National Environmental Engineering Research Institute
NFP	National Forest Policy
NFRC	National Forest Rights Council
NGOs	Non Governmental Organizations
NP	National Park
NPOP	National Programme for Organic Production
NRC	National Research Council
NREGA	National Rural Employment Guarantee Act
NRSC	National Remote Sensing Agency
NSS	National Service Scheme
NTCA	National Tiger Conservation Authority
NTFP	Non-Timber Forest Produce
NTFP	Non-Timber Forest Produce
NTPC	National Thermal Power Corporation
NWGs	Northern Western Ghats
OFPC	Organic Farmer Producer Companies
OFRI	Organic Farming Research Institute
OGC	Open Geospatial Standards
OKM	Organic Kerala Mission
OTFD	Other Traditional Forest Dweller
PAs	Protected Area(s)
PCCF	Principal Chief Conservator of Forests
PCS	Production Consumption Systems
PDR	People's Biodiversity Registers
PESA	Panchayat Extension to the Scheduled Areas Act

PGS	Participatory Guarantee System
PGSC	Participatory Guarantee System of Certification
PPP	Public Private Partnerships
PPVRFA	Protection of Plant Variety and Farmers' Rights Act
PRIs	Panchayat Raj Institutions
PTG	Primitive Tribal Group
R&D	Research and Development
REDD	Reduced Emissions from Deforestation and Forest Degradation
REDD+	Reduced Emissions from Deforestation and Forest Degradation (REDD), Forest Conservation, and Enhancement of Carbon Stocks and Sustainable Management of Forest
RES	Renewable Energy Sources
RF	Reserve Forests
RFD	Regional Forest Department.
RFL	Reserve Forest Land
RTI	Right to Information
S&T	Science and Technology
SAC	Space Application Centre
SCIPs	Soil Carbon Incentive Payments
SDA	State Department of Agriculture
SDLC	Sub-Divisional Level Committee
SEMCE	Socio-Ecological Multi Criteria Evaluation
SEZs	Approved Special Economic Zones
SFRS	State Forest Resources Survey
SLMC	State Level Monitoring Committee
SPCB	State Pollution Control Boards
SPCS	Sustainable Production Consumption Systems
SPGI	Space Department of Government of India
ST	Scheduled Tribe
STPs	Sewage Treatment Plants
T & D	Transmission and Distribution
TCS	Technical Support Consortium
TD	Tribal Department
TEDDY	The Energy Data Directory & Yearbook
TERI	The Energy and Resources Institute

TFR	Tribal Forest Right Act
TOR	Terms of Reference
TSP	Tribal Sub Plan Area
TTF	Tiger Task Force
UGC	University Grants Commission
UNDG	United Nations Development Groups
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
UNFCCC	UN Framework Convention on Climate Change
VEC	Village Electricity Committee
VFCS	Village Forest Cooperative Societies
VFPCK	Vegetable and Fruit Promotion Council of Kerala
VP(s)	Village Panchayat(s)
VPF	Van Panchayat Forests
WCC	World Conservation Congress
WG	Western Ghats
WGA	Western Ghats Authority
WGEA	Western Ghats Ecology Authority
WGEAC	Western Ghats Expert Appraisal Committee
WGEEP	Western Ghats Ecology Expert Panel
WGNG	Western Ghats North of Goa
WGPP	Western Ghats Parisara Prakashana
WGR	Western Ghats Region
WGSoPG	Western Ghats South of the Palghat Gap
WHC	World Heritage Committee
WLPA	Wild Life (Protection) Act
WLS	Wild Life Sanctuary
WTO	World Trade Organisation
ZAS	Zonal Atlas of the States
ZASI	Zoning Atlas for Siting of Industries
ZP	Zilla Parishad

Report of the Panel – Part II

This report is divided in two Parts, Part I and Part II. Part I is the main report of the WGEEP which deals with all the terms of reference, while Part II contains a discussion on the current status of ecology of the Western Ghats and specific detailed write-ups about various sectors on which the recommendations of the Panel made in the main report are based. Part II concludes with our proposals for a system of multi-centered governance to marry conservation to environmentally and socially sustainable development in the Western Ghats region.

1. Status of Ecology of the Western Ghats

The Western Ghats are an intricate product of long processes of geological evolution, of evolution of life on earth, and of evolution of human civilizations. The drama started when the great southern continent of Gondwanaland began to split 255 million years ago, with the India-Madagascar fragment drifting northwards. Gondwanaland was then covered by ferns and gymnosperms, and populated by frogs and reptiles, but the flowering plants, and with them bees, butterflies, birds and mammals had yet to reach high levels of diversity anywhere on the earth. When Madagascar parted company from India some 90 million years ago the resultant stresses raised the Western Ghats parallel to the west coast. Around 65 million years ago, the Indian fragment passed over a weak spot of the earth's crust on its northward journey, producing a tremendous volcanic eruption that created the Deccan traps. This kicked up an enormous amount of dust cooling the earth and leading to the demise of dinosaurs and the accompanying rise of birds and mammals. These birds and mammals, and the flowering plants could reach India from the Asian mainland only after the Indian fragment collided with it some 55 million years ago, leading to the uprising of the Himalayas, and the onset of the monsoons. The Western Ghats lie at a good distance from the point of contact with the Asian mainland, and although their blocking of the monsoon winds has produced a wet climate similar to that in Southeast Asia, their biota remained rather isolated and impoverished compared to that in the Eastern Himalayas. But the biota of the Western Ghats, although not as diverse as that of Eastern Himalayas, has a much greater proportion of species confined to India and Sri Lanka. So in these days of sovereign rights of countries over genetic resources for which they are the countries of origin, the Western Ghats are a treasure trove of biological diversity of very special value to India.

Humans, of course, evolved much, much later on the African subcontinent, and our own species colonized India around 60 thousand years ago. Initially, human populations prospered only in the drier parts of the sub-continent, around river valleys such as that of the Indus. This is where agriculture took root in India some ten thousand years ago, profoundly modifying the landscapes. But the wet forests of Western Ghats were colonized much later, only about three thousand years ago, when iron tools became handy. This is what probably lies behind the legend of Parashuram, equipped with the *parashu* or iron axe creating the civilization of the west coast and the Western Ghats. Fire and iron then moulded the vegetation of the Western Ghats as human settlements grew.

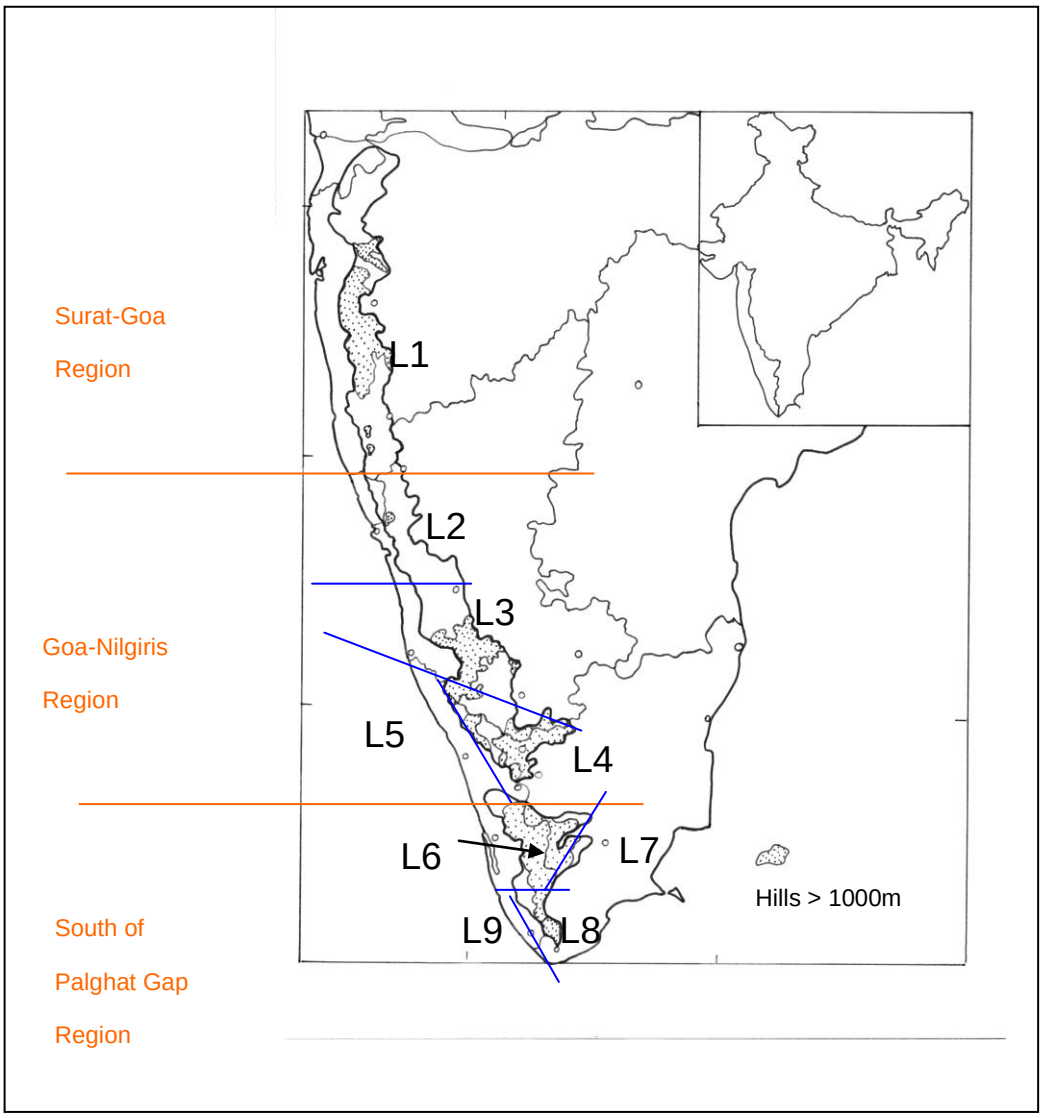
Geological and Biological Landscapes

Drawing on Pascal (1988), Daniels (2010), in a paper commissioned for the WGEEP, classifies the entire Western Ghats into nine geological landscapes across three regions – Surat-Goa, Goa-Nilgiris, and South of Palghat Gap. These nine landscapes are:

1. Surat-Goa Deccan Trap Landscape (extending between Surat and Belgaum) – L1
2. Goa-Nilgiris Pre-Cambrian Dharwar System Landscape (extending between Panaji and Kudremukh) – L2
3. Goa-Nilgiris Pre-Cambrian Peninsular Gneiss Landscape (extending between Shimoga-Kodachadri and Mysore) – L3
4. Goa-Nilgiris Pre-Cambrian Charnockites Landscape (extending between Kasargod and Nilgiris) – L4
5. Goa-Nilgiris Recent Sedimentary Rocks Landscape (extending between Malabar and Trichur) – L5
6. South of Palghat Gap Pre-Cambrian Charnockites Landscape (extending from Anamalai and Palani Hills till Shencottah Pass) – L6
7. South of Palghat Gap Pre-Cambrian Peninsular Gneiss Landscape (extending from Madurai to Kanyakumari; west of 78°E) – L7
8. South of Palghat Gap Pre-Cambrian Khondalites Landscape (extending westwards and south of Shencottah Pass till about Trivandrum) – L8
9. South of Palghat Gap Recent Sedimentary Rocks Landscape (extending from Cochin through Travancore) – L9

Figure 1 provides the location of the three key regions and nine geological landscapes of the Western Ghats.

The Surat-Goa region which covers around a third of the entire Western Ghats is also relatively the most homogeneous in terms of geology and can be treated as a large geological landscape (L1; see Map), while the Goa-Nilgiris has 4 distinct geological landscapes within it. The smallest region is the South of Palghat Gap with 4 distinct geological landscapes within it. Relative to its size, the South of Palghat region that consists of landscapes L6–9 is the most spatially heterogeneous. This region also has the highest peak (the Anaimudi) in the Western Ghats. It is further characterized by its wetness (example Valparai) and shortest dry season (2–3 months in Travancore; Pascal 1988). At the other extreme, it also accommodates the driest hills in the Western Ghats, viz., the east Palani Hills (Kodaikanal).



L1- Surat-Goa Deccan Trap Landscape

L2- Goa-Nilgiris Pre-Cambrian Dharwar System Landscape

L3- Goa-Nilgiris Pre-Cambrian Peninsular Gneiss Landscape

L4- Goa-Nilgiris Pre-Cambrian Charnockites Landscape

L5- Goa-Nilgiris Recent Sedimentary Rocks Landscape

L6- South of Palghat Gap Pre-Cambrian Charnockites Landscape

L7- South of Palghat Gap Pre-Cambrian Peninsular Gneiss Landscape

L8- South of Palghat Gap Pre-Cambrian Khondalites Landscape

L9- South of Palghat Gap Recent Sedimentary Rocks Landscape

Figure 1 Location of the 3 key regions and 9 geological landscapes of the Western Ghats

Source: Daniels, 2010

Vegetation

The broad classification of vegetation does not, however, coincide with the geological landscapes, but seems to be more associated with topography and climatic conditions, particularly the length of the dry season. Of the eleven distinct types of evergreen vegetation identified in the Western Ghats, 7 occur in L3 making it the most spatially heterogeneous geological landscape. [1] (Table 1)

Table 1 Wet evergreen vegetation types and their occurrence in the geological landscapes

Vegetation	L1	L2	L3	L4	L5	L6	L7	L8	L9
Dipterocarpus bourdillonii-Dipterocarpus indicus-Anacolosa densiflora								+	+
Dipterocarpus indicus-Kingiodendron pinnatum-Humboldtia brunonis			+	+	+				
Dipterocarpus indicus-Humboldtia brunonis-Poeciloneuron indicum			+						
Dipterocarpus indicus-Diospyros candolleana-Diospyros oocarpa			+						
Persea macrantha-Diospyros spp-*Holigarna* spp		+							
Dipterocarpus indicus-Persea macrantha			+						
Cullenia exarillata-Mesua ferrea-Palaquium ellipticum				+		+			
Mesua ferrea-Palaquium ellipticum			+						
Memecylon umbellatum-Syzigium cumini-Actinodaphne angustifolia	+								
Diospyros spp-*Dysoxylum malabaricum-Persea macrantha*		+							
Poeciloneuron indicum-Palaquium ellipticum-Hopea ponga			+						
Shefflera sp-*Gordonia obtusa-Meliosoma arnottiana*			+	+		+			
Total	1	2	7	3	1	2	0	1	1

Source: Daniels, 2010, Table 3, p 8

Wet evergreen forests are absent in L7. In the absence of a tight link between geology and the present vegetation, it can be speculated that landscape level changes in the distribution

[1] Spatial heterogeneity is an expression of resilience in that a geographical unit (such as a landscape) redistributes its biological resources into what might be considered a 'meta-community'. Local extinctions, migrations and shifting mosaics enhance the beta diversity within disturbed landscapes (Munoz et al, 2008).

and diversity of flora in the Western Ghats have gone through several stages of succession, some of the more recent ones induced and maintained by human pressures.

Spatial heterogeneity, high conservation value and ecologically sensitivity

Daniels (2010) argues (p 11) that while an irreplaceable locality, site or habitat is certainly one that has high conservation value, it is not to be treated as an ecologically sensitive area. He suggests that what is evident in the Western Ghats is some sort of correspondence between sites of high conservation value and the spatial heterogeneity of the region. "Of the 3 regions identified by Pascal (1988), the Goa-Nilgiris region and the South of Palghat Gap region are more heterogeneous. The most spatially heterogeneous Western Ghats South of Palghat Gap region has the maximum number of irreplaceable sites. Such correspondence, where authenticated across taxa, can be useful in prioritizing a landscape that has been designated as ecologically sensitive. In other words, in the exercise of protecting and managing ecologically sensitive landscapes, irreplaceable sites have high supplementary value. "

Daniels identifies some general patterns in the Western Ghats that can be accepted as realistic and adopted while characterizing and delineating ecologically sensitive landscapes. (Box 1)

Box 1: General patterns in the Western Ghats

- The 1600 km north-south hill chain of the Western Ghats falls into 3 major regions; the North of Goa (WGNG) region, the central Goa-Nilgiris (GN) region and the southern Western Ghats South of the Palghat Gap (WGSoPG) region
- Each of the three regions is comprised of one or more distinct geological landscapes. There are totally 9 geological landscapes; L1 covering region WGNG, L2–L5 covering region GN and L6–L9 covering region WGSoPG
- Eleven distinct wet evergreen vegetation types are spread over the 3 regions and 9 landscapes; L7 lacks wet evergreen vegetation, whereas L3 has 7 of the 11 types
- The geographical spread of the wet evergreen vegetation does not correspond with the geological landscapes; the distribution is apparently limited only by rainfall, length of dry season (seasonality) and topography
- Trends in beta diversity along any geo-climatic gradient are better discernable in woody plant communities than in birds; information on other taxa is sparse
- Beta diversity can be used as a reliable estimator of landscape level resilience and thus ecological sensitivity.

Source; Daniels: 2010, p 13

The geological landscape L3 is of considerable interest in the context of landscape level resilience. The landscape, Daniels suggests, can be more precisely identified as the 'South Karnataka Western Ghats' that stretches between Shimoga and Mysore, including the coastal zone. Further, he says that "… it is likely that the diversity in wet evergreen vegetation types found here is due to the high rainfall, shorter dry season and human impacts". In summary, he says, the unexplained diversity in the types of wet evergreen vegetation in L3, and the rather abrupt disappearance of wet evergreen vegetation in L1 and

just north of L2 only point to the adverse roles of the longer dry season and human impacts. He suggests that although there is not adequate amount of published information to substantiate this observation, Pascal (1988) can be used as a basis for the following speculation:

- The resilience of wet (rainfall of 2000 mm and above) lowland landscapes in the Western Ghats is inversely related to the length of the dry season.
- Landscapes that receive rainfall in excess of 3000 mm or 5000 mm are apparently vulnerable to desiccation (affecting natural regeneration of wet evergreen vegetation) when the length of the dry season exceeds a certain threshold.
- Within a rainfall regime, human impacts such as extensive opening of canopy (as experienced during shifting cultivation and clear-felling operations), fire and grazing can transform the vegetation in vulnerable landscapes more drastically (often irreversibly) than in those that enjoy shorter dry seasons.
- In the Western Ghats, lower resilience in wet landscapes that experience dry seasons in excess of 6 months has led to irreversible changes in the woody plant species composition of the lowland evergreen vegetation types.
- Transformation that is initially apparent as diversification of vegetation types (as seen in L3), becomes more rapid and drastic with longer dry seasons (as witnessed in L2) and is complete and irreversible resulting in total loss of a pristine plant community as that L1 has experienced.
- The present condition and distribution of *Dipterocarpus*-dominated lowland wet evergreen vegetation seem to be a good indicator of landscape level resilience in the Western Ghats.
- The rather homogeneous lowland *Dipterocarpus*-dominated wet evergreen vegetation, when pristine, extended north into the Uttara Kannada (L2) district if not further into southwestern Maharashtra.
- The *Dipterocarpus indicus* dominated wet evergreen vegetation diversified into 4 distinct sub-types and the *Dipterocarpus indicus-Persea macrantha* sub-type gave way to a distinct *Persea macrantha*-dominated type in Uttara Kannada (in which *Dipterocarpus indicus* may still be sporadically found) more recently.
- *Persea macrantha*-dominated wet evergreen forests may also have occurred in the landscape north of Goa (L1) during recent history; Pascal (1988) has listed this species as occasional in the medium elevation *Memecylon umbellatum-Syzigium cumini-Actinodaphne angustifolia* type of wet evergreen forests of Matheran and Mahabaleshwar (Maharashtra).
- Pascal (1988) attributes the drastic transformation in the plant species composition of the wet evergreen forests of Maharashtra to shifting cultivation and the long dry season.

Landscapes with least resilience in the Western Ghats

Daniels points to the fact that "[l]andscapes that have shown the least resilience are mainly located in the Western Ghats of Karnataka, Goa and Maharashtra. Whereas the least resilient landscape L1 that is spread across Maharashtra has been totally denuded of the original wet evergreen forest type, the Western Ghats of Karnataka (L2 and L3) are in various stages of recovery. The Western Ghats that run south beginning around Shimoga-Kodachadri latitude

(L3) is clearly the transition. Better ecological management of the landscape can help it recover and merge with the southern Western Ghats. Negligent management will certainly degrade it further and push it to an ecological state comparable with that of L2 and eventually L1."

He points to the higher beta diversity (or species turnover from locality to locality) in L3, a spatially homogeneous landscape, and suggests this may be the first indication of low resilience and higher ecological sensitivity. He concludes by stating that "[v]egetation, the primary determinant of biodiversity, is not quite influenced by the underlying geological formations in the Western Ghats. Spatial heterogeneity, therefore, is best explained by rainfall, length of the dry season and topography." He concludes that "in this regard, a spatially homogeneous landscape with high levels of beta diversity should be a matter of ecological concern."

Human Pressure and Ecological Impacts

Humans, with their tool use and deliberate, planned actions are of course the dominant actors on earth today and have shaped the ecology of the Western Ghats over many millennia. However, their influence has grown tremendously once iron tools permitted them to bring extensive tracts of wet forests under cultivation. Human influences have certainly been disruptive, but humans are also remarkable for being the only species that can be prudent, that can deliberately put conservation measures into practice. The following table provides an overview of the history of the natural and social landscape of the Western Ghats.

Table 2 Overview of the history of natural and social landscape

#	Period	Social Organization	Forest Utilisation	Conservation practices
1	Before 1000 BC	Hunting gathering and fishing societies	Gathering of biological resources	Sacred groves and sacred species
2	1000 BC to 300 BC	Agricultural communities in river valleys	River valley land diverted to agriculture	Sacred groves and sacred species
3	300 BC to 300 AD	Early chiefdoms engaged in overseas trade	Vigorous trade in pepper, cardamom and other natural forest produce	Sacred groves and sacred species
4	300 AD to 1500 AD	Caste society developed along with formation of states	Gathering of spices continues; spice gardens developed in narrow river valleys	Sacred groves and sacred species; traditions of restrained resource use
5	1500 AD to 1800 AD	Influence of European colonial powers beginning to be felt	Vigorous trade in spices; demand on timber for shipbuilding	Sacred groves and sacred species; traditions of restrained resource use
6	1800 AD to I860 AD	Traditional social organization breaking up under British rule	Unregulated exploitation of natural teak, catechu etc.	Sacred groves and sacred species, and traditions of restrained resource use continue to be maintained, but many destroyed

#	Period	Social Organization	Forest Utilisation	Conservation practices
7	1860 AD to 1947 AD	Continuance of British rule; landlords and bureaucrats dominate	Shifting cultivation banned in many tracts; State takeover of forest lands; large-scale teak plantations	Sacred groves and sacred species; traditions of restrained resource use continue to be maintained, but many destroyed
8	1947 AD to 1960 AD	Traditional social hierarchy breaks down in independent India; commerce and industry dominant,	Diversion of land for agriculture and river valley projects; rapid rise of forest-based industry	Wildlife Sanctuaries and National Parks begin to be established
9	1960 AD to 1980 AD	Pace of forest-based industrial development slows down	Beginning of shortages of forest produce; large-scale eucalyptus plantations; large-scale river valley projects	Many sacred groves felled to meet industrial requirements; many more Wildlife Sanctuaries and National Parks established
10	1980 AD till present	Contradictions in the development process become significant	Pace of diversion of forest lands and clear-felling of natural forests slows down; privatization of land and water resources and large-scale conflicts over land acquisition	Wildlife Sanctuaries and National Parks complemented by Biosphere Reserves, and Ecologically Sensitive Areas

The pace of human interventions has been continually escalating and the colonial and post-independence periods are, of course, of great interest. A good overview of these developments for the northern Western Ghats (NWGs) , a region under profound human influences because of its proximity to Mumbai, the economic capital of India, is narrated by Shri Vijay Paranjpye in the special paper commissioned by WGEEP (see Paranjpye, 2011).

Paranjpye (2011) records that "an unprecedented pace of development on the NWGs occurred during the British Period due to three major interventions – 1. Construction of Railways, 2. Roads, and 3. Dams. These became the 'channels' of resource extraction, exploitation, and appropriation by the ever expanding urban and industrial settlements of Mumbai-Thane, Nashik, Pune, which has continued in the present times. The first railway across the Western Ghats was built from Mumbai to Pune, and was completed in 1863. The second line was consequently laid from Mumbai to Igatpuri in 1865. A major impact of the construction of the railway line was the transport of agricultural products and forest resources to an untapped market in Peninsular India. Wood from the Western Ghats could be transported to most corners of the country, through the medium of railways. Hill stations like Lonavala, Khandala, Matheran grew after the construction of railways. However, the most far-reaching impact on the NWGs in terms of area covered, scale of projects and time required was the construction of dams in the British Period. The first dam in the Northern Western Ghats in British India was built in Mumbai at Vihar in 1860. It was followed by the construction of over 20 dams till 1947 (on the NWGs alone)." This, he notes, continued post-1947. "In 2009, the number of existing dams, and the construction of on-going ones had reached a total of 1821 structures, out of which approximately 200 of the large dams lay in

the NWG. A list of 165 dams is included below found in the National Register of Large Dams (2009) and from Google Earth.

Table 3 List of Dams on the Northern Western Ghats

Malangaon	Latipada	Chanakpur Dam
Ozarkhed	Punegaon	Karanjwan
Waghad	Palkhed	Alandi (nashik)
Gangapur	Mukne	Darna
Kadwa	Waldevi	Upper Vaitarna
Bhandardara	Pimpalgaon Joge	Yedgaon
Wadaj	Dimbhe	Chaskaman
Thokalwadi	Bhama-Askhed	Uksan
Valwan	Shiravata	Pawana
Mulshi	Temghar	Khadakwasla
Panshet	Varasgaon	Gunjwani
Bhatghar	Malhar sagar	Veer Dam
Neera-Deoghar	Dhom-Balkawdi	Kanher
Urmodi	Ner Dam	Koyna
Morna Dam	Chandoli	Kadve
Kasari	Kumbhi	Pombare
Tulshi (Kolhapur)	Kurli	Radhanagari
Kalammawadi	Patgaon	Chikotra
Chhitri	Jangamhatti	Tillari
Rakaskop	Anjuna	Mukti Dam
Gondur Dam	Purmepeda	Jamfal
Khulte	Khandlay	Kothare
Kanoli	Devbhane	Burzad
Nandra	Rangawli	Anchale
Motinalla	Chougaon	Lamkhani
Nawatha	Haranbari	Burdakha
Hatti	Chavdi	Panzara
Virkhel	Burai	Kakni
Kayankanda	Jamkhedi	Kabryakhadak

Anjneri	Warshi	Govapur
Bordaivat	Otur	Dhardedigar
Bhadane	Malgaon	Malgaon-Chinchpada
Rameshwar	Khirad	Markand Pimpri
Dhanoli	Jamlewani	Bhegu
Khariyaghutighat	Lower Panzara	Karanjwan
Kawadsar	Talegaon Trambak	Sadagaon Ladachi
Shiwan	Lower Tapi	Naikwadi
Amboli	Mahiravani	Rahud
Kone	Alandi (Nasik)	Waldevi
Waghera MI	Alwandi	Tringalwadi
Khed (Igatpuri)	Taloshi	Shenwad
Chilewadi	Utchil	Yenere
Ranjiwadi	Wadaj	Parunde
Waghdara (Otur)	Ballalwadi	Anepemdara
Manikdoh	Lohare kasare	Ambikhan
Ambikhalsa	Kelewadi	Bori
Sakur	Ambidumala	Belapur
Gohe	Andra dam	Jadhavwadi
Mulshi on Mula	Rihe	Bhugaon
Chinchwad	Pimpoli	Walen
Hadashi	Lavarde	Marnewadi
Shere	Kamboli	Gaddvane
Hadshi 2	Andur	Borgaon
Nimgaon	Koregaon	Mandave
Ekrukh	Hotagi	Bhose

As identified on 20th February 2011 (Note that each one of these can be located on Google Earth)

Source: Paranjpye, 2011

Construction of dams was often followed by the construction of roads, connecting remote areas in the Western Ghats to the cities, thereby exposing the virgin forests to more and

more exploitation. The roads constructed for increasing the communications network and for the 'development of backward areas' intersected the forests and have hastened the process of forest depletion.

Paranjpye notes that new industrial estates are being established, further into the Sahyadris as land is available at throw away prices due to its typical topography. Large areas are then flattened to accommodate the industrial units. He points to over 30 SEZs and industrial estates in the Northern Western Ghats that have been notified covering several hectares of land (Maharashtra Industrial Development Corporation website). However, Paranjpye notes "the larger ecosystem experiences tremendous damage during and after the construction of such estates." (p 18)

Paranjpye also refers to projects such as Amby Valley and Lavasa and the social and environmental implications these have. He points to several policy questions that arise from such projects: (p 23)

a. Whether the State Government is authorised to buy 'surplus' land from the community, and whether it can sell or lease these 'surplus' lands for private purposes.

b. Whether selling public land to a private corporation for establishing a 'privately governed and managed' city can be justified as a 'larger social benefit' that requires large-scale displacement of local communities.

c. Whether virgin lands in the Sahyadris, especially the upper watersheds of rivers, can be opened up for development of such dispersed urban areas, hill stations, farm house plots or holiday resorts, and

d. Therefore, how resilient is the Sahyadri landscape to withstand these sudden and violent developmental pressures.

Humans are thus not only the most destructive, but paradoxically the only prudent species of animal on earth. That is, of course, why WGEEP was set up to review the status of Western Ghats ecology and to suggest how we may now move towards ecologically and socially more sustainable patterns of development. The Panel's assessment of the ecological status of the Western Ghats is reported below.

Assessing the Current Ecological Status of the Western Ghats

The basis for identification of Ecological Sensitive Areas anywhere in the country, including, of course, the Western Ghats, is provided by the Report of the **Pronab Sen** Committee on "Identifying Parameters for Designating Ecologically Sensitive Areas in India," of the Ministry of Environment & Forests, GoI, September, 2000. As an important follow up of this report, the **Pronab Sen** Committee had recommended that:

1. There is no comprehensive programme for generating base-line data on different aspects relating to bio-geographical regions in India. Measures need to be taken to systematically map and record such information on ecological characteristics.
2. The expertise available on Conservation Biology, including ecology and wildlife, in the country is extremely limited, especially in so far as field investigation is concerned. Measures need to be taken to encourage and expand such capabilities in the country, both at the institutional and individual levels.
3. A comprehensive monitoring programme and network must immediately be designed and operationalized, which would involve not only government agencies

but also other institutions, universities, NGOs, and even individuals, particularly those living in and around these areas.

4. In view of the urgency of the situation, the above steps should be carried out in Mission mode.

Primary Criteria

The **Pronab Sen** Committee **recommends that** areas which meet even one of the following primary criteria deserve to be protected without any additional factor or consideration being brought in.

Species-based

1. Endemism

2. Rarity

3. Endangered species

4. Centers of evolution of domesticated species

Ecosystem-based

5. Wildlife Corridors
6. Specialized ecosystems
7. Special breeding site/area
8. Areas with intrinsically low resilience
9. Sacred groves
10. Frontier Forests

Geo-morphological features-based

11. Uninhabited Islands in the sea
12. Steep Slopes
13. Origins of Rivers

The "Definitions" and "Area" sections that follow for each criterion are taken directly from the **Pronab Sen Committee report**.(MOEF, 2000)

Endemism

DEFINITION

Endemism refers to any species which is exclusively confined to a particular geographical area and occurs nowhere else in the world.

AREA

The area of occurrence of an endemic species needs to be protected in its entirety. The precise demarcation of the area may take into account population density of the endemic species, quality of habitat, level of exploitation and the effect of introduced taxa, pathogens, competitors, parasites and /or pollutants.

Application to Western Ghats

The Western Ghats harbors over 1500 endemic species of flowering plants, and at least another 500 species of endemic fishes, amphibians, reptiles, birds and mammals. A very

substantial number of invertebrates and fungi are also likely to be endemic, but little is known of them. For instance, apart from dragonflies, most species of aquatic insects from the Western Ghats are yet to be described. These endemics are distributed throughout the region, in all sorts of habitats. Thus, several species of the wild yam genus *Amorphophallus* that are endemic to Western Ghats occur in highly human impacted habitats such as roadsides. **It can therefore be stated with complete confidence that the entire Western Ghats region needs to be protected in its entirety as the area of occurrence of a substantial number of endemic species.**

Since no action has been taken since 2000 to organize pertinent information as called for by the **Pronab Sen** Committee, WGEEP had to initiate compilation of such data. We could access the following relevant data sets for the Western Ghats:

1. Endemic plants: Number of endemic plant species
2. Endemic vertebrates
3. Endemic Odonata

This, of course, is very incomplete information that WGEEP has been able to use in quantifying the levels of ecological sensitivity over the Western Ghats.

Endangered species

DEFINITION

A species facing a very high risk of extinction in the wild in the near future.

AREA

The area containing an endangered species needs to be protected in its entirety. In case of fragmented areas of occurrence of an endangered species, all fragments having high population density and habitat integrity should be of prime concern.

Application to Western Ghats

The internationally accepted designation of Western Ghats as a biodiversity hot spot is related to a substantial number of endangered species in this region. These are distributed throughout the region; for instance a large number of frog species and herbaceous species of the hill plateaus of the northern Western Ghats and grasslands adjoining sholas in the southern Western Ghats are endangered. **It can, therefore, be stated with complete confidence that the entire Western Ghats region needs to be protected as containing several endangered species.** WGEEP could access the following relevant data sets:

1. **IUCN_max**: Number of IUCN Red listed mammal species

This, of course, is very incomplete information that WGEEP has been able to use in quantifying the levels of ecological sensitivity over the Western Ghats.

Rarity

DEFINITION

A species with a small world population that is not at present endangered or vulnerable, but is at risk.

AREA

The area of occupancy of a rare species needs to be protected in its entirety. The precise demarcation of the area will be based on the population density of the rare species, quality of habitat, level of exploitation and the effect of introduced species, pathogens, competitors, parasites and/or pollutants.

Application to Western Ghats

The situation with respect to rare species is very similar to that with respect to endangered species. **It can, therefore, be stated with complete confidence that the entire Western Ghats region needs to be protected as containing several endangered species.** WGEEP could access the following relevant data sets:

1. **IUCN_max**: Number of IUCN Red listed mammal species

This, of course, is very incomplete information that WGEEP has been able to use in quantifying the levels of ecological sensitivity over the Western Ghats.

Centres of evolution of domesticated species

DEFINITION

Areas associated with the origin of domesticated species which continue to harbour their wild relatives and/or progenitors.

AREA

The scope of this criterion should not be limited to areas containing domesticated crop plants alone, though it is most critical in that area. Animal breeds and aquatic stock in their wild state are also important sources providing a wide base of genetic variability which can be used and exploited for purposes of improvement of domestic livestock or aqua-culture species. Areas in which such populations are located, therefore, are also to be considered ecologically sensitive.

Application to Western Ghats

Western Ghats are a particularly notable centre of evolution of domesticated plant species including pepper, cardamom, cinnamon, mango and jackfruit. Indeed the Uttara Kannada district has the world's highest concentration of wild relatives of domesticated plants. The Western Ghats is also the centre of evolution of a number of now domesticated ornamental fish species such as those belonging to genus *Puntius*, distributed throughout the region. **The entire Western Ghats, therefore, deserves to be considered ecologically sensitive.**

Wildlife corridors

DEFINITION

(a) A linear two dimensional landscape element that connects two or more patches of wildlife habitats that have been connected in historical time and is meant to function as a conduit for designated animal species. Even isolated strips, but usually attached to a patch of somewhat similar vegetation, could serve as a corridor.

(b) Streams, rivulets, rivers and their flood plains are natural corridors as they facilitate movement and dispersal of designated aquatic species.

(c) Riparian zones, along with intermittent and permanent streams and rivers, provide migration routes for certain designated species, such as butterflies, birds, bats, squirrels and monkeys.

(d) Wetland habitats along the migration route of designated migratory waterfowls that provide passage for large scale movement and food. Such a series of wetland habitats or network of staging sites along the migratory highways so as to reach wintering areas is crucial for the conservation of birds

AREA

Identification of the area constituting wildlife corridors is not easy since it not only varies from species to species, but also between any pair of sub-populations of a given species. Consideration also has to be given to the nature and purpose of migration, since the characteristics of the corridors which are critical may vary depending upon the purpose. Detailed observations over an adequate period of time is, therefore, usually necessary for delineating the geographical boundaries of such corridors. The problem is further complicated by the fact that since this parameter is being applied only to "designated" species - i.e. those which are already known to be suffering from ecological stress – the possibility exists that habitat fragmentation may already have occurred through excessive human

interference in the "historical" corridors. Therefore, observation of existing migration patterns and the corridors involved may not be sufficient to provide full information on the requisite degree of inter-connectivity of habitats that is necessary to ensure survival and growth of the species. There may be situations where "historical" corridors would have to be identified and rehabilitated by deliberate and planned reduction of existing human activity.

Application to Western Ghats

The Western Ghats are very rich in what is referred to here as "designated" species, namely, rare, endangered and threatened species, and the continuity of habitat for such species is a matter of considerable concern. **Fragmentation of forests, as also disruption of continuity of freshwater habitats therefore need to be considered. This is happening so widely that the entire Western Ghats deserves to be considered ecologically sensitive.** WGEEP has been able to access the following databases that are pertinent in this context:

- Percentage of area covered by relatively undisturbed forest with low edge
- Riparian Forests/Vegetation
- Elephant corridors

Admittedly, this is quite incomplete information.

Specialised ecosystems

DEFINITION

Specialized ecosystems are complex and highly diversified. They exhibit delicate interdependence between biotic and abiotic variables and are characterized by their biological productivity, specialized adaptations in the native or inhabiting organisms resulting in unique biodiversity and giving rise to complex ecological processes.

AREA

Specialized ecosystems are usually extremely sensitive to changes in the abiotic characteristics of the habitat concerned. Since such abiotic characteristics can be seriously affected by perturbations taking place even beyond the immediate vicinity, the area of protection will need to be defined with respect to the critical abiotic characteristics of each identified ecosystem and the manner in which they can possibly be disturbed. Restrictions in activity may, therefore, have to be placed on locations which are relatively distant from the actual location of the ecosystems which would depend upon factors like water currents, wind directions, and other geo-morphological features which may affect soil or chemical characteristics of the habitat.

Fresh Water Swamps:

Fresh water swamps are slow moving streams, rivers or isolated depressions, which are dominated by herbaceous vegetation. They are also extremely rich in their faunal diversity, including migratory waterfowl. In addition to their richness in terms of specialized flora and fauna, they also regulate hydrological cycle through recharging of the ground water and seasonally controlling the release of excess water. Some of the main examples are as follows:-

(i) *Myristica* swamp forests :

These are distributed only in Travancore (Kerala) along streams (below 300 m altitude) on sandy alluvium rich in humus and inundated during the latter half of the year. The dominant tree is *Myristica* sp.

(ii) Tropical hill valley swamp forests :

They cover along streams on gravelly and sandy beds in submontane tracts of the Himalayas (in states of Uttar Pradesh, West Bengal and Assam) and at few places in the Western Ghats in particular Wynaad forest division in Nilgiris (Kerala).

Application to Western Ghats

Western Ghats harbor many significant specialized ecosystems such as *Myristica* swamps, high elevation shola-grasslands and hill plateaus of northern Western Ghats. **All of these are severely disturbed and in consequence large tracts of Western Ghats deserve to be considered ecologically sensitive.**

Special breeding sites/areas

DEFINITION

An area associated with any stage of the reproductive behaviour of a designated species.

AREA

Sites associated with the reproductive, breeding or nurturing behaviour of designated species and their associated ecosystems.

Application to Western Ghats

Spawning migrations of endemic, endangered freshwater fishes are severely disrupted throughout the Western Ghats. **Hence, the entire Western Ghats region needs to be considered as being ecologically sensitive.**

In this context, WGEEP could access pertinent data on Riparian Forests/Vegetation.

Areas with intrinsically low resilience

DEFINITION

Ecosystems which are susceptible to irreparable damage from an even low level of disturbance.

AREA

The extent of occurrence of such ecosystems, including sufficient areas for their protection and potential expansion depending upon the abiotic characteristics of the ecosystems.

Application to Western Ghats

Resilience is a difficult concept, and RJR Daniels has made a careful attempt to apply it to the Western Ghats. He suggests that the **Western Ghats of Karnataka, Goa and Maharashtra are particularly low in resilience, and therefore need special protection.**

Sacred groves

DEFINITION

Forest areas or patches of natural vegetation preserved over generations on religious grounds.

AREA

The entire area that is demarcated by tradition as being part of a "sacred grove".

Application to Western Ghats

Western Ghats are a rich repository of sacred groves, and there have been many initiatives as in Kodagu to conserve them. **These sacred groves need special consideration throughout the Western Ghats tract.**

Frontier forests

DEFINITION

Remnants of primeval natural forests that have remained on the whole relatively undisturbed and big enough to maintain their biological diversity including viable populations of species associated with the specific forest-type.

AREA

The extent of occurrence of such natural forest ecosystems, including sufficient areas for their protection and potential expansion.

Application to Western Ghats

Some examples of these are to be found on the **western escarpments of the Western Ghats**. WGEEP could access a database on "Percentage of area covered by relatively undisturbed forest with low edge" pertinent in this context.

DEFINITION

A natural slope of 20 degrees or greater.

AREA

The slope of a land area is generally defined as its upward or downward inclination to horizontal plane and it is usually measured as an angle in relation to the horizontal plane.

In the Indian context, the gradient nomenclature, which is usually used in engineering designs and the image processing techniques (GIS), classify slopes as given in the table below:

Gradient Nomenclature

Slope	Per cent	Description
-	**0-3**	**Flat**
2°	**3-8**	**Gently sloping**
4°	**8-15**	**Sloping**
8°	**15-25**	**Moderately Steep**
14°	**25-50**	**Steep**
26°	**50-100**	**Very Steep**
45°	**>100**	**Extremely Steep**

It may be seen that the 20° cut-off recommended by the Committee represents the upper half of the "Steep" classification and higher gradients. Since a mountain or a hill slope may contain segments having different degrees of inclination, the criterion should be applied to the totality of the slope from the base to the apex. Also, since the angle of a slope is related to the distance from which it is measured, measurements need to be taken from different points along the slope and, if at any point the angle exceeds 20°, the area above that point should be treated as a steep slope. The relevant area for protection would need to take into account certain destructive features which are commonly present including various combinations of steep slopes, seismicity, residual soil, high pore water

pressure, thick and deeply weathered soil cover, undercutting of the base of the slope, and weak material outcropping below stronger material. Since the horizontal planes near the top and base of a slope are prone to landslides and receive boulders /debris of a slide respectively, suitable buffer zones are designated. In general, a minimum horizontal distance of 500 m at both ends of a slope is recommended as a buffer zone. In mountainous ecosystems, buffer zones may need to be extended further in landslide-prone slopes.

Steep slopes

Application to Western Ghats

The Western Ghats is a region rich in many localities with steep slopes. Fortunately, we now have good digital databases providing elevation data, and WGEEP has been able to access databases on Slopes and Elevation.

Origins of rivers

DEFINITION

A glacier, mountain, hill or spring from where a water stream originates is referred to as the origin of a river.

AREA

The area relevant to the origin of a river is not strictly limited to the natural point of origin of the river itself (for example, the exact point at which the water spring emerges), but the entire area necessary for preserving the geological and hydrological features which are critical for the sustainability of the river sources. Thus, it is not enough to protect only the glaciers or the snow receiving slopes which feed the river, but also the channels, fissures and other features which are intrinsic to the process of recharging the water source. Similar considerations would apply to the recharging of spring and rain-fed rivers.

Application to Western Ghats

Western Ghats are a veritable water tower of the Indian Peninsula and therefore the source of numerous east- and west-flowing streams. **Evidently the entire Western Ghats region must be considered as ecologically sensitive for preserving the geological and hydrological features which are critical for the sustainability of the river sources of the Indian Peninsula.**

Auxiliary Criteria

The principal objective of identifying these seven auxiliary criteria is to draw attention to characteristics which indicate the potential for ecological sensitivity without necessarily being definitive in this regard.

Species based

1. Areas or centers of less known food plants

Ecosystem based

2. Wetlands
3. Grasslands

Geo-morphological features based

4. Upper Catchment areas
5. Not so Steep Slopes
6. High Rainfall Areas
7. Other uninhabited Islands

Centres of less known food plants

DEFINITION

Areas associated with the origin of/ or containing the wild progenitors of less known plants of potential food and horticultural values.

AREA

The entire area of occurrence of a viable population of such plant species.

Application to Western Ghats

The Western Ghats are very rich in a wide variety of lesser known food plants, including leafy vegetables, tubers and fruit. Evidently **the entire Western Ghats region must be considered ecologically sensitive as being associated with the origin of/ or containing the wild progenitors of lesser known plants of potential food and horticultural values.**

Wetlands

DEFINITION

Wetlands are submerged or water saturated lands, both natural and man-made, permanent or temporary, with water that is static or flowing, fresh, brackish, salty, including areas of marine water,

the depth of which at low tide does not exceed six meters.

AREA

As identified by the natural boundaries of the water body.

Application to Western Ghats

The Western Ghats region has a number of natural, as also many man-made wetlands that are important from the perspective of aquatic organisms and migratory waterfowl. These are distributed throughout the region; hence, the **entire Western Ghats region needs to be considered as being ecologically sensitive as a repository of wetlands.**

Grasslands

DEFINITION

Grasslands are terrestrial ecosystems characterised by plant communities belonging to the grass family - 'graminoids' and 'forbs'.

AREA

Areas containing small, isolated or remnant patches of any type of natural grassland supporting livestock, native wild animals and avi-fauna.

Grasslands may be classified as temperate or tropical grasslands. Within the temperate zone, the natural grasslands are distinguished from semi-natural types. The semi-natural types have been divided further into those used primarily for hay and those that are grazed by domesticated livestock. Likewise, scattered and small tropical natural grasslands are found in arid and semi-arid areas, where climate is the prime controlling factor, under light to moderate grazing pressure by ungulates. In general, majority of the natural grasslands (arid, semi-arid, wet and tall and temperate) have been severely impaired. Now only small, isolated fragments or remnant patches of grassland habitats are seen. However, even in this category, several sites have undergone considerable modification because of excessive livestock grazing.

Application to Western Ghats

Western Ghats region has a number of natural, as also many man-made grasslands that are important from the perspective of herbaceous flora as also herbivorous animals. These are distributed throughout the region; hence, **the entire Western Ghats region needs to be considered as being ecologically sensitive as harbouring extensive grasslands.**

Upper catchment areas

DEFINITION

Catchment area, also referred to as drainage area, is a basin like structure for collecting and draining water. Upper Catchment Area typically refers to a basin which collects precipitation, mostly in the mountainous or hilly region or the upper reaches of a river following its origin. The water collected is absorbed by the soils or drains into the river.

AREA

The designated 'upper catchment area' from which water is collected into the upper stretch of a river varies widely from river to river. It is dependent on various factors viz. location of origin of the river, slopes of the basin, tributaries, annual discharge, geology, soil characteristics and forest cover.

Application to Western Ghats

As discussed above, Western Ghats are a veritable water tower of the Indian Peninsula and therefore the source of numerous east- and west-flowing rivers. **Evidently the entire Western Ghats region must be considered as ecologically sensitive as being 'upper catchment areas' critical for the sustainability of the rivers of the Indian Peninsula.**

Not so steep slopes

DEFINITION

A slope greater than 10 degree but less than 20 degree.

AREA

An area which may have its upward or downward inclination to horizontal plane between 10 and less than 20 degrees. Since the horizontal planes near the top and base of a slope are prone to landslides and receive boulders /debris of a slide respectively, suitable buffer zones are designated. In general, a minimum horizontal distance of 200m at both the ends of a slope is recommended as buffer zones.

In mountainous ecosystems, buffer zones need to be extended in landslide prone slopes which tend to possess certain destructive features, including various combinations of steep slopes, residual soil, high pore water pressure, thick and deeply weathered soil cover, undercutting of the base of the slope, and weak material outcropping below stronger material.

Application to Western Ghats

The Western Ghats are a region with either steep or not so steep slopes. Fortunately, we now have good digital databases providing elevation data, and WGEEP has been able to access databases on Slopes and Elevation.

High rainfall areas

DEFINITION

Areas having precipitation intensity greater than 200 cm per year.

AREA

Areas which receive high precipitation on a "normal" basis as identified by the Indian Meteorological Department (IMD) or from Remote Sensing Data. This would exclude areas which receive such levels of precipitation only on an episodic basis.

Application to Western Ghats

Western Ghats are a veritable water tower of the Indian Peninsula and much of the region receives rainfall greater than 200 cm per year. **Evidently most of the Western Ghats region must be considered as an ecologically sensitive region with high precipitation.**

WGEEP exercise on assessing relative levels of ecological sensitivity in different areas of the Western Ghats

In view of the above, WGEEP concluded that the entire Western Ghats tract should be considered as ecologically sensitive. Regrettably, WGEEP had to initiate its work in 2010, without any substantial progress having been achieved in terms of organizing a national mission on developing an ecological sensitivity database as suggested by the Pronab Sen Committee. Furthermore, the Pronab Sen Committee had not provided any guidance on the management regime for ecologically sensitive areas. Since a uniform regime for the entire Western Ghats tract is not feasible, WGEEP decided on adopting a layered approach and attempted to assign relative levels of ecological sensitivity to different areas.

For this purpose, WGEEP divided the entire Western Ghats region into 5 minute x 5 minute grids. WGEEP is naturally constrained to using only the readily available datasets to decide on relative levels of ecological sensitivity of different areas. These included:

1. **Endemic plants** : Number of endemic plant species
2. **IUCN_max**: Number of IUCN Red listed mammal species
3. **Unique per cent**: Percentage of area covered by unique evergreen ecosystems such as shola forests
4. **Comp3 per cent** : Percentage of area covered by relatively undisturbed forest with low edge
5. **Forest per cent**: Percentage of forest area
6. **Elevation**
7. **Slope**
8. **Riparian Forests/Vegetation**

Admittedly, these tend to emphasize forest biota and ignore issues such as habitat continuity. However, perforce we have had to focus on readily available datasets. It is hoped that the Western Ghats Ecology Authority would be able to take this exercise further.

Western Ghats are a highly heterogeneous region with a marked north-south gradient in terms of rainfall and length of rainy period. There is also much variation in elevation and geology. It is therefore to be expected that there will be substantial variation from state to state in terms of ecological endowments and sensitivity. At the same time, it is proper that ecological protection efforts should be fairly evenly distributed through the Western Ghats region. Hence it is appropriate to look separately at each state to assess **relative levels of ecological sensitivity of different areas within the state.**

The relative and not absolute values of the parameters are pertinent for our purpose. With this in view, we normalized these parameters separately for each state. For instance, the highest recorded altitude in a state was assigned the score of 10 and all other grids in that state were ranked on a scale from 1 to 10. This was followed by calculation of the average of the ranks for all available parameters for each grid. As a result, a particular grid could be assigned a very high value, close to 10 , only if it, simultaneously has, for that state, relatively very high elevation, very high slope, very high number of endemic plants, very high number of red listed mammalian species, very high percentage of area covered by unique evergreen ecosystems, very high riparian forest and so on. Consequently, grids of substantial biodiversity endowments could still exhibit apparently low values such as 3 or 4.

This procedure also implies that a large proportion of grids would tend to be assigned quantitatively lower values if there is high grid-to-grid variation in the parameter values, and higher values if there is low grid-to-grid variation in the parameter values. This has the result that the largely homogeneous Western Ghats tracts of Gujarat have the largest area in the score class 5–7, while the major part of the Western Ghat area in other states is in the score class 3–5. Another apparently anomalous result is that a number of Important Bird Areas fall in apparently low scoring grids. This is related to the fact that, as Daniels and Gadgil (1992) have shown, evergreen forests of the Western Ghats tend to possess low levels of bird diversity compared to drier, generally deciduous forests

Given these effects, it is clear that the conservation significance of a particular grid is not to be judged on the basis of the absolute score, but scores in comparison with areas independently assessed to be of high conservation value. **Areas that have already been incorporated in the network of Protected Areas, viz Wildlife Sanctuaries and National Parks, provide a convenient yardstick. WGEEP has therefore used the thumb rule that the highest ecological sensitivity status of ESZ1 will be assigned only to grids which have, at a minimum, a score at least as high as the lowest score assigned to a PA grid in the concerned state.**

See Figures 2– 7 which provide the grid maps for the Western Ghat states.

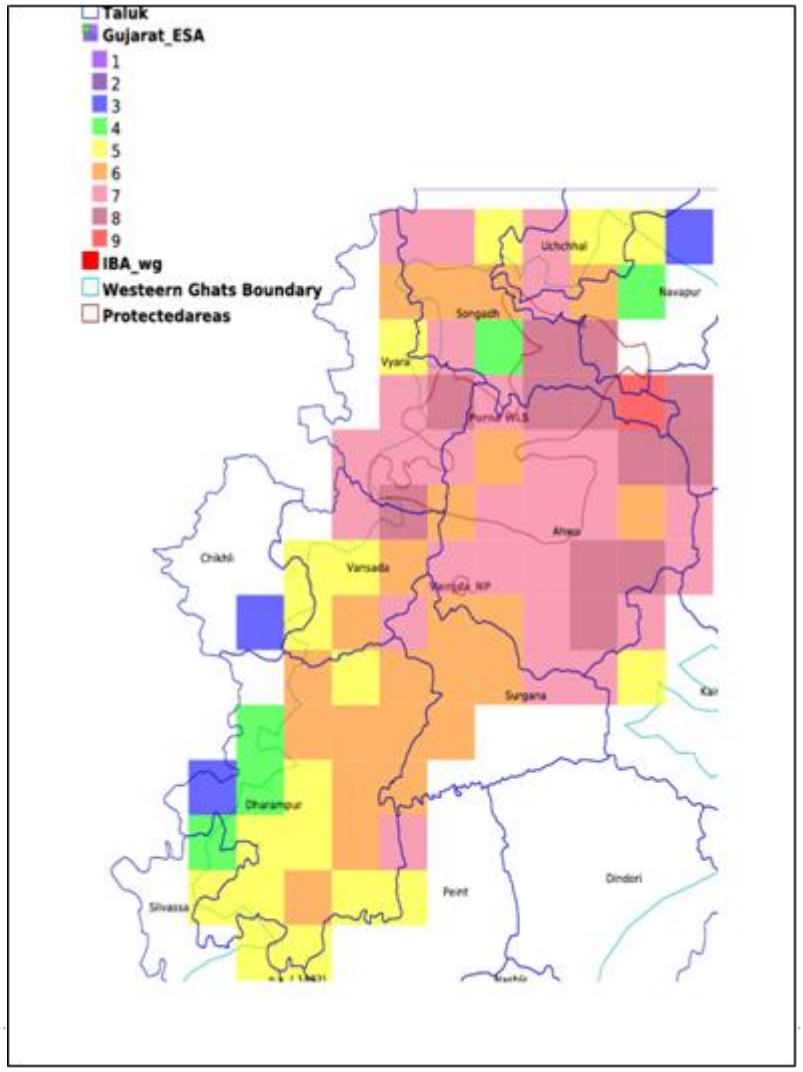
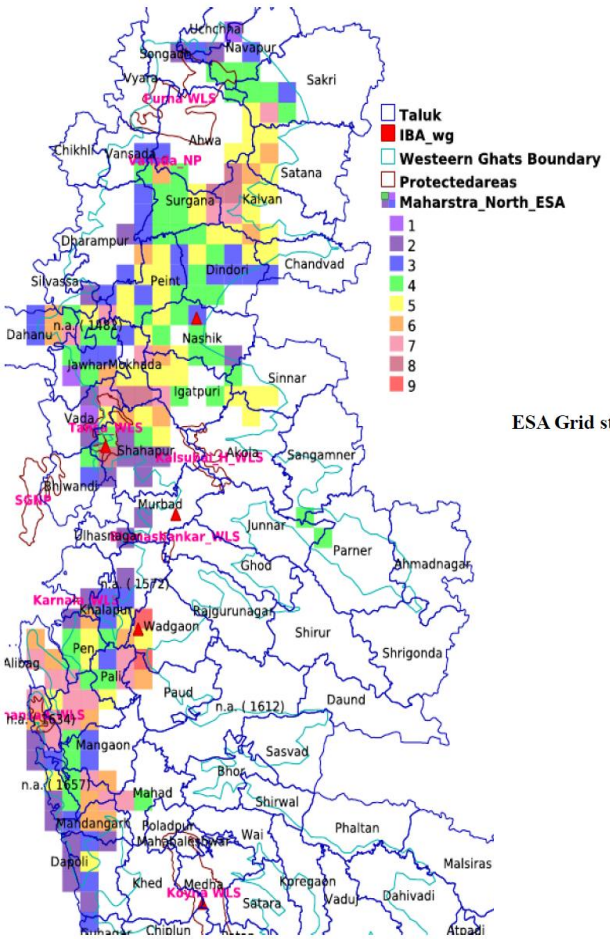


Figure 2 Gujarat Western Ghats

Maharashtra North



ESA Grid statistics for Maharashtra South

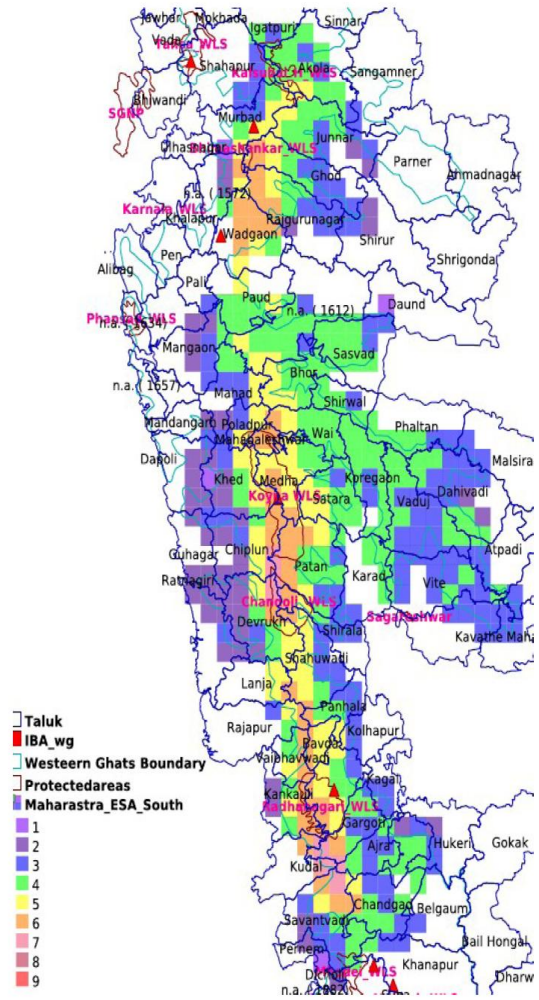


Figure 3 Maharashtra Western Ghats

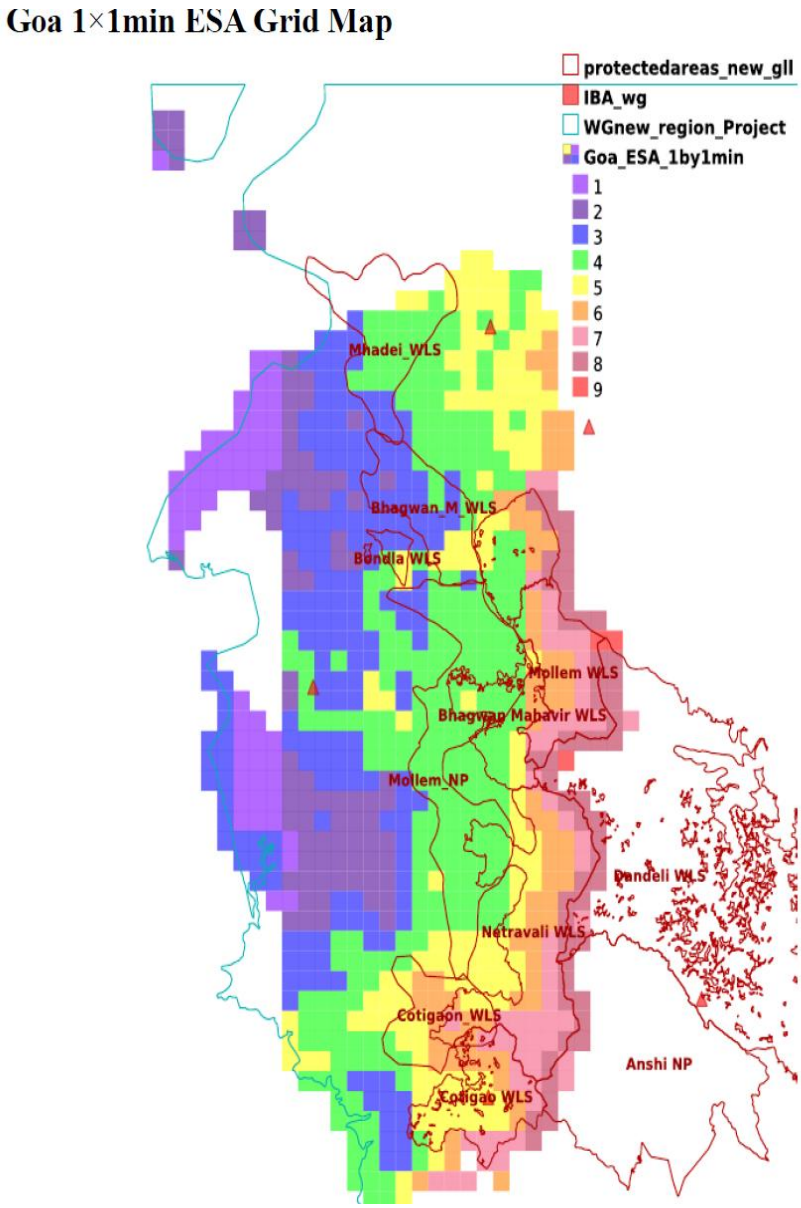


Figure 4 Goa Western Ghats

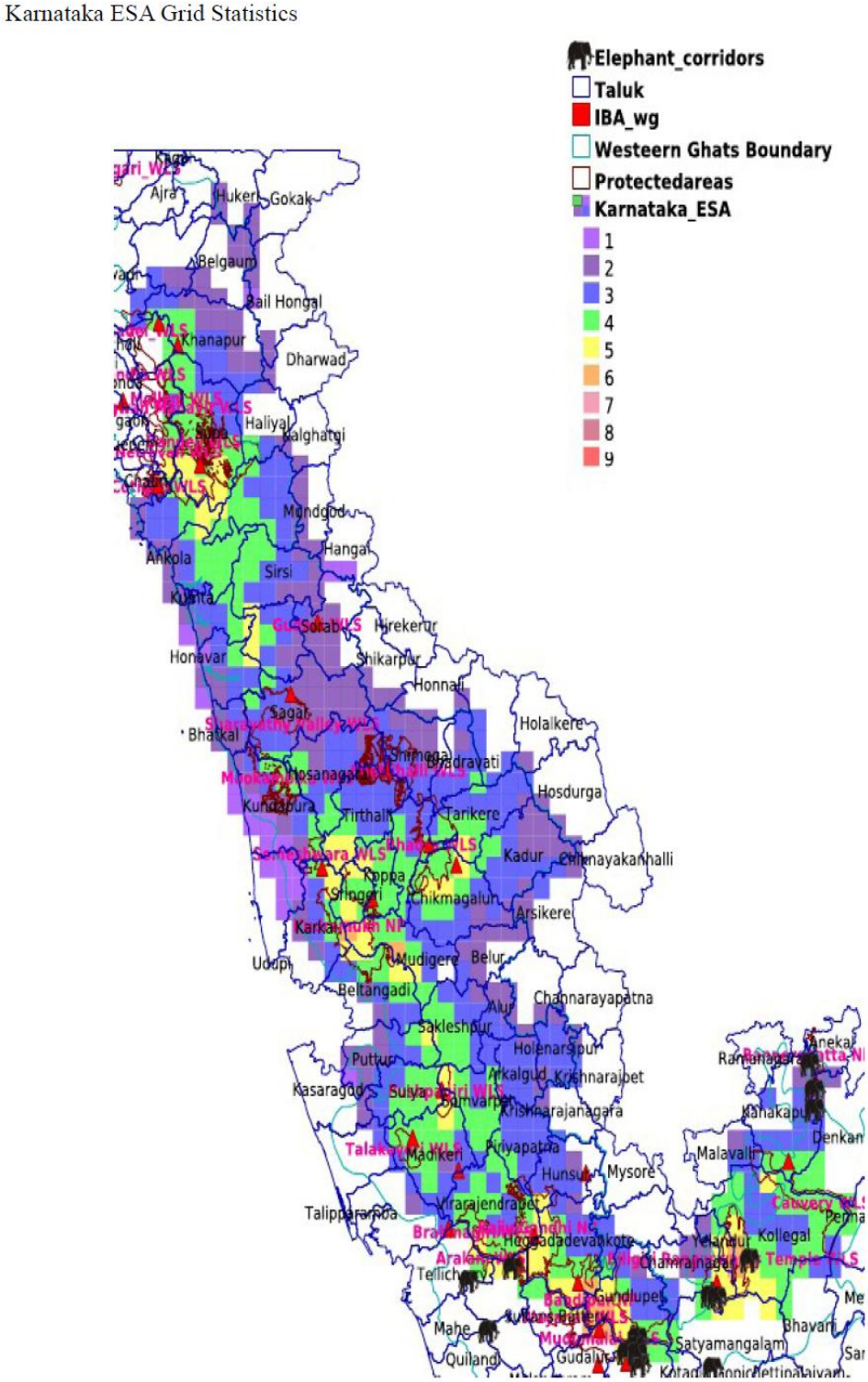


Figure 5 Karnataka Western Ghats

Kerala Outputs

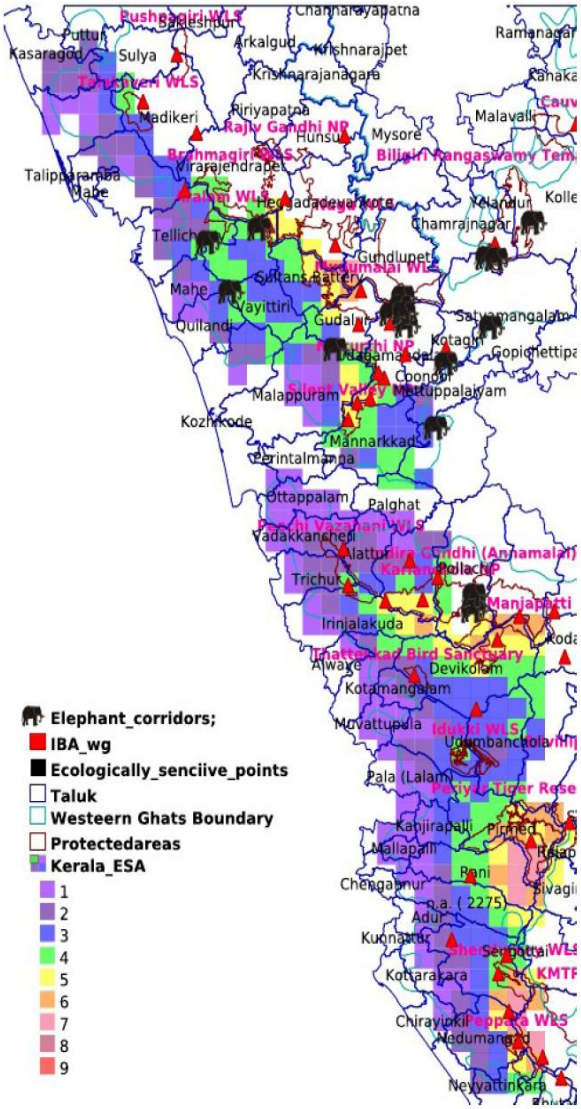


Figure 6 Kerala Western Ghats

Kerala and Tamilnadu

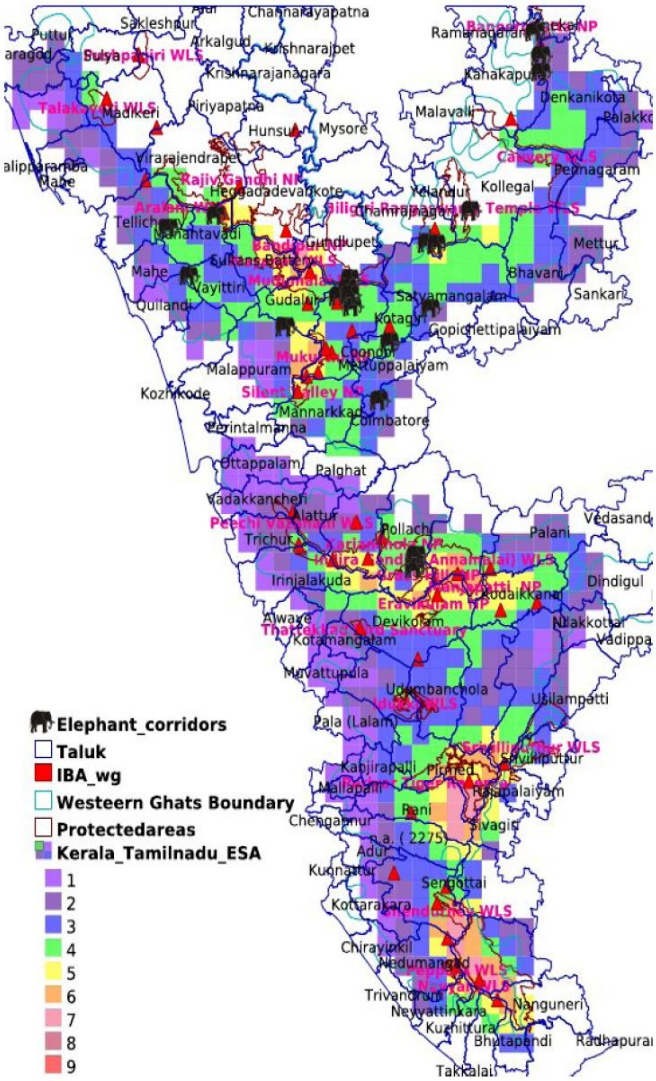


Figure 7 Kerala and Tamil Nadu Western Ghats

Future climate change and the vulnerability of ecosystems across the Western Ghats [2]

Climate change as a consequence of anthropogenic greenhouse gas emissions and its implications for biodiversity have been well documented globally. It can be expected that the biodiversity-rich Western Ghats would also be impacted by climate change, and this should be factored into considerations of ecological sensitivity of different regions or ecosystem types in the ghats.

Modelling climate change impacts

There have been a few modeling studies on the potential impact of climate change on the forests of India (Ravindranath et al. 2006; Chaturvedi et al. 2011). More specific to the Western Ghats, an early study assessed the possible impact of climate change on the vegetation and forest-based product flows in the Nilgiri Biosphere Reserve and the Uttara Kannada district (Ravindranath et al. 1997). Using an empirical-statistical model, this study brought out the potential of dry thorn forest to spread at the expense of deciduous forest and the montane grassland to shrink from increasing temperature.

The latest study (Chaturvedi et al. 2011) used the dynamic vegetation model IBIS (Integrated Biosphere Simulator, v.2). The baseline simulation brought out only the following dominant vegetation types – Tropical Evergreen Forest, Tropical Deciduous Forest, and Savanna/Grassland – in the Western Ghats, rather than a more complex situation that also includes montane forest/grassland, semi-evergreen forest, dry thorn forest and the division of deciduous into moist and dry forest. Climate change projections for the Western Ghats region were based on the Regional Climate Model of the Hadley Centre (HadRM3), U.K. for the A2 scenario (atmospheric CO_2 levels of 750 ppm by 2085) and the B2 scenario (CO_2 of 575 ppm) at a resolution of 0.5° by 0.5°. The model was run for the period 2071-2100 (mid-year 1985).

We considered a total of 51 grids (0.5° by 0.5°) in the simulation of which 26 underwent change under A2 scenario (51% grids) and 16 underwent change in the more benign B2 scenario (31%). The figures below depict the baseline vegetation distribution and vegetation changes expected under the A2 scenario. (Figures 8 and 9)

[2] This subsection has inputs from Rajiv K. Chaturvedi

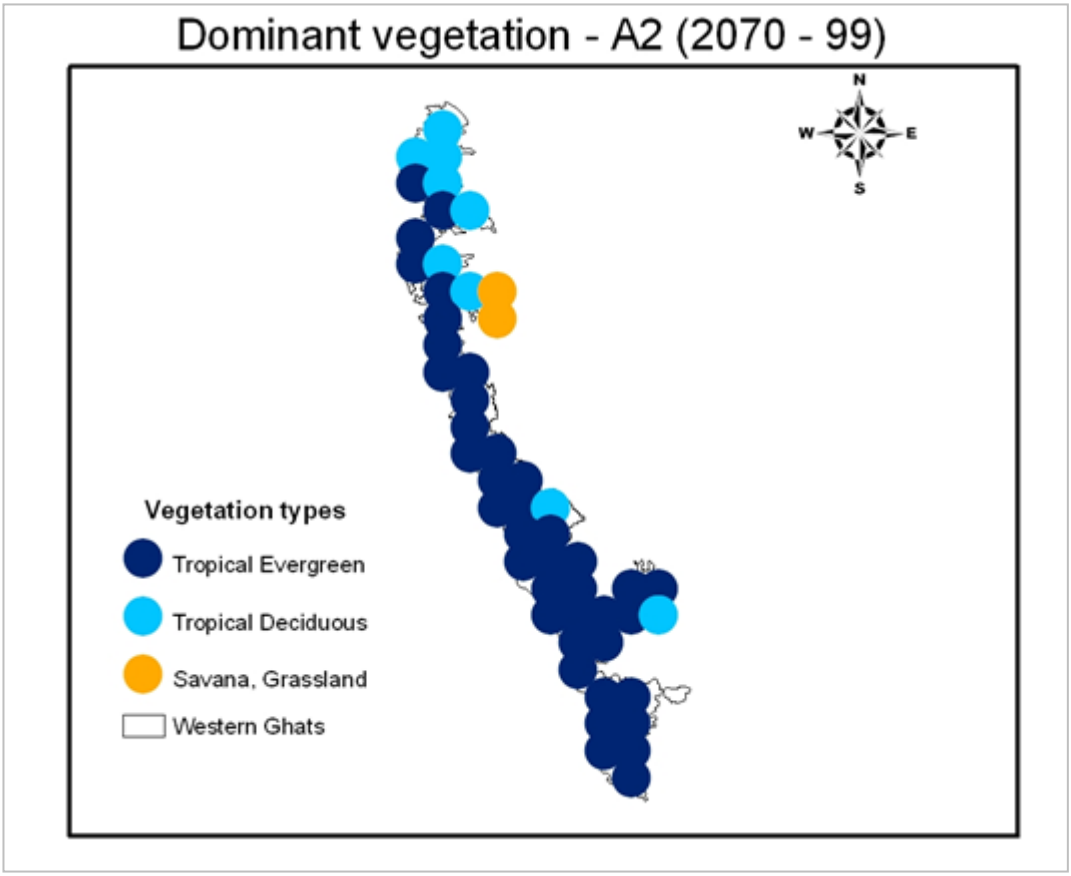


Figure 8 Dominant Vegetation

A measure of forest vulnerability in the Western Ghats

A "vulnerability index" was also developed on the basis of whether or not a particular forest grid is (a) projected to undergo vegetation change under climate change scenario (b) monoculture or mixed species forest and (c) dense forest, moderately dense or a fragmented forest. Based on these indicators each forest grid was assigned a score between 1 to 7 – 1 (blue color in the map) being the least vulnerable and 7 (red color in the map) being the most vulnerable.

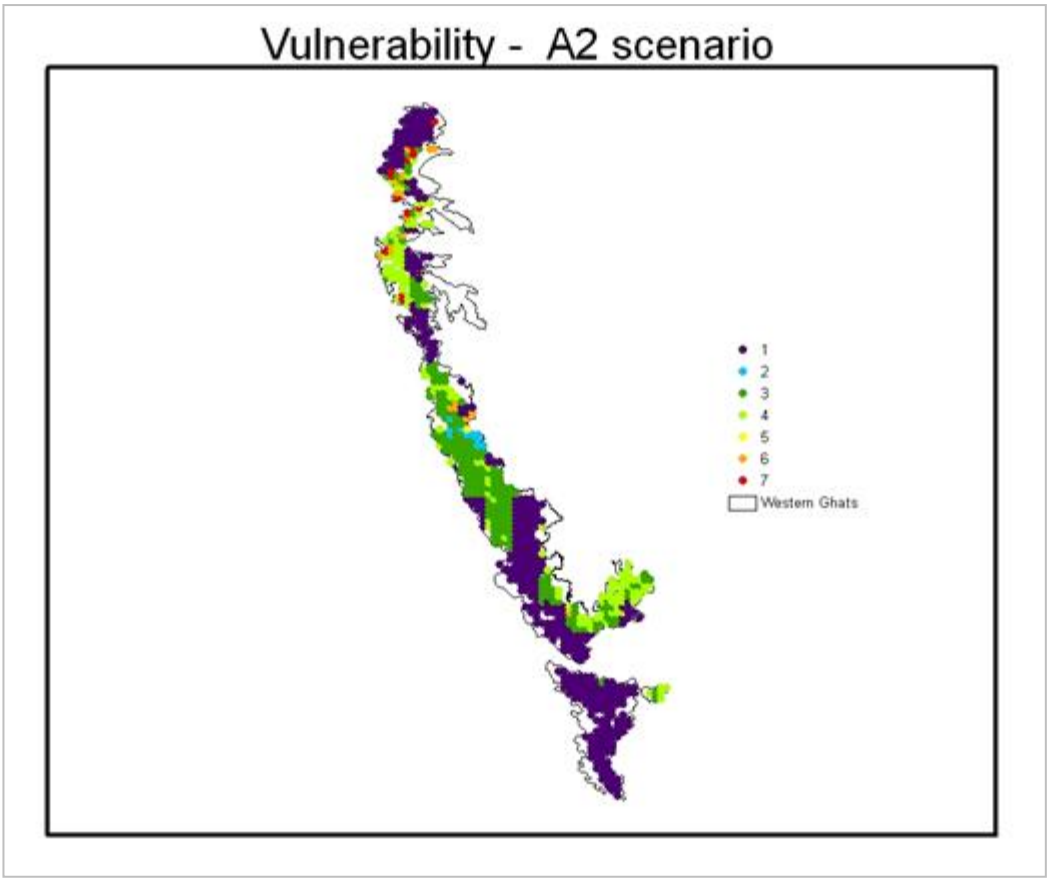


Figure 9 Vunerability to climate change

This exercise indicates a greater degree of vulnerability in the northern and central region of the ghats. However, we must interpret these results cautiously; change in forest type may not necessarily be negative as when a drier type of vegetation may change to a moister type, while the coarse resolution of the model does not pick up the sensitive montane ecosystem in the southern Western Ghats as described below.

Sensitivity of the montane shola forests and grasslands

Model IBIS has its limitations in that it does not simulate the tropical montane forest/grassland complex of the Western Ghats. At the same time, the coarse resolution of the model does not distinguish the montane ecosystem prevalent in the Nilgiris and further south in the Western Ghats. We thus have to separately consider the sensitivity of the characteristic montane stunted evergreen forests (known locally as *sholas*) and the grasslands found at elevations above 1800 m asl in locations such as the Nilgiris, the Anamalais and the Palani hills as well as high elevations both to the north and the south of these mountain ranges (Sukumar et al. 1995).

Paleoclimatic studies have shown that the shola forests and grasslands have contracted and expanded in tune with past climate change. The following predictions have thus been made for this montane ecosystem as regards the future climate change impacts. In many montane regions such as the Nilgiris and the Palanis, the grasslands have been planted with exotics such as Australian wattles (*Acacia* spp.) and eucalypts (*Eucalyptus* spp.). These plants with C3 pathway of photosynthesis can be expected to take advantage of the increasing levels of

atmospheric carbon-dioxide (the so-called CO_2 fertilization effect) for enhanced growth. Increasing temperature would also help the wattles to spread preferentially (over *shola* species) into colder grassland areas, where frost is presently limiting, and there are indications that this is happening. The exotic invasive plant scotch broom (*Cystisus scoparius*) has also spread considerably in recent times across the grasslands in the Nilgiris. Alteration of the natural montane grassland would have implications for endemic animals such as the Nilgiri tahr (*Nilgiritragus hylocrius*) and Nilgiri pipit (*Anthus nilghiriensis*).

In the next section, we a review of a number of significant sectors and our recommendations on how development activities can be regulated to protect the Western Ghats from on-going onslaughts

2. Sectoral Recommendations

The Western Ghats Ecology Panel (WGEEP) recommends a graded or layered approach to regulation and promotion of development activities located in the Ghats depending on the kind of environmental impacts the activity entails and the ecological sensitivity of the Ghat region. As per the recommendations of the Panel, the Western Ghats has been zoned into (1) Regions of highest sensitivity or Ecologically Sensitive Zone 1 (ESZ1), (2) Regions of high sensitivity or ESZ2, and the (3) Regions of moderate sensitivity or ESZ3. In these zones, the Panel recommends that development activity needs to be decided through a participatory process involving the gram sabhas. However, as a starting point, a broad set of guidelines is provided in Table 6 of Part I of the report. These broad guide-lines for the various sectors are based on extensive consultations with officials, experts, civil society groups and citizens at large. In the sub sections that follow, the key sectors are discussed as they relate to the Western Ghats, the issues of concern are highlighted and measures are suggested for addressing them. The role of the Western Ghats Ecology Authority is also discussed.

2.1 Water use

Water resources management in the Western Ghats region is inextricably linked to improving the flows in the rivers and the health of the catchments.

Western Ghats is the origin of many of the important Peninsular Rivers like Cauvery, Krishna and Godavari that drain the Deccan Plateau and flow eastwards. The hundreds of shorter perennial monsoon fed west flowing rivers like Sharavati, Netravathi, Periyar, and the Bharathapuzha travel through steeper and more undulating topography before emptying into the Arabian Sea. A rough estimate reveals that 245 million people in the five Western Ghats states directly depend on these rivers for their diverse water needs. Geographically, the Western Ghats is the catchment for river systems that drain almost 40 % of the land area in India.

The basin area of west flowing shorter rivers is mostly located on the steep western slopes. Except for a few coastal streams 1/3 rd of the basin area of most of the river basins is located within the Western Ghats. This too makes them fragile and calls for their proper care and management. Once these streams leave the Western Ghats proper, they are drained and enriched by the once fertile steep river valleys, midlands and flood plains. The coastal and backwater fisheries is sustained by the rich nutrients and sediments brought down by the flowing rivers. The musings by fisher folk in coastal Kerala: 'The Sea begins in the mountains' and 'fertility of the coast and the plains depends on the wealth from the rivers', hold significance in this context.

Open dug wells and springs are the other important water resources being extensively used for irrigation and drinking water purposes in the Western Ghats region. In several places, water-harvesting structures dependent on rainwater are also used. In the Sigur plateau, numerous drinking water schemes dependent on the Moyar River are being operated for the tribal and dalit populations. Bore wells have made their entry in the recent past due to intensive irrigation patterns and lowering of water tables. As for Kerala, the groundwater potential is low when compared to other states and shallow dug wells are the most common source of freshwater. However, over the years the groundwater table is lowering at an alarming rate indicative of poor recharging capacity.

On the other hand, water needs for drinking water, energy, irrigation and industrial purposes are growing in the Western Ghats States. More and more water is being diverted even from irrigation dams to meet the thirst of the expanding urban spaces and for industries. We have examples of Siruvani, Kabini, Peechi and Malampuzha reservoirs across the Western Ghats where irrigation water is being diverted for drinking and for the industrial needs of cities in the midlands like Coimbatore, Bangalore and Mysore, Thrissur and Palakkad respectively. New dams are being planned and some of them are in different phases of construction in the Maharashtra Western Ghats to meet the expanding needs of Mumbai and its suburbs. Pinjal, Shai, Gargai, Kalu and Vaitarani dams are recent cases.

Water abstraction through check dams across hill streams is being practiced for decades by tea and coffee plantations in upstream catchments of rivers to meet their drinking and irrigation needs. This has resulted in cutting off the stream flows at their origin itself. Indiscriminate and unplanned tourism is another reason for increasing water abstraction and diversion. The tourism industry in Ooty depends on the reservoirs constructed across the tributaries of the Cauvery in the high mountains since the times of the British.

Studies reveal that east-flowing rivers like Krishna, Cauvery are struggling to reach the seas due to over abstraction of both surface and groundwater. Basins are closing and its impact is felt even on delta fishing, farming livelihoods and ecology. During the 2001–2004 drought years, the discharge from the Krishna to the ocean was almost nil! As for the west-flowing rivers, saline ingress is advancing even into the midlands due to reduced downstream flows. Crop losses and saline water intrusion into drinking water has been reported in Kerala during severe summer owing to salinity intrusion. In Goa, mining has affected groundwater and surface flows and drainage patterns of rivers impacting downstream needs and water quality. Tailings from mines are polluting streams and rivers. The Kudremukh mining issue is a classic case of mining-related pollution.

This mountain range has a long history of human interventions and each of these have directly or indirectly impacted upon the water resources availability and recharge in the region. Some of the important interventions and issues that have had lasting impacts on water resources and its management in the Western Ghats are briefly discussed below.

Issues of Concern

Forest destruction in the river catchments

Western Ghats has a long history of deforestation. Deforestation of upper catchments of rivers for timber, river valley projects and plantations has drastically reduced the capacity of the hill streams that feed into the rivers to hold and recharge water. Drying up of streams immediately after the monsoons and desiccation related to deforestation is clearly evident. This in turn has contributed to reduced summer flows.

River management in the Western Ghats

Most of the rivers in the Western Ghats are either dammed or diverted, some of them at several sites for power generation in the upper reaches and irrigation in the lower reaches. For instance, the east-flowing tributaries of Cauvery (Bhavani, Moyar, Kabani) and Krishna (Bhima, Tunga, Bhadra) are already dammed. The west-flowing shorter rivers (Sharavathi, Periyar) have been dammed at several places. We also have complete diversion of river flows at Mullaperiyar and Parambikulam dams involving Kerala and Tamil Nadu. West-flowing rivers have been virtually made into east-flowing rivers by violating all natural laws.

Dams are without dispute the most direct modifiers of river flows. They can heavily modify the magnitude (amount) of water flowing downstream, change the timing, frequency and duration of high and low flows and alter the natural rates at which rivers rise and fall during runoff events. Severe daily flow fluctuation between peak and off peak times below dams is commonplace in west-flowing dammed rivers. This has impacted drinking water schemes, major and minor irrigation projects operating in downstream areas apart from cutting off flood plains and impacting aquatic ecology and riparian systems. However very few studies are available that correlate the reservoir operations with the different types of downstream impacts and put measures in place for mitigation.

In the case of inter-basin water diversions, absolutely no natural flows or even 'minimum flows', leave alone environmental flows, are left below the dams. The Mullaperiyar dam is a classic case where the main tributary of Periyar has been completed diverted to the Vaigai basin in the east. Idukki dam does not even have a spillway for allowing monsoon spills into the river. In Maharashtra, the tail race discharges of Koyna Powerhouse I, II and III are released into the west-flowing Vashishthi River and lead to heavy floods in Chiplun. Continuous stretches of rivers have dried up irreparably below diversions affecting river ecology, surface flows and even ground water seepage.

Many of the reservoirs especially in the steep valleys are silting up prematurely due to the massive encroachment and deforestation of catchments consequent to dam construction. Idukki dam is a classic case wherein the entire catchment was encroached along with dam construction.

The operations of hydro electric stations (reservoir operations) are in tune with the power needs rather than the downstream water needs. Hence daily flow fluctuations created by peak and off peak operations of reservoirs in dammed rivers have led to upstream–downstream conflicts in many river basins. Similarly diversion of flows into another river basin after power generation is creating problems of daily flood in the recipient basin and drought in diverted basins. These are turning into management issues which need to be addressed at a basin level. However, there is a lack of systematic river basin level data on ecological changes due to hydrological alterations created by dams.

Incorrect land use patterns

Mining for mineral ores, granite and lateritic mining has affected water availability and recharge especially in the lower altitude regions and midlands. In Goa alone, the government itself has acknowledged that over half of the 300 odd mining leases are located close to water bodies. Data tabled in the Goa Assembly revealed that several of the 182 mining leases exist within one kilometer of a major irrigation project, the Selaulim dam, which provides drinking water to six lakh people in south Goa, virtually half the population of Goa (Ref:http://www.deccanherald.com/content/85522/182-mining-leases-goa-near.html).

In South Karnataka and North Kerala, *surangams*–a traditional irrigation system in lateritic hills is losing out to lateritic mining. Many of the rivers in this region originate from these lateritic hills and many of the Western Ghats Rivers like Chandragiri, Valapattanam, and Netravathi benefit from the water recharged by lateritic hills in their flow downstream.

Agricultural practices including cropping patterns have a role to play in water resource management in the Western Ghats. Planting steep slopes with soil-eroding monocu;ture crops like rubber and banana, and heavy tillage, has led to increased surface runoff along with loss of precious top soil. This has contributed to low seepage and infiltration into deeper soil depths. The deforestation for tea, coffee and cardamom plantations located at higher altitudes has contributed to drying up of hill streams.

Reclamation of high altitude valley swamps is contributing to water scarcity in the upper catchments. Many of the rivers originate from these swamps and are source of perennial flow. In the Nilgiris, most of the fertile water rich swamps have been converted for intensive pesticide-based farming, greenhouse farms, housing, etc.

Sand mining

Most of the rivers in Western Ghats are facing the consequences of indiscriminate sand mining. The lowering of water tables and deterioration of water quality are the immediate impacts. River beds in some stretches are lower than the sea level accelerating saline ingress. Drinking water scarcity is on the rise in river bank panchayats in spite of being close to the river. Plan funds are spent for providing drinking water even to panchayats on river banks. Sand mining has also impacted breeding and feeding grounds of fish and other aquatic species

Measures for Mitigation/Improvement

Time for river basin-level planning and decentralised management of water resources in the Western Ghats

As cited above, the impacts of incorrect land use and interventions are already evident. Reduced summer flows, flow fluctuations, lowering of water tables and degrading water quality are all direct impacts of the presently followed project-oriented, demand–supply based and *ad hoc* approach to water resource planning and management. The time is ripe for a paradigm shift in approach to river basin-level management of water resources where water is considered an integral part of the ecosystem. Some important measures that can be adopted in this regard are briefly detailed.

1. **Local self- government level decentralized water management plans** to be developed at least for the next 20 years: Water resource management plans with suitable watershed measures, afforestation, eco-restoration of catchments, rainwater recharging and harvesting, storm water drainage, water auditing, recycling and reuse etc. should be built into the plans. These water management plans should integrate into basin level management plans. The objective is to reduce the dependence on rivers and external sources and to improve recharge.
2. **Reschedule reservoir operations** in dammed rivers and regulate flows in rivers to improve downstream flows and also to act as a conflict resolution strategy. These should be implemented with an effective public monitoring system in place.
3. **Revive traditional water harvesting** systems like recharge wells, *surangams*, etc.

4. **Protect high altitude valley swamps** that are the origins of rivers from further reclamation and real estate or agricultural development and declare them as 'hotspots for community conservation'.
5. **Participatory sand auditing** and strict regulations to be put in place.
6. **Declare "sand holidays"** based on assessments and sand audits for mined river stretches. Items 5 and 6 would work to improve the water retention capacity in the river.
7. **Rehabilitation of mined areas** to be taken up by the companies / agencies with special focus on reviving the water resources like rivers, wells, tanks, etc. that have been destroyed by the mines.
8. Planters, local self-governments and Forest Departments in high altitude areas should come together **for eco-restoration of the forest fragments** between the tea and coffee estates and revive hill streams.
9. Take up **catchment area treatment plans** of hydro and major irrigation projects to improve their life span.
10. **Riparian management** can be taken up with community participation and involvement to improve river flows and water quality.
11. **Water conservation measures** should be adopted through suitable technology upgradation and public awareness programs.
12. **Reconnect children** and youth to rivers and water resources through basin level education programs.

Actionable points for the WGEA

The (proposed) Western Ghats Ecology Authority (WGEA) can take a strong recommendatory and advisory role in this regard. Some of the important recommendations for WGEA are:

1. Declare origins of rivers as Ecologically Sensitive Localities (ESLs) (the catchment area)
2. Many projects in the Western Ghats are on-going or completed with violations in environmental clearance and forest clearance or even no clearances at all, as in the case of the Kalu and Shai dams in Maharashtra. The WGEA should act as an additional layer for screening projects approved by the Expert Appraisal Committees (EACs), subject them to additional scrutiny in terms of the geographical context, ecological sensitivity, status of river basin and need for environmental flows taking into consideration all season flows instead of ad hoc allocations.
3. Till the WGEA comes into operation, issue a moratorium on all on-going projects like dams and mines that can impact upon water resources in a substantial way. The WGEA should subject the projects to scrutiny for mandatory clearances and compliances, and augment the level of public consultation before deciding on whether to allow them to progress or not.
4. No more inter-basin diversions of rivers shall be allowed in the Western Ghats.
5. Take up sample river basins in each state and recommend to the State Governments to carry out :

- Environment flow assessments involving social movements for river protection, research institutions, NGOs along with communities to put in place indicators for environmental flow assessment
- Assessment of downstream impacts of dams on river ecology, flood plains, fishing habitats, livelihoods, etc.
- Salinity intrusion mapping so as to suggest improved flows in future
- Improve reservoir operations management in dammed rivers to improve meeting of water needs of downstream populations. Put proper monitoring of reservoir operations in place involving downstream local self-governments and departments.
- Update and upgrade hydrological databases in rivers and consolidate the ecological database and information at river basin level
- Based on the consolidation of databases, declare high conservation value stretches of rivers as ESAs and keep them free them from further development.

6. Recommend to State Governments to take up decentralised bottom–up river basin planning with restoration built into the plans.
7. River Basin Planning should be supported by suitable legal institutions that are capable of integrating different departments which are presently dealing with or impacting on the rivers in a compartmentalized manner. Put in place river basin organizations adapted to the State's administrative context
8. All new projects in the Western Ghats (dams, mines, tourism, housing, etc. that impact upon water resources) should be subject to cumulative impact assessment and should not exceed the carrying capacity.
9. Stronger and stricter laws for regulation of sand mining to be developed
10. Recommend the decommissioning of dams that have outlived their utility, are underperforming, and have silted up beyond acceptable standards, etc.

Box 2: Kalu dam: Submission from Indavi Tulpule, Surekha Dalvi and Parineeta Dandekar

The Kalu dam site is situated in the ecologically sensitive Western Ghats region in the Tribal Sub Plan (TSP) area of Murbad Tehsil in Thane District of Maharashtra. This dam, with a storage capacity of 407.99 MCM will submerge an area of 2100 hectares, including about 1000 hectares of forest land.

The project does not have Forest Clearance nor has the process of land acquisition started. Despite this, M/s F.A. Enterprises, Khar, Mumbai (The contractor for this work and many other ongoing dams to supply water for industries and drinking in Mumbai) has already started the work under the monitoring of Sub Divisional Engineer, Hetawane Medium Projects Sub division no. 6, Vashind, District Thane,(Authority: Executive Engineer Raigad Irrigation Division No- 2, Konkan Bhavan, New Mumbai)

The work started by the contractor under the guidance of project authorities is entirely illegal and is causing massive damage to the invaluable ecology of the region as well as the livelihoods of the Adivasis.

Various Irregularities in Kalu Dam:

1. Although the project does not have Forest Clearance, work has already started on what they refer to as 'non-Forest Land' (which is forested Adivasi land). As per the Supreme Court Order, work on non-forest land cannot proceed without a clearance for forest lands for projects that require forest-land and non-forest land.
2. The project authorities claim that the contractor has undertaken only 'Ancillary' activities as they have yet to receive Forest Clearance. These Ancillary activities should include only temporary work. However, the contractor and Project proponents have already caused massive deforestation

and destructive excavations. Such destruction of forest without the Forest Clearance is also illegal and in violation of the FCA. Levelling work is on going with more than 30 dozers and 100 JCBS on the site, plying incessantly.

- A huge foundation excavation for the dam is on-going.
- A guest house for Project officers, staff and contractors has been constructed , which is a lavish structure fitted with AC and LCD TV sets
- Ironically, though the scope of 'Ancillary Works' include shelter for dam workers, at Kalu the workers and their children sleep in the river bed (which is dangerous and illegal), while the CRPF police force, installed at the site for months, reside in rooms.

3. The non forest land on which this excavation and levelling is continuing belongs to Adivasis. No legal process of acquisition has even been started regarding these or any other lands which need to be acquired for this project. **Since there have been no EIAs, no Environmental Clearance, no Public Hearing, the local peoples' voice is left unheard.**
4. The entire area to be submerged and affected by the Kalu Dam is a **Tribal Sub Plan Area (TSP)-Scheduled Area.** The provisions of PESA require informed consent from Gram Sabhas for this project. **No such consent has been given by any Gram Sabhas. Most of the Gram Sabhas have resolved to resist this project. Thus the on-going construction of this dam amounts to Violation of PESA.**
5. The submergence area of the Kalu Project includes about **1000 hectares of forest land**. The area is inhabited by Scheduled Tribes and other traditional Forest Dwellers who depend entirely on the forest land and resources for their bona fide livelihood needs. Many of these tribals and traditional Forest Dwellers have filed Individual Cultivation Rights claims under the 'Scheduled Tribes and other Traditional Dwellers (Recognition of Forest Rights) Act 2006 (FRA)'. Further, about 20–25 hamlets/ villages have their community forest rights in this forest in the form of food gathering, collection and sale of minor forest produce like bamboo, Mahua, mangoes, karwandas, tendu leaves, cashews, gum, firewood, etc. They also depend on this forest for herbal medicines. Most of these have not been documented or settled yet.
6. The 2006 FRA, Section 4, subsection 5 states: "No member of a forest dwelling scheduled tribes or other traditional forest dwelling communities shall be evicted or removed from forest land under his occupation till the recognition and verification process under this act is complete." Therefore the ongoing work on the Kalu dam is also a violation of the FRA.
7. The Katkari, Thakur and Mahadev Koli Tribes have more than 20 traditional worship places in this forest area and there are many sacred groves and trees associated with these places.
8. The lands and forests also act as grazing grounds for cattle and goats. Fish from the streams and river are an important source of protein for these tribals.
9. The project contractor has already clear felled thousands of trees near the dam site without seeking permission even from the Regional Forest Department. After repeated agitations by Shramik Mukti Sangathana, the local Forest officials confiscated one JCB, one Dumper and more than 3000 c. meter of Timber. But this is just a small fraction and the felling is continuing in the absence of any stringent action by the Forest Department, or any other Department.

Therefore, in order to protect ecologically invaluable forests and the basic human rights of some of the weakest citizens of our country, we urge you to immediately stop the illegal and unjust work at Kalu dam and inspect other such works on-going at the neighbouring Shai project site, Balaganga, and Poshir. We also urge that the EIA notification be changed to ensure that EIAs, Environment Clearance and Public Hearings are mandatory for all such dams, including Kalu and Shai dams. Lastly, we urge you to take action against those guilty of violations and ensure that such violations are not repeated.

2.2 Agriculture

The ecology of the Western Ghats has been subjected to enormous damages, often irreparable, from the time of shifting cultivation (*punam krishi*) of tribal and other indigenous communities since centuries to the current intensive monoculture of commercial crops such as tea, coffee, cardamom, rubber, pineapple, and timber plantations. Till the advent of the British, the culture of growing single crops was never heard of in the mountains. This was essentially because agriculture was meant for assuring food security and income generation

was achieved partly through the collection of various spices and other forest produce. This practice and concept underwent a major change since the last century by the introduction of tea, coffee and teak plantations initiated by the British and later supported by the Government of independent India. Various commodity Boards were established to support each crop, to expand their cultivation, production and marketing.

Issues of Concern

The expansion of commercial plantations in the Western Ghats has led to fragmentation of forest, soil erosion, degradation of river ecosystems and toxic contamination of the environment. The use of pesticides like DDT was started in the tea plantations during the British period itself. Of late, the quantity of toxic pesticides being pumped into the plantations is so huge that not only has it impacted the ecology and biodiversity of the Ghats, but has also made agriculture unsustainable. This was more evident in the late nineties when the price of commodities came down, largely due to the changing trade policies, leading to farmer suicides and closure of many plantations especially of tea. The economic uncertainty again led to destructive crop shifts, thus further adding to the problem. The introduction of water guzzling crops and varieties aggravated the problem. Most farmers have realized this. Environmental groups raised concerns and asked for more sustainable management practices. In recent years, scientists have also been raising the issue of soil erosion and environmental contamination.

One of the most crucial ecological issues of great concern is that degradation and contamination of soil and water in the upper reaches of the Ghats gets carried downstream leading to the degradation of midlands and coastal regions. Therefore, a policy shift is urgently warranted curtailing the environmentally disastrous practices and switching over to a more sustainable farming approach in the Western Ghats.

In order to accomplish this, the following major changes are to be brought into the current agriculture development in the whole of Western Ghats through a policy supporting the environment and integration of various State departments and other agencies working in the region. A separate strategy would be needed for large plantations and small farmers. Since commodity Boards play a major role in agriculture development in the Western Ghats and since they come under the Ministry of Commerce, a clear policy direction would be needed to support sustainable agriculture development in this region. Furthermore, it must be recognised that food security as usually measured by cereal consumption (wheat and rice) is not the same as nutritional security which requires the consumption of a diverse diet of many agricultural products. To put such a policy change in practice covering the entire Western Ghats, a coordinating agency with executive powers would be essential. The proposed Western Ghats Ecology Authority will be the best suited one for this task.

Measures for Mitigation/Improvement

1. **Landscape planning in select regions /locations:** Identify locations where planning can be done based on the landscape characteristics, treating each area as part of a larger landscape and integrating various cropping systems and other development into it.
2. **Shift from monoculture to polyculture/mixed cropping systems:** The large extent of monoculture plantations such as tea, coffee, and cardamom needs to integrate more indigenous crops, especially food crops and edible fruiting trees best suited to the locality, to help reduce soil erosion, improve water holding capacity of the soil, enhance productivity and, improve economic returns from unit area. Necessary policies need to

be formulated in each State to accommodate this unavoidable change. Implementing them will not be that difficult since most of the large plantations are in leased lands from the Government with specific conditions. Both private and public sector plantations should follow a polyculture/ agro-forestry approach. Government-owned plantations should set a model by taking the lead to bring in such a change for sustainability. Apart from this, each plantation has to set aside a percentage of its area, to be fixed, if need be, by a proper scientific assessment, for natural regeneration , especially near water sources.

3. **Encourage/Support ecological soil conservation measures in the Western Ghats**: The current approach of constructing stone pitched bunds in plantations and small farms needs to be abandoned and support be given for growing live hedges and soil and water binding crops.
4. **Discontinue the use of weedicides:** Of late, the use of weedicides in the Western Ghats has increased to such a large extent that they have become a menace to biodiversity, including many economically valuable species. Further, it has led to the emergence of more hardy weeds. Hence, there is an urgent need for restricting the use of weedicides in the Western Ghats and to progressively ban them according to their hazardous nature. One of the major reasons for going in for weedicides, according to farmers, is that they are more economical than employing manual labour or other mechanical methods. It is, therefore, important that Government subsidise labour for weed removal. One option is to provide MGNREGS support to small and marginal farmers and subsidies for mechanizing weed control in the large plantations.
5. **Phase out the use of insecticides and fungicides:** The need for curtailing the use of chemical pesticides and fungicides is of greater priority in the Western Ghats than elsewhere, as application of these "poisons" in the higher hills gets carried downstream polluting the entire wetland systems. Therefore, there has to be a coordinated programme and action plan for the entire Western Ghats to ease out the use of insecticides and fungicides within a period of 5-10 years in a phased manner and, bring in No Pesticide Management and organic practices for pest and disease control. The Organic Farming Policy of Kerala (Appendix 1) could be adopted as a model not only for the Western Ghats, but also for all the six States benefitted by the mountain system. Areas need to be selected on a priority basis for implementing the same. Plantations and farms lying adjacent to the forest areas and water sources have to be taken on priority and the programme integrated with the annual plan of the respective Panchayat. Financial and technical supports need to be provided to the farmers during the transition period.
6. **Encourage use of organic manures:** Use of chemical manure has not only killed the soil biota but also has even changed the soil structure affecting soil fertility in the Western Ghats. This leads to application of an increasing quantum of chemical fertilizers without any scientific basis. Since fertilizers demand more water, there is an increased and unsustainable exploitation of water resources in the Ghats affecting the entire ecology of the hills and downstream. Therefore there is an urgent need for evolving organic management practices. Supports/ subsidies need to be provided for practices such as on-farm development of organic manure, crop rotation, and raising green manure crops. Production of organic manure should be completely decentralized promoting production in the ward level. Self-help groups/ local entrepreneurs should be supported to set up units for the manufacture of organic farming material such as good quality organic manure, oil cakes, and bio-fertilizers so that good quality manure can be assured

on time. Large plantations should produce organic manure in their plantations themselves so that more employment can be generated along with ensuring application of organic manure.

7. **Financial support to organic farmers:** Yield loss in the first two to three years has to be compensated by the State. This could, probably, be done without causing much additional financial burden to the State, provided the subsidies and supports given to the agro-chemicals are diverted for supporting the organic and ecological framers. The whole organic farming programme has to be integrated with the annual programme of the Panchayat and provision given for it in the annual budget. At least 20% of agriculture and horticulture and 10% of plantation in each Panchayat should be converted into organic production every year, making food crops in the whole of the Western Ghats poison-free within the next five years and cash crops within the next 10 years.

8. **Selection of crops and varieties:** The current policy of introducing high yielding varieties and hybrids for improving productivity need to be revisited to accommodate ecological sustainability in management practices. Many of the crops and varieties in cultivation are highly water-intensive and also input-intensive. This has to be completely discouraged by identifying such crops and consequently developing crops and varieties which are less demanding. Local nurseries and seed banks of such crops need to be developed to meet the needs of the farmers. The basic approach for production in the Western Ghats should be for quality produce rather than just quantity and a separate strategy and network should be developed for marketing these good quality products. Value addition and local employment generation should be another strategy to generate more income and improve the local economy.

9. **Agro-biodiversity conservation and crop improvement:** It is quite indisputable that since the Green Revolution the country has lost many of its traditional local cultivars and other biodiversity elements in the agro-ecosystem. It is more so in the Western Ghats which has been the store house of diversity of most of the cultivated varieties of grains, vegetables, tubers, and fruits. Determined efforts need to be taken to identify, restore, protect and conserve the genetic resources in the farmers' field itself, even while developing *ex-situ* conservation centres also. A participatory plant breeding and crop improvement programme needs to be launched at the Panchayat level with farmers, including women, to restore traditional varieties and develop good varieties suitable for each locality. It may be noted that mountain ecosystems naturally have a diversity and local adaptability of cultivars and hence the seeds developed for the plains and other regions may not perform well in this area. Conserving locally adaptive varieties may also become extremely relevant in the context of climate change.

10. **Make the Western Ghats free of Genetically Modified crops, trees and animals:** The biodiversity of the Western Ghats, one of the biodiversity hot spots of the world, although not yet fully documented, has been the source of original genes responsible for the present day cultivars. It is therefore vital to conserve them and guard them from genetic contamination from unnatural sources such as GM crops and GM trees. Since genetic contamination of local varieties from GM crops is an established fact, no attempt should be allowed to introduce GM crops in the Western Ghats. Not even open field trials should be allowed. However, *Bt* cotton, the first genetically modified crop in the country, is being cultivated in some parts of the Western Ghats. Immediate action is called for to stop this practice and farmers involved should be supplied with non-*Bt* cotton seeds. They should also be encouraged to go the organic way and a separate

marketing channel opened up for cotton farmers in the Western Ghats. Attempts are being made to introduce GM trees such as GM rubber. This should never be allowed.

11. **Awareness building: A**wareness building among different sectors including consumers, traders, policy makers on a regular basis on the indispensability of sustainable agriculture development in the Western Ghats is a must to ensure larger social support for the implementation of various programmes. Various innovative methods have to be adopted for the same using the creative energy of local communities.
12. **Educating children about organic and ecological farming and their role in conserving the biodiversity of the Western Ghats:** The importance of the Western Ghats, especially its role as a source of water and as a genetic store house of cultivars, the need for conserving its biodiversity, the role of ecological agriculture in limiting the damage to the ecosystem, and such topics should be taught formally and informally in all the schools and other educational institutions in the Western Ghats states in the local languages.
13. **Forest corridors:** Plantations between the forest patches used by animals for movement should be abandoned and steps taken to gradually revert them back to forest where ever required.
14. **Forest patches within and along the streams in the plantation:** Forest patches within the plantations and the forest vegetation along the course of the streams and rivulets are to be protected as they are havens for biodiversity. Many endangered, endemic species have been reported from these "islands of biodiversity." Expansion of plantations into these areas should never be allowed.
15. **Community forestry:** Community forestry should be encouraged to help provide necessary manure, fodder for farming, fuel wood and other needs.
16. **Wildlife problems:** One of the major problems for farming in the Western Ghats is the destruction caused to it frequently by the wildlife. While farmers should be compensated for crop loss, change of crops unsuitable for wildlife may be considered. In the case of wild boar which is a menace to agriculture in many places, the only solution, probably, is to cull them under strict guidelines and make commercially viable value added products as cottage industry. While crop change may control the damage to certain extent in the case of herbivores, farming in forest cleared areas which were traditional migratory route of elephants may have to be abandoned. Farmers thus affected need to be adequately compensated.
17. **Marketing:** Strategies focusing on: (a) maximum profits to the farmers reducing the middlemen, (b) fixing premium prices, for produce resulting from conservation efforts as done for Costa Rican Coffee, (c) linking the products of organic practices in the Western Ghats to local and regional markets, (d) securing carbon credits for organic farmers and, (e) ensuring Government support for all these efforts should be developed and implemented under the overall supervision of the proposed Western Ghats Ecology Authority
18. **Tribal farming:** A separate strategy on priority for tribal farming to revive their traditional farming methods and culture, bringing back the traditional cultivars and food culture needs to be developed.
19. **Research:** Research related to agriculture and horticulture in the Western Ghats region should give priority for restoration of traditional cultivars, and developing locally

suitable, low cost organic farming technologies and practices. Local educational and research institutions should be encouraged to take up research projects to help farmers shift from non-organic methods to organic agriculture.

These are some of the ways forward for protecting the natural, cultural and social foundations of the Western Ghats and ensuring the integrity of this unique mountain system.

2.3 Animal Husbandry

Livestock, mostly cattle, goats, sheep and poultry rearing is a major livelihood activity in the Western Ghats. Cattle rearing is for milk, agriculture (for manure and for ploughs), and transport; sheep and goat for meat and income from sale and manure; and poultry mostly for consumption and sale. Several well-defined livestock breeds well adapted to the local conditions have been bred in this region. However, there has been a declining trend in the indigenous livestock populations in contrast to a marked increase in crossbred cattle due to introduction of exotic breeds as part of the livestock development programmes of the Government resulting in more damage than benefit to the livestock keepers.

Karnataka is one of the few states, which has collected information on breeds of sheep, goat and pigs, besides cattle and buffaloes. The state has a crossbred cattle population of 16 lakhs along with a population of 2,000 exotic cattle. This comes to about 17% of the total cattle population of the state. The state has reported information on the different breeds of indigenous cattle, namely Hallikar, Amruthamahal, Khilaar, Deoni, Malanadu Gidda (a well adapted local breed of the Western Ghats) and Krishna Valley breeds. The prevalence of various buffalo breeds, namely Murrah, Surthi, Pandarpuri, and Mehasaani has been reported in Karnataka. Merino, Rambouillet and Corriedale are some of the exotic breeds of sheep found in the state. A variety of different indigenous breeds of sheep, namely Bannur, Deccani, Bellary and Hassan are found in Karnataka. The population of around 20,000 crossbred pigs in Karnataka consists mainly of Landrace and Yorkshire breeds.

Local breeds of cattle found in the Kollegal-Satyamangalam range of the Western Ghats (Karnataka and Tamilnadu) comprise the Konga, Karagu Batta, Hasur Batta and Gujjamavu types and the communities rearing them are the Kampaliga and Soliga Tribes.

According to the 2003 census, Karnataka had 5.15 % of cattle, 4.08 % of buffaloes, 11.8 % of sheep, 3.61 % of goats, 2.31 % of pigs and 5.23 % of the poultry population of the country. In Karnataka, crossbred cattle increased by 23.9 percent but indigenous cattle decreased by 16.80 %, in the period between 1997 and 2003. The buffalo population has also decreased by 8.6 %, the population of sheep, goats and pigs have decreased by 9.3 %, 8.02 %, and 22.96 % respectively during the period. The total livestock in the state has decreased from 29.57 million (1992 census) to 28.526 million (1997 census) and 25.621 million (2003 census) in the last three censuses.

Kerala: Two distinct cattle breeds, namely Vechur (almost extinct) and Kasergode Dwarf; the Malabar goat breed, the Naked Neck poultry breed and several other non-descript breeds are being reared in Kerala.

Crossbreeds are introduced on a large scale by the Government for promoting dairy farming. Indigenous cattle breeds were not considered for cross breeding programmes. Instead the exotic Jersey and Holstein-Friesian (HF) breeds were introduced. Waynaad district tribals constitute 42% of the population. Now this district is also the highest producer of milk which was not a traditional enterprise. In the last two decades, a drastic

decline in all types of livestock and poultry population was noticed. The reasons for the decline are scarcity of low cost and quality fodder, rapid increase in the cost of feed and indiscriminate slaughter of local breeds of animals for meat. Farmers' preferences have also changed from local breeds to crossbreeds because of the promotion of dairy farming and of milk breeds by the Government. Further, replacement of the diversified inter-cropping agriculture system, as elsewhere, by mono-culture and commercial crops, and the resultant replacement of the great indigenous genetic agro-diversity by a narrow genetic range has lead to a huge scarcity of food and fodder for animals in the form of crop residues.

Tamil Nadu: The major local breeds in Tamil Nadu are Kangayam cattle, Thoda buffalo (Nilgiris), Mecheri sheep (Erode), and Coimbatore sheep. Although the Kangayam cattle conform largely to the Southern Indian Mysore type, studies show evidences of the Gray-White Ongole cattle traits in their genetic composition. Possibly this mixture has given the breed its larger size in comparison with other cattle of the Mysore type. These cattle are bred in the southern and southeastern area of the Coimbatore district of Tamil Nadu. There are two varieties of Kangayam cattle, one small and the other large. The smaller variety is more numerous in the Kangayam, Dharampuram, Udmalpet, Pollachi, Paddadam and Erode subdivisions, while the larger variety occurs mostly in the areas of Karur, Aravakurchi and Dindigul subdivisions. The breed is found in its pure form in the herds of some large breeders, notably the Pattagar of Palayamkottai, who are supposed to have one of the best herds of the breed in the country. Kangayam cattle are of moderate size, active and powerful, and are highly priced animals. The cows are generally poor milk yielders but there are exceptions.

In Tamil Nadu, crossbred cattle increased by 46.61 % while indigenous varieties decreased by 27.79 % between 1997 and 2003. The buffalo population has decreased heavily by 39.51 % while sheep and goat populations increased by 6.35 % and 27.45 % respectively. The pig population has decreased by 47.29 % in the State.

Maharashtra: Cattle, sheep, goat and poultry are the livestock reared in the Maharashtra Western Ghats. Dangi Cattle is an endangered breed that takes its name from the hilly track of the Dangs adjoining Gujarat and is found in the eastern hill slopes, characterized by dry deciduous forests, of the Western Ghats hill ranges of Nasik and Igatpuri. Mansoli, the Naked Neck poultry breed is found on the western Konkan coastal regions which are hilly with very high rainfall. There are several other livestock breeds which are locally reared and suitable to the local conditions.

Issues of Concern

Plant diversity of the Western Ghats and livestock rearing

The rich biodiversity of the Western Ghats (plants and crops) has been a major source of fodder, medicinal plants and crop residues. Adivasi communities and the local communities living in the forest and hilly areas are those who were conserving livestock breeds with specific traits suitable to local environments and local production systems. The adivasi communities are mostly dependent on forest herbs for treating their animals and these communities possess a huge wealth of traditional healing knowledge which is being passed on from generation to generation (e.g. Bedekampaliga, Soliga, Kani, Muluvakuruvar, and Katunayaka communities).

The local breeds of livestock reared in these areas were well adapted to the local topographic and environmental conditions. The introduction of exotic crossbreeds has disturbed the

entire production systems and the traditional knowledge on feeding and healing is being eroded. The crossbreeds require more concentrates and roughage than the indigenous breeds and are often attacked by contagious diseases. Thus the cost of feeding and management of livestock has increased and has become a burden for livestock keepers.

Grazing issues in the Western Ghats

The traditional pattern of animal rearing in the Western Ghats areas consists of keeping herds of indigenous cattle which depend totally on community and forest grazing land.

One of the major challenges being faced by the cattle keepers in recent years is the conversion of grasslands and degraded lands for various plantations, e.g. biofuel plantations, and other activities under government programmes thereby reducing the grazing land.

The increased population and the rapid decline of forest and community grazing lands compelled the farmers to switch over to smaller animals like goats which has aggravated the damage to already diminished grazing lands since goats are aggressive browsers.

The shift or change in agricultural practices such as raising more cash crops compared to food crops in turn has also affected quality fodder production.

The uncontrolled usage of weedicides in cash crops has caused the naturally available grass varieties to perish and has thus made the recommended practice of stall feeding difficult.

The decision by tea estate managements not to allow their labourers to rear cattle in the uncultivated areas of the estates has also made cattle keeping unattractive

The strict policy of the Forest Department of Tamil Nadu which has imposed a total ban on grazing of goats inside the forests, although well intended for the conservation of forests, has thrown a difficult challenge to goat farming. Alternative sources may have to be worked out so that the local communities dependent on goat farming will not be affected.

Measures for Mitigation/Improvement

Sustainable strategy of livestock development for the Western Ghats

Animal breeds and their selection

Since the milk production status of indigenous animals will not fall within the economically profitable range, support needs to be given to farmers willing to keep indigenous cattle. A special priced marketing system for their organic products should be established, and financial assistance for conserving an indigenous species is to be provided. Financial assistance should be determined according to the degree of ecological richness that they bring back to the area. Only those breeds which can withstand the adverse agro-climatic conditions must be encouraged in these areas. Such protection of indigenous locally adapted breeds has great significance in the context of climate change since depending on climate shifts suitably adapted breeds will be available across the Western Ghats spectrum. If farmers cannot afford to keep exotics or crossbreds, these must not be introduced as they only lay further stress on the farmers and their households. There are groups working on the improvement of indigenous cattle in this region. Recognise and support such groups for the sustainable development of animal husbandry in the Western Ghats

Animal nutrition – Feeding and grazing

Improving the fodder and vegetation resources

Attempts should be made to restore community grasslands and forest grazing lands outside the Protected Areas. Unused public land may be converted to fodder cultivating lands, the work force for which could be managed from the MGNREGP or similar on-going projects.

Systems of rotational grazing and grazing management have to be developed at the village level to prevent over exploitation of resources, help resource regeneration, and also to meet the needs of different communities.

Village communities should be supported to plan their fodder requirements and to adopt suitable methods by which fodder can be grown and managed. Importance must be given to varied fodder trees, grasses, forbs and shrubs and their protection.

Improved systems of storing fodder for scarcity periods especially in the case of grasses also have to be encouraged.

Goat-rearing projects should consider local browsing areas and should not be dependent on forest areas. Cultivation of fodder plants should be a major component in such projects. Stall feeding of goats should be encouraged in areas where the ecological situation is very fragile and where goat-based livelihood needs to be protected.

A second crop of fodder in paddy fields using residual moisture is advisable.

Application of weedicides in cash crop areas alongside roads must be prohibited, since almost all plants classified as weeds are in fact rich cattle fodder, and much livestock grazing occurs along roadsides.

Grazing restrictions imposed on the grounds of forest conservation should be revisited in such a way that traditional culture and ways of life of local communities are not affected while protecting the regeneration of forest plant species.

Commercial dairy farming

Animal husbandry practices must be integrated with other agriculture activities for sustainability; therefore an integrated approach involving allied sectors is important in planning animal husbandry activities.

Since agriculture in the Western Ghats is proposed to be totally organic, animal husbandry has a vital role to play. The rejuvenation process of the over-exploited land itself would, certainly, require large quantities of organic matter. The only sustainable source for this is cattle rearing.

Since milk production is an important sector, assistance such as veterinary facilities, animal health surveillance, and feed subsidies may be provided to progress largely towards stall-fed cattle. Good cattle sheds and scientific practices must be provided to the farmers.

Instead of larger dairy farming units, mini-dairy units with 3–4 cattle many be encouraged, particularly for women self-help groups.

An integrated approach of cultivating paddy, millets, legumes and other food crops which besides providing nutritional security to the farmer's household in turn would also supply enough fodder for the stall-fed group of cattle should be encouraged and financially assisted.

Every household in the Western Ghats area having two dairy animals may be financially assisted to build biogas plants which will not only improve their living conditions but also help reduce the dependence on firewood to some extent. Moreover, the slurry from the biogas plant could be used as manure. This may also be thought of at a village level where larger biogas plants could be maintained.

Convert tea estates to organic production with the integration of animal husbandry

Since tea estates occupy large land holdings in the southern Western Ghats and since there is a heavy demand for organic tea internationally, attempts should be made to integrate animal husbandry with tea cultivation. Unused land in tea estates could be used for stall fed cattle rearing and the organic manure thus produced used for tea plantation.

Earlier, tea estate labourers reared cattle within the estates, a practice which has been recently disallowed by the management. This practice can be restored and strengthened. The manure produced may be used as fertilizer for the plantation, thus achieving the production of organic tea and organically produced milk simultaneously

Use of weedicides in tea plantations must be completely stopped.

Animal health

Livestock in the Western Ghats region is prone to a number of diseases. In view of the limited veterinary services available, the animal husbandry department should extend veterinary services to these livestock especially preventive measures such as regular vaccinations and de-worming for controlling diseases. It would be ideal if every village had its own animal health worker who was trained in giving vaccinations, first aid, elements of traditional veterinary practices, ethnoveterinary medicine using locally available plants, as well as dealing with veterinary emergencies.

Cultivation of medicinal plants

Plants with medicinal properties have been used traditionally for treating domestic animals. However, several important naturally occurring medicinal plants in the Western Ghats are being over-exploited and have become locally extinct or rare.

These plants should be grown on a large scale, even in the backyard of every tribal hut and other settlements. It would, therefore, be advisable to start nurseries for medicinal plants as well as medicine making units at the Panchayat level which should run on a cooperative basis. These medicines would then make the local communities less dependent on distant health services for themselves as well as for their cattle.

Educating and sensitizing school students about animal husbandry

It is important to educate students about their domestic and local livestock diversity, and the need for preserving and restoring it considering the crucial role that these animals play in the sustainable development of the area. "Exploring our environment: a manual for green schools" produced by Bharati Vidyapeeth Institute of Environment Education, Pune, is an excellent example of a document that also emphasises local livestock breeds.

Marketing livestock produce.

Wherever marketing is a problem, all animal-derived products need to be processed into non-perishable forms. Value addition into products which are of low bulk but command a good price is necessary. The earlier practice of converting surplus milk into ghee and khoya

needs to be revived. It is also possible to experiment with new products such as cheese and yoghurt. However, care must be taken to ensure high degree quality control in the products derived so that they could command premium prices.

2.4 Fisheries

Depletion of the fishery resources is a serious issue in the Western Ghats region. Compared to marine fish resources / biodiversity, the freshwater fish diversity is on the decline due to various reasons. Traditionally the conservation and management of fishery resources were vested with local communities, but this has now been altered. Several innovative measures are required to revive this highly valued resource and to use it in a sustainable manner on account of its relevance in livelihood improvement and food security. There is a need to re-address these issues with the fisheries department and other impacting sectors to reorient conservation measures in a participatory mode. Furthermore, local fish consumption has been a traditional source of protein for local people from time immemorial.

Issues of Concern

- Habitat loss, including loss of mangroves
- Pollution due to pesticides, industrial effluents/other sources
- Waste dumping in rivers
- Improper river maintenance and management
- Unscientific methods of collection (use of poisons, electro-fishing, dynamiting etc.)
- Impoundments in rivers, check dams
- Introduction of exotic fishes
- Destruction/loss of breeding grounds
- Fish diseases
- Over-exploitation
- Unauthorised ornamental fish trade
- Sand mining
- Excessive tourism activities in freshwater lakes
- Decline of indigenous species due to introduction of exotic and alien fishes species

Examples from Kerala

In Periyar Lake, which is well known as one of the biodiversity hotspots of Kerala, exotic species such as *Cyprinus carpio* have already established breeding populations and contribute more than 70 percent of the exploited stock. A high percentage of diet overlap exists between native fish species like *Tor khudree*, *Gonoproktopterus curmuca*, *Lepidopygopsis typus* and exotic species like tilapia *(Oreochromis mossambicus)* and common carp *(Cyprinus carpio).* There are established populations of tilapia in almost all rivers of Kerala. The exotic high-yielding African catfish (*Clarias gariepinus)* is another potential danger to indigenous species. Alien species such as catla (*Catla catla*), rohu *(Laboe rohita)* and mrigal *(Cyrrhinus mrigala)* have been cultured in most of the reservoirs and ponds of Kerala and this has led to a gradual reduction of the endemic fish populations in these water bodies.

Water quality

Agriculture in the catchment areas has aggravated water pollution by the application of chemical pesticides. Industries discharge effluents containing heavy metals such as mercury, zinc and cadmium above the permitted level; this has resulted in mortality of fishes in the major rivers. The ammonia content of effluents discharged into the rivers is also above permissible limits.

Pollutants such as acids, alkalis, fluorides and radioactive materials were detected in the effluent waters of industries in the Cochin area as a result of which the Eloor-Varappuzha areas of the Cochin backwaters are being transformed into a barren contaminated zone.

Measures for Mitigation/Improvement

- Regular monitoring of fish wealth to assess the health/ diversity of the fish population.
- Banning the use of plastics which settle at the bottom of water bodies and lakes and affect breeding of some species.
- Management measures aimed at conserving freshwater fish biodiversity to be incorporated into the fishery policy.
- The database on population size and geographical distribution of endangered and endemic species should be strengthened by undertaking extensive micro-geographical surveys. Information on area of distribution and micro-geographical characteristics of the habitats of these ecologically sensitive fishes will be inputs for establishment of aquatic reserves for the conservation of these species.
- Information regarding migration, breeding behaviour and spawning grounds of threatened fishes should be generated through extensive surveys and analysis. Such a database is essential for both ex situ and in situ conservation of the species.
- Techniques should be developed for the captive breeding and broodstock development of fishes of potential economic importance.
- Broodstock maintenance centres and hatcheries should be established exclusively for indigenous, endangered and critically endangered fishes for their in situ conservation and aqua ranching as a substitute for their natural recruitment.
- Investigation on the invasive nature of exotic species in the natural habitats should be carried out. The functioning of the committee constituted under the Government of India to quarantine and control introduction of exotic species should be made more effective and foolproof.
- Strict vigilance and monitoring, including enforcement of laws, to be ensured to reduce the loss of the natural breeding grounds of the fishes arising from reclamation of paddy and wetlands.
- Strengthen awareness programmes to ensure the sustainability and survival of fish resources.
- Regulation on fishing, during breeding seasons in freshwater environs to restore natural/ wild stock
- Establishment of fish sanctuaries

- Sand mining and other activities which destroy the habitat of many endemic fishes to be restricted.
- Live-fencing using native plant species instead of stone walls to be encouraged for protecting river banks.
- River Management Funds to be utilised for activities related to river health programmes and not for construction or other developmental activities.
- Regulation of ornamental fish collection from the wild.

Box 3: Vaitarana Fish Sanctuary (Maharashtra): Parineeta Dandekar, 22 May 2011 (communicated to Madhav Gadgil)

When on a field visit to dams in the Vaitarna and surrounding basins, I came across a beautiful fish sanctuary in the Tilase village of Wada Taluka in Thane District and thought this might be of interest to you.

The site is downstream of the upper Vaitarna Dam and is predominantly a ravine in hard rock. On the banks of this stretch is the Mandikeshwar Shiv Temple. The area on the adjoining bank has deep pools with perennial water availability and there is a wonderful congregation of Deccan Mahseer here.

The fish are not accustomed to being fed much and do not leap out like the fish at Shringeri or Chipplagudde, but the size of these Mahseer is definitely bigger than their counterparts in Tunga.

There is a fishing ban in this stretch and when I suggested looking closely at the fish, I was told that they are sacred and do not get caught in nets/ hooks.

However, activities like washing clothes and utensils do take place at the very same spot.

I was told that there was a major fish kill some five years ago when water from the upstream reservoir was not released for an extended period.

Now, there is one more reservoir, the Middle Vaitarna, the tallest dam in Maharashtra, coming up just upstream of this region, between this site and the original Upper Vaitarna Dam.

Action points for Western Ghats Ecological Authority

- The various polices and legal measures available have to be coordinated and implemented through user agencies at both Central and State governments to achieve desired effects on conservation of freshwater fishes.
- Appropriate measures need to be evolved to prevent illegal conversion and encroachment on water bodies.

2.5 Forests and Biodiversity

Our nation is evidently at a crossroads today, 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 scepticism". Professor Satish Dhawan, who served as Secretary, Space Department of Government of India from 1972–1980 was such a true scientist. He was very skeptical of the claims of the forestry establishment that as much as 23% of the country's land was under forest cover. So he asked his colleagues in the Space Department to undertake an independent assessment with the help of satellite imagery. Their estimate was far lower at 14%. This stimulated a healthy dispute leading to a so-called reconciliation at

19%. Unfortunately, the sceptical spirit was buried with the handing over of the job of the continuous monitoring of forest cover, with the help of satellite imagery, to the Forest Survey of India, an agency of the forestry establishment itself, and naturally unable to act independently.

Another pithy statement about what constitutes the scientific spirit comes from the mathematician-philosopher Whitehead (1927): "Modern science accepts brute facts, whether reasonable or not!" One such set of brute facts relates to the existence of paper tigers. When tigers were no more being sighted at Sariska, despite the official claims that many existed, the Prime Minister 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 4 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.

Issues of Concern

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 a solid bedrock of empirical facts. An important weakness of so-called scientific forestry is the lack or poor quality of its database, as the two examples cited above make abundantly clear.

In the 1960's the Forestry establishment decided to abandon the "cautious" approach of conservation forestry and to 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. Some of the very best of the Western Ghats natural forest was clearcut, on the supposition that the new plantations of *Eucalyptus* would annually produce a 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 the Western Ghats of Kerala and Karnataka 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 (Gadgil and Prasad 1978, Prasad and Gadgil 1981). Scientific management also calls for knowledge of growth patterns 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 the 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 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 these and correct them. It would also try to bring on board all interested parties, technical experts, as well as other stakeholders from civil society, in an 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* (Wesley, 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 (FAO, 1984). 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 was to convert it into a "clearfelling circle" and to completely liquidate all tree growth, replacing it by monoculture plantations. At the same time, part of the hill slope "protection circle" that was supposed to be perpetually left untouched, was brought under the 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. This is a classic example of the process of sequential overexploitation.

Sequential overexploitation

Indeed, India's forest resources have been continually subjected to such 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 (West Coast Paper Mill) 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 [Madhav Gadgil:MG] from the pre-RTI era, at a meeting in the 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 the general public. In the early 1980s, MG 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, MG could access and study them at the Commonwealth Forestry Institute at Oxford. When the proposal to clearfell large tracts of natural sal forests of Bastar and plant them up with tropical pine was opposed by many tribal groups, MG 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 (Gadgil, M., Prasad, S.N. and Rauf Ali 1983)

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 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 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 the 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 into Karnataka. The Karnataka Forest Department promptly 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, while those of Halakar and Muroor-Kallabbe appealed the order. The people of Halakar finally won their 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. (Box 4)

Box 4: 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 Perambukkanal 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, Perambukkanal 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 a few careful studies. One such is Somanathan's work on relative efficiency 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 resources from 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, MG 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. Similarly some 2 crore families in India live in the forest vicinity. If they pay an average of even Rs. 1000 per year, this amounts to an underground economy of 2 billion rupees, firmly rooted 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 coupled 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 industrial and urban interests. We have made available to the plywood industry for as little as sixty rupees, giant wild mango trees which yielded fruit famous for pickles worth hundreds of rupees every year. Such perverse incentives have destroyed people's motivation for guarding nature.

Fortunately the tide is turning. Joint Forest Management (JFM), Extension of Panchayati Raj to Scheduled Areas (PESA), Protection of Plant Variety and Farmers' Rights Act (PPVRFA), 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 Mahatma Gandhi 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 a 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 the last six decades of 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.
- Due to developmental projects whenever roads reached earlier inaccessible forest areas, there ensued large-scale felling of state forests.
- Forest-based industries, to which were made available bamboo, or huge trees for pulpwood at throw away prices, promptly exhausted these resources.
- Forest Development Corporations turned themselves into (in the 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 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 into 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 into the corrupt system.

- All over the country, keystone ecological resources like peepal, banyan, gular trees survive in good numbers.
- Even today we are discovering new flowering plant species like *Kuntsleria keralense* in sacred groves protected by people in thickly populated coastal Kerala.
- Monkeys and peafowl still survive in many parts of our country.
- Numbers of chinkaras, blackbuck, and nilgai are actually on the increase.
- People play a leading role in arresting poachers of animals like blackbuck.
- In many parts of Rajasthan people are protecting community forest resources such as "Orans".
- In Nagaland many community forests are under good management.
- Many Van Panchayats of Uttaranchal are managing forest recourses prudently.
- Many village communities of the Central Indian belt are managing well forest resources over which they earlier enjoyed nistar rights.
- Villages like Halakar in Karnataka are still preserving village forests 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 forests 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 they 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. It is therefore imperative that we strive to implement not only the letter, but also the spirit of pro-people legislations such as Joint Forest Management (JFM), Extension of Panchayati Raj to Scheduled Areas (PESA), Protection of Plant Variety and Farmers' Rights Act (PPVRFA), Biological Diversity Act (BDA), and the Scheduled Tribes and other Traditional Forest Dwellers (Rights over the Forest) Act (FRA).

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 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 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, (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 5: JFPM – An experience from the Western Ghats

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

There was great resistance by other FD officers to this process because they felt they would lose their power/control. Because of the commitment of these two officers more than 100 VFCs were formed in Kundapura Division. However, the adjacent Mangalore Division formed 25 VFCs under great pressure, ignoring NGOs/NST but involving timber merchants. Subsequently all these VFCs functioned just under FD without any people's participation.

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

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 had explicitly de-prioritized revenue generation as an objective. It gave a clear incentive for participatory forestry, and recommended creating a massive people's movement with the involvement of women for achieving the 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 schemes for regenerating degraded forests.

The JFM experiment has generated many positive outcomes in different locations, but there are limitations also. The 'jointness' in JFM is seriously limited in the field, with day-to-day decisions being controlled by the forest official who is usually the 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, i.e. capture of resources by a few in the village. This problem bedevils 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 to reverse this situation since 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, and make JFM more democratic and participatory, giving highest priority to the livelihood needs of the poorest.

Livelihood support through minor forest products (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 in 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 Andhra Pradesh and Madhya Pradesh seems to be for timber, and hence only one shoot is allowed to grow. Since sal coppices well, degraded forests and hills close to a village should be managed under a coppice or a coppice-with-standards system for fuelwood and sal leaves.

Sensitising the forest service

Since both FRA and JFM mandate close collaboration between foresters and local forest dwellers, the need for a sensitive and responsive Forest Department cannot be over-emphasized. Unfortunately, the internal culture of the Forest Department has continued to be hierarchical and authoritarian, and not participative. A paradigm shift in its outlook can be achieved by good training modules at the Indira Gandhi National Forest Academy (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 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 people's 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.

Box 6: Note on FRA Implementation for Kadars, a Primitive Tribal Group, in Vazhachal Forest Division

1. *While the Kadars constitute a Primitive Tribal Group (PTG), their community or habitat rights have not been discussed or established.*
2. *The Forest Rights Committee (FRC) for each settlement was selected without following the rules and not through the gramsabha.*
3. *There is a minimal level of awareness among the Kadars or tribal promoters supporters or the Tribal Department and the Forest Department on the nuances of the Forest Rights Act and the Rules or its significance and implications.*
4. *There is lack of co-ordination between the concerned departments regarding effective implementation.*
5. *Training programs for creating awareness seem to have been either not carried out properly or have not percolated down to the lowest appropriate level.*

JH Hutton (1946) stresses the importance of the Kadar tribes in his seminal book , 'Caste in India: Its Nature, Function and Origin' 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 the 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 wildlife and the flowing river for fish, collecting tubers, 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 area projected to be seriously impacted by the proposed Athirappilly Hydroelectric Project. In turn much of their original forest habitat has been destroyed and has become degraded. Presently two of these settlements in the proposed impact area are trying to make a living with the help of Vana Samrakshana Samithi activities under the Kerala Forest Department.

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

Except for very few, most of the Kadars at Pokalapara and Vazhachal Settlements are not aware of the FRA and its implications. The two or three persons within the tribe who know about the Act are only aware that such an Act exists and that it is for 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 claims can be made at the FRC. Hence the basic premise of the rights establishment as claimed by the Tribal Department officials is flawed. Since they are a PTG, they should have been made aware of sections a, c, d, e, i, j, k, and l by the Sub-Divisional Level Committee (SDLC) as per 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 8 to 10 acres of land by the Tribal Department and file their 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 involving gramasabhas. In the first meeting itself, the tribal department formed FRCs without taking serious efforts to enlighten the tribes on details of the Act. During the selection of FRC members, they said that there would be training programs for these selected members. However, the Kadars 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 the gramsabha process. They never mentioned the community rights that are specified in the law. They asked the tribes to claim some forest land and they promised to give them 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 instructions of the Tribal Department, every family claimed 8 to 10 acres near their settlements. The filled claim forms were submitted in the panchayat and were then transferred to the Tribal Department. The Revenue Department started a survey in each colony without informing the FRC members of the settlements, so that disputes occurred in some colonies

while a survey.

The Forest Department was not involved in any crucial steps of the implementation process. As per the Act, the gramsabha should be given guidance from the SDLC. The first SDLC meeting was convened only after the selection of FRC members and filing of claim 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 SDLC 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 the 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 benefits of these training programmes have not reached the tribes.

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

As it stands now, individual rights over the forest land on which the Kadars are presently living in settlements seems to have been somehow established by record. However, as revealed from the 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 in other Kadar settlements in the Division.

Biodiversity

Over millennia, Indian society has evolved a variety of biodiversity-friendly practices. Thanks to these traditions, pristine patches of vegetation persist in the form of sacred groves over much of the Western Ghats, a myriad banyan and peepal trees dot the countryside, while thousands of troops of langurs and macaques roam freely in towns and villages. The Indian lion survives in the Gir National Park, protected against heavy odds by the Nawab of Junagarh in what was once a princely hunting preserve. Today India has a well-dispersed network of Wildlife Sanctuaries, National Parks and Biosphere Reserves, covering over 4 percent of the land surface. This is indeed a most creditable performance in an old, densely settled country (Gadgil 1991).

But the current state-sponsored approach to biodiversity conservation is evidently under serious strain (Singh 1995). As a major conservation measure, it has tended to focus on the elimination of subsistence demands of local communities, a focus that has brought in its wake serious conflicts. It has attempted to divorce conservation from development, and is today facing the threat of opening up large tracts of nature reserves to mining and other exploitative development (Nambiar 1993). It has paid little attention to the significant levels of biodiversity in areas outside nature reserves, whether it is in wetlands or on farm bunds. It has completely ignored issues such as *in situ* conservation of land races of husbanded plants and animals. Finally, it has treated with contempt folk practices like sacred groves, as well as extensive practical ecological knowledge of large numbers of Indians living close to the earth.

Problems of tight control over Protected Areas

There is a wide-spread belief amongst urban conservation activists, endorsed whole heartedly 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. WGEA should therefore focus on promoting proper implementation of the Forest Rights Act which confers on forest dwellers certain rights and responsibilities inside Wildlife Sanctuaries and National Parks also.

Box 7: The tragic blunder of Bharatpur

Unfortunately, even as knowledgeable a scientist as Dr. Salim Ali subscribed to this perspective without examining the issues in depth. The Bharatpur wetland, famous for 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 the 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 the 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 buffaloes were keeping a water-loving grass *Paspalum* under control. 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 also started to decline. 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 the villagers were digging for khus roots. Since this collection regime was stopped on declaration of the National Park, the soil was compacted reducing the access of the cranes to this food. This is a plausible hypothesis worth further exploration (Gadgil et al 2000).

Box 8: Biligiri Rangaswamy 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 the BRT hills in Mysore district of Karnataka. At the same time, local people have constantly argued for the re-introduction of customary practices that protected 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, disenchanted local people align with timber and poaching mafias to gain some reward from the forest, which they have been denied through a 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 diversion of forests

One of the most beneficial outcomes of the FRA for conservation is that it is slowing down the diversion 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 for mines, dams, and major development projects and therefore require their rights under the FRA to be settled, has posed a huge hurdle to the till now speedy clearance of projects. The 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 the case of Biligiri Rangaswamy Temple Wildlife Sanctuary 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 sabhas 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 sabh*a* 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 of 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 noted 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. The case study 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 (NTFP) 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 the 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 Soligas 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 customarily managed the 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 an increased density of lantana. Another observation by the Soligas is regarding the increased spread of hemiparasites on amla trees resulting in the mortality of adult trees. They suggest that hemiparasites 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 hemiparasites are killing adult trees. Soligas have thus highlighted the intricate interactions between fire, hemi-parasites and tree mortality. The cessation of traditional practices 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 condition than they are 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 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. *Yelles* are thus *kula*-specific boundaries within which forest areas have been named. making it possible for Soligas to orally demarcate the boundary of each *yelle*. Mapping has revealed that the entire forest area within the sanctuary is comprised of 46 *yelles.* The 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 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 an 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 minsters and bureaucrats in 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 the Soligas 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 NTFPs 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 an exclusionary conservation policy and the denying of rights under the FRA are fueling resentment towards the state forest department, the forests and wildlife.

Measures for Mitigation/Improvement

- Monitoring and strict compliance of existing Acts and Rules, laws and legal measures by Forest and Wildlife, Revenue Departments.
- Participatory approach; JFM activities to be suitably improved to get the desired results; LSGs/NGOs and other self-help groups to be involved in conservation activities, especially in areas outside the PAs
- Promote social security forest plantations as done in Gujarat to provide job security and profit sharing of the local community
- Collaborative inputs from R&D Centres, Universities and other scientific institutions in scientifically managing the forests
- Use the Green Indian Mission effectively by incorporating indigenous, and ecosystem-friendly species
- Promote systems of providing incentives to local people for conservation efforts
- Early detection, identification and rapid management strategies against invasive alien species.
- Strengthening the Rural Development department on issues related to bamboo/reed resource availability/marketing and also of other NTFPs
- Modify suitably the Mahatma Gandhi National Rural Employment Guarantee Scheme to promote and support forest management and NTFP cultivation
- The Forest Rights Act (FRA) 2006 has yet to be implemented in its true spirit and the State Forest Departments to be alerted to the fact that implementation of this act is needed for future forestry governance.
- Improving the quality of the forests and take proactive measures to address the demographic and developmental pressures on forests

Action points for Western Ghats Ecological Authority

- Support local-level consultations at Local Self-Government level and a bottom–up approach to achieve acceptance and transparency in the whole process.
- To improved decision making, goods and services (biodiversity values and ecosystem services) of forests to be valued more accurately and a master plan for biodiversity economics of the Western Ghats to be prepared, under the proposed WGEA.
- Enforce principles of Responsible Forest Management and trade practices.
- Modification/unification of various acts and rules related to forests and wildlife and evolve implementation strategies.

2.6 Organized Industry

The importance of the industrial sector in the Indian economy has risen over the years. The contribution of industries to the gross domestic product (GDP) has improved along with a rise in the share of employment in the secondary sector. The new economic policy with its package of globalisation, liberalisation and privatisation changed the entire scenario of the Indian industrial sector and a sharp rise in foreign investment is now being seen. The Western Ghat states are also coastal states, and as such have always attracted industries given the access to ports and water. In more recent times they have been important investment destinations. In the decade since 2000, their share of these states has been 53% of the total Foreign Direct Investment (FDI), with Maharashtra, Dadra & Nagar Haveli and Daman & Diu being about a third of the total (RBI data). These states have also been found attractive for the location of SEZs. 55% of the notified SEZs by 31 December 2010 were in these states and 60% of the operational ones. Formal and in principle approvals are also over 50% of the total in these categories for these states, making them the industrial engines of India's growth story (Table 5).

Table 5 State-wise Distribution of Approved Special Economic Zones (SEZs) in India

States/UTs	As on 31.12.2010			
	Formal Approvals	In Principal Approvals	Notified SEZs	Operational SEZs
Goa	7	0	3	0
Gujarat	46	13	29	13
Karnataka	56	10	36	20
Kerala	28	0	17	7
Maharashtra	105	38	63	16
Tamil Nadu	70	19	57	22
Total in WG states	312	80	205	78

States/UTs	As on 31.12.2010			
	Formal Approvals	In Principal Approvals	Notified SEZs	Operational SEZs
Share of total (%)	54	52	55	60
India	580	155	374	130

Source : Ministry of Commerce & Industry, Govt. of India & Rajya Sabha Unstarred Question No. 4320, dated on 05.05.2010.

http://www.indiastat.com/industries/18/industrialparksspecialeconomiczonessez/27570/stats.aspx

- Spatial location(D B Boralkar 2010; TERI, 2005 COMAPS study, TERI Disha– Goa ongoing study)

Many of the investments are concentrated in a narrow strip of districts running from South Gujarat to the Konkan in Maharashtra. In Gujarat, investment in the coastal districts of Vadodara, Bharuch and Surat account for a large share of the total investment in Gujarat. In Maharashtra, there are about 22,000 small, medium and large industries in the western coastal part of Maharashtra State, of which 234 are large scale units which are highly polluting and categorized by the Central Pollution Control Board as "Red" category industries. The principal industrial zone in Maharashtra is the Mumbai-Thane-Pune belt, accounting for almost 60 % of the State's output. Most of the investments in Maharashtra are in the coastal Konkan belt. Raigarh tops the list, followed by the neighbouring district Ratnagiri. The two districts together account for about 38% of the total investment while Mumbai accounts for 7%. One of the aspects of Maharashtra's industrialisation has been the over-industrialisation of the Mumbai-Thane-Pune-Nashik belt and also the Konkan coastline. These regions have reached the saturation point (Deshpande *et al.*, 1996, Gadgil, 2010).

In Goa, there are 20 industrial estates hosting about 2037 industrial units and 18 large polluting industries. Most of these industrial estates are located on the Western Ghat plateaus While a large number of these in operation are located within the 20 industrial estates, a large portion of polluting industries operate from outside the industrial estates.(TERI, ongoing study)

In Karnataka, industries majorly include pulp and paper, sugar, distilleries, cement, petroleum, chemicals and pharmaceuticals, iron and steel, ore processing and mining. Coffee pulping units, mostly located in Coorg, Chikmagalur and Hassan districts, which are all part of the Western Ghats, have pollution problems. Cultivation of tea in the Nilgiris has come at the expense of the region's biodiversity particularly in the Nilgiris and areas like Coonoor (Boralkar, 2010, op cit.) The huge people-wildlife conflict issue in these areas is partly due to this industry.

Issues of Concern

While the attraction of industry to these Western Ghat states is beneficial, there are serious concerns because of the environmental and social impacts of such industries and SEZ locations. The social impacts are centred around land acquisition and compensation issues,

while the environmental impacts are focused around demand for energy, emissions from factories and air pollution, water pollution due to industrial effluents, or land degradation due to land conversions. Many industries require large quantities of water in their manufacturing processes**.** Industrial use of water far exceeds household use.

In Maharashtra, besides causing air pollution due to industrial processes and fossil fuel burning, industries discharge about 678,000 cubic meters of industrial effluent which is partially treated and/or treated. . The impacts of Lote MIDC on the local creeks and mangrove forests have been reported in Gadgil (2010) and Ratnagiri Zonal Atlas for citing Industries (ZASI) (2006). As an example, the Box below reports the air quality in Ratnagiri district, which shows critical air pollution levels in the Lote MIDC area.

Box 9: Air Quality status in Ratnagiri District, Maharashtra

Air quality	Location
Critical	Lote MIDC area
Low	Awashi at Khed Taluka
Medium	Mirzole, Zadgaon, Ranpur-Golap
High	Devrukh

Source: MPCB, Ratnagiri (2005)

The industrial units in Goa generate industrial waste water/effluent at about 8400 cu. m per day as per GSPCB. All the units are reported to have their own effluent treatment plants. Effluent is generated mainly by the breweries, distilleries, drugs and a sugar manufacturing unit.

A Zoning Atlas for Siting of Industries has been prepared for North and South Goa districts. It is evident from this exercise that there are no low ecological sensitivity zones (green colour codes) for the siting of industries. Most of Goa falls in the red and orange areas which is classified under the category of very high and high sensitivity to air and water pollution. A few areas in yellow suggest suitability of low to medium pollution potential where best practices and technologies are to be applied.

Some of the concerns voiced by stakeholders with regard to the impact of industries on the ecosystems of the Western Ghats are the following: (Dhara, 2010)

- Air pollution will decrease crop yields significantly, and impact negatively on human health and the vegetation of the Western Ghats.
- Because of the low pH (~4), highly porous lateritic soils, and highly inter-connected aquifers in the coastal strip, solid wastes, including ash from thermal power plants will leach into the aquifers and contaminate ground water in a substantial area around the solid waste dumps.
- Liquid effluents, even if treatment facilities are available, will contaminate the rivers and streams of the area and affect the livelihood of the local fishermen.

- Industries that require copious quantities of water, eg. thermal power plants, paper plants, may migrate towards the Western Ghats as other parts of India gradually become more water-stressed. Once core sector industries—oil refineries, power plants—take root along the coast, other downstream and ancillary industries will follow.

Measures for Mitigation/Improvement

a. Promote industries and services that involve dematerialization – e.g. e-commerce, e-paper, teleconferencing, videoconferencing

b. Promote education hubs for the states in the western Ghats

c. Encourage local bioresource-based industry – vermiculture, cane crafts, apiaries, basket weaving, afforestation, kitchen gardens, etc.

d. Special incentives should be given to agro-based fruit and food processing industries

e. Encourage cottage and soft non-polluting industries

f. The Zoning Atlas for Siting of Industries should be used as a tool for decision-making at various levels for industry, regulatory authorities and the general public. Perhaps the WGEA should engage with ZASI and adopt this tool to ensure that industry has the least impact on the ecology of the Western Ghats and the coast.

2.7 Mining

All of the six states of the Western Ghats have important mineral deposits, both major and mineral. The most important of the major minerals are iron ore, manganese and bauxite. The region is also rich in rare earths and sands (see Appendix 2). Mining activity, especially of iron ore, has increased steeply since 2002 in response to the rise in mineral prices. This is especially so in the case of Goa and Karnataka. When earlier an average Fe content of 55 was the cut off for iron ore, today this is 40. Many environmental clearances (EC) have been sought and given in the last few years in Western Ghat States; however, no attention has been given to cumulative impacts of such activity. In 2010, a moratorium on new ECs for Goa was declared by the Minister for Environment and Forests in response to the people's demand for the same. In Tamil Nadu and Kerala, sand is being mined in huge amounts for construction purposes causing a number of environmental and social issues. "Floodplain mining is severe in Thiruvananthapuram, Kollam, Alappuzha, Kottayam, Ernakulam and Thrissur, districts. Mining of sand from back waters and beaches is common all along the coastal area." (Padmalal, 2011, WGEEP Commissioned paper)

Issues of Concern

Mining activity creates considerable negative externalities which are not sufficiently addressed. It is often ground water intensive and environmentally degrading. Forests and biodiversity are lost or degraded along with precious ecological services (including buffering capacities for climate regulation). Surface water stretches are affected as a result of dump run off or due to ore transport when riverborne. Air pollution is considerable both from operations as well as through fugitive dust from ore transport. Often, mining activity occurs close to wild life sanctuaries (WLS). In Goa for example, 31 leases are within 2 km of a WLS of which 7 are working mines; 13 leases are within 1 km of a WLS.

Social impacts too are several: health impacts of polluted water and air; lost agricultural livelihoods; displacement; accidents on roads and water insecurity as mining sucks out well

water from the adjoining areas. Many of these environmental and social impacts do not get reflected when one hears of the value that mining contributes to the gross domestic product.

Illegal mining is observed in many parts of the Western Ghats, both in terms of no clearances obtained, fraudulent EIAs and/or flouting of conditions of clearances, An emerging view is that the agent (government) does not fully reflect the interest of the principal (the people). The view is also emerging that there exists government collusion with industry (Goa, Sindudurg, Ratnagiri, Bellary in Western Ghat states). This state of affairs has led to enormous disaffection in the states regarding mining activity. The strongest evidence of this disaffection and anger is in the state of Goa.

The Panel was confronted with some questions from stakeholders that require reflection and action:

- Why should mining not be banned to arrest the further loss of cultural and biological diversity and destruction of the ecology of the Western Ghats?
- Why should mining be privileged over other land, waterways, forests and groundwater uses/users?
- How have/are the intergenerational questions around mineral depletion been addressed?
- Why is there so much illegal mining? Who is doing anything about it?
- What about the corruption at all levels of jurisdiction?

Measures for Mitigation/Improvement

Exclusion of mining from ecologically sensitive areas/zones

- No mining should be allowed in the Western Ghats in:
  - Current protected areas, i.e., National Parks and Wildlife Sanctuaries as per current Supreme Court orders and the Wildlife Act 1972 provisions, and
  - In regions of high sensitivity, i.e. ESZ1, as demarcated by the WGEEP for the states of the Western Ghats.
- All Environmental Clearances for mines in these areas should have an additional conditionality requiring for 25% reduction in mining every year till 2016, when mining has to be stopped in ESZ1.
- In EZ2 of the Western Ghats, current mining may be allowed but no new mining. Mining to be subject to strong environmental and social controls
- In other areas of the Western Ghats, mining may be allowed but subject to the FCA and other clearances and strong environmental and social controls in place as discussed below
- For mining within the Western Ghats, cumulative EIAs must be made mandatory rather than entertaining EIAs for individual leases in the same areas.
- There may be some areas that are claimed to be ecologically very sensitive but have not appeared so from the WGEEP demarcation exercise. The precautionary principle should be applied to such areas and mining must be banned for at least the next five years until

reputed institutions complete the study of biodiversity and evaluate the actual level of ecological sensitivity

Action Point: Ecological Sensitive Zones to be declared by the MOEF under EPA with different conditionalities

Mineral Extraction Control

- Close all mines that have been extracting ore beyond the limits allowed by their given environmental clearances
- Introduce an Fe cut off for iron ore that reflects environmental and social concerns to prevent the current observed rush to mine
- Close all mines that violate norms set out by the Zonal Atlas of the States
- Cancel all working and non-working leases in ESZ1s as proposed by WGEEP
- Mining leases in Wildlife Sanctuaries and National Parks to be permanently cancelled
- Mining leases in the catchment area of dams used for drinking water to be terminated

Rules for Sand mining (Padmalal, 2011)

- Sand mining to be audited; introduce sand mining holidays on stretches of rivers
- Aggregate management should be considered separately from river management
- Separate legislations are required for the purpose
- Examine and encourage alternatives to river sand for construction purposes
- Necessary steps are to be taken to promote regeneration of natural riparian vegetation in areas hit by anthropogenic interferences along the river and tributary banks
- The developmental and infrastructural activities in the riparian areas should be carried out only after proper Environmental Impact Assessments by a competent authority

Action Point: Constitute a Mining Monitoring sub-committee of WGEA

Protection of ground water from mining impacts

Regulation of conjunctive production of minerals and ground water

- For mines currently operating below the water table, it should be mandatory for the company to have plans in place for ground water management and use that will not affect local wells and water supply
- Without water mapping, no mining should be allowed to commence
- Offsets should be mandatory, for example through rain water harvesting
- No mining should be allowed below the water table level of the area if geological or other factors do not allow improved practices

Ground water management in mining areas

- More studies and more data to be generated on ground water in the mining areas, both from an anthropocentric and an ecological point of view
- Conduct a study to examine the practice of industry on mining discharge

- More data sharing regarding ground water and collaboration between departments in order to tackle this issue, specifically the Indian Bureau of Mines and the National Institute of Hydrology.
- Create a PPP with Municipal water supply and industry to ensure piped water supply to all villages in mining regions within a maximum time frame of two years
- The suitability of abandoned or exhausted pits as water storage sites could be evaluated, provided forest land is not involved since the law requires forest land to be restored to forest.

Actionable Point: A special cell within WGEA to deal with ground water issues

Planning for regeneration of agriculture in mining areas

Needs to done at the watershed or micro-watershed level.

This would include:

- Intensive dump management of all dumps within the micro-watershed
- Desilting of water bodies from the upper reaches to the bottom of the micro-watershed and treatment of the drainage network to minimise transport of silt (eg. lose boulder check dams)
- Desilting of fields and/or application of soil amendments
- Attending to issues of desiccation and loss of water
- Participatory planning and management
- Coordination by all regulatory and development authorities

Incentivising improved environmental behavior in the mineral sector

- Environmental education
- Indicators to track environmental performance
- Green accounting at the state level (impact adjusted income accounts)
- Market instruments to create incentives
- Compensation for forest preservation in resource rich states
- Immediate adoption of a system of Rehabilitation Bonds or other financial assurances as required under the Mineral Concession Rules.

Improving health in mining regions

- Improve surveillance and monitoring of diseases and disorders and provision of relief and rehabilitation for people affected by mining. Mining companies should be asked to have a health insurance policy for people in mining regions.
- Increased education on health disorders through Panchayat–NGO partnerships
- Get mining to partner with Panchayats and Primary health centres to provide both diagnostics and treatments that are industry-linked
- Reduce air pollution in road corridors/waterways
- Immediate enforcement of clearance conditions to stop overloading of trucks and barges:

  - Mining companies need to formulate a "no-overloading" policy and ensure that it is adhered to by each of the trucks/barges working for them.
  - Cancellation of mine/barge permits if violation is observed
- Tarpaulin covers to be mandatory for both barges and trucks
- Speed limits to be imposed and enforced
- Companies to be responsible for clean up of incremental pollution over and above what the government does for the taxes that it charges on road and barges
- Revision of transportation rates:
  - mining companies need to keep the 10 tonne limit for current trucks in mind while calculating transportation rates
  - No ore carrying trucks over 10 tonne limit should be allowed on public roads

Action Point: Constitute Mining Monitoring sub committee of WGEA

Addressing legacy of abandoned (orphaned) mines

- Dedicated resources to convert abandoned mines to productive assets
  - This could be either through cess, or plan funds, or specific financial transfers
  - Addressed through Public-Private Partnerships

Action Point: Constitute Mining Monitoring sub committee of WGEA

Investment in the mining region

- Plan for closure: Convert closed mines to productive economic assets either for tourism or horticulture
- Set up Minerals Foundation (as in Goa) which should work out a detailed plan to invest in region to provide common facilities
- Invest in micro-plans for villages affected by mining

Action Point: Constitute Mining Monitoring sub committee of WGEA

Better practices in mining[3]

- Air pollution control measures, including use of low carbon emitting equipment and improved energy efficient practices.
- Pollution control measures, including wheel washing system at every exit of the mine.
- Stabilization of dumps with geotextiles and arresting of silt

[3] see Kalavampara, 2010 for more suggestions

- Adopting more scientific mining technology from time to time.
- Working preferably to demineralise one part of mine and concurrent backfilling system to be adopted so as to accommodate waste rocks within mining lease wherever applicable.
- Scientific methods to be adopted for dump stabilization and erosion control.
- Work with grasses only and shrubs for dumps which will control erosion better and quicker if dump material is to be used for backfilling
- Proper drainage and settling arrangements before surface runoff is let out in surrounding water bodies.

Box 10: Regulated Mining Model proposed by Shri D V Kesarkar, M.L.A., Savantwadi, Sindhudurg district, Maharashtra

As the elected representative of this area and having a practical experience of both fields, I would like to suggest the following model for mining operations in the district and especially for my constituency. I am sure you will consider the proposal positively in the interest of this region.

1. Only one site should be sanctioned in one village.

2. There should be control on production of minerals on a yearly basis (one mining season).

3. In case of iron ore, 2 hectares of land per year or depending on condition of the land should be allowed for the excavation.

4. Multipit system and a controlled production system should be utilized for mining in Sindhudurg.

5. Not more than 10 hectares should be used as a dumping ground, The rejection should be properly staged and hydro-seeding process should be utilized for making the dump into a green plantation using local varieties of plants, especially fruit-bearing plants and other important plants which are ecologically suitable for that area.

6. At the end of completion of excavations of the minerals, the pit should be refilled with rejected soil from the second pit. The process should be continued so that at the end of 5th year the area utilized should not be more than 20 hectares. At the end of the entire operation only one pit which will act as water storage area along with plantations on all the benches should be developed.

7. The local community should be given a stake-holder status in the project by offering them financial benefits by the following method. 2.5 percent of the market value of the gross production should go to the land holder and villagers of the said area as the compensation of earning they have lost. Another 2.5 percent should be spent on infrastructure of the village including plantation of trees, water supply, building of new roads, construction of schools, distance service, street lights, gardens, play parks, etc. out of which a minimum of 25 % should be utilized for ecological improvement of the region. A further 2.5 percent should be kept as reserve for the future, which is to be utilized after closure of the industry. The utilization of this reserved funds could be decide by the WGEEP on the lines of Norwegian model. Based on the present market trade and production capacity of 2 million tones from the 2 hectare pit, each village will get Rs. 45 crores per annum.

8. Sindhudurg being a tourism district also having good green coverage, and being rich in biodiversity, the following precautions have to be taken: while sanctioning any proposal especially regarding the iron ore deposits which are either to be exported or processed in the industrial zone, the area should be properly identified in the regional plan. A mechanical system for transportation of the mineral either in the form of slurry or powder should be used. The slurry could be transported in pipelines and the powder or the lumps can be transported through a closed conveyer belt system or in closed containers which could be transported on a ropeway. This will reduce the pollution created by road transportation by dust and carbon emission.

9. The systems should be developed either individually or entire mine operators could be combined to erect the required infrastructure. This point could be discussed among the entrepreneurs who are willing to set up their unit and the WGEEP committee, and a suitable technical solution could be arrived at. Only those companies who are interested and ready to invest the required large amounts in infrastructure, including inputs regarding the conservation of ecology, should be allowed to engage in mining operations in the district.

10. As suggested in the summary draft report of the study tour, small hydro-electricity projects should be promoted in the area and the excess available water after generation of electricity could be utilized for providing water to the farmers for agri-horticultural use in the area where mining activity will take place. In few cases because of the mining pits the ground water level goes down. In such cases the farming activity in the said area will not get affected because of the small dams. For example, a small dam in Phukeri village can produce electricity and give water to villages like Asanive, Zolambe, Talkat, etc. Modern technology like drip irrigation can be used for proper utilization of the water. The company should bear the cost of the hydro-electricity generation project. A drip irrigation system could be subsidized through government schemes and the funds made available through the company for village infrastructure.

11. It should be made compulsory for the companies to fence the entire operation area around the project by constructing a 2.5 meter high wall so that no animals are affected by the operations carried out inside the enclosed mining area.

12. The movement of trucks and other machinery should be restricted within this compound wall, and the operation should take place only between sunrise to sunset.

13. Proper precautions should be taken that during the operations, the dust is controlled by using the latest technique of spraying water on the entire area. Also adequate tree plantation should be done along the project area which will act as a barrier for sound pollution, if any.

14. Before starting any operation in any area a proper survey of plants in the area of operation should be made and a nursery should be established for transplantation and ex-situ conservation.

15. The sacred grove (dev rai) should be protected in each village; the management for conservation of the dev rai should be entrusted to the local communities for which the expenditure could be made by CSR of the company.

2.8 Power and Energy

The many power projects— hydro, thermal, nuclear, wind — in the states of the Western Ghats was one key recurring theme before WGEEP. Many stakeholders argued that these projects were harming the ecosystems of the Western Ghats, and questioned whether there really was a need for so many power projects in such an ecologically sensitive area.[4] Many more, especially thermal power projects, are on the anvil and it is unclear if all of these are needed, and sustainable, given their resource requirements and potential environmental and social impacts (Dharmadhikary and Dixit, 2011).

To get a sense of the energy context, we have looked at some of the power and energy statistics in the Western Ghats States. The data suggest that the per capita power consumption varies widely in the states, from Goa being 3.5 times the national average to Kerala being just 2/3 of it. The proportion of villages that have been electrified is high relative to the rest of India, but the range of rural households without access to electricity ranges from 8% in Goa to 35% in Maharashtra. Industry in these states comprises both large and small sectors, and is the largest consumer of energy. The large-scale industry comprises ore processing, iron and steel, cement, petroleum refineries, sugar, distilleries, fertilizers and petrochemicals, all of which are large energy consumers. There also is a large small- and medium-sector that contributes to industrial value and provide a large source of employment. An important segment of this sector is energy-intensive comprising sectors such as foundries, brick kilns, textile processing, ceramics, pottery, glassware, and bakery.

In terms of power supply, the states show a mix. Gujarat and Maharashtra have a high peak supply deficit, twice the national average; Maharashtra also has a high energy shortage. But Karnataka and Tamil Nadu are better placed in terms of supply deficits relative to other Western Ghat states and also the national average. Power supply can be locally sourced and

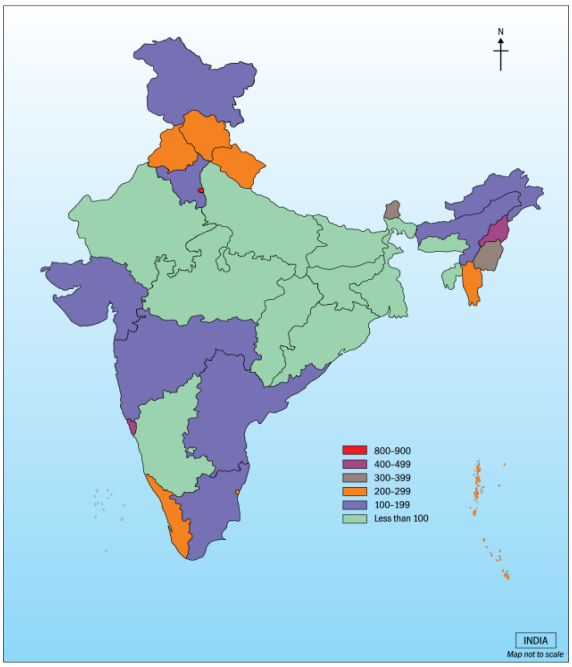
4 Brainstorming session on the role of the Power Sector in the development of the Western Ghats states, IISc, Bengaluru on 18.11.2010;

produced or can be obtained from other states, but a failure to plan for needs can result in a mushrooming of diesel-fired back up sets which can have serious local environmental problems. Transmission and distribution (T and D) losses are also still high suggesting the need for urgent action on this front.

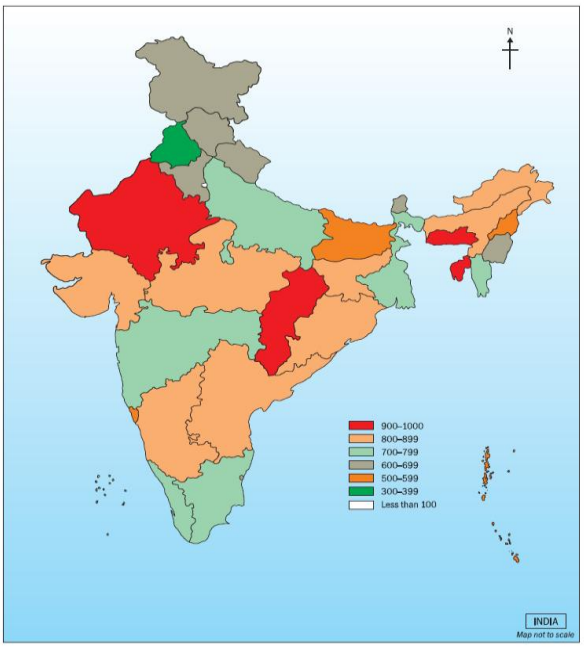
Energy for cooking and lighting in households

Figure 10 below presents the state-wise usage of LPG (Map 1) and kerosene (Map 2) as primary cooking fuels, and electricity (Map 3) and kerosene (Map 4) used in lighting among 1000 rural households in various states in 2007–08. It is evident that except for Goa, where 41% of rural households use LPG, usage of LPG for cooking is low and people are still dependent on firewood for their cooking needs in rural areas. Kerala reveals a higher proportion of rural households using LPG for cooking as compared to neighbouring Karnataka where households are more dependent on firewood. In urban households in Goa and Maharashtra, over 80% and 70% of households respectively use LPG for cooking.

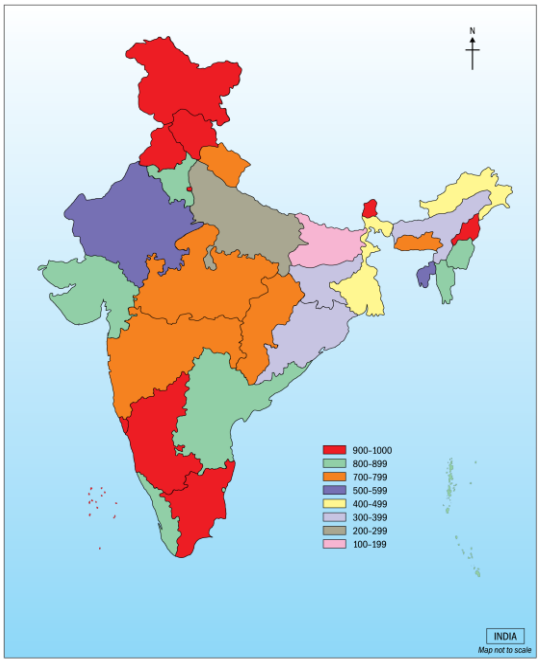
In case of lighting, more households use electricity than kerosene in the Western Ghat states as compared to the rest of the country.



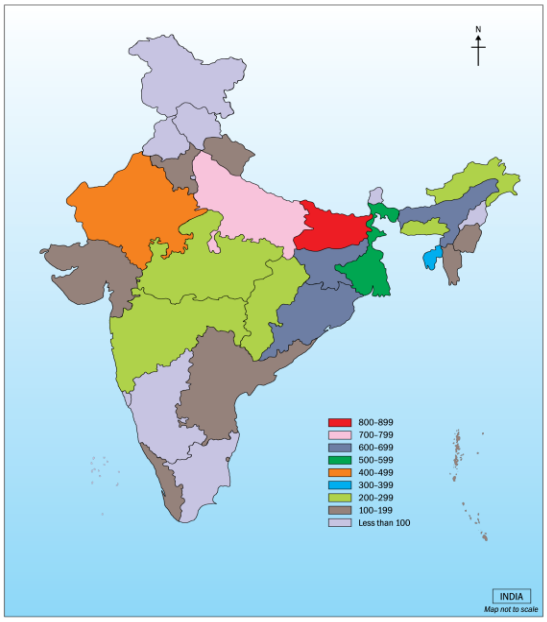
Map 1 Usage of liquefied petroleum gas as primary cooking fuel among 1000 rural households in various states (2007/08)



Map 2 Usage of firewood as primary cooking fuel among 1000 rural households in various states (2007/08)



Map 3 Usage of electricity as primary lighting energy source among 1000 rural households in various states (2007/08)



Map 4 Usage of kerosene as primary fuel among 1000 rural households in various states (2007/08)

Figure 10 Fuels used in Cooking and Lighting in rural households in varous states

Source: TEDDY 2010

Power Generation Infrastructure located in Western Ghat states

Power generation infrastructure located in the states is largely thermal (64%). Of the installed thermal capacity in the region, 47% is coal-based, 15% natural gas and 2% diesel. Hydro power represents 14% of installed capacity and is significant in Karnataka, Kerala and Tamil Nadu; nuclear constitutes 3% and is mostly located in Maharashtra. Renewable energy sources, essentially wind, comprise 19% of installed capacity and is important in Tamil Nadu, Maharashtra and Karnataka. (Figure 11)

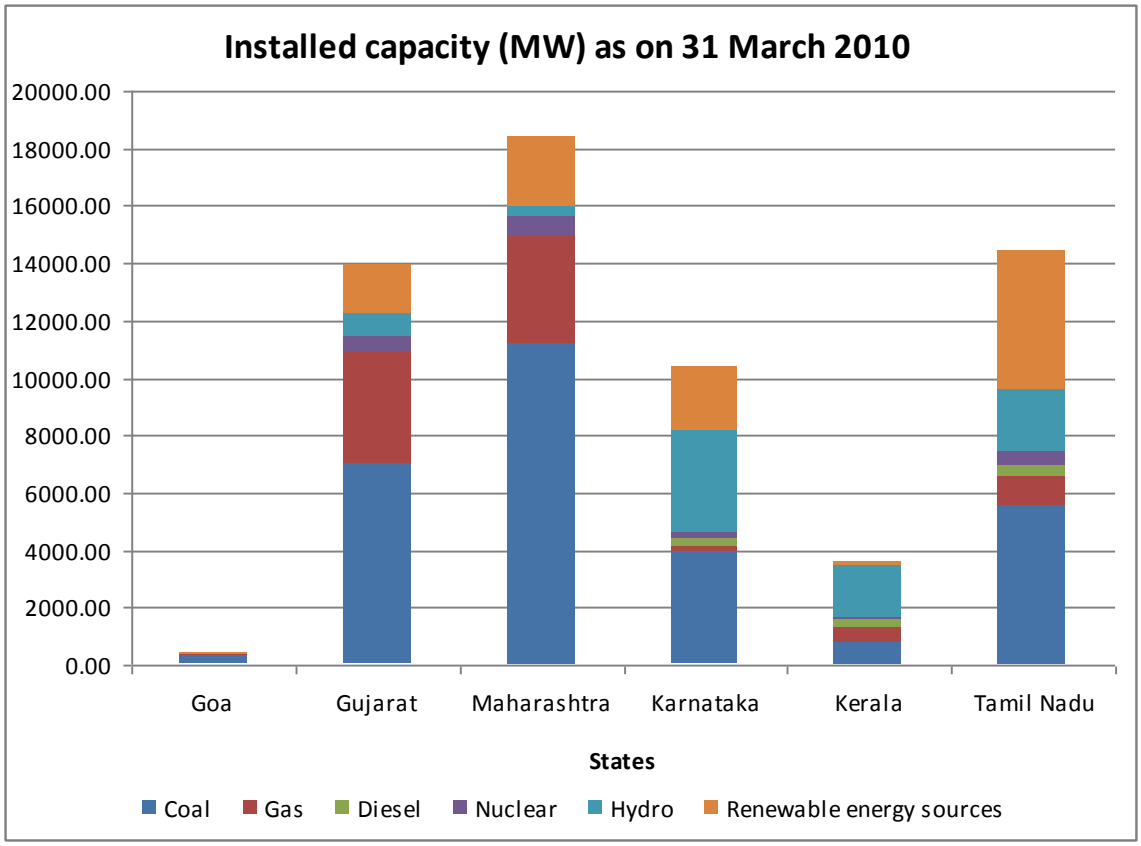


Figure 11 Power Generation Infrastructure located in Western

Source: TEDDY 2010

A number of thermal power sector projects are planned in the state of Maharashtra in the period ending 2012. Hydro power projects are also planned in Karnataka and Kerala. Two of the more controversial ones, Gundia in Karnataka and Athirappilly in Kerala are discussed in detail in Part I of the report. Papers on these topics are also available on the WGEEP website – http://www.westernghatsindia.org/

The many planned projects are creating concerns in various districts. In Raigad and Ratnagiri, for example, Prayas notes that 33000 MW of thermal power projects are in the pipeline for environmental clearances. Many of these power projects will have serious environmental and social impacts. Given that they are planned to be set up in clusters, there are also cumulative impacts that need to be considered (Dharmadhikary and Dixit, 2011). The 2010 tour report to Ratnagiri-Sindhudurg districts by the Chairman, WGEEP, has the following comment which reflects the concern that while local regions have to put up with

the negative externalities of power plant development, the benefits go to very different sets of people:

"The current energy requirements of these districts are 180 megawatts a year, while the current production is 4,543 Megawatts (Koyna 2000 MW, RGPCL 2200 MW, Finolex 43 MW, JSW 300 MW and remaining 900 MW proposed within 2-3 Months) a year. So these districts are more than meeting their own requirements and contributing to the national pool."

Further,

"If Mumbai has huge requirements, one may reasonably propose that a giant coal based power plant be located on the Malabar Hill, which offers a topographical situation identical to the current site of Jindal plant. Such location will have the further huge advantage that the power will not have to be transmitted over huge distances, greatly reducing transmission losses, and the huge losses of horticultural production under power lines in the Ratnagiri-Sindhudurg districts."(p 6)

Issues of Concern

The development-environment trade-off has its strongest manifestation in the energy and power sector. The dependence on fossil fuels in this sector has implications for the global and local environment. As people of this country become part of a global community, as more people move into the middle income classes, material aspirations tend to rise. We see in India, the increased aspirations of a people moving up the income ladder and demanding the trappings of a "modern" life which creates a whole set of new energy consumers, new political pressures, increased demand for mobility, all of which result in an increased demand for energy and fuels. Along with this growth-driven demand for energy, there is a large proportion of people who have no or little access to electricity for lighting and are still dependent on the use of "dirty" fuels for cooking and lighting that are detrimental to their health and well being. So we are faced with three key aspects of the dilemma – how do we meet energy for growth, and address energy poverty while also protecting the environment?

Considerable concern is expressed about the environmental and social impacts of existing and proposed power infrastructure.[5] Construction and maintenance of energy facilities in sensitive zones of the Western Ghats, it is argued, can affect ecosystem structure through clearing of vegetation, and habitat loss or fragmentation. This can affect not only the fauna and flora but also the microclimate in the region. The major impact that power plants have had and continue to have is loss of forest cover, where forest has been cleared for a dam.

Compensatory afforestation as a measure required under the law exists but does not restore the richness and the complexity of the biodiversity lost when original forests are cleared. Other impacts include degradation of vegetation due to thermal emissions or pollution of water bodies due to release of effluents. The effects of thermal power plants on the environment are mainly due to temperature rise of water and fly ash. Temperature also exerts direct influence on toxicity. Higher temperatures of water would lead to greater dissolution of chemicals and other pollutants such as grease leading to greater environmental damage. Apart from the rise in temperature, discharged waters are also altered chemically during the cooling processes. The water contains chlorine and other BOD material, which affects aquatic life adversely.

5 Brainstorming session on the role of the Power Sector in the development of the Western Ghats states, IISc, Bengaluru on 18.11.2010; WGEEP analysis

Fly ash is known to contain heavy metals such as Zn (6%), Ba (12.2%), Cu (1.3%), As (0.02%), V (0.08%), Ti (0.02%) and Mn (0.23%). Particles of fly ash also contain toxic elements such as lead and mercury (Sankarapandi, 1994, Prayas, 2011). Reproduction of fish is affected due to deposition of fly ash in the marginal areas of the river, which act as their breeding grounds. Fly ash covers extensive areas of the bottom, blanketing off the substratum, resulting in retardation or total elimination of benthic communities. Thick deposits of fly ash at the bottom make the nutrients unavailable to the aquatic community and thereby affect productivity.

It was pointed out at our stakeholder meetings that cumulative impacts studies are needed for the proposed merchant power plants in the Konkan region, and improved EIA practices. Many concerns were expressed on the overdevelopment of river basins of the Western Ghats for hydropower or water projects. There were suggestions that the origin of rivers be declared as "no go" areas to protect the rivers and that no new dams be allowed in over-developed basins. The need to maintain the environmental flows of rivers was also highlighted.[6] Above all, it was highlighted that the cumulative impacts on the ecosystems of the Western Ghats of all the projects that exist and are proposed for the states have not been assessed.

Given the sensitivity of the Western Ghats, many have suggested that it is important to find ways in which energy needs can be met through more efficient energy use and less degrading, less polluting, intrusive energy sources. Renewable energy is indeed being actively encouraged in many states given the more global concerns with fossil fuel based energy. The need for land and water for solar power and the local social impacts this can have was also highlighted. Another insufficiently studied impact, but often cited in our stakeholder meetings, is from transmission lines as these can also cause linear intrusions or linear fragmentations of habitats. In case of renewable energy projects, it was suggested that decentralized off-grid generation be promoted in the more ecologically sensitive areas to avoid the need for long transmission lines.

However, there is need for a greater understanding of the impacts of the development of these renewable energy sources on the local environment. For example, large scale wind energy farms do have significant effects on local ecosystems (NRC, 2007). There are many commercial proposals to erect wind mills in the Western Ghats and several have also been completed. Unfortunately, the areas deemed suitable for windmills, i.e. where there may be continuous high velocity winds are also the crest lines of the Western Ghat mountains which have the steepest slopes, the most fragile ecosystems, and are also accessed via equally biodiverse lateritic plateaus which harbour some of the most unique biodiversity elements in the Ghats. Hauling construction cranes (of the size used for building skyscrapers in cities) required to erect the huge wind masts as well as hauling the wind masts themselves to these crests of the mountains also requires the construction of roads in these remote areas which in turn necessitates the large-scale destruction of forests, habitats and soils, including leading to landslides and massive soil erosion in these high rainfall areas. A WGEEP study (by Madhav Gadgil and Renee Borges) of one such windmill project completed by ENERCON just 2 km from the boundary of the Bhimashankar Wildlife Sanctuary in Maharashtra highlighted the grave destruction of the pristine environment in the area by this supposedly "green technology". (see reference to this project also in Part I of the WGEEP Report). The "zone of influence" of this project therefore was much larger than the length of the roads, or the area covered by each windmill mast and associated structures

6 A Latha, Bengaluru meeting.

which was projected by the company as the area under the project. This study therefore clearly highlighted the urgent need for supposedly green technologies such as windmills to also undergo a comprehensive cumulative impact assessment before their clearance, as currently such technologies being considered "green" are exempt from requiring an EIA. It is recommended that a moratorium be placed on all wind energy farm proposals until comprehensive EIA studies are conducted. In any case, WGEEP has also recommended that no windmills be allowed in ESZ1.

Measures for Mitigation/Improvement

Several measures can be recommended as responses to the policy dilemma posed in the opening paragraph. These can be grouped under: demand side management, increased clean energy supply, clean fossil fuel technologies in production and use, and improved environmental governance around the power sector

With regard to energy demand

- The need to revisit the concept of energy equity in the Indian context, wherein some groups of people in the Western Ghats (and other) states are over-consuming energy, while others are energy poor. In the context not just of global concerns, but local environmental and social issues linked to energy production and use, there is need for an energy policy that clearly reflects sustainability and equity considerations. There is need to differentiate between "luxury and wasteful" and "reasonable and adequate" energy consumption in all of our energy demand projections. The equitable per capita energy consumption norms that are being demanded in the climate change debate across countries should also be studied for their relevance across regions and groups domestically.
- Much more emphasis is needed on assessing state potential to undertake energy efficiency measures in various sectors to reduce demand projections The role of the Bureau of Energy Efficiency (BEE)was emphasized here. Need to include estimates of energy efficiency potential in energy demand forecasts, so that demand figures are reasonable, not portrayed as gigantic as this creates pressure for increased energy supplies which can have adverse environmental impacts
- Educating the energy consumer about the environmental and social impacts of energy production and the need for reducing "luxury" demand
- There is need also to launch "smart" campaigns as key components of demand side management, focusing on smart grids, smart buildings, smart power, smart logistics and smart motors

With regard to energy supply

- Encourage the use of clean energy – renewable energy projects and energy efficiency; wherever possible, small renewable projects to be encouraged
- Micro and mini hydel projects in ecosensitive areas in the Ghats should be designed more to meet local power demand and not to feed to the grids as power lines are needed to evacuate power from these plants
- The importance of allowing for the intermittent nature of some renewable energy sources and ensuring backup storage facilities
- Use of Smart grids

  - To enhance communication and computing capability to improve flexibility of energy infrastructure
  - To enable better monitoring of electricity flows across the grid and improved preventive maintenance
  - Reduction in T&D losses
- Encourage states to adopt regulatory policies of open access to have more efficient and reliable electricity supply and reduce the need of using polluting diesel-fired back up units in industry.
- Upscaling interesting energy innovations: For example, a model micro-hydro community system in Pathanpara Kerala, where according to reports financing for the project was secured from the village through cash or kind. The models used by SELCO to provide solar energy in unelectrified villages or the LABL model for solar lighting need a careful assessments of the lessons they offer.
- Introducing benefit sharing arrangements when land is acquired: For example, a recent report that the Kerala government had mooted a business model for an 80 MW wind power plant with tribals of Palakkad. This will be a partnership between NTPC, KSEB and the tribal people of Palakkad. The commercial agreement will involve a fixed amount of money per unit of power generated on tribal land (FE 22 June).

With regard to environmental clearances

- Need for a complete overhaul of environmental clearance procedures of power plants.
- EIA procedures should take into account carrying capacity of region and also require cumulative impact studies when power plants are planned to be in clusters.
- As of now EIA guidelines in India do not include renewable energy projects. This should be corrected as it is increasingly well established that they do have several impacts especially wind farms. For example, UNEP has prepared guidelines for environmental due diligence of such projects which could be examined. Wind mill projects should be required to have a cumulative impact assessment before clearance is accorded.
- Need for greater environmental and social impacts studies and anticipatory planning for renewable energy projects as these are poised to take off.
- Need for greater care in clearing thermal power projects by the MOEF in the Western Ghat region
- Strict adherence to environmental clearance conditions when projects are sanctioned
- Social and environmental audits to ensure such conditions are met
- Good practices to be followed at all life cycle stages – pre siting, construction, development, operation and closure
- CAMPA funds should be used to promote green jobs in the states where these funds have been collected.

Actionable Point: A special cell within WGEA to deal with power and energy sector-related issues

2.9 Tourism

Tourism in the Western Ghats has been increasing steeply. The forms of tourism observed are nature based: ecology and wildlife; religious; social; and business (see Equations, 2010, WGEEP Commissioned Paper). Religious tourism has the highest share of tourism in the Western Ghats followed by nature-based, social and business; the largest share of tourists is from the domestic sector. Tourist flows have risen quite steeply to the Protected Areas (PAs) in the Western Ghats – Periyar, Mudumalai, Bandipur, Nagarhole, Dandeli-Anshi since 2000. The growth of resorts close to the PAs post 2000 has been recorded in several studies (Equations, 2010). Most of the tourism is unplanned and unregulated. However, it is observed that even planned world class tourism projects, e.g Amby Valley, Lavasa, have considerable local impacts. Tourism is promoted by the Centre and states without any proper EIA and Cumulative Impact Assessments.

Issues of Concern

Some of the main environmental footprints relate to the uncontrolled growth of tourist establishments in the Western Ghats leading to habitat fragmentation and increasing human–animal conflict. There is also a tremendous increase in garbage which attracts various pest species and also causes an increase in pathogens and disease. Untreated water is discharged into the open and this impacts vegetation and ground water. There is also increased risk of fires. Intensive water demand from tourism is a natural outcome.

On the socio-cultural front, it is argued that there are changes in traditional livelihoods – e.g. agriculture because of land use change and labour shortages and loss of access by indigenous and local communities to their land and resources as well as sacred sites. Despite ecotourism, arising as a concept to promote nature conservation, it is found that the way ecotourism is practiced in India, it is being perceived as becoming just another form of mass tourism. However, "*ecotourism is environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features - both past and present) that promotes conservation, has low negative visitor impact, and provides for beneficially active socio-economic involvement of local populations.*" (IUCN)

Policy attention is required on the following key pressures on ecosystems arising from:

- The increased pace of tourism
- Increased externalities of tourism
- Location of tourist infrastructure, depending on size, numbers
- Tourist behaviour – noise, waste generation and disposal,
- Absence of waste management and waste water management
- Local impacts on livelihoods, culture
- Absence of benefit sharing

Measures for Mitigation/Improvement

Tourism needs special attention in the Western Ghats. Such sites need to be understood as production–consumption systems (PCS). These are "systems in which environmental goods and services, individuals, households, firms and states are linked by flows of materials, energy and relationships in which transactions of money and information or negotiation of power and influence take place" (Lebel and Lorek, 2010, p 6)

Sustainable PCS involve

- Management of risk and uncertainty through strong sustainability rules;
- Use of industrial ecology principles, eco-technologies, in activities
- Adoption of carrying-capacity concepts, pollution prevention and polluter pays principles in regulation

SPCS are linked with notions of the carrying capacity of a location

- Allowing tourism up to the environmental carrying capacity while exceeding cultural or social limits may not be in the interests of sustainable development in the Western Ghats
- Investments can be made in order to increase a region's carrying capacity (e.g. in water recycling, establishment of green corridors for wildlife, etc.).
- Technological or policy innovations or more efficient use of resources may also ease environmental limitations.

More specifically,

In ESZ1,

- Ecotourism policy of MoEF to be followed refined by the WGEA to promote minimal impact tourism in the region
- Strict regulation for waste management, traffic and water use

IN ESZ2

- Strict regulation, on the basis of a Tourism master plan and social audit.
- Tourism Master Plan should be based on carrying capacity of area and after taking into account social and environmental costs.

In ESZ3

- Strict regulation and social audit of tourist projects
- Tourism Master Plan should be based on carrying capacity of area and after taking into account social and environmental costs

More generally,

- Small scale tourism should be encouraged adopting benefit sharing with local communities: small get-aways, spice farms, homestead tourism, etc. Tourism infrastructure, particularly accommodation, should be encouraged to be eco-friendly, with careful use of locally available materials. Incentives for the same need to be given in the form of subsidies.
- Concretisation around springs, lakes and other perennial water bodies. should be discouraged
- There should be careful thought given to tourism infrastructure.
    - Site specific control of tourism infrastructure in buffers of Protected Areas
    - Provision for rainwater harvesting should be made compulsory for all new large and medium tourist infrastructure in the Western Ghats
- Restriction on vehicular movements

- Careful planning for the management of waste
    - Strong regulation of use of plastics and ban of use of plastic bags by commercial establishments, shops, etc.
    - Special arrangements for water bottle collection
    - Encourage more local partnerships for waste management in tourist sites

Actionable Point

- A special cell within WGEA needs to be constituted to deal with tourism-related issues. Control of tourism developments and activities, including licensing and overall targets for and limits to the scale and type of tourism should be overseen by the WGEA

2.10 Transport

Transport infrastructure is key to the connection of different parts of the country, to enable a balanced regional development, for developing a communications network and to promote intra- and inter-state commerce and industry. In the case of the Western Ghats, the long western coastline and the need for connecting this to the hinterland of the peninsula is obviously an important infrastructural imperative. Presently, only the Palghat Gap provides a passage between the coast and the hinterland through the plains. However, roads, railways, and highways passing through the hilly terrain of Western Ghat region have been one of the key instruments of change affecting its ecological status. The Panel notes that the rapidly rising demand for transport infrastructure has been of serious concern, given the impacts that they have on the forest, biodiversity and wildlife of the Western Ghat region.

Issues of Concern

Roads and railway lines also bring in their wake linear development of human settlements and other forms of land-use change. In many cases, such linear development is more harmful to the ecology as compared to the direct impact of the transport project itself. The development of transport infrastructure is of great concern to ecological and biodiversity hot spots as they fragment habitats and cause biodiversity loss. Roads passing through hilly terrain involve considerable blasting and cutting of rock/soil along the slopes.

Apart from immediate concerns of disturbance to the natural habitat, this increases the risk of landslides during periods of heavy rainfall as has occurred commonly at several places in the Western Ghats, a good example being the Mettupalayam to Udhagamandalam road in the Nilgiris that has witnessed frequent landslides. At the same time, the steep cuts along roads across hilly terrain make it impossible for larger animals such as elephant to get across; typically their movements are restricted to narrow passages along stream or river courses or even completely broken. Road kills of animals is a commonly observable phenomenon along road in the ghats, especially those that go through flat terrain thereby allowing vehicles to move at high speed. Permanent lighting on roads, honking, the speed of vehicles, accidents, and disturbance to the animal life in the forests are other serious issues.

Road construction is under way not only across the Western Ghats but also along the crest-line, thus dissecting wildlife corridors, and isolating the already small patches of forests and wilderness. There are again constant demands for new roads in the region. Many more projects are on the anvil and thus require serious attention given their potential impacts.

Paranjpye (2011, pp 14-17) notes that while in the Nineties, the number of roads cutting across the Northern Western Ghats was around thirteen, the number in 2011 was twenty-one. (Box 11) This list is not exhaustive but indicative of the road development in the region. This number includes the four-lane Express Highway connecting Pune and Mumbai as well as the highway under construction between Nashik and Mumbai. Paranjpye (2011) notes that the construction of the Mumbai-Pune Expressway has resulted in irreparable and irreversible damage to the proposed Fr. Santapau Wildlife Sanctuary near Lonavala. In the early 1990s, he reflects "a road meant the development of towns and villages which often developed at the intersection of roads and became an outlet for the forest produce, timber, minerals, etc. However, the trend today is that these areas sandwiched between the three metropolitan (Pune, Mumbai and Nashik) areas are slowly falling prey to land grab for large scale industrialisation and the urban crawl, which wipe out entire patches of forests at a very rapid pace."

The Konkan Railway, completed in 2001/2002 is one such contested space of environment versus development, and impacts on coastal versus forest ecology. The Railway traverses through 4 of the 6 states of the Western Ghats and many of its districts. The Railway has had a number of impacts, both on forest and coastal ecology, more on the latter because of its alignment and was much fought against in the state of Goa as it was expected to have, and has had, enormous impacts on coastal ecology, especially on mangrove forests, swamps and khazan lands. A number of track maintenance problems and collapse of tunnels have been observed, along with frequent incidents of landslides and slippages blocking the track. The Railway has involved diversion of forest land as it crossed parts of the Western Ghats as documented by Ranade (2009).

Similarly, the number of major roads in the southern Western Ghats have also resulted in ecological problems. For instance, the highways from Mysore through the Protected Areas of Nagarahole, Bandipur, Mudumalai and Wynaad in the states of Karnataka, Tamil Nadu and Kerala witness heavy traffic with resulting disturbance to wildlife (Vidya and Thupil 2010). In 2010 the Karnataka High Court imposed a ban on movement of traffic across these highways during the night, an order that has been contested by traders from Kerala. The Tenkasi-Kollam railway line and the highway across the Shencottah Gap in southern Tamil Nadu and Kerala has now completely cut off the movement of elephants between the north (Srivilliputhur-Ranni-Konni Divisions) and the south (the Kalakkad-Mundanthurai and Neyyar Reserves), isolating the relatively smaller population in the south.

There have been a number of recent demands for more railway lines through the southern Western Ghats. These include the proposed Hubli-Ankola line, the Talguppa-Honnavar line, the Mysore-Kannur line, the Chamarajnagar-Satyamangalam line, and a line to Sabarimalai. The proposed Chamarajnagar-Satyamangalam line would pass through the forests of Satyamangalam Forest Division, the steep slopes of the Talamalai plateau and through the Moyar River Valley, a major stronghold of the elephant. The potential for train accidents involving elephants would be very high. The line would also effectively slice through the only connection between the Western Ghats and the Eastern Ghats. For the present, clearance has not been provided for this railway line on the basis of the scientific evidence.

Box 11: List of Roads across the Northern Western Ghats

Sakri – Pimpalner
Sakri – Dahivel
Kalwan - Dhule
Nashik - Kasara
Sangamner – Bhandardara
Ahmednagar – Kalyan
Pune – Nashik
Pune – Mumbai Old
Pune – Mumbai Express
Pune - Satara (Katraj)
Pune - Satara (Kumbharli)
Karad – Chiplun
Satara – Mahabaleshwar – Poladpur
Kolhapur- Shahuwadi – Ratnagiri
Rajapur – Kolhapur
Kolhapur – Kudal (Phonda Ghat)
Belgaum – Kudal
Nipani – Kudal
Panji – Belgaum
Pune – Bhor – Mahad

Source: Paranjpye, 2011, p 10-11



Figure 12 The Mumbai-Pune Expressway Courtesy www.amitkulkarni.info.

Source: Picture 9, V Paranjpye, 2011

Measures for Mitigation/Improvement

The Panel recommends the following:

- No new railway lines and major roads in ESZ1, except where it is highly essential (as perhaps in Goa), and subject to EIA, strict regulation and social audit. Goa is a special case because it has most of its current development, including the Konkan Railway located along its coastal regions. Balancing development and decongesting the coast thus requires some movement to the talukas in the Western Ghats, which are mostly demarcated as ESZ1 by the Panel. Given that Goa's boundary with Karnataka is in ESZ1,

it may require some leeway on this issue. Goa's Regional Plan 21 also has plans to spatially move development to inner talukas and this will require some transport infrastructure development.

- Avoidance of new highways, expressways in ESZ1.
- No new railway lines and major roads, except when highly essential and subject to EIA, strict regulation and social audit in ESZ2.
- Upgrading of roads and railways is permissible in ESZ2 subject to strict guidelines.
- Essential new roads/ railways may be allowed in ESZ3 subject to strict regulation and social audit.
- A master plan be prepared for the transport sector in the entire Western Ghats that would take into consideration both present needs and future demands of transport of people and goods across the ghats in relation to the biodiversity and ecological value of the area. Such a master plan could then make recommendations of possible development of essential railway line/s and/or roads that would cause the least disturbance to the ecology.
- All future proposals for railway lines and roads should undergo a thorough environmental and wildlife impact assessment. The WGEA should set up a sub committee (comprising all relevant stakeholders and local communities and tribes) to assess the environmental and ecological impacts of constructing any transport infrastructure through rich forests, wildlife habitats and wildlife corridors.
- Before a project is approved, necessary mitigation measures including engineering solutions such as tunnelling, bridges, overpasses or elevated roads to facilitate the passage of animals, should be a mandatory part of the project design.

2.11 Human Settlements

Changing trends of ownership and lifestyle

Over the past few years, villagers have been selling their lands, and either work as labour on the land or migrate to nearby towns / cities in search of work and a "better" life. The new owners, i.e. city people purchase lands from these farmers and convert it into a farm house / resort with city amenities and city plans. Many times they convert the land into horticulture plantations (mostly mango especially in Maharashtra), or introduce non-native plants for landscaping/greening purposes or try out innovative plants like tea, coffee, etc. But for all these activities, the original plant diversity is removed indiscriminately. Increasingly, the Western Ghat areas are now being occupied by urban individuals / developers with land holdings ranging from 0.5 acres to 1000+ acres. These people are politicians, developers, the common man, corporates, and industrialists.

Second homes

When cities started becoming overcrowded and polluted, people needed a weekend destination and creative developers offered it with farm-house schemes and resorts. For the past two decades, the Western Ghats have become dotted with farmhouses, resorts and their ilk, attracting elite city people. City dwellers need a neat and clean look and all city amenities wherever they travel. This started the massive development of the hills to modify

and conquer nature. At the same time, when city people were attracted to the hills, the village people wanted city life. So they started selling land, and migrating to cities.

City lifestyle in the Ghats

City people living in the Ghats need all the modern amenities even in countryside houses. Good wide roads, water, electricity, etc., are all needed for the weekend home. The infrastructure is built with inert and non-renewable materials like cement, steel, bricks and quarried stone. Palace-like houses are replete with ACs, TVs, marble, and similar luxuries. Consequently, the weekend home becomes more lavish and energy-consuming than a city home. Along with urban amenities, elements in city gardens are incorporated in the hill gardens. Gardens with excessive resource consumption and non-native plants are laid out with large lawns and flower beds which need daily watering, fertilisers and pesticides. The gardens are overlaid with pathways, paving, steps, etc., consuming a lot of cement. Many times invasive plant varieties are used that are dangerous to local ecosystems. There are no guidelines or norms for garden development in sensitive hilly areas.

Hills to developed destinations

Depending on ownership, the resultant treatment to the land and its impact on ecosystems vary.

- Individual owners - Farm house, Resort, Farm lands, Horticulture
- Land developers – Farm house scheme, Resort, Townships
- Industries – IT park, Processing units, Floriculture etc.

A large number of farm houses and resort projects are being set up all over the Western Ghats on land holdings ranging from 10 acres to 500 acres. This is apart from huge projects like Amby Valley and Lavasa. Developmental activities associated with these projects are roads, terracing, vegetation cutting, construction and landscaping, all proving dangerous to biodiversity. Such impacts cannot be measured or compensated by any amount of greening activities.

Issues of Concern

These new settlement patterns and developments are resulting in hill cutting and physical changes in slope profile due to roads, terracing, construction, etc. Modification in hydrological patterns are noticed; terracing is causing removal of vegetation and soil and changes in hill topography. Dumping of material like stones, sand, bricks is observed as is quarrying for stone, murrum, and soil for various construction purposes.

Allied (or indirect) activities required as support structure during development also cause a lot of damage to ecosystems. These are:

- Establishment of a labour colony and temporary settlements on land
  - Problems of waste disposal, both solid and liquid
  - Increase in vegetation cutting for fuel wood
  - Increase in wildlife hunting
  - Temporary access roads
- Quarries and stone crushers

- Disturbance to slopes & streams
- Temporary material storage cause levelling of large areas
- Stone dust causes air, soil & water pollution
- Ill effect of accumulation of stone dust on vegetation

Hydrology changes

- Canalisation, modifications, removal of boulders, loss of riparian vegetation, habitats pose threat to stream ecosystem and its function
- Changes in natural streams & hyporheic zones
- Loss of special biodiversity like streamside vegetation and aquatic life
- Destruction of natural springs and oozes
- Alteration of sub-surface flows
- Damage to ground water table
- Introduction of waste water to water bodies
- Increase in runoff due to hard paved surfaces and reduction in water percolation

Soil:

- Increase in soil erosion
- Resource is wasted during construction activity

Vegetation:

- Major loss to unique floral species
- Introduction of non-natives for plantation
- Underground tubers are removed

Fauna

- Direct impact on small and ground dwelling fauna
- Destruction of migratory routes and corridors

Measures for Mitigation/Improvement

The Panel recommends the following:

- For all settlements and built areas/ to be developed areas, certain types of areas would be no-go areas, including water courses, water bodies, special habitats, geological formations, biodiversity rich areas, and sacred groves
- Special Economic Zones should not be permitted
- New hill stations should not be allowed
- Public lands should not be converted to private lands

In ESZ1,

- Change in land use should not be permitted from forest to non-forest uses or agricultural to non-agricultural, except agriculture to forest (or tree crops), and except when extension of existing village settlement areas to accommodate increase in population of local residents.
- For existing built structures such as hotels, resorts, the tourism policy of the MOEF appropriately refined by WGEA, to be followed

In ESZ2.

- Change in land use should not be permitted from forest to non-forest uses or agricultural to non-agricultural, except agriculture to forest (or tree crops) except when extension of existing village settlement areas to accommodate increase in population of local residents.
- For existing built structures such as hotels, resorts, the tourism policy of the MOEF appropriately refined by WGEA, to be followed

A building code should be evolved by the WGEA which include inter-alia eco-friendly building material and construction methods, minimising the use of steel, cement and sand, providing water harvesting methods, non-conventional energy and waste treatment The application or detailing of the framework can be done by local authorities to suit local conditions.

Certain recognized best practices of construction/development such as topsoil conservation, trees conservation etc. should be followed as per the guidelines of Green Building certifications of Eco Housing, GRIHA or any other appropriate codes to be encouraged.

Certain activities for example filling of marshes/ wetlands, introduction of alien invasive species are not permitted

- The area that may be paved is to be restricted; paving of ground areas may be done in such a manner that there is no change in the run-off / permeability of the plot overall before and after paving (if some area is paved, the recharge from other areas will have to be enhanced)

2.12 Science and Technology

In general, the contributions from the Science and Technology sector in solving environmental issues are found wanting. Eco-friendly technologies in various sectors have not been developed and even the available technologies have not been applied or popularised, to the full extent. There is need to insist on 'Green Technology' to be implemented, wherever possible in the Western Ghats region.

Through some of the R&D Centres/ Universities have developed eco-friendly technologies, they do not get the desired attention and are not being utilised or transferred in an effective manner.

The institutional mechanisms have to be strengthened to transfer the technologies developed at ISRO/ DST/ DBT and other centres of excellence in the country and State Science and Technology Institutions.

Issues of Concern

- Scientific inputs are lacking in environmental resource management/ sustainable utilisation of resources.
- No integration between R&D Centres, Universities and other scientific organisations both at Centre and State level in addressing environmental issues.
- Some of the useful technical reports/ theses from various R&D centres and Universities related to application of technology in solving environmental problems are not made available for evaluation under practical situations.
- Modern technologies are not used in solving environmental issues.
- There is lack of R&D in providing alternatives to the use of nature resources for construction purposes
- Green technologies for various sectors are not developed or used.
- Mechanisation in agriculture and material handling is absent or low.
- There is an absence of technologies for value added products.
- There is lack of proven / effective methods of pest and vector control which use biological means.
- Modern technologies like remote sensing and GIS are not being properly utilised in natural resource management.
- Solid waste treatment, plastic recycling and disposal are inadequate
- e-waste management in the IT sector is lacking.

Measures for Mitigation/Improvement

- Promote green technologies in various sectors (housing, energy, agriculture) and encourage investments in this area.
- Develop sophisticated technologies in the following areas and / or transfer the existing technology for wider use and application:
  - (i) recovery of petroleum from plastics
  - (ii) Evaluate the potential of bio fuels; wood gasification technology to meet fuel needs
  - (iii) Biological control of pests and diseases
  - (iv) Use of Remote Sensing and GIS in natural resource management and to develop local level plans
  - (v) Adopt, adapt or modify existing technologies to suit local conditions
- Reduce the energy intensity of production and focus on sectors which are more efficient in the use of energy, water and natural resources.
- Make water harvesting compulsory and also use of solar energy wherever possible.
- Collate database on Science and Technology-based innovations on the environment and take steps to improve capacity building at local level using these technologies.

- Accessibility of Science and Technology benefits is now available only to a group of privileged class and measures to initiate action to receive these benefits in a more broad-based manner to be evolved.
- Adopt mechanisation in agriculture and other sectors to reduce pressure on human labour (which is costlier/ unavailable in some places) and making it available at local levels.
- Enforce improved technology in the industrial units and mines to check effluent emission.
- Enhance the efficiency of existing technologies in controlling pollution of air, water and soil and conserve the biodiversity.

Action points for WGEA

- A separate cell should be set up within WGEA to look into transfer of technology of usable technologies and promote 'green technologies' under various sectors in the Western Ghats' region.
- Adopt "polluter pays" principle and generate income to fund R&D centres on developing eco-friendly technologies.
- Come up with a 'vision statement' to enhance the science and technology capacity to provide ecologically, economically and socially viable solutions with emphasis on conservation of biodiversity.
- Promote green technologies
- Promote Citizen Science
- Adopt the Australian River Watch model

Managing information

- Follow the lead of Goa Regional Plan 2021, that has put together an excellent GIS database, pulling together information from diverse agencies, and that could be used in many ways, e.g. to identify mine degraded areas outside mining leases, or to identify encroachments in riverine areas
- Government agencies should proactively disclose information as required by RTI
- No information is currently available on vital issues such as natural springs
- Potential valuable role of student projects

Need to create publicly accessible, transparent, participatory database on environmental resources,

2.13 Nutrition and Health

Especially after globalization and commercialization, coupled with cultural alienation and transformed lifestyles, humans have been paying heavily in the form of lifestyle diseases. Increased consumption of popular fast food/junk food is known to cause lifestyle diseases.

Wild plant resources can provide raw materials for a number of traditional, local, healthy and eco-friendly "slow" foods such as *idly, dosa, vada, bonda, patrode, paratha, tukudi, semige*

(vermicelli), *chutney, curry, sambar, rasam, sukka, tambuli,* pickle, *jamoon, halwa,* juices and decoctions.

The Western Ghats has been identified as one of the world's top hotspots of biodiversity. The Western Ghats, together with the adjoining west coasts form an important eco-region of India. Ecological and economic issues mainly focus on nature's goods and services, such as clean air and water, fertile soil, fodder and fuel wood, bamboo, cane and medicinal plants, honeybees, fish and animal husbandry as they relate to the material, aesthetic, cultural, spiritual needs of human beings. Manifold processes over a period of time have eroded the availability and enjoyment of these gifts of nature. It is therefore appropriate that the process of development become more sensitive to the needs of sustaining nature's goods and services, even as it promotes man made goods such as roads and bore-wells, sprinklers, fertilizers and pesticides, telephones, mobiles and internets, radio and TV broadcasts.

Grassroots inputs play a vital role in sustaining nature's goods and services, since these are still highly significant to the quality of life of the people from rural localities; people who depend on water from streams to irrigate their fields or provide some fish as food, or bamboo and cane to thatch cattle-sheds or weave baskets, or use fuelwood to cook or medicinal herbs to treat illness. The rural people are also the custodians of valuable resources such as traditional crop varieties and also have a treasury of knowledge such as the use of wild plants as food, cosmetics and medicines. In the modern times of patenting and globalization of trade, it is important to preserve these biological resources and knowledge and to ensure just-sharing of benefits from their commercial use.

Locally value-added ecosystem goods may include mats, baskets, pickles from amla, large serving spoons made of coconut shells, rain-cover (*gorabe*) made from the leaves of *Vateria indica*, milk products like *dood-peda*, areca palm leaf (sheath) plates etc.

Hedgerows are rich hunting grounds for wild berries, fungi (mushrooms) and other leafy vegetables. Cucumbers, pumpkins, watermelons and other squashes are cultivated as vegetables because of their high water content and refreshing nature, although they are low in calories. Cucumbers are valued as an ingredient in skin care preparations. Fibre consumption help to prevent constipation and also help to lower cholesterol levels in the blood. Dietary sources of fibres mainly include fruits, figs, vegetables, cereals and pulses.

The patterns of land use and of agriculture have changed over time, thereby affecting ecosystem services. There were many varieties of paddy. Since paddy is the least paying crop, it is losing out to other crops. In addition, the new farming practices have led to the increased use of chemical fertilizers and pesticides, coupled with intensive irrigation. The increasing areas of monoculture plantation crops, especially arecanut, coconut and cashewnut have caused reduction in the output of food grains. The land use changes, especially the conversion of former common village lands and scrub lands that were once used as grazing lands to habitation or to Casuarina, Acacia or rubber plantations have led to forced reduction in livestock holdings and a decline in organic manure resources.

The Western Ghats ecosystem also harbour a range of cultural practices like sacred groves, sacred stretches of river/stream beds, tanks, mangroves and sacred species of plants and animals. The smaller sacred groves are generally referred to as '*devarabana*' or '*nagabana*' (serpent groves), which are occasionally linked to temple complexes. Many species of the genus *Ficus* are protected by the people. *Nagabanas* protected the cobras. In most of the temple ponds sacred animals such as the mahseer fishes and turtles are protected. The sacred groves are also experiencing a variety of pressures including grazing, illegal felling of trees, hunting of wild animals and more recently concretization of *nagabanas* in the pretext of

renovation. Further, the ongoing acquisition of agricultural land from the farmers for the implementation of Special Economic Zones (SEZs) has not only affected the already depleting agricultural productivity, but has also destroyed a number of sacred groves leading to the extinction of some of the pristine sacred forest patches and their endemic flora and fauna.

Thus, ecosystem goods and services sustain and fulfill human life and they may be grouped into 'provisioning' services, such as food, water, fibre, fuels and other products; 'supporting' services, such as biodiversity, soil formation, pollination, waste treatment, nutrient cycling; and 'enriching' services, such as aesthetic, social relations and cultural traditions.

Nutritional needs vary individually, depending on a variety of factors including age, sex, level of physical activity, metabolic rate and state of health. However, whether a person needs a low daily intake of 1500 calories or a high intake of 3000 calories – the proportion of food from the different food groups should almost always remain the same. By eating a variety of foods in sensible proportions an optimum level of every nutrient needed to maintain good health can be obtained. Protecting a diversity of traditional food resources in the Western Ghats would thus ensure nutritional security as well as ensure good health of the local people.

3. Towards Multi-centred Governance in the Western Ghats

Governance for the Western Ghats requires us to work with complexity. This necessitates designing institutions that involve multiple levels and multiple actors – state and non-state, and across many levels for the support of new norms and sustainability practices. In other words, we need many centres for decision-making and at many scales, which enable thinking across knowledge domains, social relationships, and competing interests.

Excessive centralization of regulatory control does not, and has not worked well. Patchy enforcement and inadequate monitoring and often an incomplete understanding of environmental regulations has resulted in poor environmental outcomes as we have already observed. In the case of decentralized institutions, not only is there inadequate regulatory capacity, but often the blurring of interests between the regulators and the regulated creates unsatisfactory results in terms of environmental and social outcomes. This then requires us to work in a more participatory fashion, and with other forms of governance, processes and norms beyond just legal rules with a view to achieve the outcomes that we desire.

To deal with complexity we need resilient institutions that are able to adapt to changes and pressures around them. It is in this context that we would like to suggest that we strengthen resource and environmental federalism in the Western Ghats, and move towards more polycentric forms of governance, and many centres of decision-making, which will enable more innovative responses, learning, cooperation and better adaptation to ecosystem pressures and changes. We believe that the key focus of the WGEA should be to "facilitate the development of institutions that bring out the best in humans"(Ostrom 2009). To cite Ostrom (2009) again, "building trust in one another and developing institutional rules that are well matched to the ecological systems being used are of central importance for solving social dilemmas" (p 24).

This section of the Panel Report will focus on issues of governance and then propose specific measures in the trajectory towards multi-centred governance with a view to achieving greater social harmony. It also discusses the special role of education in promoting a more thoughtful conservation and development in the Western Ghats. The section concludes with

suggestions on how people, communities and companies can be incentivised to conserve the biodiversity of the Western Ghats.

Governance Deficits

In the course of the Panel's work, it became evident that a number of issues relating to governance needed attention. Many of these were also reported by authors who contributed papers to support the work of the WGEEP. In this section, we highlight some key areas that need attention.

Environmental Impact Assessment (EIA) and Environmental Clearance (EC) process

The EIA process which is so central to protect the ecosystems in the Western Ghats was found to be defective at several points (WGEEP observations; WGEEP commissioned papers by R Dutta and R Sreedhar, 2010, Equations, 2010 and N Alvares, 2010; M Gadgil, Field Report. 4th to 11th October, 2010)

1. These relate to the poor quality of EIA reports and the process of public hearings. Not only were EIAs seen at times to be fraudulent, but it is found that the minutes of public hearings are also manipulated. We have seen and heard of cases where the EIA consultant did not visit the village or did not conduct appropriate surveys and impact studies.
2. Given that EIA reports are not to be trusted, the role of the Environmental Appraisal Committee (EAC) for the sector becomes that much more important. The Composition of the Environmental Appraisal Committee (EAC) is considered inadequate since it does not always have representation from the region in which the project is to be located.. Many problems emerge because the EAC does not have a sense of the place and also knowledge of what other activities may be stressing the region when the new project is being proposed. Since EAC deliberations take place in Delhi, without, most often, a visit to the project site, local-level pressures and concerns are not always understood. Consequently the EIA report is often defective and the public hearing minutes are manipulated Given this, reliance on faulty EIA reports makes a mockery of the whole regulatory process.
3. States, such as Goa, felt that EC 2006 notification reduced the SPCB to post offices; little state/local input was provided into the EC process. However, at other places, it was felt that the SPCB acted against the interests of the local people by misleading the EAC of the MoEF.
4. The perception of the State government is that its views or the State Pollution Control Board's views do not find place in the whole procedure and process post-2006 except in the "consent to establish" which in any case happens only after the MoEF has given its clearance. States do have a veto under the "consent to establish" requirement but that needs to be exercised better. It was felt that pressure to consent is high post-EC when the stakes are high.
5. Environmental Clearances are given to individual projects so the Cumulative Impacts of Projects are ignored
6. Despite a poor history of compliance the promoter is granted clearance for new projects
7. Exclusion of projects from the EIA process: The 2006 notification left out many projects from the requirement of obtaining Environmental Clearance on grounds of scale and to simplify the process. However many of these have serious impacts on the Western

Ghats. For example, hydro projects below 25 MW, wind farms, tourism projects, townships etc. The problem becomes really serious when one considers that some of these are coming in close proximity resulting in cumulative impacts. Furthermore, many of these projects have been thought to be exempt from environmental clearances because they are considered "green" technologies, e.g. wind farms. "Green" projects and so-called "small-scale projects" must require an EIA and a Cumulative Environmental Impact Assessment wherever applicable.

Poor level of Compliance and Monitoring for projects:

- Conditions of Environmental Clearance are not observed. Many mines, for example, who are mining beyond the tonnage are permitted to continue with impunity.
- There is not enough capacity at SPCB-level to monitor projects.
- There is also inadequate understanding and monitoring of the impact of gases (SO_2 and NO_x) on plantations and forests.

Poor implementation of PESA and Forest Rights Act

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 (Choudhary, C. & Dandekar, A. 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 licenses 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 promise of PESA tragically remains mostly unrealised. The legislative and executive work, which state governments were meant to undertake, still remain 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 the economic and political elite 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. 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 gets fullest attention. This does not seem to have happened, with the forestry establishment playing a notably obstructive role. On the other hand legal and administrative subterfuge has relegated the provisions of PESA to a set of unfulfilled aspirations and the agenda of self-governance remains postponed.

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 as a result of 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 as "encroachers" or criminals while 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. 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 states.

Box 12: N.C. Saxena Committee report (2010) on the 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.
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
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-ridden 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 forest 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). These are defined in section 2(a) of FRA as customary common forest lands 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 (Ministry of Tribal Affairs) 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 made 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 (community forest resource), 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. The 20 July 2010 letter of MoTA to all states also indicates such a course of action. 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. 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.

Poor regulatory oversight and institutional coordination

The institutional oversight on matters relating to environmental and natural resource management (ENRM) is highlighted in Box 13. It is evident that local governments and local

community are not being sufficiently involved in the oversight process. There is also insufficient coordination between the centre and states and across levels; consequently many key concerns remain unattended. This results in poor delivery, insufficient feedback from affected groups for policy revisiting, and subsequently social disharmony and conflict.

Box 13: Current regulatory oversight on matters relating to ENRM

Key functions/ responsibilities	Centre	State	Local government	Community
Land issues: access, compensation		DoRev, Agriculture	Missing/weak link	
Overseeing of environmental and health impacts	MoEF	SPCBs		
Forest Clearances	MOEF			
Rehabilitation of project-affected people	MoRD	DoRev/RD		
Social investment programmes	MoRD			

Inadequate databases of relevance to governance and planning

Databases that are needed for regulation and good development planning are deficient such as for example spatial data bases.

Measures for Improved Governance

The discussion on proposed measures for improved governance focuses on the following:

1. Adopting Principles for development and conservation in the Western Ghats
2. Regulating development activity in the Western Ghats through ESZs
3. Decentralization as the route to a more inclusive multi-centred governance and development in the Western Ghats
4. EIA, Environmental Clearance Reform, Implementation of PESA, FRA
5. Diffusion of Control through Society

Principles for Development and Conservation in the Western Ghats

Through our work on the Western Ghats, we have arrived at the following sets of principles that we believe should guide development and conservation.

1. Whether it is for conservation or development, inclusion and transparency should be key.
2. Development planning should be decentralized, water shed-based, with increased convergence of planning at grassroots level.

3. District Planning Committees mandated under the Constitution should be supported in all Western Ghat States and these DPCs should be mandated to arrive at the district plan.
4. Ecological sustainable livelihoods should be brought into the planning process for natural resource management, and tribal communities should be involved wherever relevant.
5. Education to address individual/ community valuation of resources
6. Appropriate green technologies that reduce the footprint of development:
    a. Use of appropriate materials, conserving water and soil, and energy saving centres that make such technologies accessible in one place
    b. Training programs, to enable households to use this
    c. Use of Industrial Ecology principles, Eco-Technologies
7. Use of carrying capacity concepts, pollution prevention, polluter pays principles
8. FPIC through the gram panchayat route for mega-development projects, if at all

Action Point: These considerations can be included in the design of the WGEA

Regulating Development Activity in the Western Ghats

ESZs in the Western Ghats are demarcated using a socio-ecological multi-criteria evaluation (SEMCE), discussed in Part 1 of the WGEEP Report. ES Zones are to be seen as tools for balancing conservation and economic activity such as:

1. Areas where human activities will continue, but be prudently regulated under the Environment (Protection) Act, 1986.
2. Areas not at all meant to stop development in ways that would hurt local people, but to ensure that development is environment-friendly and people-oriented, as well as serves to preserve the ecological heritage on a long term basis.
3. Areas with no set regulations, such as ban on all new industries, or on conversion of agricultural into commercial land, that would prevail in every ESA.
4. Areas where regulations should be worked out with due respect to local context.
5. Areas which are not just about regulation, but about positive promotion of environment-friendly development as well.

Table 6 in Part I summarizes the broad guidelines for regulation of development activity in the Zones.

Action Point: The Ecological Sensitive Zones and broad guidelines should be woven into the WGEA structure and regulatory functions

Decentralization as the route to a more inclusive multi-centred governance and development in the Western Ghats

WGEEP recommends that following the Constitutional amendment and provisions for decentralized government, this should be actively supported in development planning in the Western Ghats. According to Article 243 (G) of the 73rd Constitutional Amendment Act, the States are required to devolve adequate powers and responsibilities on the Panchayati Raj Institutions (PRIs) in order to make them effective institutions of local self-government.

The responsibility for the preparation of plans for economic development and social justice and its implementation in relation to 29 subjects listed in the Eleventh Schedule is also bestowed on the PRIs.

District Planning Committees mandated under the Constitution should be supported in all Western Ghat States and these DPCs should be mandated to arrive at the district plan. To be able to do this effectively, spatial planning should be the focus. All necessary technical support should be provided to DPCs and LGs from the State, academic institutions, NGOs and other experts for local planning. Some of the key issues that need attention are the management of solid waste, waste water, local impacts of mining, tourism on livelihoods, and benefit sharing from such activities. Management should seek to integrate issues. Special purpose vehicles should be set up by local governments to handle multi-jurisdictional matters, such as watershed development, waste disposal, and natural resources management.[7] Ecological sustainable livelihoods should be brought into the planning process for natural resource management and tribal communities should be involved wherever relevant.

WGEEP believes that if local governments are given clear roles and held accountable for these, the incentive structures will be transformed. There will be a demand for capacity to be created and this will put pressure on higher levels of government to meaningfully respond.

A note of caution to be heeded is that devolution of powers of licensing natural resource use to local bodies without adequate safeguards can result in ruthless exploitation of these resources.[8] Such powers can create incentives for Panchayats to have this as the preferred route rather though taxing property. The issue of proximity to the governed can also result in corruption and nepotism in the handing out of granite and sand extraction licenses, for example. To avoid this, several design precautions have to be kept in mind while entrusting conservation responsibilities to local governments: Firstly, one must not give them scope to substitute their property tax bases with revenues earned from indiscriminate exploitation of finite natural resources.[9] Secondly, there has to be overseeing and appropriate safeguards built in. Thirdly, design principles should focus on creating the appropriate incentives for the building of trust and reciprocity.

The following suggestions would go a long way on better natural resource governance by Local Governments (Raghunanda, 2008).

First, given the externalities that are associated with natural resource management and governance, there must be scope for arrangements that are more flexible and which can go beyond the tiered system of Local Government. Thus, local governments should be encouraged to enter into partnerships with each other, form clusters and collaborate with private entities to tailor proper arrangements for natural resource management and create many centres for decision-making.

Two, in the context of natural resource management across urban and rural local governments should use the instrumentality of the District and Metropolitan Planning Committees to develop solutions for matters that straddle rural and urban jurisdictions, such as water supply, garbage disposal etc., by providing an overarching system than

[7] Ideas taken from the Conclusions of the Conference of Academics on Panchayati Raj Inclusive Growth through Inclusive Governance: The Future Agenda for Local Government, 25-26 February 2009, New Delhi
[8] Ibid.
[9] In Karnataka when Mandal Panchayats were given the rights in 1987 for the extraction of minor minerals such as granite, there were several instances of them indiscriminately issuing licenses for granite extraction, sometimes even endangering historical sites such as forts and archeological excavations.

manages these activities. Finally, it will be necessary to create a set of new fiscal instruments and arrangements for resource sharing and benefit sharing from utilisation of natural resources. Similar instruments such as SPVs will need to be conceived for undertaking common over-arching projects.

Box 14: Plachimada experience

A myth actively perpetuated by traditional politicians and a supportive bureaucracy is that panchayat bodies are India's lowest ranked implementing agency for government programmes. Thus their status as an institution of self-government, as designated in the Indian Constitution, remains a distant dream. This is why, when the Plachimada panchayat in Kerala's Pallakad district rescinded the license of a global soft drink major corporate and the state high court dismissed the company's writ petition challenging this decision, it became an event with huge ramifications.

The event strongly indicates the emergence of the panchayat as 'government'. That is why the fight between the panchayat and the company – paternally supported by the state government – has occurred on the terrain of constitutional rights and their relevance to public good.

While cancelling the license, the panchayat evoked its constitutional rights (further empowered by state legislation). As local elected government, it has argued, it has the duty to protect the well-being of its subjects. So it has the right to cancel – or refuse permission – to anything that affects its subjects adversely. The panchayat holds the soft drink plant responsible for depleting groundwater in the area under its jurisdiction; this has affected local agriculture. The panchayat's reasoning is important: it establishes the crucial link between governance and managing local natural resources, and if history serves memory right, panchayats were formulated precisely for this reason. The Plachimada panchayat has established the supremacy of an elected government.

The company contends the panchayat is a subordinate of the state government and thus can not operate out of its domain. This is usual corporate arrogance, which was shattered by the turn of events. The company has visibly panicked, what with the prospect of being denied permission permanently, and is now sitting-in at hearings with village leaders. The Constitution has given enough power to the panchayat (to avoid such stand-offs, it has even listed 29 functions in a separate schedule) to function totally outside state policy. Judicial pronouncement from the Supreme Court also upholds the panchayat's power to evolve its policy and to take all necessary steps to implement it. Plachimada is a first-hand lesson on the power of local government. This is the event's first important lesson.

Coincidentally, Plachimada occurred even as India tried dimly – hesitantly – to remember Bhopal, site of the world's worst industrial disaster. Or, should we say: corporate social irresponsibility. Bhopal is a perfect case of how a gap between government and people can stymie the delivery of justice. Practically nobody has been punished for this disaster. More importantly, people's right to know about the hazards they and their environs might encounter gets grossly curtailed by such distance. Till December 2-3, 1984, local residents had no clue about the poison being brewed right in their backyard.

To think of Bhopal's affected people reacting against the plant as swiftly and successfully as Plachimada is, unfortunately, wishful thinking. When the disaster occurred, panchayats were not constitutional bodies (panchayats were made possible by the 72nd and 73rd amendments to the Constitution in 1992). The idea of making people a part of governance was overpowered by the need to get more industries. This overpowering need to seek multinational investment is still a policy, but the difference is that, in between, Bhopal happened. Plachimada residents asked questions of the company that Bhopal victims would surely have asked much before the tragedy. Arguably the

tragedy could have been averted. Thus Plachimada comes across as an effective mechanism to instil corporate accountability in the country, and for the corporate sector an amicable way to transact business. This is the second important implication of the event.

Notwithstanding sceptics, panchayats are showing signs of maturity as able governments. This is not the place to clinically dissect a crucial development like this, but to realise the inevitability of panchayat as government. Interpreting Plachimada as a setback to the country's economic liberalisation programme is primarily abrogating responsibility in a democracy, that also the world's largest one. If the states use the 'federal' argument to ask for more power from the Union, they must apply the same argument to themselves and give power back to the panchayats.

In fact empowered panchayats like Plachimada can make the flow of investment smooth and faster. Companies will not only bypass the massive bureaucratic hierarchy, but can also avoid Plachimada-like scenarios. This is because panchayats will make allowance only for such companies as would suit their growth; at the same time, the responsibility of how companies conduct themselves will fall to the panchayats. Small in size, panchayats would also be able to speedily sort disputes out.

But before all this happens, as a beginning, the company and the Kerala state government must give in to what Plachimada wants.

Action point: Local government should have representation in the proposed Western Ghat Ecological Authority

EIA and Environmental Clearance (EC) Reform, Implementation of key Acts

Within existing provisions of EIA processes, the following needs to be done (Dutta and Sreedhar, 2010):

- Specific Terms of Reference (TORs) should be framed for preparation of EIA reports for projects located in the Western Ghats and the TORs should be available for public comments.
- The process of accreditation of EIA consultants is welcome. It would be better still if the project proponent deposited the money with the MoEF and the MoEF then chose the consultant so as to preserve the independence of the consultant.
- The EIA process in the Western Ghats should move to Regional and Cumulative Impact Assessments and carrying capacity studies.

The EIA clearance procedure introduced in 2006 can be re-visited:

- To provide a separate forum for inputs by the State: The conditions in the Environmental Clearances specify the role of the Regional Office of the MoEF, to monitor the conditions stipulated in the ECs. It would be ideal that the State Pollution Control Boards should undertake these tasks. This will help resolve many local monitoring issues and curb unhealthy mining practices, which the mining operators indulge in, in the absence of regular monitoring of mining conditions by the Regional Office.[10]
- For inclusion of projects having significant impacts within the ambit of the EIA: It was observed that several projects with significant impacts were outside the purview of the

[10] Suggestion from the Government of Goa.

EIA process or requiring only state clearances, i.e. the so-called B category. Examples of such projects are: diversion of rivers, mini-hydel projects, wind mills, tourism projects and resorts specially located within or in proximity of forest land and other ecologically sensitive areas. For the Western Ghats, given the richness of the area, this differentiation should be revisited. Instead of such compartmentalization of projects, protecting the environment needs better coordination between Centre and State entities and across State regulatory and development bodies. The EIA process has to also take into account whether a particular project is permissible in the ESZs so declared.

- No mine or tourist infrastructure is to be allowed to continue if environmental rules and conditions of clearance are flouted.
- Strengthen institutional coordination for monitoring impacts

Given that the challenges to the tribal community's way of life have severely intensified in the past decade with a liberalizing economy, the 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, the neglect of PESA has had particularly tragic and violent implications.

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. Consequently we need to move ahead to genuinely empower tribal people using the path-breaking provisions of PESA.

Action Point:

A special Western Ghats Expert Appraisal Committee should be set up (or may be part of the function of the proposed Western Ghats Ecology Authority) to further appraise a project after it is recommended by the Sector-specific EAC.

A separate Cell is needed to take forward the enforcement of PESA and FRA in Western Ghat districts

Diffusion of Control through Society

We would also like to suggest that governance in the Western Ghats allow for a wider range of instruments, norms and processes beyond the legal rules that are in place and thereby allow a diffusion of regulatory control through society in order to strengthen good development practices and incentivise conservation (Scott, 2004). Such processes and instruments can include the following:

- Pro-active disclosure of information in connection with RTI
- Social audits of projects and development activities
- Participatory monitoring of impacts using tools and indicators
- Green accounts for the minerals and tourism sector
- Creation of spatial databases
- Creation of incentives for conservation and innovations
    - Payments for ecosystem services (Somanathan, 2010)
    - Influence social attitudes and norms
    - Reward good corporate/state behaviour

- Encourage green innovations

Strengthening Environmental Governance

The Panel believes that immediate steps must be taken to address the issue of the serious deficit in environmental governance all over the Western Ghats tract. The Panel is impressed both by levels of environmental awareness and commitment by citizens towards the cause of environment, and their helplessness in the face of their marginalization in the current system of governance. The Panel urges the Ministry of Environment and Forests to take a number of urgent steps to involve the citizens, in particular:

(a) pro-active and sympathetic implementation of provision of Community Forest Resources of the Forest Rights Act,

(b) establishment of fully empowered Biodiversity Management Committees in all local bodies,

(c) promotion of programmes on the pattern of 'Conservation of biodiversity rich areas of Udumbanchola taluk' formulated by Kerala State Biodiversity Board,

(d) a radical reform of Environmental Impact Analysis and Clearance process,

(e) a revival of Paryavaran Vahini programme, and

(f) 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.

To recapitulate, we recommend the following:

- Pro-active disclosure of information in connection with RTI
- Implementation of Forest Rights Act, 2006
- No mine or tourist infrastructure to be allowed to continue if environmental rules are flouted
- Social audits and participatory monitoring of impacts using tools
- Recognize and incentivise good corporate behaviour
- Green accounts for the minerals and tourism sector
- Require EIA even for "green" technologies
- Creation of spatial databases in the public domain
- Strengthening institutional coordination before giving EC
- Strengthen institutional coordination for monitoring impacts
- Tax the mining and industrial sectors to improve social infrastructure in region
- Strengthen local panchayat capacity in environmental governance
- Empower local panchayats in mining regions financially by sharing royalty with them
- Central Government to arrive at ways to compensate Western Ghats states for the contribution to preservation of country's forests given the high share of forests in their land area

A More Thoughtful Conservation and Development Through Education

Role of Schools, Colleges and Voluntary Agencies

Educational institutions with their voluntary force of students of NSS and NCC programmes, often working in tandem with local voluntary agencies, could an make an important contribution to the effort at environmentally and socially sound development of the Western Ghats. To be fruitful, however, such an effort should be directed and form part of a long term plan. Ideally, the effort should focus on a definite locality and should be undertaken in collaboration with the local village panchayats, their Biodiversity Management Committees, as well as Governmental agencies.

Environmental education is now a compulsory component of educational activities at all stages from the Primary Level through University education, thanks to a Supreme Court order of 22 November 1991. The National Council of Educational Research and Training and the University Grants Commission are guiding this process, which is being implemented at the state level. It would be very fruitful for WGEA to establish links with these extensive educational activities. The National Curriculum Review 2005 has made a number of significant suggestions in this context. These include the need to ground Environmental Education in student activities relating to local environmental issues and to use the information so generated to create a publicly accessible, transparent database on India's environment.

Parisara: A free, public domain knowledge resource on Indian environment developed in a collaborative fashion

All over the world, citizens are a great repository of detailed information on many facets of their local environment. Our citizens, especially students and teachers, ought therefore to play an important role in this process of building up a good information resource on India's environment. The rapidly advancing tools of ICT hold much promise in facilitating such a participatory process of knowledge generation. An outstanding example of such an application is Wikipedia, the free encyclopaedia that anyone can edit. Wikipedia articles are expected to be encyclopaedic, i.e. based on published, authenticated information, and not on primary observations. Thus, a review of published information on birds of Ratnagiri district can qualify for an article in Wikipedia, while a checklist of birds of a particular college campus based on personal observations. However, the Wiki software is freely available for other users to create their own websites. Therefore, such a checklist could be hosted on a Wiki site set up on the website of a school/ college, or some other appropriate agency. Taking advantage of the Wiki facility, other students or interested citizens, observing additional species may then quickly add to the checklist. They may also add images of these bird species in Wikimedia Commons, their local names in the Hindi/Gujarati/Konkani/Marathi/Kannada/Tamil/Malayalam Wiktionary, classification details in Wikispecies, and show the location of the college campus on Google Earth images.

Another application of interest is a shared spreadsheet that is made available to all or selected users for concurrent data entry or modification, usually on a private or public network. One may visualize students from different colleges collecting information on BOD levels and other water quality parameters, in different water bodies, as a part of their Environmental Education projects. They may all be authorized to access a shared spreadsheet on which information from a number of different investigations can be

uploaded, validated by a moderator, integrated, analyzed and eventually shared with the public.

The WGEA may begin this collaborative process of developing publicly accessible information on India's environment, with a pilot project in Western Ghats districts. The programme may involve the many interested citizens of the district working with a consortium of junior and undergraduate colleges representing both urban and rural localities. It would take advantage of the fact that it is now mandatory for students in XI–XII standards as well as for second year undergraduates in all branches to undertake a major project on the environment. It could also build upon the provisions of the Biological Diversity Act 2002 that mandates all local bodies–Panchayats and Nagarpalikas–throughout the country to undertake documentation of local biodiversity resources and associated knowledge in the form of *"People's Biodiversity Registers"*.

To succeed, such an endeavour clearly needs vigorous scientific support. The WGEA should provide this with the help of a Technical Support Consortium (TCS), primarily of local, district-based scientists. This group will have to develop manuals detailing study methodologies, formats in which quantitative data may be collected to support these studies, as also other resource material such as field guides to identification of bioindicators of water quality etc. Most importantly, the TCS may help through assessing the quality of the primary data posted by students or other interested citizens on the various Wiki sites that may be networked to constitute a non-peer reviewed publication called "*Western Ghats Parisara Sthiti".* TCS may help in selecting material of good quality from this information resource, help in its interpretation in light of available scientific knowledge and in its publication in an appropriate peer-reviewed medium. Since much of such information, although of good quality, is likely to be of very locality-specific interest, it might be worthwhile organizing a locality-specific on-line publication called "*Western Ghats Parisara Prakashana"* to host it. Once properly peer reviewed and published, this information may be used to write Wikipedia articles.

This should set up a positive feedback system, because the more knowledge there is, the more readily can its quality be assessed, and the more readily can it be added to. With students, and other interested citizens generating knowledge about the environment, the quality of environmental education will improve. The built in transparency of the process would promote honest submissions, as well as grading. It would be a self-correcting system with a built-in forum for all citizens, including experts to assess, point out possible deficiencies, and incorporate improvements. In the long run, this process should create a totally transparent, publicly accessible information resource on India's environment with proper accreditation to concerned students, teachers and other interested citizens for all items of information.

Analysis of the Local Situation

The particular problems of environment and development of a region vary a great deal especially in a hilly tract such as the Western Ghats with its tremendous variation in rainfall, landform, extent of deforestation, population pressure and so on. Pointing out and investigating the specific problems of a locality does not require very sophisticated technical instrumentation and expertise, but can be very valuable for planning development. Schools, colleges and voluntary agencies could easily take up simple useful investigations of this type in a specific locality. The following is a sample of the kinds of questions that may be investigated:

1. What is the depth of water table in the wells in different months of the years? How has this level changed in recent years with the installation of electric pumpsets?
2. How much of the land previously accessible to grazing has been covered by *Eupatorium*?
3. What was the actual level of compensation which was productively invested by farmers who were rehabilitated due to a development project?
4. What is the quantity of paddy straw used up as thatching material every year?
5. What are the population levels of mosquito vectors of malaria in different seasons of the year?
6. What are the levels of gastrointestinal infections at different times of the year and in different strata of the society?
7. What are the levels of pesticide usage in arecanut orchards? Which pesticides are used? Are there any known suspected cases of pesticide poisoning?
8. How many years of fallow period are being allowed in the shifting cultivation of hill slopes?
9. What are the locally growing plants used for medicinal purposes?
10. What is the source of energy used for domestic cooking?

If properly organized in a free, public domain knowledge resource on Indian environment developed in a collaborative fashion, as sketched above, a wealth of useful information pertinent to questions of environmentally sound development could be thus collected and used in highlighting specific local problems and required solutions. This could serve as a very useful aid to learning and teaching in educational institutions as well.

Public Awareness

There is a great scope for educational and voluntary organisations to take the lead in educating the public, as also the technical people and administrators, about locally significant issues of environment and development. Many form of media, ranging from lectures, exhibitions, plays and songs could be employed. The Society for Environmental Education in Kerala at Payyanur and the Kerala Sastra Sahitya Parishat have been organising exhibitions, touring theatre productions, and publishing magazines, and books as well as conducting nature camps. The Hulgol Group Villages Co-operative Service Society in Sirsi taluk has organised lectures for their members on management of livestock, development of fodder resources and merits of stall feeding. The Mahavishnu Yuvak Mandali in Kumta taluk had organised a training programme on the construction of fuel efficient smokeless chulas at home. A variety of such models is thus already available and could be very profitably emulated more widely.

Organizing People

Perhaps the most serious stumbling block in the way of eco-development is the fact that the masses of people are poor, and uneducated, and so fragmented by barriers of caste and religion that they cannot act together in common interest. They are so pressed by the need of making daily ends meet, that they find it difficult to exercise prudence in their own future interest. Therefore a major contribution that the educational and voluntary organizations could make is to help in organizing these people to co-

operate with each other in good management of natural resources, and to take proper advantage of the many Government schemes to help them in this endeavour. The following is a list of worthwhile projects in this context:

1. Organise the villagers to agree to protect a fuel-cum-fodder plantation taken up under the social forestry programme on village common land
2. Organise a rotational grazing system on the village gochar land
3. Organise forest labourers, co-operative societies or LAMPS in tribal areas to take up working of forests
4. Organise a community biogas plant
5. Organise a co-operative programme of soil conservation on agricultural lands

Diffusion of Desirable Technologies

A major block in our development programmes has been the lack of serious effort at understanding the problems of diffusion of new technologies under the field conditions, and then, promoting such diffusion. Local schools, colleges and voluntary agencies could take an active part in this process by analysing the situation, arranging model demonstrations, providing voluntary help to set up a project, acting as liaison with the Governmental agencies involved or acting as agencies for the execution of a project. Examples of such technologies which deserve consideration include:

1. Revegetation of barren slopes by species of utility to the local population
2. Fuel-efficient smokeless chulas,
3. Compacted soil cement blocks for construction
4. Sulabha Shouchalaya latrines

There are thus a whole varieties of ways in which educational and voluntary organisations could promote the process of environmentally-sound development. At the same time, these could strengthen their own resource base by executing certain project components such as setting up nurseries for social forestry plantations or construction of chulas in scheduled caste houses.

Role of Universities and Scientific Institutions

The following is an indicative list of areas of high priority for scientific research and development work for the Western Ghats tract:

1. Changes in soil fertility in relation to levels of use of organic manure and chemical fertilizers
2. Standing biomass and productivity of various sources of organic manure
3. Evolution of pesticide resistance amongst animal and microbial pests
4. Impact of pesticide usage on human and livestock health
5. Utilization of land in relation to its capability
6. Extent of soil erosion from hill slopes under different land usages

7. Extent of water runoff versus percolation from hill slopes under different land usages
8. Socio-economic forces promoting cultivation of hill slopes
9. Techno-economic feasibility of discontinuance of cultivation of hill slopes and a switchover to tree and fodder crop production on such lands
10. Possible role of rural employment generating programmes in switchover to tree and fodder crop production on hill slopes
11. Dependence of horticultural crops on forest cover in the neighbourhood for maintenance of microclimate, water regime, supply of leaf manure, fuelwood for curing tea etc.
12. Maintenance and liquidation of shade trees in plantation crops especially cardamom
13. Implications of future plans of extension of plantation crops for the maintenance of the natural vegetation on the Western Ghats
14. People's attitude towards the use of community and state-owned land, pressures of fuelwood extraction and grazing on community and state-owned as well as privately held lands
15. Social organisations needed to ensure proper use of community and state-owned lands,
16. Current patterns of utilisation of malki forest lands
17. Techno-economic feasibility of switchover to stall feeding of livestock
18. Maintenance of goats on the Western Ghats
19. Enhancing the fodder resources of Western Ghats,
20. Development of fisheries in large reservoirs of the Western Ghats
21. An inventory of all near-virgin forest tracts of the Western Ghats
22. Impact of grazing, fuelwood collection, selection felling on levels of biological diversity of the Western Ghats
23. Cultural traditions of conservation of biological diversity of the Western Ghats
24. Man–wildlife conflict especially for elephant and wild pig populations
25. Economies of on-site preservation of indigenous varieties of cultivated plants
26. Non-sustainable use of ground water resources of Western Ghats
27. Micro- and mini-hydel potential—its utilization through pilot demonstrations
28. Impact of accessibility by road on the forest cover of Western Ghats,
29. Utilization of plant material in rural house construction
30. Improving the life of thatch on huts and cattle sheds
31. Impact of sanitation measures on incidence of diseases in rural areas of Western Ghats
32. Role of natural living resources in nutrition of people of Western Ghats
33. Environmental control of vectors of diseases such as malaria and KED in the Western Ghats
34. Socio-economic factors affecting the diffusion of environmentally desirable technologies

35. Socio-economic and psychological factors determining the number of children desired by families of Western Ghats tract
36. Perception of environmentally and socially sound developmental priorities by people of various strata.

Catalysing Environmentally and Socially Sound Development

There is clearly considerable scope for Research Institutions, Universities and research-minded faculty members of colleges to generate scientific information and technologies of immense value to the process of environmentally sound development of the Western Ghats. There are several reasons why very little has so far been accomplished in these directions. Foremost amongst these is the lack of tradition and interest in working with people and under field conditions. But technologies developed in isolation in laboratories at research stations often prove irrelevant in the field. It is therefore very important that we should now create new traditions of field research and of experimenting with technologies under field conditions.

Each University or scientific institution selecting a particular group of village or watershed for detailed long-term effort would best accomplish this. It could then involve itself in a variety of environmentally-sound development-oriented action programmes in collaboration with local schools, colleges and voluntary agencies and governmental agencies. Its original research and technical development work could form part of such an overall programme with the local schools, colleges and voluntary agencies taking up the major responsibility of actual field action. We believe that this could serve as a very good model for catalysing environmentally sound development.

Direct Payments to People, Communities and Companies for Conserving the Biodiversity of the Western Ghats

Forest ecosystems provide a wide range of provisioning, regulating, supporting and cultural services broadly termed the 'ecosystem services' (MEA, 2003). A key goal of creating a Western Ghats Ecology Authority is to maintain the existing forest cover as well as increase the tree cover in other areas including degraded lands and privately held lands so as to promote ecological sustainability. At the same time, the large human population in the ghats, the highest population density of any of the "global hotspots of biodiversity", also makes it imperative that people meaningfully participate in the conservation of this region. We think that this would be best achieved under the present circumstances through a system of incentives and payments for ecosystem services to people, communities and even corporate (such as plantation companies) for maintaining or increasing tree cover as well as facilitating the presence and movement of wildlife.

In addition to the role of forest cover in conserving biodiversity and regulating the hydrology of the region, we may also add the following positive ecological roles of increasing the tree cover of the region:

a) Provide alternative sources of biomass-related products to people who may otherwise depend on protected areas and other forest areas for their needs.

b) Promote the overall ecological resilience of the region.

c) Improve habitat connectivity across the ghats in order to facilitate migration and adaptation of plant and animal species to future climate change.

d) Contribute to reducing the country's greenhouse gas emissions through sequestering carbon into biomass.

There are a number of ways in which incentive-based approaches to nature conservation have been experimented with globally (Somanathan 2010). These could be either in the form of deterrents for activities that are seen as inimical to biodiversity conservation (prohibition on entry into and extraction from land declared as "protected areas", imposition of taxes on undesirable land-use) or incentives of a positive nature as listed below:

1) Allocation of rights to revenue generated from use of biodiversity to local communities who at the same time nurture and protect this biodiversity. Examples of this would include the Van Panchayat system in the Kumaun region of Uttarakhand Himalaya that began in 1930 (and has expanded considerably since then) and the Joint Forest Management experiment in the country that began in the 1990s.

2) Subsidies to activities which are complementary to conservation. An example of this is a suite of actions broadly classified as "eco-development" in which loans or small amounts of capital are provided to people living in the fringe or within forest areas to help them start non-forest related businesses. Subsidies for cooking gas or solar cookers to reduce the dependence of people on fuel wood collected from forests are another example of such incentives.

3) Direct payments for conservation. Economists have recently favoured the direct payment of incentives to land-owners and communities for their demonstrable achievements in conservation (Ferraro and Kiss 2002). This approach, also known as "payments for ecosystem services", has never been tried in India but is being implemented both in developed (e.g. U.S.A., Australia) and developing (e.g. Mexico, Costa Rica, Colombia) countries. The draft eco-tourism policy for Protected Areas posted on the website of the Ministry of Environment and Forests, Govt. of India, on June 2, 2011, also makes a mention of financial incentives to private land owners near Protected Areas for maintaining forest cover.

Here the panel makes a case for using the third mechanism, namely, that of judicious direct payments for conservation for promoting the ecology of the Western Ghats. While the framework for such a scheme to operate in the Western Ghats has to be worked out in detail, some examples are provided of the context of such direct payments as well as the financial mechanisms available to implement such a programme.

Context of direct payments for conservation

i) Payments to people: Considerable land area of the Western Ghats region is under private ownership of individuals. This would include the large number of settlements, cultivated areas and other privately-owned land under other forms of land-use. Increasing the tree cover in some of these lands that are strategically located would help fulfil some of the positive ecological roles mentioned above while also increasing the income and promoting a positive conservation outlook among land owners. While the choice of tree species perceived by people as profitable seems to be most important determinant of success of tree planting programmes in the country (Hegde 2010), this limitation may be partly overcome through incentives for planting native species, irrespective of profitability, as well as permitting economically valuable species to be planted and harvested in a regulated manner.

ii) Payments to communities: Unlike the northeastern region where a major part of the land is under the control of village communities, a much smaller proportion of the Western Ghats is vested under community ownership. Examples would include community grazing lands, traditional Toda community patta lands (in the Nilgiris), betta lands in Uttara Kannada district and perhaps Kovikam lands in Kerala. Some of these lands could have considerable value for biodiversity if they are not transformed into other land uses, or there may be scope for bringing these under forest cover. Although the option of declaring these as Community Reserves exists under the Wildlife Protection Act, this concept has not really caught on because of the lack of incentives and of clarity on community rights. Payments could be made to communities for maintaining such lands in a favourable state for biodiversity.

iii) Payments to companies: The proposal to make payments to the corporate sector for conservation of biodiversity may seem too radical at first, but we think there is a specific context in which such incentives could be explored. Large areas of the Western Ghats are under commercial plantations of tea, coffee, cardamom, rubber and other species. Plantation lands may be under private ownership (i.e. patta lands held by companies or individuals) or under long-term lease from the government. Many of these plantations are embedded within existing protected areas or about the boundaries of protected areas; as such they have considerable potential for conservation of biodiversity as well as providing passages for the migration/movement of animal species. The importance of bringing plantations within the ambit of direct payments for conservation thus lies in their strategic location and the considerable area they can provide for biodiversity conservation.

Plantations can be brought under a conservation programme under two situations:

a) Plantations on private lands: Many plantations maintain a certain proportion of their land under natural vegetation cover. These areas may be important not just for the biodiversity they hold but also for providing habitat connectivity. Examples of this would include riparian habitat of tea estates in the Valparai plateau and the thorn forest of Singara estate (coffee plantation) in the Nilgiris where specific parcels of land are identified as corridors for elephants [Baskaran et al. 1995; Anand Kumar et al. 2010]. Both regulatory orders (prohibiting the conversion of such lands to other use) as well as rewards (payments for the ecosystem services provided) should go hand-in-hand to achieve conservation goals. Another example would be the importance of evergreen forest patches within land owned by plantations in the ghats for maintaining populations of the endangered and endemic lion-tailed macaque. Plantation companies who maintain private lands under forests or other forms of natural vegetation such as montane grassland should also be rewarded for the intrinsic biodiversity values they preserve. Such rewards need not be solely in the form of direct payments; these could also be indirect recognition through a process of "certification" that would enhance the prestige of the company and the value of their products; certified coffee for example fetches premium prices in the international market.

b) Plantations on leased lands: The issue of incentives to plantations on leased land may be contentious, especially when conservationists would argue that all such lands should revert to government control upon expiry of the present leases. We do not have statistics on the precise extent of plantations in privately-owned versus leased lands but the latter is expected to be much smaller than the former category overall in the Western Ghats [T.R. Shankar Raman, pers. comm.]. The plantations have a large labour force whose future employment will have to be factored into any transition plans; it would be both socially unacceptable and politically a very difficult decision to render a large work force idle. The potential of such lands for biodiversity conservation can only be realized if these are brought

under native tree cover. The private sector is more likely to more achieve this in a cost-effective manner, a task that should perhaps be carried out in a phased manner. A mixed strategy of forest restoration and regulated nature tourism along with reduced area under the original plantation could perhaps provide the necessary economic viability for sustaining the land-use of such areas.

Financial mechanisms for direct payments for conservation

Several national policies and programmes have been formulated and are being implemented to maintain and enhance the green cover of India. There are also emerging international mechanisms which provide opportunities to provide financial initiatives for afforestation, reforestation and forest conservation. Such programmes could provide the needed finances for enhancing the role of people, communities and companies in protecting, managing and regenerating the forests and biodiversity of Western Ghats.

a) Green India Mission: The National Mission for a Green India is one of the eight Missions under the National Action Plan on Climate Change (NAPCC). Green India Mission (GIM) acknowledges the influences that the forestry sector has on environmental amelioration though climate mitigation, food security, water security, biodiversity conservation and livelihood security of forest dependent communities (GIM, 2010) and puts "greening" in the context of climate change adaptation and mitigation. The Mission aims at responding to climate change by a combination of adaptation and mitigation measures, which would help:

- enhancing carbon sinks in sustainably managed forests and other ecosystems
- adaptation of vulnerable species/ecosystems to the changing climate, and
- adaptation of forest-dependent communities.

The Mission envisages a clear role for local communities and promotion of decentralized governance. The Mission aims to bring primacy to Gram Sabha as an overarching institution to oversee Mission implementation at the village level. The committees set up by the Gram Sabha, including revamped JFMCs, CFM groups, Van Panchayats, Committees set up under Forest Rights Act; Biodiversity Management Committees etc., will be strengthened as the primary institutions on the ground for nested decentralized forest governance in rural areas. Likewise, the Mission will support revamping/strengthening of the Forest Development Agencies to support the field institutions. GIM is a large programme and with appropriate incentives including financial could ensure the participation of people and communities in forest regeneration in the Western Ghats.

b) CAMPA: The "State Compensatory Afforestation Fund Management and Planning Authority" (State CAMPA) is intended as an instrument to accelerate activities for preservation of natural forests, management of wildlife, infrastructure development in the sector and other allied works. CAMPA seeks to promote:

- Conservation, protection, regeneration and management of existing natural forests
- Conservation, protection and management of wildlife and its habitat within and outside protected areas including the consolidation of the protected areas
- Compensatory afforestation
- Promotion of environmental services.
- Research, training and capacity building.

The large funding available under the CAMPA programme could be utilized to provide incentives to local communities to undertake compensatory afforestation on degraded forest lands as well as increase tree cover on private lands in a cost-effective manner.

c) National Afforestation and Ecodevelopment Board (NAEB): The National Afforestation Programme (NAP) was formulated by merger of four 9th Plan centrally-sponsored afforestation schemes of the Ministry of Environment & Forests, namely, Integrated Afforestation and Eco-Development Projects Scheme (IAEPS), Area Oriented Fuel wood and Fodder Projects Scheme (AOFFPS), Conservation and Development of Non-Timber Forest Produce including Medicinal Plants Scheme (NTFP), and Association of Scheduled Tribes and Rural Poor in Regeneration of Degraded Forests (ASTRP). This was done with a view to reducing the multiplicity of schemes with similar objectives, ensuring uniformity in funding pattern and implementation mechanism, avoiding delays in availability of funds to the field level and institutionalizing peoples participation in project formulation and its implementation. The NAEB is responsible for promoting afforestation, tree planting, ecological restoration and eco-development activities in the country, with special attention to the degraded forest areas and lands adjoining the forest areas, Protected Areas as well as ecologically fragile areas. One of the important roles of NAEB is to create general awareness and help foster people's movement for promoting afforestation and eco-development with the assistance of voluntary agencies, non-government organisations, Panchayati Raj institutions and others and promote participatory and sustainable management of degraded forest areas and adjoining lands.

d) Clean Development Mechanism (CDM): CDM is one of the funding mechanisms under the UNFCCC (UN Framework Convention on Climate Change). Both afforestation and reforestation activities are included under CDM. The carbon revenue derived from afforestation under the CDM is largely transferred to the local communities and farmers. CDM is therefore a 'win-win' strategy, providing local benefits (to communities) as well as global benefits, contributing to the stabilization of CO2 concentration in the atmosphere. The forest dwellers and rural communities will be rewarded for providing global environmental benefits. A large number of forestry projects, particularly JFM under CDM, implemented in different regions of India, incorporating innovative technical, institutional and financial interventions, could lead to a large positive impact on forest conservation and regeneration, degraded land reclamation and socio-economic development of rural communities, in a participatory way. CDM is also suited for large scale reforestation projects such as conversion of monoculture plantations to a more natural forest cover. Currently four CDM afforestation projects have been approved in India and are under implementation.

e) REDD+: Parties to the UN Framework Convention on Climate Change (UNFCCC) have agreed to mitigate climate change through several activities, namely, Reduced Emissions from Deforestation and Forest Degradation (REDD), Forest Conservation, and Enhancement of Carbon Stocks and Sustainable Management of Forests, collectively known as REDD+. The Cancun agreement encourages all countries to find effective ways to reduce the human pressures on forests that result in degradation and greenhouse gas emissions. This would require addressing drivers of deforestation and forest degradation and inclusion of local communities in protection, management and conservation of forests and carbon stocks, linking REDD+ with sustainable development and poverty reduction. Although India has traditionally been characterized a "Low Forest - Low Deforestation" country, there is significant scale small scale deforestation and forest degradation in India. Consequently there is potential for REDD+ activities in India after due care is taken with rights of local

people. The Western Ghats would be a logical starting point for seeking finances of these activities.

Conclusions

India has realized the importance of involving local communities in forest protection and management, and has developed several policies and implemented large programmes such as Joint Forest Management programme. India has multiple institutional approaches to forest protection and management. However, in spite of its rich experience in forest management through traditional initiatives, JFM, social forestry and farm forestry, the genuine involvement and empowerment of local communities is limited. It is necessary to use this vast experience and existing policies to formulate and implement appropriate policies, including transfer of financial powers, and institutions to promote sustainable and participatory forestry under the emerging programmes and mechanisms. Some potential recommendations could be as follows:

1. National programmes such as Greening India Mission, CAMPA and NAEB should include not just intentions of involving people and local communities but aim for genuine and effective transfer of powers and funds to local institutions for implementing the programmes.

2. Similarly, international mechanisms such as CDM and REDD+ could be tapped to provide adequate financial resources for larger scale efforts (such as on plantations) to regenerate forests. These international mechanisms already have arrangements to ensure transfer of all financial returns from carbon credits to local communities.

3. Guidelines should be developed to ensure transfer of funds from these large national programmes, as envisaged under the international mechanisms, to local communities and not mere pronouncements of involvement of communities. Local community led initiatives with financial resources and powers could provide a cost-effective way of implementing the programmes, which has not been attempted so far.

These national and international mechanisms, with adequate financial resources and powers, could be deployed in the Western Ghats for effective participation of local communities.

UNESCO's World Heritage Convention

There can be no dispute that the Western Ghats are a unique biological heritage that needs to be protected, and nurtured along the path of environmentally and socially sound development. This is why WGEEP has strongly recommended that the entire Western Ghats tract be considered as an Ecologically Sensitive Area, with substantial areas brought under Ecologically Sensitive Zones 1 and 2. It is proposed that the further process of fine-tuning the limits of the various zones, deciding on management regimes and the implementation be a participatory process going right down to gram sabhas. WGEEP believes that these proposals are far more comprehensive, and would more effectively serve the objectives of the UNESCO Heritage Programme, than the proposals currently submitted by the Government of India. Importantly, the WGEEP proposals would overcome the serious and quite genuine objections raised at the UN Permanent Forum on Indigenous Issues to the Indian proposals on 17 May 2011 at the Tenth Session, New York, 16–27 May 2011. (See Appendix 3)

Appendices

Appendix 1 : Kerala State Organic Farming Policy, Strategy and Action Plan, Govt of Kerala, 2010

Vision

Make Kerala's farming sustainable, rewarding, and competitive, ensuring poison-free water, soil and food to every citizen.

Background

India has a glorious history of farming, starting probably from the 6th millennium BC in the Indus Valley, harnessing the annual floods and the subsequent alluvial deposits. The Indus Valley Civilization was founded on sustainable farming practices. Subsequently, our culture and ethos became reflections of the agricultural practices and it became mutually inseparable till recently. The harvest of the main crops is celebrated throughout the country.

In Kerala, it went to the extent of identifying the farmland with Mother God or a female. Just like the female has to take rest after delivery, the farm land has also to be given rest for three months after the harvest; tilling is strictly prohibited during this period. Although it may look superstitious, the ecological reason behind this ritual is that tilling during the monsoon leads to severe soil erosion and thus, is an unsustainable practice. Therefore, sustainability has been the hallmark of our farming system from time immemorial; growing the time tested, weather suited, traditional crops with or without additional organic inputs, but deeply interwoven with the ecological systems and climatic conditions.

The once flourished *Pokkali* cultivation in the coastal districts and the *Kaipad* farming system in Kannur district are testimonials to man's ingenuity in harnessing the natural events for farming, that too integrated farming, without affecting the natural ecological processes and without even any external inputs.

However, the so-called modern agriculture – unmindful of the ecosystem principles so revered and practiced for centuries –l ed to seemingly irrevocable ecological and environmental catastrophes in the country. The Green Revolution essentially replaced the traditional varieties with high-yielding ones. These high-yielding varieties now recognized as 'high input varieties' needed tonnes of fertilizers, to achieve the target growth. The crops and varieties alien to the soil attracted new pests and diseases and also outbreaks of existing pests. To combat them, came in huge quantities of pesticides. Input of these "exotic" elements into the traditional farming led to a multitude of environmental issues.

The microorganisms declined; the soil lost its fertility and vitality; water demand increased and, the time tested traditional varieties disappeared. In short, the century-old practices came to a halt. The eternal relationship between the farmer and farmland was lost. More importantly, sustainability of the agriculture systems collapsed, cost of cultivation soared, income of farmers stagnated and, food security and food safety became a daunting challenge.

Biodiversity in the agricultural fields has now become a history of the past. The farmland became silent; devoid of the croak of frogs, chattering of warblers, whistling of Whistling Ducks. The long tubular straw striven nests of the Baya weaver bird hanging on the fronds of palms – a once spectacular sight – have disappeared from most localities. The insectivorous birds such as the drongo, bee-eater, even the house sparrow became rare or locally extinct, indicating the collapse of the entire food webs of the farmland.

In the forestry sector, fortunately, the use of pesticides has been much less. However, the aerial spraying of pesticides in India was first tried in Kerala in 1965 to control the teak defoliators in Konni forest division. It was noted that within 48 hours nearly 162 non-target species of arthropods were knocked down.

The mentally and physically retarded and handicapped children in Padri village in Kasergod tell the world in unequivocal terms the tragedies and disasters that aerial spraying of pesticides could inflict on human life.

As a result of all these "modern" techniques, the air, water and the soil were polluted; most food grains and farm products were contaminated by pesticides. The run off from the farm land contaminated the wetlands – rivers, tanks, ponds, reservoirs, lakes and all water bodies – and the life in them. Fishes carried high levels of pesticides and also heavy metals, the latter as a result of the many chemical industries that sprang up to provide chemical fertilizers.

Health hazards became unimaginably high. Incidence of fatal diseases rose. Hospitals with modern amenities came up in the cities as profit-making industries. Pharmaceuticals flourished.

Food crops became non-attractive, while cash crops became more remunerative. Rice fields have been filled up for non-agricultural activities. The area under cash crops expanded during the last 20 years (16% under rubber alone), while that under food crops plummeted (to just 9% of the total cultivated area). The monoculture of such economically valuable crops led to soil erosion and loss of soil fertility to a great extent. The advent of chemical intensive farming and its prevalence in Kerala for the past 50 years have resulted in the near stagnant levels of productivity of many of these economically important crops such as coconut, cashew, pepper, coffee, tea, cardamom and arecanut. Besides these, many regions in Kerala, like Wayanad started facing acute water scarcity. The State has taken note of it and given priority in the Eleventh Five Year Plan.

Over and above, the economic liberalization and WTO policies added to the woes of the farmers by bringing down the prices of agriculture commodities**.** They are caught in the debt trap owing to the loans taken to meet the high cost of farming, as it demanded more external inputs such as fertilizers, pesticides and water. These led to increasing instances of suicide by farmers. Investment in agriculture has essentially changed from the farmer to the industries supplying input to the farmer, and as a direct consequence, net income for farmers decreased while the industries supporting agriculture in the country flourished.

The national policies of opening the retail sector to national and multinational companies pose great threat to our food sovereignty and right to safe food. The enhanced 'food miles' led to increased carbon emission, further increasing the load of green house gases. The

potent danger of introducing Genetically Modified crops, monopoly of seeds by national and multinational corporate bodies could very well be the last straw on the camel's back for the farmers of Kerala.

Many farmers have realized that they are fighting a losing battle with the "high yield variety-fertilizer-pesticide pack" of the Green Revolution. They have also realized that the degradation and disruption of the fragile ecosystems of 'God's own country' are the chief culprits for the water scarcity, nutritional insecurity, loss of primary productivity and agrarian crisis being faced by the State.

The farmers in Kerala are convinced that the only way is to return to the traditional sustainable ways of cultivation without harming the ecosystem. Thus organic farming, a system with the broad principle of 'live and let live', came up which was recognized nationally and internationally.

Organic agriculture is not limited to crop production alone, but encompasses animal husbandry, dairy, fisheries, poultry, piggery, forestry, bee keeping, and also uncultivated biodiversity around.

By and large, there is an increasing awareness among the consumers also on the deleterious effects of pesticides and hence, there has been a high demand for organically cultivated food produce. Therefore, it has become a solemn responsibility of the Government to encourage organic farming to ensure poison-free food at an affordable price to every citizen.

There have been demurs and doubts on the practicability of organic farming on the grounds that the production would plummet and the country would once again be forced to yet another food crisis. This is quite unfounded. Success stories on high productivity of organic farming are now abundant. The Food and Agriculture Organization reports at the International Conference on Organic Agriculture and Food Security 2007 as follows: "*Conversion of global agriculture to organic management, without converting wild lands to agriculture and using N-fertilizers, would result in a global agricultural supply of 2640 to 4380 kcal/person/day. Sustainable intensification in developing countries through organic practices would increase production by 56 per cent. Organic yields on average are comparable to conventional yields; although yields do decline initially when converting from high-input systems and almost double when converting from low-input systems".* It also has found that organic farms use 33 to 56 percent less energy per ha than conventional farms.

Worldwide, as of now, more than 22.81 million hectares of land area are managed organically and the market of organic food is around $30 billion. It may be noted that Cuba, a country with 42,402 sq. miles of land and with 11.3 million people, is completely organic.

A brief history of organic farming

Pesticides have been in use in agriculture since the Second World War and from the very beginning there have been concerns about the commercialization of chemical pesticides**.** Rachel Carson's "Silent Spring" published in 1964 brought out the scientific certainties of the impacts of pesticides on environment. Although DDT was banned in the developed world in the 1970s, and its use in the agriculture fields of developing countries later, varieties of toxic pesticides found their way into the farms .The scientific predictions of Rachel Carson

became true and the public, especially farmers and scientists, the world over realised the dangers of pesticides. This led to the beginning of non-chemical farming. Researches and trials of traditional methods and also new models of soil and crop management began to appear.

For the last 4–5 decades scientists have been trying to find out a sustainable agricultural system. One of the prominent personalities among them was Sir Albert Howard, the Advisor for Agriculture in India from 1905 to 1924. "An Agricultural Testament", written by him, is considered to be the first authentic book on organic farming in India. The "indoor method" in organic composting was also worked out first by him.

The permaculture (permanent agriculture) experiments of Bill Mollison and Holmen in the 1970s gave hope to many farmers the world over. The permaculture wave had its impact in Kerala too and since then many farmers have started experimenting with this methodology and they found that this is one of the best practices for Kerala with its topographical peculiarities and high rainfall so as to conserve soil and water and improve productivity of their farms.

In a report submitted in 1983 to the Department of Agriculture of the United States, Robert Papendick and James Parr, agriculture scientists of the same department, had emphasised the crucial need for focussing research on sustainable agriculture to replace the farming systems being followed using chemical pesticides and fertilizers.

The infamous Bhopal tragedy of 1984 was an eye opener to a larger section of people in India and abroad. Discussion on alternatives began seriously. Publication of the book "One Straw Revolution" in 1984 by Masanobu Fukuoka (a Japanese scientist turned farmer), on his success in natural farming for the last half a century and, translation of his book into Malayalam in 1985 were timely in channelising such discussions in Kerala. Biodynamic farming was another method of organic farming which attracted many farmers.

The very sustainability of agriculture assumed serious concern in the discussions among the farmers and organizations in Andhra Pradesh, Karnataka, Tamil Nadu, Gujarat, Maharashtra, Punjab and Kerala during the same period. The total external dependence of farmers for agriculture inputs had started affecting their economies leading to desperation among farming communities and ultimately to an agrarian crisis. As an alternative, to make farming sustainable, Low External Input Sustainable Agriculture (LEISA) thus gained momentum in many places, especially sustainable among small and marginal farmers. The agriculture crisis that began in the late 1990s further strengthened this movement. Many individuals and organizations started interacting with farmers to make them understand the problems of the modern agriculture.

Thus, from a simple beginning, organic farming later matured to such dimensions as women's empowerment, seed conservation, development of seed banks, value addition and, more importantly, food and nutritional security. It took only 10–15 years for this transition and the results are encouraging.

Currently there are a number of certified organic farmers in the state, those cultivating cash crops such as spices, tea, and coffee, mainly targeting the export market and also non-certified organic farmers who focus on food crops and biodiversity. All of them, whether

certified or not, focus clearly on soil health improvement. Kerala also has an accredited organic certifying agency catering to the needs of the farmers.

Some of the farming systems such as *Pokkali* and *Kaipad* cultivation, cultivation of *Jeerakasala* and *Gandhakasala* varieties of paddy in Wayanad and, homestead farming systems all over the state are organic by default. Studies have established the economic viability and productivity of homestead farms in the State and elsewhere. Recently the Adat panchayath in Thrissur district has started organic cultivation of rice in an area of 2,500 acres, promoting integrated farming system, which is known as the Adat model. Similarly, Marappanmoola in Wayanad has another model organic farming system involving hundreds of farmers.

Marketing of organic produce is also being experimented upon in many places like Organic Bazaar in Thiruvananthapuram, Eco-shops in Thrissur and Kozhikode, and Jaiva Krishi Sevana Kendram in Kannur. Self-help groups of women are encouraged to undertake organic farming of vegetables in some panchayats.

There is a rich potential for promoting organic farming in Kerala in the light that intensity of inorganic agriculture here is not that severe compared to that in other States in the country. While the national average consumption of fertilizers and pesticides during 2002–2003 was 90kg/ha and 288g/ha respectively, it was only 60kg/ha and 224g/ha respectively in Kerala. This points to the positive side of agriculture in Kerala in terms of the already low levels of consumption of hazardous chemicals and, therefore, chances of redeeming farmers to organic agriculture are quite high.

Realising the ground realities, the State Department of Agriculture commenced organic farming promotional activities since 2002–03. In the following year, the Department set up a cell for Promotion of Sustainable Agriculture and Organic Farming. It has also launched two brands, namely 'Kerala Organic' and 'Kerala Naturals' to market organic farm produces. Currently, about 7,000 farmers practice organic farming in the State as per NPOP standards, covering a total area of 5750 ha. But non-certified organic cultivation areas, assessments of which have not been done, are expected to be much more than this.

Benefits of organic farming

- Makes agriculture more rewarding, sustainable and respectable.
- Sustains soil fertility by preventing the loss of soil and leaching of minerals.
- Protects and enriches biodiversity – micro organisms, soil flora and fauna, plants and animals.
- Requires less water and promotes water conservation.
- Improves and maintains the agro-ecosystem and natural landscapes for sustainable production.
- Depends mostly on renewable on-farm resources.
- Encourages consumption of renewable energy resources – mechanical and other alternate sources of fuel.
- Includes domestic animals as an essential part of the organic system which helps maintaining soil fertility and also increases the income of farmers.

- Ensures pollution free air, water, soil, food, and natural ecosystems.
- Improves agro-biodiversity (both varieties and crops).
- Protects and enhances traditional knowledge in farming, processing and seed improvement leading to its protection for the future generations.
- Reduces the cost of production through locally suitable methods and inputs.
- Produces adequate quantity of nutritious, wholesome and best quality food and develops a healthy food culture.
- Reduces food mileage, and thereby, carbon emission.

The State Government is seized of the importance of organic farming, and realized the health hazards and un-sustainability of chemical farming as it clearly states in its Biodiversity Strategy and Action Plan that the state has to have an organic farming policy to protect its rich biodiversity and thus sustain various livelihoods dependent on this precious resource.

Organic Farming Policy, Strategy and Action Plan Objectives

1. Make farming sustainable, remunerative and respectable.
2. Enhance natural soil fertility and productivity.
3. Ensure soil and water conservation.
4. Ensure agricultural bio-security and food and nutritional security.
5. Create and ensure domestic market for organic products controlled by the farmers.
6. Avoid the use of agrochemicals and other hazardous material, and ensure chemical-free water, soil, air and food.
7. Ensure seed, food and sovereignty.
8. Promote biodiversity based ecological farming.
9. Ensure quality control in organic inputs and agricultural produce
10. Enable human health promotion by providing safe agricultural products and commodities
11. Conservation and extension of traditional knowledge related to agriculture.

FAO put the objectives succinctly: "Organic agriculture improves food access by increasing productivity, diversity and conservation of natural resources, by raising incomes and by reducing risks for farmers. Improvement also results from sharing of knowledge among farmers. These benefits lead to poverty reduction and a reversal of rural outward migration. Policy requirements to improve food access include: increasing farmers' rights to seeds, local varieties and biodiversity; expanding fair-trade systems along the full value chain; evaluating current emergency aid and procurement programmes; and strengthening the rights of indigenous farmers".

Strategies and Action Plan

General approach: The mission to convert Kerala into an organic State is to be achieved focusing on potential crops and areas in a phased and compact manner with the aim of converting a minimum of 10% of the cultivable land into entirely organic every year and thus achieving the target within five to ten years. On completion of the third year of implementation of the organic farming policy, a Committee of experts comprising representatives of farmers and scientists should make a comprehensive assessment of the farmer's well being, economy and environment, and only after rectifying the drawbacks, if any, can the policy be implemented in the rest of the areas.

Definition of organic farmer

A farmer may be defined as an 'Organic Farmer' provided he/she adheres to and practices the following three essentialities of organic farming.

1. a farmer who practices mixed farming including food crops
2. a farmer who ensures the conservation of soil and water
3. a farmer who conserves the biodiversity of the farmland

Strategy 1

Ensure seed sovereignty of the farmers and the State

Action

1.1 Establish seed villages exclusively for organic farming.

1.1 (a) Begin programmes for the production of seeds, seedlings, planting materials and, traditional animal breeds at the Panchayat level, so as to become self-sufficient in the availability of good quality local seeds, both indigenous and breeder seeds developed by the KAU and other institutions of agricultural research.

1.1(b) Begin at the farmers' group levels, seed banks and seed cooperatives to produce, store, share and supply good quality seeds, including those which are traditional and location specific.

1.1(c) Promote farmers who can produce organically, good quality seeds and develop participatory seed production programmes along with the KAU and other institutions of agricultural research.

1.1(d) Develop storage facilities/protection measures using traditional methods

1.2 Ensure maintenance of traceability chain mandatory at the Local Self Government Institution level by the Biodiversity Management Committees (BMC) with regard to seeds produced, sold, transferred and shared in the Panchayat to protect the farmers from spurious low quality seeds, including hazardous genetically modified seeds

1.3 Declare and ensure Genetically Modified (GM)-free villages/panchayats and State

1.4 Establish a mechanism to regulate the prices of seeds

1.5 Ensure supply of locally suitable seeds in each agro-climatic zone

Strategy 2

Implementation of organic farming policy in a phased manner

Action

2.1 Conduct an initial assessment of the status of organic farming and farmers in the State including cultivated, certified and non-cultivated wild organic areas in the State.

2.2 Develop an action plan with an objective of converting annual crops such as grains, fruits and vegetables to organic within five years and the perennial crops with in 10 years.

2.3 Develop a clear plan of action with budgets for incorporation into the planning process of the Local Self Government Institutions for phasing in organic farming in the State.

2.4 Special thrust should be initially given to complex, diverse and risk-prone areas such as rain-fed districts, drought-prone districts, food crop producing districts and tribal districts.

2.5 All agricultural practices to be launched in the tribal belts of Kerala should compulsorily be organic.

Strategy 3

Compact Area Group approach in organic farming

Action

3.1 Encourage the formation of organic farmers groups, especially women organic farmer groups, clubs, SHGs and cooperatives for the purpose of cultivation, input production, seed/seedlings/planting materials production, certification and marketing.

3.2 Each group should be of a minimum of five members (as stipulated under the Participatory Guarantee System of Certification)

3.3 Models such as Vegetable and Fruit Promotion Council of Kerala (VFPCK), Maarappanmoola Cooperative Society, Adat Cooperative Society for paddy, GALASA, Compact Area Group approach of Kannore KVK, and Harithasree may be adopted.

3.4 Encourage Kudumbasree, Vanasamrakshana Samithi, Theera SVS, and Grama Haritha Samithi to develop organic farming enterprises

Strategy 4

Strengthen soil and ensure water conservation measures

Action

4.1 Declare the existing sacred groves, ponds and mangroves as protected areas and ensure their conservation.

4.2 Ensure organic farming approach in all the watershed development areas and extend support including capacity building and financial assistance for soil and water conservation measures through ongoing watershed development programmes.

4.3 Integrate the various institutions presently involved in watershed management and introduce organic farming as a key component.

4.4 Adopt appropriate agronomic practices suitable to the agro-ecological conditions as well as the topographical conditions at the micro watershed level and, discourage/restrict inappropriate crops and cropping practices.

4.5 Kerala Agricultural University and other research institutions should develop suitable crop combinations and locally suitable technology, through participatory research with farmers.

4.6 Encourage landowners and part-time farmers by providing adequate financial support to utilize their lands for organic farming, if left unutilized.

4.7 Formulate legislative measures to rejuvenate and protect traditional water resources including fresh water lakes, *surangas* and ensure rain water conservation, restriction of bore wells, especially in dark zones and recharging of existing bore wells, open wells and ponds, and other conservation measures so as to improve the ground water table and also to conserve top soil.

4.8 Establish testing facilities for soil, water, micronutrients and microorganisms at least at the block and introduce the system of providing Soil Health Cards.

4.9 Promote bio-fencing and thus help ensure soil and water conservation, and availability of green manure and green leaf manure

4.10 Conduct training programmes for resource persons at the Local Self Government Institution level on soil and water conservation measures

4.11 Avoid use of plastics in agricultural practices. Coir and other natural fibres should be encouraged to prepare shade for nurseries and flower farming.

Strategy 5

Promote a mixed farming approach for livelihood security and ecological sustainability

Action

5.1 Make crop–livestock (including poultry) integrated farming as part of organic farming, with women-centered ownership and management in the farmer households and groups. Emphasis may be given to Kerala's traditional farming approach of integrated farming of dominantly coconut with cattle and poultry.

5.2 Develop bee-keeping, fisheries, duckeries and similar enterprises as part of the mixed farming programme.

5.3 Promote decentralized production of livestock feed from locally available resources, but excluding spurious ingredients such as growth promoters and hormones.

5.4 Document and popularise traditional knowledge related to animal health care.

5.5 Develop linkages between organic farmers and livestock growing farmers for exchange of manure for fodder.

5.6 Encourage mixed cropping of indigenous trees and medicinal plants through organic farming.

5.7 Promote proven and successful practices developed by farmers.

5.8 Tax relaxation shall be given to land holdings with maximum forest and wild trees.

Strategy 6

Conserve and improve agro-biodiversity and undomesticated biodiversity

Action

6.1 Document agro-biodiversity and related traditional knowledge and practice, both cultivated and un-cultivated, in each Panchayat.

6.2 Encouragement in the form of financial support may be given for the establishment of model agro-biodiversity conservation farms.

6.3 Develop programmes for farmers to collect, purify and multiply traditional seeds.

6.4 Encourage protection of traditional agricultural systems such as *Kaipad*, *Pokkali*, *Kole* and *Kuttanad* as "agricultural heritage of Kerala"

6.5 Promote indigenous rice varieties such as navara, jeerakasala and gandhakasala and also other traditional indigenous varieties of crops.

Strategy 7

Launch a state-wide intensive campaign on organic farming in the form of a popular movement: "Jaiva Keralam"

Action

7.1 Organise Organic Melas in all districts.

7.2 Begin state-wide awareness programmes for the promotion of organic farming focusing on the advantages of organic produce and harmful effects of chemical-based farming.

7.3 Produce handouts, publications of case studies and best practices, video films, posters and other awareness materials to reach out to all sections, especially women.

7.4 Organize workshops, seminars and exchange programmes for consumers, teachers, traders, farmers, government and semi-government officials in the related area.

7.5 Ensure the strict enforcement of the provisions of the Food Adulteration Act, 1954, and rules 1955, and bring suitable legislations to notify and enable Agriculture Officers, Veterinary Doctors and similar professionals as Inspectors under the Act and also establish quality and adulteration testing facilities at district level.

7.6 Encourage setting up of organic kitchen gardens, organic orchards in urban and rural households.

Strategy 8

Ensure availability of quality organic manure to the farmers

Action

8.1 Encourage, with adequate support, the availability of biomass in the organic farm itself, through programmes such as crop rotation, tree crops, cover crops, leguminous crops, green manure and green leaf manure.

8.2 Provide support for cows, buffaloes, ducks, fish, poultry and goats, preferably traditional breeds, to organic farmers/groups to ensure integrated farming and the availability of farmyard manure and urine.

8.3 Required changes in the exisiting Cattle Breeding Policy may be made to ensure availability of indigenous varities of cows and buffaloes to the organic farmers.

8.4 Encourage the production of various types of compost in the farm itself, including vermi-composting and biogas slurry.

8.5 Formulate special programmes for increasing the biomass and organic manures, especially in rain-fed cultivation areas where soil depletion is high, so as to drought-proof the farm.

8.6 Encourage indigenous species of earthworms and effective microorganisms in composting.

8.7 Establish a decentralized system to produce organic manure from biodegradable organic waste segregated at source.

8.8 Ensure the quality of the organic manure and establish a centralized testing laboratory to monitor the same.

8.9 Discourage burning of all organic materials in the field, which could be utilized as manure.

8.10 Under the leadership of the "Padasekhara Samithi" and other farmer groups draw the benefits of the provisions of the National Rural Employment Guarantee Programme to ensure production of green leaves and extraction of silt from the rural ponds, tanks, reservoirs, streams and rivulets for augmenting the fertility of the farm lands.

Strategy 9

Ensure farm inputs for organic farming

Action

9.1 Implement programmes for the production of seeds, seedlings and other planting materials, manure, plant protection materials at the farm with the help of agriculture department, agricultural university, at local level.

9.2 Encourage Farmers Associations/Clubs/Cooperatives/Companies of farmers, SHG's/Youth groups at the local level to produce need-based farm inputs.

9.3 Link organic municipal solid waste segregated at source, especially from markets, hostels, densely populated areas and other institutions including night soil to farms through such means as simple and cost-effective decentralised composting, biogasification and vermi-composting and thus ensure organic matter recycling. Organic waste treatment plant should be made compulsory for the flats.

9.4 Conduct training programmes for local resource persons for producing good quality input, quality testing and for such related aspects at the Local Self Government Institution level.

9.5 Formulate legislative measures to empower the Local Self Government Institutions, reputed NGOs for ensuring quality of inputs, including necessary rules, guidelines, standards, monitoring and testing procedures, and establishment of laboratories.

9.6 Establish special financial assistance schemes, and/or link existing support schemes to groups to start production facilities for farm inputs.

9.7 Develop local linkages for low cost input materials to farmers and ensure markets for good quality input materials at reasonable price

9.8 Steps may be taken to formulate the organic farming packages developed by the Agricultural University in collaboration with organic farmers. Priority may be given for crops like banana, ginger, pineapple, vegetables, pepper, cardamom, paddy etc.

9.9 Prepare a database on the organic content of the soil in different zones of Kerala.

9.10 Ensure the quality of fruits and vegetables coming from other states.

Strategy 10

Capacity Building for farmers, implementing officers, agencies, and local self-government members

Action

10.1 Conduct orientation, training and exposure visit programmes.

10.2 Group of 10–20 unemployed youth in each Panchayat (50% women) in the model of Kudumbasree would be designated as "Karshaka Sevakar", trained in all facets of

organic farm management supported through Local Self Government Institution programmes to assist farmers in organic farming.

10.3 Develop the existing Agro-clinics of the Department of Agriculture into Organic Farming Resource Centres and the staff should be given training on organic farming.

10.4 Create awareness on organic farming practices among the agriculture officers in the Agriculture Department.

Strategy 11

Develop Model Sustainable Organic Farms in the State

Action

11.1 Every Local Self Government Institution would develop model organic farms in select farmers' fields.

11.2 Research Stations in each agro-ecological zones under the KAU and other agricultural institutions should be converted to organic management systems, and thus become a field study centre for students, farmers and peoples' representatives.

11.3 Such farming areas could be made part of the responsible tourism programme.

Strategy 12

Ensure and improve the health and well being of the tribals through special tribal agriculture programmes.

Action

12.1 Ensure adequate nutritional food availability for tribals, whose traditional agriculture has been degraded.

12.2 Develop specific programmes for the rejuvenation of their traditional agriculture and knowledge protection.

12.3 Ensure sustainable collection of minor forest produce and facilitate the fair marketing of these produce through organic outlets.

12.4 Formulate specific schemes to provide tribal children with their traditional food at least once in a day.

12.5 Develop village (*ooru*) level seed banks of their traditional crops and medicinal plants.

12.6 Integrate watershed programmes, NREG etc in the rejuvenation of tribal agriculture.

Strategy 13

Establish Producer Companies promoted by organic farmers

Action

13.1 Facilitate establishment of Organic Farmer Producer Companies or similar concerns as an organic farmers-promoted enterprise with share investment by the organic farmers and the LSGs

Strategy 14

Establish storage and transportation facilities

Action

14.1 Establish separate and decentralized storage facilities for organic farm produce to ensure its organic integrity and help farmers in certification processes.

14.2 Provide separate local transportation facilities for organic produce to nearby domestic markets.

Strategy 15

Promote farm level processing, value addition and encourage the use of organic farm produce in food industry

Action

15.1 Encourage farm processing by farmers groups, SHGs and Farmer Producer Companies for value addition.

15.2 Ensure value addition does not compromise organic produce quality by facilitating testing and evaluation of processes with help from KAU and other research institutions.

15.3 Encourage organic food-based industry in Kerala to procure and use organic produce in their products.

15.4 Set up food industries at manageable decentralised levels in the State with special incentive packages.

Strategy 16

Develop diverse channels for marketing of organic produce

Action

16.1 Set up separate markets/facilities for organic produce certified by the PGS process through the existing channels of marketing of agriculture products such as the Milma, Supplyco, Horti-corp, Haritha and People's Market.

16.2 Encourage direct marketing/linkages by farmers groups with end-user institutions such as schools, hostels, hotels, hospitals, Ayurveda centres, SHGs making food products and food-based industries in the State.

16.3 Encourage institutions such as schools, hostels, hospitals and government institutions to procure local organic produce following rules and specific guidelines.

16.4 Disallow large private retail corporations through suitable legislations.

16.5 Encourage existing vegetable, fruits and grocery vendors to promote organic products

16.6 Facilitate the establishment of organic farm produce outlets in all the districts, with the help of Governmental and Non-governmental organizations.

16.7 Ensure that the tourism industry, through the Responsible Tourism Initiative, source organic produce from local producers as much as possible for their hotels and resorts.

Strategy 17

Develop a simple certification process in the State for all organic farmers

Action

17.1 Encourage through specific schemes the implementation of an internal control system for organic farmers' group.

17.2 Encourage the Participatory Guarantee System of Certification for small and marginal farmers to supply to the domestic market.

17.3 NGOs accredited by the PGS Council of India should be authorised to help implement and monitor the PGS system in the State.

17.4 The State will develop an Organic Kerala Certification and a logo, and "Jaiva Keralam" shall be developed as a brand. Since each country is following different norms, crops aimed at export may go for third party certification.

17.5 Fix local standards for quality testing and certification.

17.6 Ensure that every organic farmer who is doing organic farming for three years is given the certificate free of cost.

17.7 Include organic livestock rearing (animal husbandry) in the certification system

Strategy 18

Provide financial incentives for promoting organic farming

Action

18.1 Provide interest-free loans to organic farmers, especially small and marginal farmers. Credits linked to banks should be subsidized through Central/State Governments.

18.2 Set in place production linked incentive system supports.

18.3 Promote a revolving funds system.

18.4 Provide assistance during conversion period: two years for annual crops and three years for perennials.

18.5 Introduce a State-led insurance scheme for small and marginal organic farmers

18.6 Introduce a pension scheme for organic farmers.

Strategy 19

Encourage the use of renewable energy sources

Action

19.1 Assistance in terms of expertise and finances should be given for use of biogas plants, solar energy and wind energy units wherever feasible to reduce dependence on external energy sources.

19.2 Develop appropriate small farm machinery for reducing energy, cost and drudgery.

Strategy 20

Introduce organic farming in education institutions

Action

20.1 Introduce organic farming in educational institutions, prisons and juvenile homes, through academic inputs. A specific campaign shall be started among students to ensure that they consume organically grown food.

20.2 Set up a system in all schools in Kerala to have organic vegetable and fruit gardens as well as paddy, in potential regions, as part of inculcating among the children the love for organic farming and biodiversity conservation, and perpetuation in their households. Necessary support schemes may be formulated and implemented through the Local Self Government Institutions.

20.3 Encourage schools to have seed banks and seed farms in the premises, wherever feasible, to produce and supply good quality seeds for use in nearby regions.

20.4 Promote children–farmer interfaces in each school, which shall include visits to organic farms.

20.5 Encourage schools to link with organic farmers for supply of rice, vegetables, fruits, pulses, milk, egg and honey as part of the noon meal and nutritional supplement programmes. The ICDS can also be encouraged to supply organic food processed and prepared through SHGs for the Anganwadis.

20.6 Provide suitable incentives to baby-food industries that use organic inputs and processes.

20.7 Develop a curriculum for school students on organic farming.

20.8 Publicity through the Farm Information Bureau.

Strategy21

Reorient Research, Education and Extension

Action

21.1 The KAU would set up a special multi-institutional special task force to re-orient the Research, Education and Extension systems to support the Organic Farming Policy and the transition of the State's agriculture to organic farming.

21.2 The KAU shall develop a package of practices and model demonstration farms for organic farming in different agro-ecological zones.

21.3 Introduce as part of the course curriculum, both at under- and post-graduate levels, interactions with leading organic farmers, groups and NGOs promoting organic farming in the state.

21.4 Develop participatory research programmes with organic farmers on all aspects of organic farming, ensuring a monthly remuneration for the farmers of the participatory research programme.

21.5 Research and inventories to recognize and document existing practices of organic farmers.

21.6 Identify and screen native livestock/fish breeds which are locally adaptable and resistant to parasites and diseases.

21.7 Develop herbal remedies for control of diseases and pests of livestock/ crops/ fish.

21.8 To institutionalise the above, an Organic Farming Research Institute (OFRI) may be set up.

Strategy 22

Phase out Chemical Pesticides and Fertilizers from the farming sector

Action

22.1 Ensure phased restriction/ban of sale and use of chemical agricultural inputs such as fertilizers, pesticides, fungicides and weedicides parallel to the implementation of the organic farming policy in the region.

22.2 Through necessary legislation stop the sale and use of the highly toxic Class-1a and 1b pesticides as a preliminary step.

22.3 Declare and maintain ecologically sensitive areas with rich biodiversity and natural resource base (e.g. water bodies) as Chemical-, Pesticide-, and Fertilizer-Free Zones.

22.4 Regulate the sale and use of pesticides through necessary legislations, enforcing a prescription-based system ensuring that pesticides are sold only on a case-to-case basis after obtaining prescription from the Agriculture Officer.

22.5 Strictly prohibit the sale of pesticides to children, pregnant women and non-farmers

22.6 Generate a database on the non-agricultural use of pesticides (e.g.household, storage, food processing, construction) and regulate its sale and use.

22.7 Review and regulate promotional activities and advertisements of pesticides as per the FAO Code of Conduct and Guidelines for Pesticide Use.

22.8 Conduct periodical analysis of water, soil, milk and crops at the district level where pesticides continue to be used and the data to be made public.

22.9 Precautionary measures should be taken before using exotic organisms for biocontrol programmes.

Strategy 23

Integrate the programmes and activities of various departments, local self-governments and organizations

Action

23.1 Integrate the various government departments, institutions, civil societies, and their schemes in a harmonious manner duly considering organic farming principles and local situations. These include government departments such as Agriculture, Animal Husbandry, Forest, Fisheries, Local Bodies, Finance, Revenue, Industries, Tribal, Khadi and Village Industries, Financial Institutions, State Corparations, Department; institutions such as Kerala Agriculture University, ICAR institutions in the state; Commodity Boards for Spices, Coffee, Tea, Coconut and Rubber; APEDA, MILMA and other milk marketing societies; Farmers' Organisations and Societies, Self Help Groups; Organic Farming Associations, and NGOs promoting organic farming

Strategy 24

Organisational set-up for promotion of organic farming

Action

24.1 Set up an Organic Kerala Mission to implement the organic farming policy, strategy and action plan and ensure their success. Since the coordination of the various departments is vital for the some, a General Council to be chaired by the Honourable Chief Minister, and since the policy has to be implemented by the Agricultural Department, an Executive Committee to be chaired by the Honourable Minister for Agriculture will supervise and guide the functioning of the Organic Kerala Mission.

Appendix 2 : Minerals and Minerals Productions in the Western Ghats

a. Minerals in the Western Ghat States/Districts

Districts of Western ghats	Important Minerals
Maharashtra	
Nasik	
Thane	bauxite, china clay
Dhule	limestone
Nandurbar	
Pune	
Sindhudurg	bauxite, china clay, chromite, iron ore, quartz and silica sand
Raigad	bauxite
Satara	
Ratnagiri	bauxite, fireclay, manganese ore, quartz and silica sand
Sangli	limestone
Kolhapur	bauxite, laterite, quartz and silica sand
Ahmednagar	limestone
Gujarat	
Surat	fireclay, lignite, limestone, quartz/silica
Valsad	bauxite, limestone, quartz/silica
Dangs	
Karnataka	
Belgaum	bauxite, china clay, dolomite, felspar, limestone, manganese ore, quartz/silica sand, quartzite

Districts of Western ghats	Important Minerals
Uttara Kannada	bauxite, china clay, dolomite, iron ore(hematite), iron ore (magnetite), limestone, kyanite, manganese ore, quartz/silica sand
Shimoga	fireclay, iron ore (hematite), limestone, kyanite, manganese ore, quartz/silica sand
Udupi	bauxite, limestone, quartz/silica sand
Dakshina Kannada	bauxite, china clay, iron ore (magnetite), limestone, kyanite, quartz/silica sand
Chickmagalur	bauxite, china clay, chromite, dunite/pyroxinite, iron ore(hematite), iron ore (magnetite), limestone, kyanite, manganese ore, quartz/silica sand, talc/steatite
Hassan	china clay, dunite/pyroxinite, felspar, fireclay, gold, iron ore (magnetite), limestone, quartz/silica sand, talc/steatite, chromite
Kodagu	
Chamrajnagar	
Mysore	chromite, dolomite, dunite/pyroxinite, limestone, kyanite, mangnesite, quartz/silica sand, talc/steatite
Dharwad*	china clay, fireclay, gold, iron ore(hematite), quartz/silica sand
Kerala	
Kasargod	bauxite, china clay, limestone, quartz/silica, titanium
Kannur	bauxite, china clay, limestone
Kozikode	limestone
Malappuram	limestone
Wayanad	quartz/silica
Palghat	
Thrissur	china clay, limestone

Districts of Western ghats	Important Minerals
Ernakulam	china clay, limestone
Pathanamthitta	titanium
Idukki	
Kottayam	china clay
Allapuza	china clay, limestone, quartz/silica
Kollam	bauxite, china clay, limestone, sillimanite, titanium, zircon
Thiruvananthpuram	bauxite, china clay, quartz/silica, sillimanite, titanium
Tamil Naidu	
Nilgiris	bauxite, magnesite
Coimbatore	felspar, gypsum, limestone, magnesite, quartz/silica sand, steatite
Theni	
Dindigul	bauxite, felspar, limestone, quartz/ silica sand
Virudunagar	gypsum, limestone
Tirunelveli	garnet, granite, gypsum, limestone, magnesite, titanium
Erode	felspar, granite, quartz/ silica
Madurai	granite, graphite, limestone, quartz/ silica sand
Kanyakumari	garnet, titanium, zircon

Source: IBM 2008

b. Mineral Production in 2007–08

In red: WG districts

State	Important Mineral	District	2007-08(p)			
			Tonnes	Value of production (Rs. '000)	State value of mineral production (Rs. '000)	Mineral production as a % of state production
Maharashtra					50652367	
	Bauxite	Kohlapur, Raigad, Ratnagiri, Satara, Sindhudurg, Thane	1785330	531830		1.0500
	China Clay	Amravati, Bhandara, Chandrapur, Nagpur, Sindhudurg, Thane				
	Limestone	Ahmednagar, Chandrapur, Dhule, Gadchiroli, Nagpur, Nanded, Pune, Sangli, Yavatmal	9600000	987938		1.9504
	Chromite	Bhandara, Chandrapur, Nagpur, Sindhudurg				
	Iron Ore (Hematite)	Chandrapur, Gadchiroli, Sindhudurg	588000	396291		0.7824
	Quartz	Bhandara, Chandrapur, Gadchiroli, Gondia, Kohlapur, Nagpur, Ratnagiri, Sindhudurg	13442	1648		0.0033
	Silica Sand	Bhandara, Chandrapur, Gadchiroli, Gondia, Kohlapur, Nagpur, Ratnagiri, Sindhudurg	443259	96313		0.1901

State	Important Mineral	District	2007-08(p)			
	Fireclay	Amravati, Chandrapur, Nagpur, Ratnagiri	7239	543		0.0011
	Manganese Ore	Bhandara, Nagpur, Ratnagiri	854120	5313228		10.4896
	Laterite	Kohlapur	245237	58538		0.1156
Gujrat					63445599	
	Fireclay	Bharuch, Kachchh, Mehsana, Rajkot, Sabarkantha, Surat, Surendernager	35451	2531		0.0040
	Lignite	Bharuch, Bhavnagar, Kachchh, Surat	11788000	8277771		13.0470
	Limestone	Amreli, Banaskantha, Bharuch, Bhavnagar, Jamnagar, Junagadh, Kheda, Kachchh, Panchmahals, Porbandar, Rajkot, Sabarkantha, Surat, Vadodra, Valsad	22120000	2743616		4.3244
	Quartz	Bharuch, Bhavnagar, Dahod, Kheda, Kachchh, Panchmahals, Rajkot, Sabarkantha, Surat, Surendrnagar, Vadodra, Valsad	69255	6361		0.0100
	Silica	Bharuch, Bhavnagar, Dahod, Kheda, Kachchh, Panchmahals, Rajkot, Sabarkantha, Surat, Surendrnagar, Vadodra, Valsad	383349	39876		0.0629
	Bauxite	Amreli, Bhavnagar,	12515094	2278084		3.5906

State	Important Mineral	District	2007-08(p)			
		Jamnagar, Junagarh, Kheda, Kachchh, Porbandar, Sabarkantha, Valsad				
Kerala					7482336	
	Bauxite	Kannur, Kasaragod, Kollam, Thiruvananthpuram	-	-		
	China Clay	Alappuzha, Ernakulam, Kannur, Kasaragod, Kollam, Kottayam, Pallakad, Thiruvananthpuram, Thrissur				
	Limestone	Alappuzha, Ernakulam, Kannur, Kollam, Kottayam, Kozikode, Mallapuram, Pallakad, Thrissur	475000	147326		1.9690
	Quartz/Silica	Alappuzha, Kasaragod, Thiruvananthpuram, Waaynad	38552	18298		0.2445
	Sillimanite	Kollam, Thiruvananthpuram	14570	87420		1.1684
	Titanium	Kosaragod, Kollam, Pathanamthitta, Thiruvananthpuram				
	Zircon	Kollam				
Tamil Nadu					30065910	
	Bauxite	Dindigul, Namakkal, Salem, Nilgiri	342687	3663		0.0122

State	Important Mineral	District	2007-08(p)			
	Felspar	Coimbatore, Dindigul, Erode, Kanchipuram, Karur, Namakkal, Salem, Tiruchirapalli	576	261		0.0009
	Garnet	Ramanathapuram, Tiruchirapalli, Tiruvarur, Kanyakumari, Thanjavur, Tirunelveli, Kottabomman	863014	289493		0.9629
	Granite	Dharmapuri, Erode, Kanchipuram, Madurai, P.Muthuramalingam, Salem, Thiruvannamalai, Tiruchirapalli, Tirunelveli, Vellore, Villupuram				
	Graphite	Madurai, Ramnathapuram, Shivganga, Vellore	50543	16204		0.0539
	Gypsum	Coimbatore, Perambalur, Ramnathapuram, Tiruchirapalli, Tirunelveli, Thoothukudi, Virudhunagar	-	-		
	Limestone	Coimbatore, Cuddalore, Dindigul, Kanchipuram, Karur, Madurai, Nagapattinum, Namakkam, Perambalur, Ramnathapuram, Salem, Thiruvallur, Tiruchirapalli,	17336000	2514291		8.3626

State	Important Mineral	District	2007-08(p)			
		Tirunelveli, Vellore, Villupuram, Virudhunagar				
	Magnesite	Coimbatore, Dharmapuri, Karur, Namakkal, Nilgiri, Salem, Tiruchirapalli, Tirunelveli, Vellore	179095	301549		1.0030
	Quartz	Chengai-Anna, Chennai, Coimbatore, Cuddalore, Dharmapuri, Dinigul, Erode, Kanchipuram, Karur, Madurai, Namakkal, Periyar, Perambalur, Salem, Thiruvallur, Thiruvarur, Nagapattinam, Tiruchipallai, Villupuram, Virudhnagar, Vellore	5828	6504		0.0216
	Silica	Chengai-Anna, Chennai, Coimbatore, Cuddalore, Dharmapuri, Dinigul, Erode, Kanchipuram, Karur, Madurai, Namakkal, Periyar, Perambalur, Salem, Thiruvallur, Thiruvarur, Nagapattinam, Tiruchipallai, Villupuram, Virudhnagar, Vellore	27206	10264		0.0341
	Steatite	Coimbatore, Salem, Tiruchirapalli, Vellore	-	-		
	Titanium	Kanyakumari, Nagapattinum, Ramanathapuram,				

State	Important Mineral	District	2007-08(p)			
		Thiruvallur, Tirunelveli, Thootukudi				
	Zircon	Kanyakumari				
Karnataka					44949142	
	Bauxite	Belgaum, Chickmagalur, Uttar & Dakshin Kannada, Udipi	161554	28425		0.0632
	China Clay	Bangalore, Belgaum, Bellary, Bidar, Chickmagalur, Dharwad, Gadag, Hassan, Haveri, Koalr, Uttar & Dakshin Kannada, Shimoga, Tumkur	45000	4500		0.0100
	Chromite	Chickmagalur, Hasan, Mysore	7257	43843		0.0975
	Dolomite	Bagalkot, Belgaum, Bijapur, Chitradurga, Mysore, Uttar Kanadda, Tumkur	348690	46020		0.1024
	Dunite/Pyroxenite	Chickmagalur, Hasan, Mysore	6438	515		0.0011
	Felspar	Mysore, Belgaum, Chitradurga, Hassan	-	-		
	Fireclay	Bangalore, Chitradurga, Hassan, Dharwad, Kolar, Shimoga, Tumkur	-	-		
	Gold	Chitradurga, Dharwad, Gadag, Gulbarga, Hasan, Haveri, Kolar,	2831kg	2799422		6.2280

State	Important Mineral	District	2007-08(p)			
		Raichur, Tumkur				
	Iron Ore (Hematite)	Bagalkot, Bellary, Bijapur, Chickmagalur, Chitradurga, Dharwad, Gadag, Uttar Kannada, Shimoga, Tumkur	45605000	39919060		88.8094
	Iron Ore (Magnetite)	Chickmagalur, Hasan, Uttar & Dakshin Kannada, Shimoga				0.0000
	Kyanite	Chickmagalur, Chitradurga, Coorg, Mandya, Mysore, Shimog, Dakshin Kannada	-	-		
	Limestone	Bagalkot, Belgaum, Bellary, Bijapur, Chickmagalpur, Chitradurga, Davangere, Gadag, Gulbarga, Hassan, Mysore, Uttar & Dakshin Kannnada, Shimoga, Tumkur, Udipi	14859000	1309892		2.9142
	Magnesite	Coorg, Mandya, Mysore	4602	7714		0.0172
	Manganese Ore	Belgaum, Bellary, Chickmagalur, Chitradurga, Davangere, Uttar Kannada, Shimog, Tumkur	309716	388210		0.8637
	Quatrz	Bagalkot, Bangalore, Belgaum, Bellary, Chickmagalpur, Chitradurga, Davangere,	2500	153		0.0003

State	Important Mineral	District	2007-08(p)			
		Dharwad, Gadag, Gulbarga, Hasan, Haveri, Kolar, Koppal, Mandya, Mysore, Uttar & Dakshin Kannada, Raichur, Shimoga, Tumkur, Udupi				
	Silica	Bagalkot, Bangalore, Belgaum, Bellary, Chickmagalpur, Chitradurga, Davangere, Dharwad, Gadag, Gulbarga, Hasan, Haveri, Kolar, Koppal, Mandya, Mysore, Uttar & Dakshin Kannada, Raichur, Shimoga, Tumkur, Udupi	89713	8792		0.0196
	Talc/Steatite	Bellary, Chickmagalpur, Chitradurga, Hassan, Mandya, Mysore, Raichur, Tumkur	358	36		0.0001

Source: IBM 2008

Appendix 3 : Objections Raised at UN Permanent Forum on Indigenous Issues to Indian Proposals

UN Permanent Forum on Indigenous Issues, Tenth Session, New York, 16–27 May 2011: Agenda Item 3(c): Follow-up to the recommendations of the Permanent Forum: free, prior and informed consent (Tuesday, 17 May 2011)

Joint Statement on Continuous violations of the principle of free, prior and informed consent in the context of UNESCO's World Heritage Convention Submitted by:

Budakattu Krishikara Sangha, Karnataka, Western Ghats, India (representing indigenous peoples of Pushpagiri Wildlife Sanctuary, Brahmagiri Wildlife Sanctuary, Talacauvery Wildlife Sanctuary, Padinalknad Reserved Forest, Kerti Reserved Forest); Pothigaimalai Adivasi Kanikkaran Samuthaya Munnetra Sangam (Kalakkad Mundanthurai Tiger Reserve, Western Ghats, India); Adivasi Gothrajaan Sabha, Kerala (Aralam Wildlife Sanctuary, Western Ghats, India); Adivasi-Dalit Land Rights Committee, Kerala; Adivasi Gothra Mahasabha, Kerala, India (representing Shendurney Wildlife Sanctuary, Neyyar Wildlife Sanctuary, Peppara Wildlife Sanctuary, Kulathupuzha Range, Palode Range, Ranni Forest Division, Konni Forest Division, Achankovil Forest Division, Mankulam Range, Chinnar Wildlife Sanctuary, Silent Valley National Park, Attapadi Reserved Forest, Aralam Wildlife Sanctuary); Kerala Girivarga Kanikkar Sangham (Shendurney Wildlife Sanctuary, Neyyar Wildlife Sanctuary, Peppara Wildlife Sanctuary, Kulathupuzha Range, Palode Range); along with a large number of other organizations from all over the world.

Introduction

1. We would like to again bring to the attention of the Permanent Forum our serious concern about the continuous and on-going disrespect of the principle of free, prior and informed consent by UNESCO's World Heritage Committee when it designates sites in Indigenous peoples' territories as "World Heritage sites".
2. This issue has already been brought to the attention of the Permanent Forum on several occasions, by Indigenous peoples and organizations from many different parts of the world.
3. There are numerous examples of Indigenous sites on the World Heritage List that have been inscribed without the free, prior and informed consent of the Indigenous peoples concerned. In many cases Indigenous peoples were not even consulted when their territories were designated as World Heritage sites, although this designation can have far-reaching consequences for their lives and human rights, their ability to carry out their subsistence activities, and their ability to freely pursue their economic, social and cultural development in accordance with their right of self-determination.
4. The practice of the World Heritage Committee is inconsistent with the provisions of the UN Declaration on the Rights of Indigenous Peoples, the Programme of Action for the Second International Decade of the World's Indigenous People, the United Nations Development Group's Guidelines on Indigenous Peoples' Issues, the comments and concluding observations of the UN human rights treaty monitoring bodies, the views of the UN Special Rapporteur on the rights of indigenous peoples, the Resolutions of the 4th World Conservation Congress (Barcelona, 2008), and the recommendations of the Permanent Forum on Indigenous Issues.

5. It is also inconsistent with UNESCO's objective to integrate a human rights-based approach into all of its programmes and activities. It contrasts with the practice of UNESCO's Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage, which has adopted Operational Directives ensuring that elements can only be inscribed on UNESCO's lists of intangible cultural heritage if the free, prior and informed consent of the communities and groups concerned has been obtained.

6. Last year, at the World Heritage Committee's 34th Session in Brasilia (25 July – 3 August 2010), the Committee inscribed two sites on the World Heritage List although questions had been raised regarding Indigenous peoples' participation in the nomination processes and their free, prior and informed consent: the Northwest Hawaiian Islands Marine Monument ("Papahānaumokuākea Marine National Monument") and the Ngorongoro Conservation Area in Tanzania.The latter was re-inscribed as a cultural World Heritage site, because of its significance as an archaeological site, not because of the significance of the Maasai culture. We are concerned that the Committee's recognition of only the archaeological values, and not the living cultural values of the Indigenous residents, may exacerbate the already existing imbalances in the management framework for the Ngorongoro Conservation Area and lead to additional restrictions on the livelihoods of the Indigenous residents and further infringements on their rights.

7. This year, at its upcoming 35th Session in Paris (19-29 June 2011), the World Heritage Committee will be considering several nominations of sites that are located in Indigenous peoples' territories. These include (among other sites):

   - **"Western Ghats" (India);**
   - "Trinational de la Sangha" (Republic of Congo / Cameroon / Central African Republic);
   - "Kenya Lake System in the Great Rift Valley" (Kenya).

All three of the mentioned sites are nominated under natural World Heritage criteria alone, without giving due consideration to the Indigenous cultural values connected to these areas and Indigenous peoples' roles as stewards of these places. Moreover, all of the mentioned nominations were prepared without meaningful involvement and consultation of the Indigenous peoples concerned and without obtaining their free, prior and informed consent.

Recommendations

We urge the Permanent Forum to call on the World Heritage Committee:

a. to defer all World Heritage nominations of sites in Indigenous peoples' territories if it cannot be ensured that the Indigenous peoples have been adequately consulted and involved and that their free, prior and informed consent has been obtained;

b. to defer the nominations of "Western Ghats", "Trinational de la Sangha" and "Kenya Lake System in the Great Rift Valley", and call on the respective State parties to consult and collaborate with the Indigenous peoples concerned, in order to ensure that their values and needs are reflected in the nomination documents and management plans and to obtain their free, prior and informed consent;

c. to endorse the UN Declaration on the Rights of Indigenous Peoples and use it as the basic reference framework when making decisions about World Heritage sites in Indigenous territories, together with the UNDG Guidelines on Indigenous Peoples' Issues;

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1. Article 32(2) of the UN Declaration on the Rights of Indigenous Peoples (UN Doc. A/RES/61/295, Annex), adopted by the UN General Assembly on 13 September 2007, states: "States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources…"
2. Art. 41 of the Declaration requires UN Agencies and other intergovernmental organizations to "contribute to the full realization of the provisions of this Declaration" and to establish ways and means of "ensuring participation of indigenous peoples on issues affecting them."
3. Art. 42 calls on UN Agencies to "promote respect for and full application of the provisions of this Declaration and follow up the effectiveness of this Declaration."
4. According to the Programme of Action for the Second International Decade of the World's Indigenous People (UN Doc. A/60/270), adopted by the UN General Assembly on 16 December 2005, one of five objectives of the Decade is: "Promoting full and effective participation of indigenous peoples in decisions which directly or indirectly affect their lifestyles, traditional lands and territories, their cultural integrity as indigenous peoples with collective rights or any other aspect of their lives, considering the principle of free, prior and informed consent." (para. 9ii).
   The Programme of Action also states that "programmes and initiatives relating to indigenous cultures should follow the principle of free, prior and informed consent of indigenous peoples. Particular caution should be exercised when elaborating tourism and national park projects in indigenous territories." (para. 19)
   In regard to World Heritage nominations, the Programme of Action states: "UNESCO is urged to establish mechanisms to enable indigenous peoples to participate effectively in its work relating to them, such as the… nomination of indigenous sites in the World Heritage List and other programmes relevant to indigenous peoples." (para. 16, emphasis added)
5. United Nations Development Group Guidelines on Indigenous Peoples Issues, February 2008, p. 18: "conservation efforts on indigenous lands, including the establishment of new and management of existing protected areas, have to take place with the free, prior and informed consent and full participation of the communities concerned."

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Annexure: Minutes of the Meetings of the WGEEP

Minutes of the First Meeting of the Western Ghats Ecology Expert Panel held on 31st March 2010 at 10.00 am at ATREE, Bengaluru.

The first meeting of the Western Ghats Ecology Expert Panel was held at Ashoka Trust for Research in Ecology and Environment (ATREE), Royal Enclave, Srirampura, Jakkur Post, Bengaluru 560 064 on 31st March, 2010. The following were present:

1. Prof. Madhav Gadgil	Chairman
2. Shri. B.J. Krishnan	Member
3. Dr. Nandakumar Mukund Kamat	Member
4. Dr. K.N. Ganeshaiah	Member
5. Dr. V.S. Vijayan	Member
6. Prof. (Ms.) Renee Borges	Member
7. Prof. R. Sukumar	Member
8. Dr. Ligia Noronha	Member
9. Ms. Vidya S. Nayak	Member
10. Prof. S. P. Gautam	Member
11. Dr. G. V. Subrahmanyam	Member Secretary

Dr. P.L. Gautam, Chairman, National Biodiversity Authority; Dr. R.R. Navalgund, Director, SAC, Ahmedabad, Member of the Panel could not attend the meeting. He deputed Dr. P. S. Roy, Dy. Director, NRSC, Hyderabad to represent him.

The Chairman welcomed all the members and requested them to introduce themselves. Thereafter, Dr. G.V. Subrahmanyam briefly outlined the tasks and expected outcomes of the Panel. These included assessment of the current status of the ecology of the Western Ghats region, demarcation of areas within the region to be notified as ecologically sensitive zones under the Environment (Protection) Act, 1986, as also to recommend modalities for the establishment of the Western Ghats Ecology Authority under the Environment (Protection) Act. He also informed members that the Panel, with a term of one year, was to submit its interim report within six months from the date of its constitution.

The Chairman briefly explained the TORs of the panel and introduced the major agenda points to be taken up during the meeting. These included:

1. Work plan
2. Organizing an information system
3. Organizing a process of Comprehensive Consultation
4. Time frame

I. Work Plan

The Chairman introduced the agenda item on work plan (Annexure-I) as prepared by him and thereafter a detailed discussion was held. The following were the major points that emerged during the discussions:

- The Panel may collect the following relevant information to address the terms of reference listed at I to VI of the MoEF order of 4th March, 2010:
    - Status and on-going changes in health of soils, water, air, biodiversity, rural and urban settlements, forestry, farming, herding, fishing, industry, tourism, mining etc.
    - Institutional issues related to ecologically sensitive areas, community conservation areas, wildlife sanctuaries, national parks, biosphere reserves, project tiger reserves, environmental impact assessment, assessment of carrying capacity, Central and State Pollution Control Boards, Coastal Regulation Zone, National, State and local biodiversity authority/ boards/ management committees, Heritage sites, Threatened species, Protection of Plant Varieties and Farmers Rights Act, Joint Forest Management, Tribal Forest Right Act, models like Dahanu Taluka Environment Protection Authority, working of Panchayati Raj Institutions, possible new initiatives grounded in positive incentives such as the Australian Soil Carbon Accreditation scheme and Costa Rica's Payment of Service Charges to farmers for providing watershed services through maintenance of tree cover on private land.
    - A Western Ghats Ecology Authority could be constituted under Sub-section 3 of Section 3 of Environment (Protection) Act, 1986, as has been done in the case of the Dahanu Authority and many other such Authorities. Though the Dahanu Authority is an outcome of judicial intervention, the Ministry as an Executive could pro-actively constitute the proposed Western Ghats Ecology Authority as has been contemplated under the Environment (Protection) Act, 1986. Nevertheless, it may be desirable to enact a separate law for establishing the 'Western Ghats Ecology Authority'. Such a law would serve as a model in future.
- Intersectoral/interdepartmental conflict resolution (vis-à-vis mining against forests etc.) could be done by suitable amendment to the EPA to establish a clear hierarchy for better executive and judicial interpretation.
- The Panel suggested that the schedule of the work may be divided into the following modules:
    - Research,
    - Stakeholders consultation (Region-wise and State-wise) including the administration, MPs of the Western Ghats Region and local people,
    - Outreach/communication plan and
    - Implementation/constitution of the Western Ghats Authority.

II. Organizing an Information System

The Chairman introduced the detailed Agenda (Annexure-II) as prepared by him and thereafter detailed deliberations were held by the Panel and the following action points emerged:

- Need to immediately begin with the organization of information pertaining to the current status of the ecology of the Western Ghats Region and to demarcate areas within the Western Ghats Region to be notified as ecologically sensitive areas under the Environment (Protection) Act, 1986.
- Besides plants, animals, insects, birds etc., emphasis also needs to be given to the precious microbial diversity of the Western Ghats where hundreds of novel microbial species have been identified. Historical, archaeological aspects such as prehistoric human occupation sites and routes of migration, rock art sites etc. also need to be considered.
- The emphasis for data collection is on published material in English but a lot of information on the Western Ghats exists in local languages of the region in the five Western Ghats states and at least abstracts of these could be compiled.
- The tribals of the Western Ghats need special focus as they have traditional knowledge about the forest resources and they are the main stakeholders.
- The Ministry would make available the reports of the Pranob Sen and the Dr. T.S. Vijayaraghavan Committees on ecologically sensitive areas and also the recommendations of the National Board for Wildlife and Hon'ble Supreme Court decisions relating to eco-sensitive zones around National Parks and Sanctuaries.
- Dr. Ganeshaiah who has been involved in the development of the India Bio-resources Information Network and associated with ATREE's India Biodiversity Portal and Dr. Sukumar who heads CES, IISc, which hosts ENVIS's Sahyadri: Western Ghats Biodiversity Information System, were requested to assist the Panel in organizing the relevant information system using modern information technologies such as ICT including web 2.0 technologies. The assistance of Mr. Janardhan Pillai, Systems Manager, CES, may be sought.
- Dr. Ganeshaiah was requested to develop a proposal seeking a seed budget to initiate a programme for creating a Western Ghats data base site. This website is initially intended to serve the Western Ghats Ecology Expert Panel, including its outreach activities, but will eventually be expanded as a dedicated site for the Western Ghats data base management. A detailed proposal along with budgetary details for this purpose will be submitted to the MoEF for financial assistance. The Panel strongly recommended that such a proposal be funded in an expeditious manner.
- To incorporate in the proposed information system as well as uploaded on the web, soft copies be created of the documents relating to Western Ghats Ecology that are currently available as hard copies. Some of these include the following:
    - the framework for assessment of the carrying capacity of Dakshina Kannada District by Dr. D.K. Subramanian
    - the initial project document and a ten-year assessment of the Nilgiris biosphere reserve prepared by Prof. Madhav Gadgil

- relevant impact assessment documents especially those pertaining to protected areas in Western Ghats to be provided by MoEF, e.g. Kudremukh Iron Ore Project EIA report by NEERI
- Specific reports of importance towards defining Eco-sensitive Areas in the Western Ghats to be identified by the Panel and to be commissioned by the Ministry
- Landscape-level information by Dr. P.S. Roy, NRSC, Hyderabad
- Judicial and policy-related information to be provided by Shri B.J. Krishnan
- Various types of literature from NGOs, Millennium Biodiversity Report of CDFC and sacred groves to be provided by Ms. Vidya S. Nayak
- Information on Goa to be provided by Dr. Nandkumar Mukund Kamat
- Compilation of existing information on Western Ghats Microbial Biodiversity and to suggest systematic eco-conservation and sustainable utilization measures by Dr. Nandkumar Mukund Kamat

- The Chairman noted that a vast amount of pertinent information is available with the Ministry of Environment and Forests in its archives; this includes EIAs of projects on the Western Ghats, deliberations of various committees such as the Western Ghats Eco-development Research Programme, review of Niligiri Biosphere Reserve and so on. Apparently there is no system of filing and retrieval of all this valuable information. The Ministry is urged to initiate the process of identifying all such, so-called, 'gray' literature, scanning it and creating soft copies through an optical character recognition (OCR) process.
- The Panel suggested that the data may be organized into biodiversity data, landscape/landuse data, natural resources (including soil, water and minerals), various policy / legal sets, conservation-related data, data related to endangered species, threat maps, human resources, spatial data, traditional / cultural data, pollution-related issues from the Central Pollution Control Board (CPCB), tourism, governance and various notifications and finally bibliography.
- The Panel also suggested that important persons involved in the ecology of the Western Ghats be contacted; viz. Shri Jayant Kulkarni, Pune; Prof. Sharad Lele; Dr. N.R. Shetty; Prof. Vinod Vyasulu, IIM, Bengaluru; Dr. Janardhan Pillai, Centre for Budgetary Policy, Bengaluru, and also contacts be made with various institutions viz. Project Tiger of MoEF (Dr. Rajesh Gopal), Shri K.G. Tampi, IG (NAEB) and Forest Department MoEF (Dr. Dilip Kumar, DG & SS), Justice Dharmadhikari, Dahanu Authority, and Anthropological Society of India for tribal-related information.
- A questionnaire to collect information as per the mandate of the Panel will be designed by Dr. Sukumar for circulation to all PCCFs of Forest Departments and District Administration of the concerned States. Chairman may send a common circular (preferably in local/official language of the state) to Panchayat Raj institutions (PRIs) in Western Ghats districts asking for their comments/ suggestions so that the Panel's work becomes truly participative at the grass-roots level. It was noted that Panchayat level Biodiversity Management Committees have been formed only in some Panchayats in Karnataka and Kerala.
- The Chairman identified the following as focal points for organizing the information system:

- Dr. K.N. Ganeshaiah and Dr. Sukumar – The information system, web-based database
- Dr. Nandkumar Mukund Kamat – various parameters pertaining to ecologically sensitive areas taking into account the existing reports of the Pranob Sen and Dr. T.S. Vijayaraghavan Committees on ecologically sensitive areas.
- Dr. K.N. Ganeshaiah and Dr. R. Sukumar – Mapping of Boundaries of the Western Ghats in collaboration with Dr. P.S. Roy, NRSC, Hyderabad
- Dr. B.J. Krishnan and Dr. Ligia Noronha – Site visit plans, public consultation processes to arrive at the core issues of the conservation process
- Dr. Renee Borges and Dr. Sukumar – To design the questionnaire
- Prof. S.P. Gautam – All pollution and industry-related information

III. Organizing a Process of Comprehensive Consultation

The Chairman introduced the agenda on organizing a process of comprehensive consultation (Annexure-III) as prepared by him. Thereafter, the Panel discussed the agenda and the following action points emerged:

- Such a consultative process could involve: (a) discussions with people in the field in local languages, (b) brainstorming sessions involving a cross section of actors including government representatives in English, (c) correspondence including e-mails, and (d) web-based discussion forums.
- To put together a web-based data base of individuals and institutions concerned with environmental issues pertinent to the Western Ghats. This should be an open process of involving all interested individuals and institutions to register themselves.
- The web-based discussions need to be moderated taking the advantage of the experience of people like Dr. Aparna Watve.
- The data base should include the following fields:
  - **Data base of individuals:**
    - First name
    - Last name
    - Preferred address for postal communication
    - E-mail
    - Telephone Number(s)
    - Geographic area of interest
    - Thematic area of interest
  - **Data base of Institutions:**
    - Name
    - Nature of organization
    - Preferred address for postal communication
    - E-mail

- Telephone number(s)
- Geographic area of interest
- Thematic area of interest

- Broad outline of the public consultation process will be prepared by Shri B.J. Krishnan in consultation with the other members of the Panel.
- The brainstorming sessions could be organized in the form of four or five workshops of two days each on identified themes followed by Panel meetings. The themes for the workshops will be identified by Dr. Ligia Noronha in consultation with the other members of the Panel.
- It would be useful to form an informal consultative – "Western Ghats Inter-University Forum" to bring together all the universities along the Western Ghats. The Chairman may write to the respective VCs to solicit help. Al the universities have repositories of information on the Western Ghats.
- All deliberations of the panel would be posted on the Ministry's website. It might be appropriate to direct media to this material, rather than engage in making any other comments.

IV Time frame

The Chairman introduced the agenda item on time frame (Annexure-IV) and after detailed discussions, the following time frame emerged:

- Commissioning of discussion papers – a list of discussion papers to be prepared by Dr. Ganeshaiah and circulated to all the members and finalized by 12th April, 2010. Thereafter, they will be commissioned by MoEF as quickly as possible with a request that they be submitted by 15th July, 2010.
- Develop the Western Ghats Ecology Expert Panel (WGEEP) webpage on MoEF, ATREE and CES, IISc websites by 25th April, 2010. This will provide access to all documents of interest (older documents, commissioned papers as they are received, all records of work of WGEEP). Some of these will be both the normal and wiki version, open for inputs by all registrants. Hosting of pertinent documents will begin on 15th April, 2010 and continue till 15th September, 2010. Dr. Ganeshaiah will develop a proposal in this regard and submit the same to the Ministry immediately.
- Put up a site for registration by individuals and institutions who wish to contribute to the work of the WGEEP by 25th April, 2010. This will be done by Dr. Ganeshaiah.
- Site visits and consultation by members of the WGEEP. A tentative set of criteria for selecting sites for these visits will be prepared and circulated by Shri B.J. Krishnan. Based on the feedback a full plan for sites visit will be prepared. This will be finalized at the second meeting of the Panel in the Nilgiris on 7th May, 2010. Site visits will then be conducted over the period 15th May to 15th August, 2010. Records of the observations and discussions during these visits would be immediately put up on the WGEEP webpage, welcoming public feedback.
- Brainstorming sessions on specific themes: A broad programme will be prepared by Dr. Ligia Noronha and will be circulated to all the members. Based on the feedback, the themes will be finalized by 15th April, 2010.
- Develop and post initial version of the report of the WGEEP on its webpage by 1st September, 2010, welcoming public feedback.

- Submit a final version of the report of the WGEEP in both printed form and as a more detailed web-based version by 15th September, 2010.

Other Points

Sustainable models of living in and across the Western Ghats where ecological/natural resources of Western Ghats linked to new marketing /employment opportunities, e.g. in sale of agro-horticultural produce, medicinal plants, handicrafts, artwork, ecotourism need to be highlighted.

The Panel suggested that all meetings should be held in all the concerned States and it was recommended to convene the next meeting of the Panel on 7th May 2010 at Ooty / Kotagiri, Nilgiris.

The meeting ended with a vote of thanks to the Chair.

Annexure-I: Western Ghats Expert Group: Work Plan

1. Our Western Ghats Expert Group has a challenging assignment ahead of us.

Our mandate is:

i. To assess the current status of ecology of the Western Ghats region.

ii. To demarcate areas within the Western Ghats Region which need to be notified as ecologically sensitive and to recommend notification of such areas as ecologically sensitive zones under the Environment (Protection) Act, 1986. In doing so, the Panel shall review the existing reports such as the Mohan Ram Committee Report, Hon'ble Supreme Court's decisions, Recommendations of the National Board for Wildlife and consult all concerned State Governments.

iii. To make recommendations for the conservation, protection and rejuvenation of the Western Ghats Region following a comprehensive consultation process involving people and Governments of all the concerned States.

iv. To suggest measures for effective implementation of the notifications issued by the Government of India in the Ministry of Environment and Forests declaring specific areas in the Western Ghats Region as eco-sensitive zones under the Environment (Protection) Act, 1986.

v. To recommend the modalities for the establishment of the Western Ghats Ecology Authority under the Environment (Protection) Act, 1986 which will be a professional body to manage the ecology of the region and to ensure its sustainable development with the support of all concerned states.

vi. To deal with any other relevant environment and ecological issues pertaining to the Western Ghats Region, including those which may be referred to it by the Central Government in the Ministry of Environment and Forests.

2. In order to accomplish this, we would need to consider the following:

Context

Status and ongoing changes in health of soils, water, air, biodiversity

Rural and urban settlements

Forestry

Farming

Herding

Fishing

Industry

Tourism

Mining

Institutional issues:

Ecologically Sensitive Areas

Community Conservation Areas

Wild Life Sanctuaries

National Parks

Biosphere Reserves

Project Tiger Reserves

Environmental Impact Assessment

Assessment of Carrying Capacity

Central and State Pollution Control Boards

Coastal Regulatory Zone

National, State and Local Biodiversity Authority/Boards/ Management Committees

Heritage Sites

Threatened Species

Protection of Plant Varieties and Farmers' Rights Act

Joint Forest Management

Tribal Forest Rights Act

Models like Dahanu Taluka Environment Protection Authority (DTEPA)

Working of Panchayati Raj Institutions

Possible new initiatives, grounded in positive incentives, such as the Australian Soil Carbon Accreditation Scheme, and Costa Rica's payment of service charges to farmers for providing watershed services through maintenance of tree cover on private land.

3. I suggest that we examine the list set out above, and amend it as appropriate. We might then like to apportion responsibilities for dealing with the various themes amongst ourselves, and chalk out a Work Plan at our first meeting in Bengaluru on 31st March 2010.

Appendix: Dahanu Taluka Environment Protection Authority (DTEPA)

A unique prototype of a democratic institution set up to protect the ecology, natural resources and livelihoods of a region, the Dahanu Taluka Environment Protection Authority (DTEPA) has for a period of ten years been more than just a watchdog institution. Recognising the ecological politics of control over natural resources, the Authority has unwaveringly stood by the principles of social justice and equitable rights for local communities. With its landmark orders and judgments, the DTEPA has contributed to the environmental discourse and debate in India.

With the local groups in Dahanu seeking legal redress for consistent flouting of environmental laws, the Supreme Court in a landmark order, in 1996 recommended the setting up of a special Authority in "order to address the complex issues of planning and management of ecologically fragile areas". (Read Supreme Court Order, October 1996)

With the mandate to protect the ecologically fragile area of Dahanu taluka, specifically control pollution, consider and implement the Precautionary Principle and the Polluter Pays principle, the Authority was set up in December 1996 headed by Justice Chandrashekhar Dharmadhikari (Read Notification setting up of the special Dahanu Taluka Environment Protection Authority, 1996).

The Authority also has as its members experts from the areas of hydrology, environmental engineering, urban planning, etc. Government representatives like the Collector of Thane and Member Secretary, Maharashtra Pollution Control Board are also its members.

Considered a quasi-judicial body, the Authority has functioned like a peoples' court responding to local environmental complaints and problems. Through a process of hearings, the Authority has been able to discuss and debate issues in a most democratic manner holding both public and private institutions accountable. In a sense an environmental consciousness and responsibility has been forced into the minds of bureaucrats, elected representatives and private players with the Authority taking the position of a strict school teacher.

For instance, the Authority ensured that the Power Grid Corporation while setting up high transmission lines through Dahanu, undertakes a massive compensatory afforestation project of planting ten trees for every tree cut. Preference was given to indigenous varieties and the project was not sanctioned until a deposit was give to the forest department to start the afforestation project.

The Authority started its term with a heavily contested project – despite the fact that Dahanu had been declared ecologically fragile, since its coastline fell under the most stringent clause of the Coastal Regulation Zone (CRZ) Notification and there was a series of orders and judgments restricting industrial development, a proposal to set up a multi-billion dollar industrial port in Dahanu was mooted.

The Authority took up this issue and a series of hearings were conducted. Representatives of the global giant P&O had to appear and submit their reports and so on. Community members, environmental groups also submitted their data on the negative effects of the Port on Dahanu. Eventually, with the substantive legal arguments, scientific reports and well articulated resistance to the project from the affected communities, the Authority rejected the siting of the port in Dahanu. (Read landmark order of September 1998 rejecting the siting of the port at Vadhavan)

The thermal power plant has been another significant area of intervention. The Dahanu Authority passed an order in May 1999 directing that the thermal power plant comply with clearance conditions and set up a Flue Gas Desulphurisation (FGD) Plant to reduce the emissions of sulphur from its plant. Once again in 2005, the Authority passed a significant judgment directing energy giant Reliance to produce a bank guarantee of Rupees 300 crore to show its commitment in setting up the FGD unit.

(Read landmark 300 crore order passed by the Authority on March 19, 2005)

The Dahanu Authority continues to play an important role in ensuring that Dahanu Taluka becomes a model taluka of environmental protection and conservation.

Australian Soil Carbon Accreditation Scheme (ASCAS)

From: Christine Jones, PhD, Founder, Amazing Carbon, www.amazingcarbon.com

Appropriately managed agricultural soils can sequester large volumes of atmospheric carbon dioxide, significantly improving soil water-holding capacity, nutrient status and agricultural productivity. Under the Australian Soil Carbon Accreditation Scheme (ASCAS), carbon sequestration is measured within Defined Sequestration Areas (DSAs) located on regeneratively managed broad acre cropping and grazing lands. Soil Carbon Incentive Payments (SCIPs) are paid annually and retrospectively for validated soil carbon increases above initial baseline levels determined within each DSA.

Receipt of Soil Carbon Incentive Payments is similar to being paid 'on delivery' for livestock or grain, with the bonus being that sequestered carbon remains in the soil, conferring production and NRM benefits. Soil Carbon Incentive Payments are calculated at one-hundredth the 100-year rate ($25/tonne CO2-e).

The ASCAS model is based on financial reward from the private sector, creating a collaborative and progressive market based instrument to help address a wide range of environmental issues. Increased levels of soil carbon have multiple landscape health and productivity advantages.

The Australian Soil Carbon Accreditation Scheme is a first in the Southern Hemisphere, placing Australia among world leaders in the recognition of soils as a verifiable carbon sink.

Payments for watershed services

Context:

Payments for environmental services (PES) are a means of creating a market in environmental/ecosystem services.

They link those who value a given service with those who can provide it. Most early PES initiatives were in Latin America, which remains the region with the most PES schemes, followed by Asia, and lastly Africa (Figure 1).



Figure 1

Payments for *watershed functions* seek to link upstream land use and management with downstream water use and management to realize benefits for upstream and downstream participants in the scheme and others in the area – not to mention for the environment. The ideal is a *voluntary* agreement between at least one buyer and one seller of ecosystem services (or land-use changes presumed to provide an ecosystem service). PES schemes have become increasingly popular with donors over the last few years; yet despite their widespread application, by their nature they are not primarily intended as a tool for poverty reduction – but they may be tailored to this purpose.

From IFAD's perspective, the problem is that poor rural people lack the prerequisites for participation in PES. Often, they do not have secure land tenure, rewards are easily usurped by the elite, and they lack the assets (human capital, natural resources, etc.) to provide the level of service needed to yield the desired impacts. Part of the solution to this stubborn dilemma may be to eschew PES schemes that simply seek market creation. Rather than clinging to economic principles, develop a variant of PES that builds on the reality faced in

rural areas. This means allowing for market support, subsidies and a means of directing PES benefits to poor people – in short, developing *pro-rural-poor* PES.

Main challenges

'Market creation' is the market-based incentive ideally employed for PES. It involves putting an economic value on environmental services and bringing together willing buyers and providers – examples include emissions trading, nutrient trading, wetland mitigation and PES. Yet the goal of market creation is exactly what may impede PES schemes from being pro-rural-poor. If they are indeed intended to be pro-rural-poor, then it is arguably necessary to depart from the economic tenets of PES

Watershed-based PES schemes are not, by definition, pro-poor. They are not intended for this purpose, they are intended to secure watershed functions such as downstream water supply. If they are to be made to fit into a poverty-reduction box, they must be tailored to fit this role. The *ideal* of PES is to link those who value ecosystem services with those who can provide them so as to create a market. In the context of developing countries, poor rural people may not be the best vehicle to achieve this end.

The bottom line is that if donors and governments are willing to accept a compromised version of PES in order to target poor rural people, then PES schemes for watershed services can indeed benefit them – but PES might not be the right name for such schemes.

IFAD approaches

Intersectoral management is a relatively new, holistic approach that offers a promising framework for better understanding and pro-poor mobilization of potential development synergies. In IFAD's approach to water, this theme is not central, but is considered a holistic element in strengthening poor rural people's livelihoods and resilience. IFAD investment approaches to water-related interface management take into account the country-specific structures of the rural political economy. In so doing, they support the development of pro-poor, community-based natural resource management (NRM) institutions, which in turn improve farmer-led agriculture, natural resource technologies, and the sharing of knowledge of these achievements.

When planning a watershed PES scheme intended to benefit poor rural people, several assumptions must be tested against the 'new rurality'. For instance, the likelihood that upstream land users will benefit from PES does not necessarily mean that there will be a substantial impact on poverty. Across many watersheds, a large proportion of the population may be poor, but this will not be true everywhere; and the poorest people may not be the ones who receive the payments.

Institutional approaches

- Make secure land tenure a prerequisite for participation in PES schemes – pro-poor or otherwise – and provide for it. The poorest people are almost always landless. The creation of legal and institutional frameworks that allow poor rural people to participate and that ideally provide secure land tenure will often be incentive enough to encourage initial participation.
- Facilitate an effective and impartial legal system to ensure that would-be participants can enter into contractual PES arrangements with confidence. Ideally, PES schemes should be formally recognized by the country's legal and institutional framework, but this is not essential.

- Reduce transaction costs by concentrating service providers into groups. Groups of service providers or consumers have a more effective voice in negotiations than do individuals; they are better able to monitor compliance; and they can more easily accept or make payments.
- Establish a strong, independent intermediary between service providers and consumers in order to: ensure that water resource allocations are properly monitored and assessed; assist in the resolution of disputes; and, most importantly, provide a mechanism for the regular transfer of payments.

Technical approaches

- Assess demand as a first step in setting up a PES scheme. There must be sufficient demand for the service, and would-be participants must have the capacity to provide it. In parallel with assessing demand, planners can discover which types of incentives (payments, rewards) are most likely to encourage and sustain the participation of service providers.
- Technically assess, monitor and evaluate the likely effects of introducing PES. In the planning stages, appropriate measurement, testing and modeling should be used (e.g. hydrographs, remote sensing and allocation models) to determine the likely effects of the proposed land-use change on downstream water quality and quantity. Moreover, these techniques can help identify which households and communities need to participate in order to achieve the desired downstream results – optimizing, rather than maximizing, participation.
- Monitor schemes independently once they are implemented. It is important that land-use management and downstream water quality and quantity are independently monitored at regular intervals by an independent intermediary trusted by both buyers and sellers.
- Reward service providers for land management changes. That is, reward upstream land and water users for their actions, not for the outcomes of the changes made, since it is not certain that changes to upstream land management will yield the desired effects downstream.

Investment approaches

- Invest in smaller-scale schemes, which are more likely to benefit poor people, being more easily managed and monitored.
- Build capacity and invest in education; both are crucial to PES schemes. Once ecosystem services are assigned an economic value, both service providers and consumers will assign a market value to these services, which may, in turn, lead to more efficient use of the resource.
- Package payments as incentives or rewards, such as credit, vouchers for school fees or livestock. Direct money payments for services rendered may not always be ideal or even desired by service providers.
- Provide start-up investment. This is essential to ensure that the pro-poor PES schemes actually work and, in particular, that poor groups and households are able to and will participate.

- Provide funding for ongoing subsidies and market support. Donors and participating agencies must be willing to face the likely need for such support (e.g. demand augmentation)

IFAD case study

Green water credits in Kenya

Over the last two and half decades, most of Kenya's cropland has lost its topsoil, while the population has doubled, boosting demand for power and water. Green water credits (GWC) offer a tried and tested means of providing Kenya with food, water and power security. GWC are payments or rewards for water and land management services provided by farmers, which in turn benefit downstream users by providing them better-quality water and a more reliable supply. World Soil Information (ISRIC) will begin a full-scale GWC project in the near future (Proof-of-Concept of a Global Mechanism to Pay Rainfed Land Users for Water Management Activities), based on extensive testing and piloting in Kenya.

In the GWC proof of concept, focus groups were organized to give voice to land users. Water user groups and other institutions in the sector shared their views of existing institutional capacities.

Much was learned from these sessions and filtered into the current project design. Leaseholds were identified as one of the best means of providing GWC participants with secure land tenure, in order to ensure that the project is pro-rural-poor. In addition, the Kenyan hydroelectric company, KenGen, was identified as an ideal GWC partner: they have a clear incentive to pay, a long-term commitment to the scheme, and the financial resources needed.

The project's policy will be to encourage group rather than individual participation, and the Government of Kenya has attempted to decentralize water provision and operation and maintenance responsibilities, while providing an enabling policy and regulatory environment.

The promise of GWC Kenya can be measured anecdotally by the Government's desire to scale it up to the national level. This does not testify to the scheme's pro-poor impact (which will have to wait for eventual assessment), but it does indicate the demand for such an approach.

Topic sheet author: Alasdair Cohen

Peer reviewed by: Marcela Quintero (CGIAR)

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Biodiversity Procurement Schemes

Professor Peter Bardsley

(http://www.findanexpert.unimelb.edu.au/researcher/person666.html)

Background - Some Australian Experience

Awareness of environmental issues and the value placed on environmental

goods and services has risen steadily over some decades in Australia, becoming increasingly important as a political issue. This is understandable, and consistent with worldwide patterns. These appear to be goods for which demand systematically increases as income, wealth, education and the communication intensity associated with globalisation increase. As the supply of these goods diminishes, while demand increases, the value placed on them naturally rises. These trends can, I think, be predicted to continue, and will become more and more evident in India, as in Australia and the rest of the world, in the future. I think that it is clear that future generations will wish that we had done more.

Since these are public goods, and their provision is also subject to various forms of market failure, there is a very sound economic efficiency case for public intervention, either by governments or by non-government agencies.

Australia has seen the growth of a very significant public willingness to pay for such goods, particularly for actions to protect biodiversity. This has taken the form of political pressure such that environmental policy is now a mainstream political issue, and private action. With this rise in willingness to pay, there is increasing dissatisfaction with the mechanisms available to meet the demand. Standard government regulatory responses are rarely incentive compatible, and can create perverse incentives that are actually counter-productive. Voluntarism, while admirable, often lacks scientific depth or the capacity for long term commitment. People are increasingly dissatisfied with policies that are merely symbolic, or are inefficient and do not give value for money, and that often lead to no scientifically valid verifiable outcomes.

The design of good policy instruments for the provision of environmental services is a fruitful area for the application of modern economic theory, particularly the economics of information and incentives, but this is an area that has been rather neglected. Over the past decade, a group of economists and scientists have worked on this issue in Australia. The main elements of the approach have been the objective is a practical framework for

achieving desired outcomes, which means changing people's behaviour; this means aligning their incentives with ours start from first principles, and work analytically towards a solution (rather than beginning with a preconception of, or ideological predisposition to, any particular type of policy instrument) close partnership from the beginning between science and economics recognise the fundamental importance of information and incentives, and engage with scientists on these issues, start small (pilot projects, demonstration projects, experimental economics lab work), refine the approach, build confidence, build expertise, demonstrate results, take the long view.

Over the last decade, beginning with an initial pilot project for managing biodiversity on private land in Victoria, Australia, we have developed a program of biodiversity procurement auctions, and related programs, that have now been adopted state-wide as the preferred policy approach. Imitation programs have been initiated in the majority of Australian states, and there is interest from agencies in the US, Canada, France and Scotland.

The project has involved partnership between the following groups: economists. ecologists (development of metrics, contract design, on ground implementation), hydrologists and biophysical modelers (connecting local interventions to large scale landscape effects), computer scientists and environmental engineers (remote sensing, micro sensor network arrays, for contract monitoring). A lot of material, including field manuals and some evaluations, are available on the web at http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/DED128E11A362A51CA256FFF001CAB6C544ABC860B2506F7CA257004002550CC

EcoTender

What are ecoMarkets? | How ecoMarkets work | The science behind ecoMarkets | EcoTender | BushTender | BushBroker

What is EcoTender?

EcoTender is an auction-based approach that expands BushTender to include multiple environmental outcomes. It introduced a more detailed way to evaluate tenders, based on potential improvements in salinity, biodiversity, carbon sequestration and water quality.

Under EcoTender, landholders are invited to tender contracts to deliver these multiple environmental benefits, primarily by means of improved native vegetation management and revegetation works on their properties.

Successful bids include activities offering the best value for money to the community, based on ecosystem outcomes, the significance of the environmental assets affected by these changes and the cost. Successful landholders receive periodic payments as they deliver the management actions under contractual agreements with the DSE.

- Current EcoTender
- Past EcoTenders

EcoTender process

Landholders start by registering their interest to participate in EcoTender. A DSE Field Officer will then come and visit their property to advise on the environmental significance of the site. They will work with the landholder to identify on-ground actions that could be included in a five-year EcoTender Management Plan.

The Field Officer will write up the management plan based on actions agreed with the landholder. The plan could include planting new native vegetation, weed control or protection of existing native vegetation along waterways, around wetlands, in gullies and paddocks.

The landholder uses this Management Plan as the basis for their EcoTender bid along with details on how much they expect to be paid to do the environmental work over five years.

Successful EcoTender bids are those showing best environmental value for money, with successful landholders receiving periodic payments for management activities conducted under agreements entered into with the DSE.

Potential For Cooperation With India

First of all, it is not the case that we have a model that can simply be transferred to another environment. What we do have is a group of people with considerable experience in thinking about problems of this nature; I think that they would be delighted to be involved in exploring these ideas in an Indian context.

From an economist's viewpoint, there are two main aspects to the biodiversity procurement problem. One is identifying which projects are worth investing in, given the fact that people do not necessarily have an incentive to be truthful (would YOU tell the government that you have something rare and valuable on your land?). Developing this idea leads naturally in the direction of designing certain kinds of auctions. The second is designing the incentive structure for the groups who participate in your program (rewards, penalties, risk sharing, monitoring, transactions cost). This leads naturally to what economists understand by contract design. Both issues clearly need to be addressed to some degree. In Australia, most attention has been given to the auction theory, and less to the contract design issue. This is now being rectified, and we are looking intensively, both from the economic design and the science/engineering points of view, at contract design and practical contract implementation issues.

Given the Indian context, I think that it is in the latter area, of contract design and implementation, where the most interesting work might be done. We have in fact been looking for a project of this type. So I think that there would be considerable interest from the Australian end in some kind of cooperation in this area.

E Somanathan, Professor, Planning Unit, Indian Statistical Institute, New Delhi

I would add the following to Peter's note [see Peter Bardsley above]. A valuable pilot project in India would:

1. Protect a habitat not already protected by regulation and with no plausible alternative means of funding protection (such as tourism).

2. Be of high value from the perspective of the conservation organisations funding the project, and from that of the public at large.

3. Make a clearly measurable difference to what would have occurred in the project's absence. We'll have to think carefully about this one. One possibility is to locate a set of comparable candidate locations.

Then select one (or some) of them for the project, either by auction, randomly or some suitable means. Then monitor both the selected and non-selected areas and compare them.

4. Be potentially replicable.

Annexure-II: Western Ghats Expert Group: Organizing a process of comprehensive consultation

One of the mandates of our Western Ghats Expert Group is "to make recommendations for the conservation, protection and rejuvenation of the Western Ghats Region following a comprehensive consultation process involving people and Governments of all the concerned States."

We would have to work out how to organize such a process of comprehensive consultation. It could involve: a) Discussions with people in the field in local languages, b) Brain-storming sessions involving a cross-section of actors, including Government representatives, in English, c) Correspondence, including Emails, and d) Web-based discussion forums.

During our first meeting on March 31, we should chalk out a strategy for this component of our work plan, assigning responsibilities amongst ourselves. To facilitate these consultations, we should immediately begin putting together a web-based database of individuals and institutions concerned with environmental issues pertinent to the Western Ghats. This should be an open process of inviting all interested individuals and institutions to register themselves.

The web-based discussion would need to be moderated; to this end we may take advantage of experience of people like Dr Aparna Watve who has serious interest in issues of the Western Ghats as well.

The database may include the following fields:

Database of individuals

First name

Last name

Preferred address for postal communication

Email

Telephone number(s)

Geographic areas of interest [to be selected from a drop-down list]

Thematic areas of interest [to be selected from a drop-down list]

Database of institutions

Name

Nature of organization [to be selected from a drop-down list]

Preferred address for postal communication

Email

Telephone numbers

Geographic areas of interest [to be selected from a drop-down list]

Thematic areas of interest [to be selected from a drop-down list]

Annexure-III: Western Ghats Expert Group: Organizing an Information System

The mandate of our Western Ghats Expert Group includes two information-intensive items:

(i) To assess the current status of ecology of the Western Ghats region.

(ii) To demarcate areas within the Western Ghats Region which need to be notified as ecologically sensitive and to recommend for notification of such areas as ecologically sensitive zones under the Environment (Protection) Act, 1986. In doing so, the Panel shall review the existing reports such as the Mohan Ram Committee Report, Hon'ble Supreme Court's decisions, Recommendations of the National Board for Wildlife and consult all concerned State Governments.

It is therefore important that we immediately begin organizing information pertinent to these themes. For this purpose, we ought to take full advantage of modern developments in Information and Communications Technology (ICT), including the Web2.0 technologies, such as wikis. Fortunately, we have amongst our members considerable experience and expertise in this area. Dr. Ganeshaiah has been leading the development of the IBIN (India Bioresources Information Network), and is associated with ATREE's India Biodiversity Portal; Dr Sukumar heads CES, IISc which hosts the ENVironmental Information System [ENVIS]'s Sahyadri: Western Ghats Biodiversity Information System. So I would like to request Dr. Ganeshaiah to lead this effort.

In this context, it would be useful to incorporate in our Information System and upload on the web, many documents that may currently exist only as hard copies. Examples include the framework for an assessment of the 'Carrying Capacity' of Dakshina Kannada district, prepared by Dr. D.K.Subramaniam, or the initial project document and a ten-year assessment of the Nilgiri Biosphere Reserve prepared by me. We also need to identify and upload all pertinent Environmental Impact Assessment documents, beginning with that of Liquid Propulsion R&D unit (at Valiamalla) and the test station (near Nagercoil) of Vikram Sarabhai Space Centre commissioned by Dr Satish Dhawan in 1975, before this became a formal requirement, and including that of Bedthi Hydroelectric Project in 1979, a more recent one of the Kudremukh Iron Ore Project by NEERI, and the latest one of the Neutrino Observatory in the Nilgiris, and so on. A serious effort on a war footing will have to be launched in this context, and I would like to request Dr G V Subrahmanyam to lead this effort. Of course, we also need to have ready access to and examine the Mohan Ram Committee Report, Hon'ble Supreme Court's decisions, recommendations of the National Board for Wildlife etc, specifically mentioned in our mandate. Of course, these are only some initial suggestions; all of us need to put our heads together and finalize a comprehensive list of useful information resources during our first meeting.

We might also wish to commission specific reviews of existing information. Possibilities include: 1) Birds of Western Ghats and a strategy for their conservation: Dr Ranjit Daniels, 2) Amphibians of Western Ghats and a strategy for their conservation: Dr Gururaja, 3) Hill streams of Western Ghats and a strategy for their conservation: Dr K A Subramaniam, 4) Balsams of Western Ghats and a strategy for their conservation: Dr Bhaskar, 5) Uropeltid snakes of Western Ghats and a strategy for their conservation: Dr Karthik Shankar, 6) Tiger and panther populations of Western Ghats and a strategy for their conservation: Dr. Uma Ramakrishnan, 7) Elephant populations of Western Ghats and a strategy for their conservation: Dr T N C Vidya, 8) Landscapes of Western Ghats: Dr Harini Nagendra, 9)

Crop genetic resources of Western Ghats and a strategy for their conservation: An expert from NBPGR, 10) Wild relatives of Cultivated Plants of Western Ghats and a strategy for their conservation: An expert from NBPGR, 11) Current Protected Areas Network of the Western Ghats: Dr Savarkar, former Director, WII, and so on. Please note that this is only an indicative list based on my personal knowledge; your feedback is most welcome; the list may be examined, changed, added to and finalized at our first meeting.

All of this will need some funding from the Ministry, and I would like to request Dr G V Subrahmanyam to assess the possibilities before our first meeting.

All thoughts, ideas, offers of undertaking specific responsibilities in this context, would be most welcome.

Annexure-IV: Western Ghats Expert Group: Time frame

Agenda item for meeting of the Western Ghats Expert Group on 31/03/10.

We need to decide upon a time frame for completing our assignment.

I propose the following for consideration.

1. Chalk out a work plan and time frame: 31/03/10
2. Complete commissioning of discussion papers (to be submitted by 15/07/10) by 15/04/10
3. Develop a Western Ghats Expert Group web page on ATREE and CES, IISc, websites by 15/04/10. This will provide access to all documents of interest (older documents, commissioned papers as they are received, all records of work of the Western Ghats Expert Group). Some of these will be in both normal and wiki versions, open for inputs by all registrants. Posting of pertinent documents will begin on 15/04/10, and continue till 15/09/10.
4. Put up a site for registration by individuals and institutions who wish to contribute to the work of the Western Ghats Expert Group by 15/04/10
5. Site visits and consultations by members of Western Ghats Expert Group: 15/04/10 to 15/08/10. A broad programme will be decided upon on 31/03/10. Records of these discussions and consultations would be immediately put up on the Western Ghats Expert Group web page, welcoming public feedback.
6. Brain storming sessions on specific themes: 15/04/10 to 15/08/10. A broad programme will be decided upon on 31/03/10. Records of these discussions would be immediately put up on the Western Ghats Expert Group web page, welcoming public feedback.
7. Develop and post an initial version of the Report of the Western Ghats Expert Group on its web page by 01/09/10, welcoming public feedback.
8. Submit a final version of the Report of the Western Ghats Expert Group, in both printed form, and as a more detailed web based version by 15/09/10.

Minutes of the Second Meeting of the Western Ghats Ecology Expert Panel held on 7th May 2010 at 10.00 am at BSI, Coimbatore.

The second meeting of the Western Ghats Ecology Expert Panel was held at Botanical Survey of India (BSI), Coimbatore on 7th May, 2010. The following were present:

1. Prof. Madhav Gadgil	Chairman
2. Shri. B.J. Krishnan	Member
3. Dr. K.N. Ganeshaiah	Member
4. Dr. V.S. Vijayan	Member
5. Prof. (Ms.) Renee Borges	Member
6. Prof. R. Sukumar	Member
7. Prof. S. P. Gautam	Member
8. Ms. Vidya S. Nayak	Member
9. Dr. G. V. Subrahmanyam	Member Secretary

The following Members of the Panel could not attend the meeting:

1. Dr. Nandakumar Mukund Kamat
2. Dr. Ligia Noronha
3. Dr. D.K.Subrahmanyam
4. Dr. P.I. Gautam

Dr. R.R. Navalgund was represented by Dr. Murthy, NRSA, Hyderabad.

The following experts were co-opted by the Chairman of the Panel:

1. Dr. Ranjit R. Daniels, Care Earth Trust, Chennai
2. Dr. Pratim Roy, Keystone Foundation, Kotagiri
3. Dr. Latha, River Research Centre, Kerala
4. Dr. Sanjappa, BSI, Kolkata
5. Dr. P. Pramod, SACON, Coimbatore
6. Dr. S. N. Prasad, SACON, Coimbatore

The Chairman welcomed all the Members and briefly explained the action taken on the points that emerged in the first Meeting of the WGEEP. He stressed that the current identification of Ecologically Sensitive sites such as Matheran and Mahabaleshwar on the Western Ghats was based on the concern of particular groups of individuals with respect to those specific sites, and not on the basis of a comprehensive assessment of the totality of the situation on the Western Ghats. As opposed to this, the site for the country's first Biosphere Reserve in the Nilgiris had been identified on the basis of an assessment of all potential sites

from the Western Ghats region. WGEEP would now have to follow this precedent and undertake a comprehensive assessment of the totality of the situation on the Western Ghats. Such an assessment of potential Ecologically Sensitive Areas within the Western Ghats region on a scientific basis calls for a sound information base. He also emphasised the need for consultations with the local people and all other concerned stakeholders in the process of delineating Ecologically Sensitive Areas within the Western Ghats region, and the importance of avoiding situations such as in Matheran, where the Kalpavriksh study mentions that the members of BEAG (Bombay Environment Action Group), the original proponents of the Matheran ESA can now visit the site only under police escort. The Chairman informed the Panel about the concerns expressed by the Hon'ble Minister of State (Independent Charge) Environment and Forests about the ecological sensitivity of the Western Ghats region through a letter addressed to him. In this letter, the Hon'ble Minister has urged the Panel that while it continues working on the larger issues in a comprehensive manner as planned, the work plan was to be undertaken in two parallel tracks; one to begin the task urgently to complete the demarcation of areas within the Western Ghats Region to be notified as Ecologically Sensitive Areas within the next 4-5 months and parallel to this activity the Panel should continue the broader work plan as proposed by the Panel to suggest measures that would promote conservation, protection and rejuvenation of the ecology of the Western Ghats Region.

The Chairman indicated that these suggestions from the Hon. Minister were fully acceptable, and that the action plan of WGEEP may involve the following steps that may be pursued in parallel:

(a) Drawing up a set of criteria for identification of ESAs, based on earlier work such as the Sen Committee report

(b) Put together an information base on the Western Ghats that would support objective identification of potential ESAs arranged in order of priority. Suggest appropriate regulatory measures that need to be put in place for management of different potential ESAs on a case by case basis

(c) Call on different civil society groups to propose areas for protection as ESAs.

(d) Call on different local bodies (gram panchayats, taluk panchayats, zilla parishads, and nagarpalikas) to propose areas for protection as ESAs

(e) Assess ESA proposals received from different civil society groups and local bodies in light of the exercises [a] and [b]

(f) Suggest how the Western Ghats Ecology Authority may operate.

The Chairman then briefly explained the agenda for the Meeting and the agenda items were taken up for discussion. These included:

1. Review of actions taken so far regarding website (Dr. Ganeshaiah)
2. Delineation of geographical limits (Dr. Ganeshaiah and Dr. Kamat)
3. Registering individuals and institutions who wish to interact (Dr. Ganeshaiah and Sh. B.J. Krishnan)
4. Finalizing the list of commissioned papers (Prof. Madhav Gadgil)
5. Themes, participants and schedule of Brainstorming Sessions (Prof. Madhav Gadgil) and
6. Schedule of site visits / consultations (Prof. Madhav Gadgil and Sh. B.J. Krishnan).

The detailed agenda on which the Coimbatore discussions were based is given in Annexures A,B,C.

The major outcomes of the Meeting were as follows:

I. Review of progress of website:

Dr. Ganeshaiah presented the basic structure of website and mentioned that the website for Western Ghats will be developed with a facility for registration of individuals and institutions.

The Ministry has released the requisite funds as sought by the ATREE for the development of the Western Ghats Ecology website by ATREE with the condition that the proposed website will cover the entire ecology of the Western Ghats region which will be interactive and dynamic with domain registration of gov.in and have linkages to other websites of the Western Ghats, and will also have a provision for updating it remotely. After its development, the website shall be transferred to the Ministry and shall be maintained by the Ministry.

Further, the panel members were requested to send the papers / concerned material in their respective domain areas for uploading on the website. The Chairman opined that documents may be uploaded for discussion in 15 days.

II. Registering individuals and institutions who wish to interact with the Panel.

Sh. B. J. Krishnan provided to the Panel details of individuals and their organizations working in the States of the Western Ghats Region who had expressed their desire to interact with the WGEEP and would like to get registered on the website. They would be happy to contribute extensively to the proposed consultations as well as to field visits inareas falling within their respective States. These are as follows:

I Organisations/individuals (according to State):

1. Gujarat: Kutch Mahila Vikas Sangathan – Ms. Sushma lyer
2. Maharastra: Applied Environmental Research Foundation – Dr. Archana Godbole.
   Email: archanagodbole64@gmail.com
3. Goa: Goa Foundation – Ms. Norma Alvares.
4. Karnataka: Nature Conservation Foundation, Mysore – Dr. N. Madhusudan
5. Kerala: (i) River Research Centre, Vayali, Thirssur – Dr. A Latha.
   Email: rrckerala@gmail.com
   (2) Prof. M.K. Prasad, KSSP, Kerala
6. Tamil Nadu: Keystone Foundation, Kotagiri, Nilgiris – Dr. Pratim Roy
   Email: pratim@keystone-foundation.org

II Organisations/individuals (thematic/generic):

1. Environment & Social Movement: SWGM – Pandurang Hegde, Sirsi
   Email: appiko@gmail.com

2. Conservation Education: Ms. Anitha Sharma, Balvihar, Trivandrum
3. Biodiversity Research: ATREE Bangalore, Agumbe Rainforest Research Foundation, Shimoga
4. Livelihoods: Deshpande Foundation, Hubli
5. Political Economy: Sampark, Bangalore – Ms. Smita Premchandran
6. Gujarat: Kutch Mahila Vikas Sangathan – Ms. Sushma lyer
7. Maharastra: Applied Environmental Research Foundation – Dr. Archana Godbole
8. Karnataka: Nature Conservation Foundation – Dr. N. Madhusudan
9. Tamil Nadu: Keystone Founsation – Dr. Pratim Roy
10. Kerala: River Research Centre – Dr. A Latha; V Gayali, Thrissur

III. Geographical Limits:

The Panel deliberated at length on the geographical limits for drawing the map of Western Ghats region for the purpose of its conservation and sustainable development.

The Panel opined that the delineation of the map of the Western Ghats region should be based on topography, taking account of altitude, slope and connectivity. The overall Western Ghat region would fall into three segments with extended plains areas separating them, viz. Western Ghats north of the Palghat gap, Western Ghats south of the Palghat gap, and the BRT hills.

National Remote Sensing Agency (NRSA) was requested to define the BRT Hills segment for inclusion in the map of the Western Ghats region.

IV. Commissioned papers:

The Panel discussed at length the list of Commissioned papers as given at Annexure 'A' of the agenda. The Panel decided that the authors of commissioned papers should be requested to address the specific theme, as they see fit, in the context of the mandate of the Western Ghats Ecology Expert Panel; keeping in mind that it is desirable to: [a] draw a picture of the current status of ecology of the Western Ghats region, [b] provide suggestions as to measures that would promote conservation, protection and rejuvenation of the ecology of the Western Ghats Region, [c] provide suggestions as to areas within the Western Ghats Region which may be considered for notification as ecologically sensitive.

The nearly-final list of Commissioned Papers as agreed by the Panel is as follows:

S.No.	Name	Mobile/ landline	E-mail	Theme
1	V.B.Savarkar, 464 Rasta Peth, Flat 3, Nr. MSEDC Ltd. Power House, Opposite. Mahalaxmi Motors, **Pune**-411011. Maharashtra.	9890045692. 020-26133844	woodow464@yahoo.co.in	Protected Areas Network

S.No.	Name	Mobile/ landline	E-mail	Theme
2	G S Mohan	College of Forestry Ponnampet	Mohangs2007@gmail.com	Wild relatives of Cultivated Plants and Crop genetic resources
3	D. Padmalal, Environmental Sciences Division, Centre for Earth Science Studies, Thiruvananthapuram, 695031, Kerala		drpadmalal@yahoo.com	Alluvial sand Mining- the Kerala experience
4	Ajay Desai		Ajay Desai (ajayadesaih@yahoo.com) .	Elephants
5	AJT Johnsingh, former Dean, Wild Life Institute of India, Bengaluru		ajt.johnsingh@gmail.com	Wild life poaching
6	Kartik Shanker Centre for Ecological Sciences Indian Institute of Science Bangalore 560012	Office :080- 2293 3104, 2360 0985 (Labs-Internal): 233, 313 Res: 32720750 Mobile: 9945565935	kshanker@ces.iisc.ernet.in	Uropeltid snakes
7	Bhaskar, formerly of UAS, Bengaluru	9844021625	vbhaskar49@yahoo.co.in	Balsams
8	K.A.Subramanian Scientist C Zoological Survey of India Western Regional Centre Rawet Road, Sector-29 Vidyanagar Akurdi, PCNT (PO) Pune-411 044	Phone (Office): +91-20-27655213,27652564, 27651927 Phone (Residence):+91-20-27658971 Phone (Mobile):+91-9422907805 Fax (Office): +91-20-27652564	subbuka.zsi@gmail.com	Hill streams
9	T.N.C. Vidya, JNCASR, Bangalore, and N. Basakaran, ANCF, Bangalore		tncvidya@jncasr.ac.in, baskar@ces.iisc.ernet.in	Large mammal populations
10	Ranjit Daniels, Careearth, Chennai Care Earth Trust No 5, 21st Street Thillaiganganagar Chennai 600 061	Tel: 91-44-6543 5841 Mobile: 09282123242	careearth careearth <ranjit.daniels@gmail.com>	Birds
11	C T S Nair, formerly of FAO, Nilambur	09995305542	ctsnair@hotmail.com	Working of forests
12	E Somanathan, Indian Statistical Institute, Delhi	098681 82096, 011-41493939	E. Somanathan <e.somanathan@gmail.com>	Incentive based approaches to nature conservation
13	B R Ramesh, French Institute, Pondichery		Ramesh <ramesh.br@ifpindia.org>	Trees
14	M D Subash Chandran, CES, IISc, Bengaluru	09242123555	subash md <mdschandra@yahoo.com>	Sacred groves
15	T R Shankar Raman, Nature Conservation Foundation, 3076/5, IV Cross, Gokulam Park, Mysore - 570 002	Telephone : +91.821.2515 601 Facsimile : +91.821.2513 822	trsr@ncf-india.org	Shola- grasslands

S.No.	Name	Mobile/ landline	E-mail	Theme
16	A Damodaran, Center for Public Policy, Indian Institute of Management, Bengaluru	080-26993323	damodaran@iimb.ernet.in	Plantation crops
17	Nitin Rai, ATREE, Bengaluru	Telephone: +91-80-23635555 Fax : +91-80-23530070	Nitin Rai <nitinrai@atree.org>	Tribal Forest Rights Act
18	Ranjan Rao Yerdoor, Nagarika Seva Trust, Gurvayankere	09448287055	nstgkere@sancharnet.in	Joint Forest Management programmes
19	Aparna Watve	09822597288	Dr. Aparna Watve <aparnawatve@gmail.com>	Grassy plateaus
20	S N Prasad, SACON	09440602754	S Narendra Prasad <snarendra.prasad@gmail.com>	Wetlands
21	Vijay Paranjape	9922009749	gomukh@pn3.vsnl.net.in	Dams
22	Mrunal Wanarase, Ecological Society, Pune	09822000862	ioraespune@gmail.com, ecological.society@gmail.com,	Regeneration of streams
23	Jay Samant, formerly Shivaji University, Kolhapur	09822655168	Udaysinh gaikwad <uday_gd@yahoo.com>	River pollution
24	Kusum Karnik, Shashvat		shashwat <shashwatmkr@bsnl.in>	Religious tourism
25	Vinod Uniyal, Kerala Forest Department			Ecodeveolpment committees
26	K.V.S. Prasad, AME foundation, No. 204, 100 feet ring road, 3rd phase, Banashankari, 2nd block, 3rd stage, Bengaluru, 560085	91-080-26699512,91-080-26699522,fax-91080-26699410		Sustainable agriculture
27	Sharad Lele, ATREE, Bengaluru		Sharad Lele <sharad.lele@gmail.com>	Watershed management
28	SHALINI RAGHUNATH, Department of Studies in Folklore, Karnatak University, Dharwad 580 003, Karnataka	(O) 0836-2215299, (R) 0836-2778233, (M) 09845809746		Nature in Folklore of central Western Ghats (Karnataka)
29	Pandurang Phaldessai, member secretary, Kala akademy, Panaji, Goa, 91-832-2420451,	Res. 91-832-2410888 (R) 9822123030 (M)		Natural resources as reflected in folklore of Goa
30	Dilip Boralkar, Mumbai	09892542288,022-25552558	dboralkar@gmail.com,	Industrial Pollution
31	Shyam Asolekar, IIT, Mumbai	022 -25767867, 09820410443	asolekar@iitb.ac.in	Functioning of ESA Authority
32	S. Muralidharan, Sálim Ali Centre for Ornithology and Natural History, Anaikatty Post, Coimbatore - 641 108, Tamil Nadu,.	Tele Fax: +91 - 422 - 2657088 Tele : +91 - 422 - 2657101 - 102, 131, 199	salimali@vsnl.com	Pesticides
33	Anil Kumar, MSSRF, Chennai		<anil@mssrf.res.in>	Wild food plants

S.No.	Name	Mobile/ landline	E-mail	Theme
34	Shri L. Narayan Reddy, Srinivaspura, Marlenanahalli, Dodaballapura, Hanabe, 561203	080 7651360		Potential of organic farming
35	N G Hegde, Formerly of BAIF, Pune	09890181848	nghegde@baif.org.in	Tree growth on private lands
36	Jayant Kulkarni, Row House 1, Ratan Park Phase 2, 127/5, Sus Road, Pashan Pune 411021	09423006694 Office: +9120-65222903/25861310 Home : +9120-65619257	main@envirosearch.in, jayant.kulkarni@envirosearch.in	Human- wild life conflict
37	Sagar Dhara, E-303, Highrise Arparments , Lower Tank, Bund Road Hyderabad 500 080	(040) 636593 Fax: (040) 636593	Sagar Dhara <sagdhara@yahoo.com>, sagdhara@hd1.vsnl.net.in	EIA process
38	Mewa Singh, Mysore University, Mysore	09448603506	mewasingh@bsnl.n	Primates
39	Jagdish Krishnaswamy/ Kiran, ATREE, Bengaluru	Telephone: +91-80-23635555 , Fax : +91-80-23530070	jagdish@atree.org, jagdish.krishnaswamy@gmail.com	Criteria for deciding on Ecologically Sensitive Areas
40	SNEHLATA NATH, Keystone Centre, Groves Hill Road, Kotagiri, Nilgiris, Tamil Nadu			Livelihood security
41	Harini Nagendra, ATREE, Bengaluru		harini.nagendra@gmail.com	Landscapes
42	T R Vijayaraghavan, IAS (Retd)			Hill stations
43	ANITA VARGHESE Keystone Centre, Groves Hill Road, Kotagiri, Nilgiris, Tamil Nadu			Non-Timber Forest Produce
44	Dr Aravind ATREE		amadhyastha@gmail.com	Amphibians
45	Dr Vasudeva College of Forestry Sirsi		vasukoppa@gmail.com	Economically important but endangered species
46	Dr Ravikanth ATREE		gravikanth@gmail.com	Conservation of forest genetic resources
47	DK Ved, FRLHT		dk.ved@frlht.org	Medicinal Plants
48	NA Madhyastha/Rajendra Mavinkurve Malacology Centre, Poorna Prajna College, Udupi-576101		na_madhyastha@sancharnet.in (Please check this email)	Land snails of Western Ghats
49	PA Sebastian Division of Arachnology, Dept. of Zoology Sacred Heart College Thevara, Cochin-682013, Kerala		administrator@southindianspiders.org	Spiders

S.No.	Name	Mobile/ landline	E-mail	Theme
50	Dr Shashidhar Viraktamath University of Agricultural Sciences, Dharwad			Wild bees of Western Ghats; crop pollination deficits
51	Kalyan Kumar Chakravarty (Former Director of Indira Gandhi Rashtriya Manav Sangrahalaya, Ministry of Culture, Bhopal)			Hill forts and cultural heritage, including rock carvings
52	KS Valdiya JNCASR, Bangalore		valdiya@jncasr.ac.in	Geological and palaeobiological heritage (rare rock formations; fossiliferous strata)
53	N M Kamat, Goa University			Ethnomycology of western ghats (focus on edible, medicinal, toxic and hallucinogenic species)
54	D.J.Bhat, Goa University			Microbial habitats and resources-terrestrial
55	K.R.Sridhar, Mangalore University			Microbial habitats and resources-aquatic
56	Urmila Makhija, Agharkar Research Institute, G.G. Agarkar Road, Pune-411 004			Lichens
57	K. Gopalkrishna Bhat Dept of Botany, Poornaprajna College, Udupi Add: "Madhuca", Durga Saw Mill Lane, Chitpady, UDUPI, 576101	9449935486		Conservation of Pteridophyes and Gymnosperms of Western Ghats
58	C.Achalender Reddy, I.F.S, Secretary, National Biodiversity Authority, 5th Floor, TICEL Biopark, Taramani, Chennai - 600 113 Tamilnadu, India.	44-22541071(Off), +91-44-24515020(Resi).Mobile: +91 96770 66330	secretary@nbaindia.in, achal.reddy@gmail.com	Ecotourism development and opportunities in Western Ghats
59	Norma Alvares, Goa Foundation G-8, St Britto's Apts, Feira Alta,Mapusa, Bardez, Goa – 403507,	832-2256479 / 2263305		Environmental PIL and judicial activism: A Western Ghats NGO perspective
60	A. Sundara, Director of the Post-Graduate Research Centre of the Karnataka University at Bijapur			Prehistoric and protohistoric cultural heritage of Western Ghats

S.No.	Name	Mobile/ landline	E-mail	Theme
61	Raghunandan Raghavan, IAS(Retd), No 1 KPTCL Quarters, Hosakerehalli Main Road, Bangalore 560085	Land line: 08026420700 cell: 9845749988	<trraghu@yahoo.com>	Need for enhancing the role and capacity of the Panchayats for improving governance in the Western Ghats districts
62	Antonio Mascarenhas, NIO, Dona Paula, Goa,	Telephone: 91-0832-2450335 Fax: 91-0832-2450602	mascarenhas@nio.org,	Tourism-Legal, technical, ecological and environmental issues (Goa, Konkan, Coastal Karnataka) esp. w.r.t. CRZ, geo and ecohazards, SLR etc.
63	Alito Sequiera, Associate professor, dept. of sociology, Goa University, Taleigao, Goa, 08326519308		alito@unigoa.ac.in,	Tourism-Social, cultural issues
64	Ranjan Solomon ,149/D, Gina, Maina-Curtorim Salcete, Goa – 403709,	Telephone +91 – 9881181350 (Mobile) and +91 - 832-2787667 (Home),	ranjan.solomon@gmail.com	Tourism –Cultural, social ethical issues
65	Dr T T Sreekumar assistant professor, communications and new media programme National University of Singapore	Tel: +65-6516 3148 Fax: +65- 6779 4911	cnmsttp@nus.edu.sg; sreekumar@nus.edu.sg	Tourism in Kerala – social, cultural impacts
66	Ramesh Ganwas, Senior teacher, Govind Gunaji sawant high school, Sarvona, Bicholim			Mining (Konkan and Goa) Mining-people's perspectives
67	Rajendra Kerkar , Gonteli, Keri, Sattari, 9421248545,		rpkerkar@yahoo.com	Mining-Goa, Konkan (social, ecological)
68	Glenn (GMOEA)			Mining-Geological and Economic perspective
69	Gujarat ecological society		http://www.gesindia.org/eco.htm	Mining (Gujarat)-
70	Kanchi Kohli Kalpavriksh		kanchikohli@gmail.com	Mining (Karnataka)-
71	D. Padmalal, Environmental Sciences Division, Centre for Earth Science Studies, Thiruvananthapuram, 695031, Kerala		drpadmalal@yahoo.com	Alluvial sand Mining- the Kerala experience
72	Pratim Roy			Tourism
73	VB Mathur, WII, Dehra Dun			Wildlife Tourism
74	M P Nair			Keystone species
75	???			Transport infrastructure
76	Sankaran, K F R I			Invasive species

S.No.	Name	Mobile/ landline	E-mail	Theme
77	Suresh, Equations			Tourism in forest areas
78	Gautam, CPCB			Systems of environmental monitoring
79	Murthy, NRSC, Hyderabad			Land cover monitoring
80	Dr. Pratim Roy Keystone Foundation, Kotagiri			Sustainable ecotourism in Nilgiris

For preparation of commissioned papers, the Panel suggested that an Honorarium of Rs. 10,000/- should be provided to each contributor and funds for this purpose will be made available by the MoEF. Prof. Sukumar has kindly agreed to write to all the authors and obtain their acceptance / willingness within two weeks; therafter the authors will be requested to submit the papers in their allotted themes within 3 months to the CES, IISc, Bengaluru for peer review and acceptance. The papers will accompany an executive summary with a focus on policy. The commissioning of papers would be undertaken at CES, IISc, Bengaluru

V. Brainstorming sessions:

The Panel discussed the themes, participants and schedules of brainstorming sessions given in the Agenda at Annexure-B. The Panel opined that the brainstorming session should be operationalised at CES, IISc, Bengaluru. The Panel finalised the list of brainstorming sessions as indicated below:

S. No.	Theme	Responsible panel member	Lead discussant
1	Positive and negative experiences of administering Ecologically Sensitive Areas	Madhav Gadgil	S Asolekar
2	Current EIA process and how we may reform it	Ligia Noronha	Sagar Dhara
3	Assessing regional level Carrying Capacities	DK Subramaniam	Somnath Nayak
4	Incentive based approaches to nature conservation	R Sukumar	E Somanathan
5	Potential of Joint Forest Management Programmes for promoting ecologically positive action	Vidya Nayak	R R Yerdoor
6	Potential of Tribal Forest Rights Act for promoting ecologically positive action	BJ Krishnan	Nitin Rai
7	Sequestering carbon in agricultural soils and grazing lands	BJ Krishnan	K.V.S. Prasad
8	Potential of Biological Diversity and PPVFR Acts for promoting ecologically positive action	Nandkumar Kamat	Raghunandan Raghavan
9	How to manage mining projects so as to minimize ecological damage, and possibly generate positive outcomes	Nandkumar Kamat, Dr. V.S. Vijayan	Rajendra Kerkar
10	How to manage tourism projects so as to	Renee Borges	C.Achalender

S. No.	Theme	Responsible panel member	Lead discussant
	minimize ecological damage, and possibly generate positive outcomes		Reddy
11	How to manage power projects so as to minimize ecological damage, and possibly generate positive outcomes	Ligia Noronha	Norma Alvares
12	How to manage river valley projects so as to minimize ecological damage, and possibly generate positive outcomes	DK Subramaniam	T R Vijayaraghavan
13	How to manage road/ railway projects so as to minimize ecological damage, and possibly generate positive outcomes	R Sukumar	Jagdish Krishnaswamy
14	Patterns of distribution of biological diversity and human activities on the Western Ghats	KN Ganeshaiah	R Vasudeva
15	Sites that deserve to be declared as Ecologically Sensitive Ares of Western Ghats	KN Ganeshaiah	Ranjit Daniels
16	Land Use Planning	Renee Borges	V S Vijayan
17.	Invasive Alien Species	Dr. Sankaran, KFRI (subject expert)	Dr. Ramachandaran, KFRI

The members of the Panel were requested to send their detailed proposals in respect of their allotted themes indicating the schedules, duration, and participants along with budgetary requirements to Prof. Sukumar, CES, IISc, Bengaluru

VI. Site visits and public consultations

The panel discussed the site visit plan and public consultation processes to arrive at the core issues of conservation process as proposed by Sh. B. J. Krishnan which is given in the agenda at Annexure C. After detailed deliberations the Panel agreed to employ the framework suggested by Sh. B.J. Krishnan and Prof. Madhav Gadgil's as given in Annexure – C of the agenda.

The detailed plans for various states will be drawn up by the following members:

1. Gujarat and Maharashtra: Madhav Gadgil and Renee Borges
2. Goa: Nandkumar Kamat and Ligia Naronha
3. Karnataka: KN Ganeshaiah and Vidya Nayak
4. Tamilnadu: B J Krishnan and Sukumar
5. Kerala: V S Vijayan

The members of the Panel are requested to submit details of themes, responsibility and schedule of site visits / consultations in respect of each of their States in the Western Ghats region as per the details given in Annexure C of the agenda to Prof. Sukumar, CES, IISc, Bengaluru for inclusion in the budgetary proposal being prepared by him.

The Panel noted that the official term of Dr V S Vijayan as Chairman, Kerala State Biodiversity Board may end by end of May 2010. His current position on WGEEP is in his

official capacity. WGEEP would, of course, welcome the new Chairman, Kerala State Biodiversity Board as an ex-officio member. However, given Dr V S Vijayan's extensive involvement in WGEEP thus far, and his deep knowledge of the field situation in Kerala and Tamil Nadu, he may be co-opted as a member of WGEEP for the remaining tenure of WGEEP in his personal capacity, in the eventuality of his ceasing to be the Chairman, Kerala State Biodiversity Board.

VII. The Panel suggested that Prof. Sukumar, CES, IISc, Bangaluru will develop a detailed proposal along with the budgetary requirements towards:

1. Commissioned papers
2. Brainstorming sessions
3. Site visits and public consultations

As noted below Drs Ganeshaiah, Murthy, Daniels and Prasad will develop another proposal for developing a quantitative data base on Western Ghats based on available information that will provide an objective basis for delineation of Ecologically Sensitive Areas.

The proposals then will be submitted to the Ministry for financial assistance.

VIII. Brainstorming Session on Criteria for deciding Ecologically Sensitive Areas

Regarding the agenda items related to criteria for deciding on Ecologically Sensitive Areas, Dr. Ranjit R.J. Daniels who was co-opted by the Panel presented a paper on the criteria for deciding Ecologically Sensitive Areas which focussed on the following steps:

1. Define ecological sensitivity
2. Classify the entire Western Ghats into landscapes of varying levels of ecological sensitivity
3. Grade the different landscapes along a scale of decreasing sensitivity; example Grade I being the most sensitive, Grade II less sensitive and so on
4. List out the salient physiographic and ecological attributes adopted in grading landscapes
5. Prepare a map of the entire Western Ghats delineating landscapes by their respective ecological sensitivity grade
6. The map will generally guide the delineation of any landscape as ecologically sensitive area (ESA)
7. Biological communities and species can be used as tools for prioritizing landscapes
8. Biological communities and species should have one or more characteristics such as being relic, representative, endemic, endangered, of great human use value, etc
9. All other values being equal, priority should be accorded to landscapes that are likely to complement ongoing conservation efforts when delineated as ESA.
10. Assessment at 3 levels is needed such as: **Landscapes** wherein Topography and climate can predict the ecological sensitivity of landscapes and the most sensitive landscapes have shown the least resilience which has been assessed based on our understanding of trends of change in communities of woody plants, amphibians and birds. Landscapes have been classified in six grades viz., Grade I and Grade II are divided on the basis of

altitudes, Grade III as watersheds, Grade IV as hill–coast ecotones, Grade V as cultural landscapes and Grade VI landscapes that have shown the most resilience.

Biological Communities of special sensitivity include those that are relic, representative, of restricted range, with high species richness, with high levels of endemism, of high ecological service value and with high values of endemic, endangered, sacred/venerated and human use species .

The Chairman while summing up the discussion as the criteria to demarcate areas as Ecologically Sensitive Areas in the Western Ghats region, opined that the Panel has been considering the available guidelines as contained in the Pranob Sen Committee Report as well as the experience thus far in already notified Ecologically Sensitive Areas of Matheran, Mahableshwar-Panchgani and Dahanu. He also observed that there are a number of practical problems in employing criteria as given in the Sen Committee Report.

For instance, it was proposed that the area of occupancy of an endemic species needs to be protected in its entirety. The Western Ghats harbours well over one thousand endemic species of flowering plants, fish, frogs, birds and mammals amongst the better known groups of organisms, and no doubt thousands more amongst less studied groups including insects. Amongst themselves these would cover the entire geographical extent of the Western Ghats and all conceivable habitats, including many disturbed ones such as roadsides. There are thus obvious difficulties in operationalizing this, as well as other recommendations of the Sen Committee.

It was also noted that the experience of "India's notified ecologically sensitive areas" has been summarized in a report published by Kalpavriksh in 2009. It narrates the experiences of three areas of interest to WGEEP, namely, Dahanu, Matheran and Mahabaleshwar. In all these cases the identification of ESAs began with interests of specific groups, in particular, the Bombay Environmental Action Group, in protecting these particular areas. In contrast, WGEEP would have to assess the situation over the entire stretch of Western Ghats and then identify particular areas as appropriate for designation as ESAs, assigned to different levels of priority. In all cases so far, the initiative has come from above, and not from the ground level. Surely, WGEEP should not impose its recommendations in this fashion from above, and must promote a process of broad-based public consultations from the ground level up to fulfill its mandate.

The Panel also opined that it should look at the global-best practices and accordingly pick up the best suitable for the needs of the Western Ghats Region.

The Panel suggested that a project on assessing the levels of eco-sensitivity along the Western Ghats is to be developed by Dr. Ranjit Daniels, Dr. Pramod, Dr. M.S.R. Murthy and Dr. Ganeshaiah with Dr. Murthy as nodal person and should be submitted to MoEF for financial assistance. The outcome of this project would be used by the Panel in demarcating areas as Ecologically Sensitive Areas in the Western Ghats Region.

The Chairman invited Dr. Pratim Roy and Dr. Latha, the co-opted experts for that meeting, to make their observations.

Dr. Pratim Roy, Director Keystone Foundation while participating in the brainstorming session made the following observations:

1. Instead of identifying all those areas which are ecologically sensitive and perhaps "re-discovering the wheel" why don't we demarcate all areas which have ecologically destructive or severely unsustainable practices? Then the areas which

are left out could be the landscape that requires to be preserved, and the value of conservation would thus be enhanced.

2. Fragmentation is the biggest issue. If the panel arrives at how to connect the fragmented areas then the flow of ecological processes, linkages and continuity will start to tick again. This would include pollination flows, river valleys, upstream and downstream linkages.
3. The Panel has an opportunity to do something unique here. In terms of classification of ecology and inventories; if people on the ground, i.e. communities across 51 districts are to be involved in this exercise then it will become truly a partnership between science and people's movements. SWGM (Save Western Ghats Movement) can help the Expert Panel as much as possible to make this paradigm shift.
4. It may be desirable to have broad criteria and sub-criteria to capture niches and special areas such as water-falls and water bodies.
5. Western Ghats should be divided into 4 zones – North, Central, South Central, and South – in each of these areas we could contact local stakeholders – tribals and non-tribals whose livelihoods and lives depend on the natural resources that are found in this region such as plantations, rivers, forests, NTFPs, cultural spaces – if their insights can come forth and they can be a part of this consultation process – then it will be unique and relevant to these changing times. Need for wide dissemination of information such as radio, post cards as well as places where web-based inputs through open source software.
6. Two examples were given to expand on this concept – Hill wetlands in the Nilgiris – we have surveyed 38 wetlands and have detailed analysis of ecological and livelihood status in those areas. We could plug that in the larger Western Ghats Wetlands database. Another example is Non-Timber Forest Produce – through our network we could provide data from across the Western Ghats on the communities and their dependence on NTFPs, the current practices, trade and business, and the ecological aspects of sustainable harvesting. Perspectives of ancestral domains and home ranges need to be brought in as a current tool for delineation purposes of hills, valleys and plains – which connect culture, ecology, social systems and economy of the region.
7. A strategy of less intensive growth pattern and softer / greener industries in parts of the Western Ghats may enable the promotion of eco-enterprises such as eco-tourism, value addition of local products, and viable small cottage industries which are ecologically sustainable. The Keystone Foundation could share their 16 years of local enterprise experience in promoting contextual ventures which improve ecology and biodiversity.
8. A series of panchayats as in the case of the People's Biodiversity Register or 9 districts of NBR (Nailigiris Biosphere Reserve) may be taken up for a local level consultation process to identify ecological and connected social issues. The Western Ghats Fly Through map hosted by the Keystone Foundation is intended to be an open source and participatory exercise through which other stakeholders and interest-groups can contribute with information on their local ecosystems and environmental issues in their area.

Dr. A Latha from River Research Centre, Kerala, while participating in the brainstorming session during the meeting made the following important points / observations relating to Western Ghats ecology and its conservation:

1. The people living within ESAs when declared should own the ESA concept and be ready to cooperate in its effective implementation. Also, there is need to sensitize the people and rope in the support and consensus of local self-governments, MLAs and MPs early in the process before finally declaring ESAs.
2. There should be a Zonal approach to declaration of ESAs in the long run. Within a larger declared ESA Zone, there can be smaller zones of **'no touch or no more development'** and there could be zones of **'development with caution'** just like in the case of the CRZ Notifications.
3. As far as possible, highly ecologically sensitive river basins or landscapes with considerable representation and extent of PAs, IBAs, Elephant Reserves etc. within them can be considered for ESAs.
4. The extent of destruction / degradation / human intervention could be a criterion for deciding ESAs. For instance, the extent of dammed stretches in a river basin, extent of dried up river stretches below dams and diversions, extent of mined catchments, extent of catchments with monoculture plantations etc. could be criteria for deciding ESAs along with biogeographical aspects. For instance the entire Kannan Devan Hills village in Munnar High Ranges is a potential ESA within the larger Munnar landscape.
5. Along with cultural aspects, the traditional hunting and gathering areas of primitive hunter-gatherer tribes needs to be preserved for posterity. Hence, while declaring ESAs such areas may be given high priority.
6. Once the ESAs have been declared on a Zonal basis, perspective management plans with clear prescriptions of what can be allowed and what cannot be allowed within the ESA can be worked out for each ESA. **ESA Management Committees** can be formed which are multidisciplinary in nature with representatives from different departments, local self-governments, MLAs , MPs, NGOs and grass-roots organizations etc. working within that ESA. They can work under the proposed Western Ghats Ecology Authority to prepare **perspective plans** for the respective ESA. Separate **monitoring committees** can be set up to oversee effective implementation.
7. Along with the declaration of the ESAs the expert panel should also recommend restorative measures in the ESA as part of the perspective planning process to be taken up after declaration based on the context.

The Keystone Foundation and River Research Centre, Kerala, were requested to submit innovative ideas / success stories for effective implementation of Ecologically Sensitive Areas Notifications.

Annexure: Agenda WGEEP meeting, Coimbatore, 7th May 2010

Review of action taken so far

Website (Ganeshaiah)

Decisions needed

Geographical limits (Ganeshaiah, Kamat)

Registering individuals and institutions who wish to interact (Ganeshaiah, Krishnan)

Commissioned papers (Gadgil) – Annexure A

Themes, participants and schedule of Brainstorming Sessions (Gadgil) – Annexure B

Themes, responsibility and schedule of site visits/ consultations (Gadgil, Krishnan) – Annexure C

Each member should present her/his proposal for site visits she/he desires to undertake. We should consolidate and arrive at a final plan during this meeting.

Timetable

I believe that the real bottleneck is going to be obtaining required Ministry of Environment and Forest sanctions for undertaking our proposed work plan. I suggest that we finalize the detailed work plan at this meeting. We will not decide on the actual time schedule, including the date of the next meeting, until the requisite sanctions are obtained. Only after all the sanctions are in place, we will initiate action and decide on a time frame. Till then we will keep WGEEP in suspended animation. If it is still in suspended animation on September 1, 2010; or, for that matter, when our term ends in March 2011, so be it. But, of course, I very much hope that the sanctions will be obtained promptly so that we can get going.

Brainstorming

Criteria for deciding on Ecologically Sensitive Areas

Paper presentation by:

Ranjit R J Daniels, Care Earth Trust, Chennai 600 061

Discussant: Dr P Pramod, SACON, Coimbatore

Annexure A: Commissioned papers: penultimate list

We shall request the authors of commissioned papers to address the specific theme, as they see fit, in the context of the mandate of the Western Ghats Ecology Expert Panel, keeping in mind that it is desirable to: [a] draw a picture of the current status of ecology of the Western Ghats region, [b] provide suggestions as to measures that would promote conservation, protection and rejuvenation of the ecology of the Western Ghats Region, [c] provide suggestions as to areas within the Western Ghats Region which may be considered for notification as ecologically sensitive.

#	Name	Mobile/ landline	E-mail	Theme
1	V.B.Savarkar, 464 Rasta Peth, Flat 3, Nr. MSEDC Ltd. Power House, Opposite. Mahalaxmi Motors, **Pune**-411011. Maharashtra.	9890045692.020-26133844	woodow464@yahoo.co.in	Protected Areas Network
2	G S Mohan	College of Forestry Ponnampet	Mohangs2007@gmail.com	Wild relatives of Cultivated Plants and Crop genetic resources
3	D. Padmalal, Environmental Sciences Division, Centre for Earth Science Studies, Thiruvananthapuram, 695031, Kerala		drpadmalal@yahoo.com	Alluvial sand Mining- the Kerala experience
4	Ajay Desai		Ajay Desai (ajayadesaih@yahoo.com)	Elephants
5	A J T Johnsingh, former Dean, Wild Life Institute of India, Bengaluru		ajt.johnsingh@gmail.com	Wild life poaching
6	Kartik Shanker Centre for Ecological Sciences Indian Institute of Science Bangalore 560012	Office :080- 2293 3104, 2360 0985 (Labs-Internal): 233, 313 Res: 32720750 Mobile: 9945565935	kshanker@ces.iisc.ernet.in	Uropeltid snakes
7	Bhaskar, formerly UAS, Bengaluru	9844021625	vbhaskar49@yahoo.co.in	Balsams

#	Name	Mobile/ landline	E-mail	Theme
8	K.A.Subramanian Scientist C Zoological Survey of India Western Regional Centre Rawet Road, Sector-29 Vidyanagar Akurdi, PCNT (PO) Pune-411 044	Phone (Office): +91-20-27655213,27652564,27651927 Phone (Residence):+91-20-27658971 Phone (Mobile):+91-9422907805 Fax (Office): +91-20-27652564	subbuka.zsi@gmail.com	Hill streams
9	T.N.C. Vidya, JNCASR, Bangalore, and N. Basakaran, ANCF, Bangalore		tncvidya@jncasr.ac.in, baskar@ces.iisc.ernet.in	Large mammal populations
10	Ranjit Daniels, Careearth, Chennai Care Earth Trust No 5, 21st Street Thillaiganganagar Chennai 600 061	Tel: 91-44-6543 5841 Mobile: 09282123242	careearth careearth <ranjit.daniels@gmail.com>	Birds
11	C T S Nair, formerly, FAO, Nilambur	09995305542	ctsnair@hotmail.com	Working of forests
12	E Somanathan, Indian Statistical Institute, Delhi	098681 82096, 011-41493939	E. Somanathan <e.somanathan@gmail.com>	Incentive based approaches to nature conservation
13	B R Ramesh, French Institute, Pondichery		Ramesh <ramesh.br@ifpindia.org>	Trees
14	M D Subash Chandran, CES, IISc, Bengaluru	09242123555	subash md <mdschandra@yahoo.com>	Sacred groves
15	T R Shankar Raman, Nature Conservation Foundation, 3076/5, IV Cross, Gokulam Park, Mysore - 570 002	Telephone : +91.821.2515 601 Facsimile : +91.821.2513 822	trsr@ncf-india.org	Shola- grasslands
16	A Damodaran, Center for Public Policy, Indian Institute of Management, Bengaluru	080-26993323	damodaran@iimb.ernet.in	Plantation crops
17	Nitin Rai, ATREE, Bengaluru	Telephone: +91-80-23635555 Fax : +91-80-23530070	Nitin Rai <nitinrai@atree.org>	Tribal Forest Rights Act

#	Name	Mobile/ landline	E-mail	Theme
18	Ranjan Rao Yerdoor, Nagarika Seva Trust, Gurvayankere	09448287055	nstgkere@sancharnet.in	Joint Forest Management programmes
19	Aparna Watve	09822597288	Dr. Aparna Watve <aparnawatve@gmail.com>	Grassy plateaus
20	S N Prasad, SACON	09440602754	S Narendra Prasad <snarendra.prasad@gmail.com>	Wetlands
21	Vijay Paranjape	9922009749	gomukh@pn3.vsnl.net.in	Dams
22	Mrunal Wanarase, Ecological Society, Pune	09822000862	ioraespune@gmail.com, ecological.society@gmail.com,	Regeneration of streams
23	Jay Samant, formerly Shivaji University, Kolhapur	09822655168	Udaysinh gaikwad <uday_gd@yahoo.com>	River pollution
24	Kusum Karnik, Shashvat		shashwat <shashwatmkr@bsnl.in>	Religious tourism
25	Vinod Uniyal, Kerala Forest Department			Ecodeveolpment committees
26	K.V.S. Prasad, AME foundation, No. 204, 100 feet ring road, 3rd phase, Banashankari, 2nd block, 3rd stage, Bengaluru, 560085	91-080-26699512,91-080-26699522,fax-91080-26699410		Sustainable agriculture
27	Sharad Lele, ATREE, Bengaluru		Sharad Lele <sharad.lele@gmail.com>,	Watershed management
28	SHALINI RAGHUNATH, Department of Studies in Folklore, Karnatak University, Dharwad 580 003, Karnataka	(O) 0836-2215299, (R) 0836-2778233, (M) 09845809746		Nature in folklore of Central Western Ghats (Karnataka)
29	Pandurang Phaldessai, member secretary, Kala akademy, Panaji, Goa, 91-832-2420451,	91-832-2410888 (R) 9822123030 (M)		Natural resources as reflected in folklore of Goa
30	Dilip Boralkar, Mumbai	09892542288,022-25552558	dboralkar@gmail.com,	Industrial Pollution
31	Shyam Asolekar, IIT, Mumbai	022 -25767867, 09820410443	asolekar@iitb.ac.in	Functioning of ESA Authority

#	Name	Mobile/ landline	E-mail	Theme
32	S. Muralidharan, Sálim Ali Centre for Ornithology and Natural History, Anaikatty Post, Coimbatore - 641 108, Tamil Nadu,.	Tele Fax: +91 - 422 - 2657088 Tele : +91 - 422 - 2657101 - 102, 131, 199	salimali@vsnl.com	Pesticides
33	Anil Kumar, MSSRF, Chennai		<anil@mssrf.res.in>	Wild food plants
34	Shri L. Narayan Reddy, Srinivaspura, Marlenanahalli, Dodaballapura, Hanabe, 561203	080 7651360		Potential of organic farming
35	N G Hegde, Formerly of BAIF, Pune	09890181848	nghegde@baif.org.in	Tree growth on private lands
36	Jayant Kulkarni, Row House 1, Ratan Park Phase 2, 127/5, Sus Road, Pashan Pune 411021	09423006694 Office: +9120-65222903/25861310 Home : +9120-65619257	main@envirosearch.in, jayant.kulkarni@envirosearch.in	Human–wildlife conflict
37	Sagar Dhara, E-303, Highrise Arparments , Lower Tank, Bund Road Hyderabad 500 080	(040) 636593 Fax: (040) 636593	Sagar Dhara <sagdhara@yahoo.com>, sagdhara@hd1.vsnl.net.in	EIA process
38	Mewa Singh, Mysore University, Mysore	09448603506	mewasingh@bsnl.n	Primates
39	Jagdish Krishnaswamy/ Kiran, ATREE, Bengaluru	Telephone: +91-80-23635555 , Fax : +91-80-23530070	jagdish@atree.org, jagdish.krishnaswamy@gmail.com	Criteria for deciding on Ecologically Sensitive Areas
40	Snehlata Nath, Keystone Centre, Groves Hill Road, Kotagiri, Nilgiris, Tamil Nadu			Livelihood security
41	Harini Nagendra, ATREE, Bengaluru		harini.nagendra@gmail.com	Landscapes
42	T R Vijayaraghavan, IAS (Retd)			Hill stations
43	Anita Varghese Keystone Centre, Groves Hill Road, Kotagiri, Nilgiris, Tamil Nadu			Non-Timber Forest Produce

#	Name	Mobile/ landline	E-mail	Theme
44	Dr Aravind ATREE		amadhyastha@gmail.com	Amphibians
45	Dr Vasudeva College of Forestry Sirsi		vasukoppa@gmail.com	Economically important but endangered species
46	Dr Ravikanth ATREE		gravikanth@gmail.com	Conservation of forest genetic resources
47	Ved, FRLHT		dk.ved@frlht.org	Medicinal Plants
48	NA Madhyastha/Rajendra Mavinkurve Malacology Centre, Poorna Prajna College, Udupi-576101		na_madhyastha@sancharnet.in	Land snails of Western Ghats
49	PA Sebastian Division of Arachnology, Dept. of Zoology Sacred Heart College Thevara, Cochin-682013, Kerala		administrator@southindianspiders.org	Spiders
50	Dr Shashidhar Viraktamath University of Agricultural Sciences, Dharwad			Wild bees of Western Ghats; crop pollination deficits
51	Kalyan Kumar Chakravarty (Former Director of Indira Gandhi Rashtriya Manav Sangrahalaya, Ministry of Culture, Bhopal)			Hill forts and cultural heritage, including rock carvings
52	KS Valdiya JNCASR, Bangalore		valdiya@jncasr.ac.in	Geological and palaeobiological heritage (rare rock formations; fossiliferous strata)
53	N M Kamat, Goa University			Ethnomycology of Western Ghats (focus on edible, medicinal, toxic and hallucinogenic species)
54	D.J.Bhat, Goa University			Microbial habitats and resources-terrestrial

#	Name	Mobile/ landline	E-mail	Theme
55	K.R.Sridhar, Mangalore University			Microbial habitats and resources-aquatic
56	Urmila Makhija, Agharkar Research Institute, G.G. Agarkar Road, Pune-411 004			Lichens
57	K. Gopalkrishna Bhat Dept of Botany, Poornaprajna College, Udupi Add: "Madhuca", Durga Saw Mill Lane, Chitpady, Udupi, 576101	9449935486		Conservation of pteridophyes and gymnosperms of Western Ghats
58	C.Achalender Reddy, I.F.S, Secretary, National Biodiversity Authority, 5th Floor, TICEL Biopark, Taramani, Chennai - 600 113 Tamilnadu, India.	44-22541071(Off), +91-44-24515020(Resi).Mobile: +91 96770 66330	secretary@nbaindia.in, achal.reddy@gmail.com	Ecotourism development and opportunities in Western Ghats
59	Norma Alvares, Goa Foundation G-8, St Britto's Apts, Feira Alta,Mapusa, Bardez, Goa – 403507,	832-2256479 / 2263305		Environmental PIL and judicial activism: A Western Ghats NGO perspective
60	A. Sundara, Director of the Post-Graduate Research Centre of the Karnataka University at Bijapur			Prehistoric and protohistoric cultural heritage of Western Ghats
61	Raghunandan Raghavan, IAS(Retd), No 1 KPTCL Quarters, Hosakerehalli Main Road, Bangalore 560085	Land line: 08026420700 cell: 9845749988	<trraghu@yahoo.com>	Need for enhancing the role and capacity of the Panchayats for improving governance in the Western Ghats districts,
62	Antonio Mascarenhas, NIO, Dona Paula, Goa,	Telephone: 91-0832-2450335 Fax: 91-0832-2450602	mascarenhas@nio.org,	Tourism–legal, technical, ecological and environmental issues (Goa, Konkan, Coastal Karnataka) esp. w.r.t. CRZ, geo and ecohazards, SLR etc.

#	Name	Mobile/ landline	E-mail	Theme
63	Alito Sequiera, Associate professor, Dept. of Sociology, Goa University, Taleigao, Goa, 08326519308		alito@unigoa.ac.in,	Tourism–social, cultural issues
64	Ranjan Solomon ,149/D, Gina, Maina-Curtorim Salcete, Goa – 403709,	Telephone +91 – 9881181350 (Mobile) and +91 - 832-2787667 (Home),	ranjan.solomon@gmail.com	Tourism–Cultural, social ethical issues
65	Dr T T Sreekumar Assistant Professor, Communications and New Media Programme National University of Singapore	Tel: +65-6516 3148 Fax: +65-6779 4911	cnmsttp@nus.edu.sg; sreekumar@nus.edu.sg	Tourism in Kerala–social, cultural impacts
66	Ramesh Ganwas, Senior teacher, Govind Gunaji Sawant High School, Sarvona, Bicholim, Goa			Mining (Konkan and Goa) Mining–people's perspectives
67	Rajendra Kerkar , Gonteli, Keri, Sattari, Goa	9421248545	rpkerkar@yahoo.com	Mining–Goa, Konkan (social, ecological)
68	Glenn (GMOEA)			Mining-Geological and Economic perspective
69	Gujarat Ecological Society		http://www.gesindia.org/eco.htm	Mining (Gujarat)
70	Kanchi Kohli, Kalpavriksh		kanchikohli@gmail.com	Mining (Karnataka)

Annexure B: Brainstorming Sessions: Penultimate list

#	Theme	Responsible panel member	Lead discussant
1	Positive and negative experiences of administering Ecologically Sensitive Areas	Madhav Gadgil	S Asolekar
2	Current EIA process and how we may reform it	Ligia Naronha	Sagar Dhara
3	Assessing regional level Carrying Capacities	DK Subramaniam	Somnath Nayak
4	Incentive based approaches to nature conservation	R Sukumar	E Somanathan
5	Potential of Joint Forest Management Programmes for promoting ecologically positive action	Vidya Nayak	R R Yerdoor
6	Potential of Tribal Forest Rights Act for promoting ecologically positive action	BJ Krishnan	Nitin Rai
7	Sequestering carbon in agricultural soils and grazing lands	BJ Krishnan	KVS. Prasad
8	Potential of Biological Diversity and PPVFR Acts for promoting ecologically positive action	Nandkumar Kamat	Raghunandan Raghavan
9	How to manage mining projects so as to minimize ecological damage, and possibly generate positive outcomes	Nandkumar Kamat	Rajendra Kerkar
10	How to manage tourism projects so as to minimize ecological damage, and possibly generate positive outcomes	Renee Borges	C Achalender Reddy
11	How to manage power projects so as to minimize ecological damage, and possibly generate positive outcomes	Ligia Naronha	Norma Alvares
12	How to manage river valley projects so as to minimize ecological damage, and possibly generate positive outcomes	DK Subramaniam	T R Vijayaraghavan
13	How to manage road/ railway projects so as to minimize ecological damage, and possibly generate positive outcomes	R Sukumar	Jagdish Krishnaswamy
14	Patterns of distribution of biological diversity and human activities on the Western Ghats	KN Ganeshaiah	R Vasudeva
15	Sites that deserve to be declared as Ecologically Sensitive Ares of Western Ghats	KN Ganeshaiah	Ranjit Daniels
16	Land Use Planning	Renee Borges	V S Vijayan

Annexure C: Site Visits

B.J. Krishnan proposals:

Site Visit Plan and Public Consultation Processes to arrive at the core issues of the conservation process

TASK: 1. Broad outline of the Public Consultation Process (and)

2. A tentative set of criteria for selecting Sites for Visit

For the sake of convenience and easy identification, I have broadly divided the entire Western Ghats regions into four Zones (1) Southern Western Ghats (2) South-Central inclusive of Nilgiri Biosphere Reserve (3) Central and (4) Western Zones – See Annexure

B. Outline of the Public Consultation / Approach

Consultation processes for each zone and themes will have stakeholders representing the 3 dimensions of the CBD (Convention on Biological Diversity) objective triangle

- Conservation – Ecology
- Sustainable Use of Natural Resources – Economics
- Benefit Sharing – Equity

To validate the current situation, each stage of the consultation process will engage various stakeholders. I suggest selecting research institutions, private and government and NGOs / CSOs to provide inputs, data, evidences, case studies and innovative ideas in each of the selected sites.

C. Core Issues of Conservation Processes / Proposed Themes: Broad outline for Public Consultation process and tentative set of Criteria for selecting Sites for Visits

1. Plantations / Farming Practices – Annamalais / South Western Ghats/Nilgiris
   - Agricultural plantation like tea, coffee, rubber, cardamom in areas near forests
   - Cultivation along steep slopes
   - Soil erosion
   - Frequent landslides
   - Chemical Inputs / Pesticides / Toxics
   - Buffer zones not protected or declared
   - Encroachments into forest areas
   - Farming and excessive application of Chemical Pesticides
   - Need for Organic Farming
2. Mining – Goa / Central Western Ghats
   - Deforestation
   - Buffer zones not protected or declared
   - Encroachments into forest areas
3. Rivers, Dams & Reservoirs – Idduki / South Western Ghats

- Forests submerged under reservoirs
- Tourism related pollution, traffic and disturbance to wild life and ecology
- Riparian zone destruction and/ or loss
- Legal Protection of Catchment Areas (no legislative protection in state or centre)
- Power lines cutting through forests

4. Wildlife Corridors / Man – Animal Conflict – Nilgiris / South Central Western Ghats
   - Forest Fragmentation – lost continuity
   - Poaching and wild life trade
   - Invasion of exotic species
   - Frequent forest fires
   - Grazing by domesticated animals from the surrounding villages / settlements
   - Buffer zones not protected or declared
   - Encroachments into forest areas
5. Tourism – Goa and Ooty / South Central Western Ghats
   - Unregulated / unplanned / issues of carrying capacity
   - Benefit sharing
   - Infrastructure – Carrying Capacity of roads
6. Energy / Power Plants / Heavy Industries – Dahanu, Ratnagiri / North Western Ghats/ and all other areas
   - Pollution – land, air, water
   - Displacement
7. Urban Settlements – North Western Ghats
   - Unplanned Infrastructure and buildings
   - Highways cutting through forests

WESTERN GHATS: ZONES AND DISTRICTS

Tentative set of criteria for selecting sites for visits/ Public consultation Processes:

Proposed Zonation of Western Ghats (4 Zones) for the purpose of Identifying thematic issues and consultation processes and site visits.

S.No	Zones	District
1	North Western Ghats (NWG)	Surat
2	North Western Ghats (NWG)	The Dangs
3	North Western Ghats (NWG)	Valsad
4	North Western Ghats (NWG)	Nandurbar
5	North Western Ghats (NWG)	Dhule

6	North Western Ghats (NWG)	Nashik
7	North Western Ghats (NWG)	Thane
8	North Western Ghats (NWG)	Pune
9	North Western Ghats (NWG)	Ahmadnagar
10	North Western Ghats (NWG)	Satara
11	Central Western Ghats (CWG)	Ratnagiri
12	Central Western Ghats (CWG)	Sindhudurg
13	Central Western Ghats (CWG)	Kolhapur
14	Central Western Ghats (CWG)	Sangli
15	Central Western Ghats (CWG)	Belgaum
16	Central Western Ghats (CWG)	Dharwad
17	Central Western Ghats (CWG)	Uttara Kannada
18	Central Western Ghats (CWG)	Shimoga
19	Central Western Ghats (CWG)	Udupi
20	Central Western Ghats (CWG)	Chikmagalur
21	Central Western Ghats (CWG)	Hassan
22	Central Western Ghats (CWG)	Dakshina Kannada
23	South Central Western Ghats (SCWG)	Kodagu
24	South Central Western Ghats (SCWG)	Mysore
25	South Central Western Ghats (SCWG)	Chamarajanagar
26	Central Western Ghats (CWG)	North Goa
27	Central Western Ghats (CWG)	South Goa
28	South Central Western Ghats (SCWG)	Kasaragod
29	South Central Western Ghats (SCWG)	Kannur
30	South Central Western Ghats (SCWG)	Wayanad
31	South Central Western Ghats (SCWG)	Kozhikode
32	South Central Western Ghats (SCWG)	Malappuram
33	South Central Western Ghats (SCWG)	Palakkad
34	South Western Ghats	Thrissur
35	South Western Ghats	Ernakulam
36	South Western Ghats	Idukki
37	South Western Ghats	Kottayam
38	South Western Ghats	Alappuzha
39	South Western Ghats	Pathanamthitta
40	South Western Ghats	Kollam

41 South Western Ghats Thiruvananthapuram

42 South Central Western Ghats (SCWG) Erode

43 South Central Western Ghats (SCWG) The Nilgiris

44 South Central Western Ghats (SCWG) Coimbatore

45 South Western Ghats Dindigul

46 South Western Ghats Madurai

47 South Western Ghats Virudhunagar

48 South Western Ghats Theni

49 South Western Ghats Tirunelveli

50 South Western Ghats Kanniyakumari

51 North Western Ghats (NWG) Raigarh

Madhav Gadgil proposals:

Site visits may involve one or more members. At least one of the members should be fluent in the local language.

We might wish to choose representative examples of the following three types of sites for field visits by one or more members/ entire panel:

- Candidate sites for being declared as Ecologically Sensitive Areas
- Sites representing various types of serious threats to ecological health: river valley projects, mining, power projects, industrial pollution, tourism, roads and railways
- Sites representing examples of positive action: for example, Dahanu ESA Authority, Lamkani revegetation, Thekkady EDAs

Minutes of the Third Meeting of the Western Ghats Ecology Expert Panel held on 23 – 24 June, 2010 at Dahanu, Maharashtra.

The third meeting of the Western Ghats Ecology Expert Panel (WGEEP) was held at Dahanu, Maharashtra on 23 – 24 June, 2010. The following were present:

1. Prof. Madhav Gadgil	Chairman
2. Shri. B.J. Krishnan	Member
3. Dr. K.N. Ganeshaiah	Member
4. Dr. Ms. Ligia Noronha	Member
5. Dr. V.S. Vijayan	Member
6. Dr. P.L. Gautam	Member
7. Prof. S. P. Gautam	Member
8. Ms. Vidya S. Nayak	Member
9. Dr. G. V. Subrahmanyam	Member Secretary

The following Members of the Panel could not attend the meeting:

1. Dr. D.K. Subrahmanyam
2. Prof. (Ms.) Renee Borges
3. Prof. R. Sukumar
4. Dr. Nandkumar Mukund Kamat

Dr. R.R. Navalgund was represented by Dr. Chandrasekhar Jha, NRSC, Hyderabad. Mrs. Usha Subramaniam, Additional Director, MoEF, also participated in the Meeting.

The Following Special Invitees were present:

1. Justice C.S. Dharmadhikari, Chairman, Dahanu Taluka Environment Protection Authority (DTEPA)
2. Mrs. Asha Dahake, Town Planner & SO, DTEPA
3. Shri N.R. Praveen, Deputy Conservator of Forests, Dahanu Forest Division
4. Shri Ashok D. Patil, Asst. Forest Officer, Dahanu Forest Division
5. Dr. J.M. Jare, S.D.O. Dahanu

The meeting began on 23rd morning with a site visit by the Expert Panel to the areas where tree plantation has been undertaken by the DTEPA. The WGEEP was able to visit a few of the 12 *upavans* (small forests) developed in the area by the DTEPA with the assistance of the Forest Deptt.

The Panel met in the afternoon of 23rd June, 2010 to discuss the agenda items of the 3rd meeting of the WGEEP.

Chairman initiated the meeting by thanking DTEPA and the Forest Dept., Dahanu Taluka for organizing the site visits as also for making arrangements for the meeting at Dahanu. After welcoming all the Members he briefly explained the Agenda for the meeting and

proposed introduction of two more items namely, Lavasa Township and BVEERI, Pune for discussion and stated that the Panel could adopt the agenda after which the agenda items would be taken up individually for discussion.

Then the agenda was adopted by the Members of the Panel with the comment that the WGEEP should give utmost priority to the development of guidelines and criteria for demarcation of any area as ecologically sensitive or fragile in the Western Ghats Region. After this the agenda items were taken up for discussion.

Agenda Item No.1: Confirmation of the Minutes of the Second Meeting of the WGEEP held on 7th May, 2010

The minutes were confirmed with the clarification that the six experts who were present in the Second Meeting are to be shown as special invitees, invited specifically for the second meeting and not as co-opted members. It was also decided that the Minutes of the meetings of the WGEEP would be put up in the website of the both MoEF and WGEEP, after they have been seen and approved by the members of the Panel.

Agenda Item No. 2: Inauguration of WGEEP website.

The WGEEP website was formally inaugurated by Justice C.S. Dharmadhikari, Chairman, DTEPA. Dr. Ganeshaiah demonstrated the features of the website and mentioned that the website would be interactive and dynamic in nature with a query answer system. The website is designed in such a way that spatial data can also be uploaded. The Chairman congratulated Dr. Ganeshiah in getting the website developed in such a short time. The WGEEP decided to place on record its appreciation and gratitude to Dr. Ganeshaiah for developing the WGEEP website. Several suggestions were also given by the members for expanding the information base of the website. All the Members of the Panel were requested to upload the information available with them relating to the Western Ghats Region on the website. It was decided that under the window – "discussion" in the website, a page for WGEEP be created to receive queries and suggestions from concerned stakeholders and to respond to the same.

Agenda Item No. 3: Geographical limits

The Panel discussed the geographical limits for drawing the map of Western Ghats Region for the purpose of its conservation and sustainable development. As National Remote Sensing Center (NRSC) has defined the BRT Hills segment, it was decided to include this segment in the map of the Western Ghats Region.

Agenda Item No.4: Status of the project to assess the levels of eco-sensitivity along the Western Ghats

Chairman mentioned that as decided in the 2nd meeting of the WGEEP, NRSC was to prepare a detailed proposal on assessing the levels of eco-sensitivity along the Western Ghats. He therefore requested Dr. Chandrashekhar Jha to apprise the Panel of the progress regarding this. Dr. Jha then made a detailed power point presentation on the proposal during which it was mentioned that in view of the procedural constraints in appointment of project staff, NRSC may not be in a position to take up implementation of the proposal. After discussion, it was decided that the project proposal would be prepared by Dr. S. N. Prasad, SACON, Hyderabad in consultation with NRSC and would be submitted to the Ministry for financial assistance. Dr. Moorthy and Dr. Jha from NRSC, Dr. K.N. Ganeshiah and Dr. Ranjit R. J. Daniels will also collaborate in this project.

Agenda Item No.5: Commissioning of Papers and organization of Brainstorming Sessions / Site Visits.

A detailed project proposal comprising of commissioned papers (80 in number) and details of brainstorming sessions and site visits for public consultations, along with budgetary requirements, has been prepared by Prof. R. Sukumar and the same has been received in the Ministry. The proposal is under active consideration in the Ministry for release of requisite funds. During the meeting it was clarified that the brainstorming sessions will be of three days duration each with two sessions per day. Dr. Ligia Noronha was requested to coordinate the site visits for the State of Goa and also to take on the other responsibilities that were given to Dr. Nandkumar Mukund Kamat who has resigned from the membership of the Panel.

Agenda Item No.6: Interaction with the group undertaking the study of Carrying Capacity of Uttara Kannada District

The Chairman introduced the Agenda and also briefly explained the application of the concept of carrying capacity to parts or whole of the Western Ghats Region. He informed the Panel that Dr. T V Ramachandra is presently engaged in Study of the Carrying Capacity of Uttara Kannada District. Since Uttara Kannada is an important component of the Western Ghats, this work would be of relevance to WGEEP. Hence, it was decided to invite Dr. Ramachandra to make a presentation before the Panel.

Agenda Item No. 7: Lavasa Township

The Chairman informed the Panel that in view of the apprehensions expressed by people about this Township, the WGEEP may have an open discussion with Lavasa Corporation and other interested people.

Agenda Item No. 8: Consideration of the proposal of Bharati Vidyapeeth Institute for Environment Education and Research (BVIEER), Pune.

The Chairman informed the Panel that BVIEER has carried out extensive work on the Western Ghats of Dangs (Gujarat) and Maharashtra. The BVIEER has offered to review all available literature on these areas and prepare a background paper, if possible in both Marathi and English addressing the mandate of Panel. Once this is ready, it could be uploaded on the WGEEP website and also circulated widely throughthe media followed by an open discussion meeting at BVIEER which will be hosted by them.

Agenda Item No.9: Discussion

Presentation by Justice Chandrashekhar Dharmadhikari, Chairman DTEPA.

The Chairman extended a warm welcome to Justice C.S. Dharmadhikari and expressed his gratitude that in spite of the heavy rains Justice Dharmadhikari could come to share with the WGEEP his experience and knowledge on the subject.

The Panel sought the advice of Justice C.S. Dharmadhikari, Chairman, DTEPA, as a way forward for the WGEEP in the light of his vast experience in administering the Dahanu Taluka Environment Protection Authority (DTEPA) with specific reference to the following:

a) To share the experiences of the DTEPA with the WGEEP with reference to ecologically sensitive areas.

b) To advise on the measures for effective implementation of the notifications issued by the MoEF declaring specific areas in the Western Ghats region as eco-sensitive zones under the EPA, 1986.

c) To advise on the modalities for the establishment of the Western Ghats Ecology Authority under the EPA, 1986.

Justice Chandrashekhar Dharmadhikari, Chairman DTEPA, made a detailed presentation regarding the role and functioning of the DTEPA followed by a presentation by Mrs. Asha Dahake, Town Planner, SO, DTEPA.

The salient points made by the Chairman, DTEPA, during his presentation include the following:

i. The Authority had adopted the new concepts of pre-afforestation and pre-habilitation, keeping in view the Right to Protection of Life and also since re-afforestation and re-habilitation do not take place as planned.

ii. The Authority has accepted the slogan of "Development without Tears" and believes that development should not be for a few, at the cost of the Public. For this purpose, a Social Cost is added to every project

iii. DTEPA is able to carry out its mandate being a Statutory Authority vested with the powers under the Environment (Protection) Act, 1986. Therefore, he suggested that the proposed Western Ghats Ecology Authority should be a Statutory Authority vested with powers under the EPA except for the powers of prosecution.

iv. The Authority successfully convinced the concerned authorities of the power plant in Dahanu to install an FGD (Flue-gas desulfurisation) Plant which was absolutely necessary for controlling sulfur dioxide emissions.

v. The principle of transparency and public participation was followed by the Authority, in order to enable the affected persons to put forward their suggestions and objections which could be considered very objectively. He emphasized the need for public consultation and not public hearing, as the former allows a dialogue. Public consultation would not only include hearing objections but even accepting suggestions which may be made by affected persons or by any other interested parties.

vi. The criteria for deciding whether an area is ecologically fragile cannot be imprisoned in a straitjacket formula, as the criteria may change according to the facts and circumstances of each case.

Agenda Item No. 10: Action Plan for WGEEP

The Chairman then took up the action plan as outlined in Annexure-C of the Agenda Note which is enclosed. The action plan was discussed in detail and the Panel accepted the action plan *in toto*. The following major decisions *inter alia*, emerged during the discussions:

(a) The Panel agreed to draw up a set of criteria for identification of ESAs by building on the earlier work such as the Pronob Sen Committee report.

(b) To finalize a note on ESA for public circulation in English and local languages, incorporating the following points: [i] ESAs are not meant to stop development in ways that would hurt local people, but to ensure that development is environment-friendly and people-oriented, as well as serve to preserve ecological heritage on a long-term basis. [ii] There are no set regulations that would prevail in every ESA; rather, the regulations need to be worked out with due respect to the local context.

(c) The proposed Western Ghats Ecology Authority should be a Statutory Authority vested with powers under the Environment (Protection) Act, 1986 except powers for prosecution.

The Panel also visited the Reliance Dahanu Thermal Power Station to inspect the FGD plant installed at the instance of the DTEPA for control of sulfur dioxide emissions.

The Panel decided to hold the 4th meeting at Trivandrum in the last week of July, 2010.

The meeting ended with a vote of thanks to the Chair.

Annexure : Agenda for the Third Meeting of WGEEP

23 – 24 June, 2010 at Dahanu

Review of action taken so far

A] Website

B] Geographical limits

C] Status of project on assessing the levels of eco-sensitivity along the Western Ghats being developed by Drs. M.S.R. Murthy (nodal responsibility), Ganeshiah, Ranjit Daniels, and P. Pramod

D] Arrangements for commissioning papers, holding brainstorming sessions, and financing site visits and consultations through CES, IISc

E] Interaction with group undertaking the study of Carrying Capacity of Uttara Kannada district

Decisions needed

Timetable

Discussion items

A] Experiences to date of Ecologically Sensitive Areas with special reference to Dahanu ESA. This discussion will be on the background of the field visit on 23 June, and will be facilitated by Justice Chandrashekhar Dharmadhikari, Chairman, Dahanu Taluka Ecologically Sensitive Area authority.

B] Measures for effective implementation of the notifications issued by the Government of India in the Ministry of Environment and Forests declaring specific areas in the Western Ghats Region as eco-sensitive zones under the Environment (Protection) Act, 1986. Justice Chandrashekhar Dharmadhikari would be requested to give his advice on this issue as well.

C] Modalities for the establishment of Western Ghats Ecology Authority under the Environment (Protection) Act, 1986 which will be a professional body to manage the ecology of the region and to ensure its sustainable development with the support of all concerned states. Justice Chandrashekhar Dharmadhikari would be requested to give his advice on this issue also.

D] Putting into operation the following process:

a) Drawing up a set of criteria for identification of ESAs, based on earlier work such as Sen Committee report.

b) Put together an information base on Western Ghats that would support objective identification of potential ESAs arranged in order of priority. (Work relevant to steps a and b is being undertaken by the group headed by Dr. Murthy).

c) Prepare a list in order of priority of potential ESAs identified on the basis of such an information base.

d) Call on different civil society groups to propose areas for protection as ESAs, and to suggest how these areas should be managed on a case by case basis.

e) Call on different local bodies (Gram Panchayats, Taluk Panchayats, Zilla Parishads, and Nagarpalikas) to propose areas for protection as ESAs, and to suggest how these areas should be managed on a case by case basis.

f) Assess ESA proposals received from different civil society groups and local bodies, as also generated on the basis of WGEEP's own information base, and suggest appropriate regulatory measures that need to be put in place for management of different potential ESAs thus identified on a case by case basis.

g) Suggest how the Western Ghats Ecology Authority may operate.

Annexure A: Response to Shri Jairam Ramesh, Hon. Minister for Environment and Forests, Government of India, from Chair, WGEEP

Thank you so much for your most kind letter of 4th May, with its many valuable suggestions for the functioning of WGEEP. We fully appreciate that our priority function is to demarcate areas within the Western Ghats region to be notified as Ecologically Sensitive Areas. In this context we have been examining the available guidelines, as well as the experience thus far. The most significant guidelines are contained in the Sen Committee report; however, there are a number of practical difficulties in employing their criteria. For instance, it is proposed that the area of occupancy of an endemic species needs to be protected in its entirety. Western Ghats harbours well over one thousand endemic species of flowering plants, fish, frogs, birds and mammals amongst the better known groups of organisms, and no doubt thousands more amongst less studied groups including insects. Amongst themselves these would cover the entire geographical extent of the Western Ghats and all conceivable habitats, including many disturbed ones such as roadsides. There are thus obvious difficulties in operationalizing this, as well as other recommendations of Sen Committee.

The experience of "India's notified ecologically sensitive areas" has been summarized in a report published by Kalpavriksh in 2009. It narrates the experiences of three areas of interest to WGEEP, namely, Dahanu, Matheran and Mahabaleshwar. In all these cases the identification of ESAs began with interests of specific groups, in particular, Bombay Environmental Action Group, in protecting these particular areas. In contrast, WGEEP would have to assess the situation over the entire stretch of Western Ghats and then identify particular areas as appropriate for designation as ESAs, assigned to different levels of priority. In all cases so far, the initiative has come from above, and not from the ground level, so much so, that in the absence of local involvement and support, Kalpavriksh report notes that activists of Bombay Environmental Action Group can today visit Matheran only under police protection. Surely, WGEEP should not impose its recommendations in this fashion from above, and must promote a process of broad based public consultations from ground level up to fulfill its mandate.

The action plan of WGEEP may then involve the following steps that may be pursued in parallel:

1. Drawing up a set of criteria for identification of ESAs, based on earlier work such as Sen Committee report
2. Put together an information base on Western Ghats that would support objective identification of potential ESAs arranged in order of priority. Suggest appropriate regulatory measures that need to be put in place for management of different potential ESAs on a case by case basis

3. Call on different civil society groups to propose areas for protection as ESAs.
4. Call on different local bodies (gram panchayats, taluk panchayats, zilla parishads, and nagarpalikas) to propose areas for protection as ESAs
5. Assess ESA proposals received from different civil society groups and local bodies in light of the exercises [a] and [b]
6. Suggest how the Western Ghats Ecology Authority may operate.

I attach a note that provides some further details. We are working hard and would like to complete the task assigned to us in a timely fashion. However, I see no alternative to the six step process outlined above. I will, of course, keep you posted as we progress, and would appreciate your feedback at all stages of our work. In the meanwhile, I would greatly appreciate your support in ensuring that the financial sanctions required from your Ministry to pursue our work plan are obtained in an expeditious fashion.

Annexure B: An appraisal of the Report of the Pronab Sen Committee on Identifying Parameters for designating Ecologically Sensitive Areas in India. September, 2000.

Introduction

An important element of the mandate of the Western Ghats Ecology Expert Panel is to demarcate areas within the Western Ghats Region which need to be notified as ecologically sensitive and to recommend for notification of such areas as ecologically sensitive zones under the Environment (Protection) Act, 1986. In doing so, the Panel has been asked to review the existing reports such as the Mohan Ram Committee Report, Hon'ble Supreme Court's decisions, Recommendations of the National Board for Wildlife and consult all concerned State Governments. So far, WGEEP has not been provided any of these reports. However, we have been supplied a copy of the Report of the Pronab Sen Committee on Identifying Parameters for Designating Ecologically Sensitive Areas in India, September, 2000. This report is clearly a significant starting point for WGEEP's work. This note therefore provides an appraisal of this report.

Need for objective criteria

The report begins by stating that a balance had to be struck between the protection of ecologically sensitive areas (ESA) and the needs of national development, particularly in the context of a country like India with low levels of income and high levels of poverty. Therefore, the parameters had to be selected and defined in such a manner that they represented only the critical elements of ecological preservation and did not impinge unduly on the process of development and efforts at eradication of poverty. Second, it was clearly recognized that in view of the pressing demands on land and land-use patterns, areas designated as ecologically sensitive would become issues for litigation. Therefore, the parameters evolved by the committee and the modes of application would have to be framed in such a manner that they could stand scrutiny in the courts of law. As the committee stresses, it is therefore important that the criteria should be as objective as possible, and applicable in a transparent manner, while keeping in mind that it is not practicable that ESAs cover a very large proportion of the Western Ghats tract.

The Sen Committee Report proposes that the operative concept which would need to form the basis of defining ecological fragility is organisms or life forms. It goes on to define ***"ecological sensitivity" as the imminent possibility of permanent and irreparable loss of extant life forms from the world; or significant damage to the natural processes of evolution and speciation***. It states that the loss of a species in its entirety from the world is a grave matter. The prevention of such a possibility is not merely an ethical issue, which places absolute importance on the right to existence of every form of life, but it has a practical dimension as well. The importance of genetic resources is only now beginning to be realized to any extent, and even today our knowledge of the intricate and complex relationship between different forms of life and their environment is at best rudimentary. Given this inadequacy of knowledge, conservation of bio-diversity would have to cover not only species which are presently threatened and protection of eco-systems which have demonstrated qualities of high evolutionary activity, but also characteristics whose ecological impact can be so widespread that there is no reasonable method of predicting the consequences on present and future progress of bio-diversity.

Sen Committee Criteria

The Sen Committee Report goes on to list thirteen principal parameters of ecological sensitivity falling into three broad categories of ecological significance. The first of these categories is species-related, and defines the characteristics of species which are or may become threatened with extinction. The second category relates to eco-systems. Some of these derive their importance from being essential to the survival of the first category, while the rest are critical for maintaining the range and pace of evolution and speciation. The third category includes geo-morphological conditions which are known to have substantial effect on eco-systems at large.

Principal criteria

Species-based

Endemism

Rarity

Endangered species

Centers of evolution of domesticated species

Ecosystem-based

Wildlife corridors

Specialized ecosystems

Special breeding site/area

Areas with intrinsically low resilience

Sacred groves

Frontier forests

Geo-morphological features-based

Uninhabited islands in the sea

Steep slopes

Origins of rivers

The Sen Committee Report states that areas which meet even one of the above primary criteria deserve to be protected without any additional factor or consideration being brought in. In addition to these primary criteria, the Committee has also identified seven auxiliary criteria, which though less compelling than the primary criteria, nevertheless require consideration in view of our insufficient state of knowledge and ecological understanding. Areas which are characterized by these auxiliary criteria need further investigation in order to establish the degree of ecological sensitivity that may be present.

Auxiliary Criteria

Species-based

Areas or centers of less known food plants

Ecosystem-based

Wetlands

Grasslands

Geo-morphlogical features-based

Upper catchment areas

Not so steep slopes

High rainfall areas

Other uninhabited islands

The Sen Committee opines that the Government should move proactively in identifying and protecting areas as expeditiously as possible. The mandate of the WGEEP is a step in this direction. In order to fulfil this requirement, a number of steps are necessary. First, the Sen Committee recognizes that the availability of information and knowledge limits the ability of the Government to move on a broad front. A certain amount of prioritization, therefore, becomes necessary. A convenient starting point would be to consider such areas which are already known to be either ecologically important or under ecological stress. According to the Sen Committee, examples of such areas are:

a) National Parks and Sanctuaries
b) Tiger Reserves
c) Protected and Reserve Forests
d) Biosphere Reserves
e) National Marine Parks
f) Coastal Regulation Zone – I (i)
g) Hill Stations

Although some of the above areas are already under some form of protection, the Sen Committee was of the view that additional protection under the EPA should nevertheless be accorded to either the whole or part of the above areas which fulfil the criteria of ecological sensitivity as defined in the Sen Committee Report. Such multiple protection is both feasible under law and desirable under ecological considerations.

The Sen Committee Report states that this would still, however, leave vast areas of the country uncovered in so far as assessment of their ecological sensitivity is concerned. Given the size of the country, it is very unlikely that at the present rate of progress, complete ecological mapping would be feasible within any reasonable span of time. Reliance would, therefore, have to be placed on research and investigations that are being carried out by a wide range of people ranging from academics to environmental activists. In order to utilize such data effectively, it will be necessary for the Government to evolve a transparent system by which such information either becomes available or is accessed with relative ease and is evaluated to determine prioritization of areas for detailed investigation of ecological sensitivity. For this purpose, the criteria of ecological sensitivity must be made widely available and a format devised by which the relevant information can be passed on to the Government in a systematized manner. Application of information technology can help this process significantly. WGEEP proposes to take this route, and to undertake a programme of

further work involving: (1) A critical appraisal of the criteria proposed by the Sen Committee, (2) Formulation of a set of more objective and practicable criteria, (3) Organizing the readily available relevant information with respect to the Western Ghats in order to identify candidate sites for being considered Ecologically Sensitive Areas in order of priority.

Difficulties in employing the Sen Committee criteria

Endemic and rare species

It must be noted that there are a number of practical difficulties in employing the Sen Committee criteria. Their foremost principal criterion is endemism, followed by rarity. The Sen Committee Report states that:

"endemism refers to any species which is exclusively confined to a particular geographical area and occurs no where else in the world. The area of occurrence of an endemic species needs to be protected in its entirety. The precise demarcation of the area may take into account population density of the endemic species, quality of habitat, level of exploitation and the effect of introduced taxa, pathogens, competitors, parasites and /or pollutants."

Incidentally, the Sen Committee Report erroneously refers to the Nilgiri Langur as *Macaca silenus.* The Sen Committee Report proposes that the area of occupancy of an endemic (as also rare) species needs to be protected in its entirety. The precise demarcation of the area will be based on the population density of the endemic/ rare species, quality of habitat, level of exploitation and the effect of introduced species, pathogens, competitors, parasites and/or pollutants.

There are obvious difficulties in operationalizing this recommendation. The Western Ghats harbours well over thousand of endemic species of flowering plants, fish, frogs, birds and mammals amongst the better known groups of organisms, and no doubt thousands more amongst less studied groups including insects. Amongst themselves these would cover the entire geographical extent of the Western Ghats and all conceivable habitats, including many disturbed ones such as roadsides.

Endangered Species

The Sen Committee Report also states that an 'Endangered Species' is a species facing a very high risk of extinction in the wild in the near future, and that the area containing an endangered species needs to be protected in its entirety. In case of fragmented areas of occurrence of an endangered species, all fragments having high population density and habitat integrity should be of prime concern. Here again, all vulture species have recently become seriously endangered. They occur in fragmented populations over the entire stretch of the Western Ghats. So, once again, we have problems in operationalizing this recommendation.

Centres of evolution of domesticated species

The Western Ghats are an important center of origin of cultivated plants such as pepper, cardamom, jackfruit and many others, such as yams. The Sen Committee Report recommends that areas associated with the origin of domesticated species which continue to harbour their wild relatives and/or progenitors should be considered ecologically sensitive. These occur in fragmented populations over the entire stretch of Western Ghats, including roadsides. So, once again, we have problems in operationalizing this recommendation.

Special Breeding Sites/Areas

The Sen Committee report defines Special Breeding Sites/Areas as areas associated with any stage of the reproductive behaviour of a designated species, where designated species are any recognized endemic, rare or endangered species. Incidentally, it cites Keoladeo National Park, Bharatpur, for Siberian Cranes as an instance of a Special Breeding Site. This is an error; the Keoladeo National Park, Bharatpur, is only a winter visiting area for Siberian Cranes. The Special Breeding Sites/ Areas are recommended to be considered ecologically sensitive. All the streams and rivers of Western Ghats harbour some endemic, rare or endangered species, as do all grasslands, and forests. Even many farms and orchards harbour endemic, rare or endangered species of limbless amphibians or uropeltid snakes. All of them breed in these localities. So, once again, we have problems in operationalizing this recommendation.

Areas with Intrinsically Low Resilience

The Sen Committee report defines as 'Areas with Intrinsically Low Resilience' ecosystems which are susceptible to irreparable damage from even a low level of disturbance, and gives, as an example, 'Evergreen Forests of the northern Western Ghats'. It recommends that the extent of occurrence of such ecosystems, including sufficient areas for their protection and potential expansion depending upon the abiotic characterstics of the ecosystems be considered ecologically sensitive. The Evergreen Forests of the northern Western Ghats occur in fragments over the entire stretch of the Northern Western Ghats. So, once again, we have problems in operationalizing this recommendation.

Sacred Groves

The Sen Committee report recommends that the entire area that is demarcated by tradition as being part of a "sacred grove" should be considered ecologically sensitive. These occur in several thousand fragments of several hectares to stands of just a few trees scattered over the entire stretch of the Western Ghats. So, once again, we have problems in operationalizing this recommendation.

Steep Slopes

The Sen Committee report defines these as natural slopes of 20 degrees or greater. It recommends that such slopes along with a minimum horizontal distance of 500m at both ends of a slope be considered ecologically sensitive. These would cover much of the western slopes of the Western Ghats. So, once again, we have problems in operationalizing this recommendation.

Origins of Rivers

The Sen Committee report refers to as the origin of a river as a mountain, hill or spring from where a water stream originates. It suggests that the area relevant to the origin of a river is not strictly limited to the exact point at which the water spring emerges, but the entire area necessary for preserving the geological and hydrological features which are critical for the sustainability of the river sources. Thus, it is not enough to protect only the slopes which feed the river, but also the channels, fissures and other features which are intrinsic to the process of recharging the water source. These would cover almost the entire stretch of the Western Ghats. So, once again, we have problems in operationalizing this recommendation.

Auxiliary criteria

These are some of the difficulties in operationalizing the recommendations of the Sen Committee report relating to principal criteria. Similar difficulties would attend operationalizing the recommendations of the Sen Committee report relating to many of the

auxiliary criteria. Consider, for instance, High Rainfall Areas, defined as areas having precipitation intensity greater than 200 cm per year. This would cover almost the entire stretch of the Western Ghats, barring some rain shadow areas to the East. So, once again, we have problems in operationalizing this recommendation.

Regulating activities in ESAs

In addition to laying down objective and scientific parameters for identifying ecologically sensitive areas in the country, the terms of reference of the Sen Committee required it to "*evolve an appropriate methodology for regulating various activities in such areas*". The Sen Committee noted that this is no easy task, since the nature of protection that may be required will vary not only from parameter to parameter but quite possibly from one specific constituent of a particular parameter to another. The Committee debated this issue at length, and unanimously concluded that to lay down a specific methodology, or even a set of methodolgies, for regulation of activities would be both impractical and undesirable, particularly at the level of generality that has been used for identification of the parameters. The nuances of ecological sensitivity are such that excessive rigidity on this count could defeat the very purpose of this exercise, which seeks to strike a balance between preservation of our ecological endowments and the needs of development. The Committee felt that the system presently being followed for notifying environmentally sensitive areas under the EPA, which involves wide public consultation on the nature and manner of regulation of economic activities in the identified areas, was appropriate and adequate for the purpose with only minor modifications. The modifications which would need to be introduced have to do with the degree of transparency and with the precise characteristics of ecological sensitivity which require preservation. Mechanical application of existing regulations on use may not suffice, and consultation with experts on ecology should form an integral part of the process. The Sen Committee also felt that the weaknesses that exist in the monitoring of permissible activities need to be corrected expeditiously through widening the ambit of information flows and sources.

The nature and extent of human activity that can be permitted in designated ecologically sensitive areas will vary from criterion to criterion. These must therefore be worked out with due regard to the nature of the criterion and its implications.

The story so far

The experience of "India's notified ecologically sensitive areas" has been summarized in a report published by Kalpavriksh in 2009. It narrates the experiences of three areas of interest to WGEEP, namely, Dahanu, Matheran and Mahabaleshwar. In all these cases the identification of ESAs began with interests of specific groups, in particular, Bombay Environmental Action Group, in protecting these particular areas. In contrast, WGEEP would have to assess the situation over the entire stretch of the Western Ghats and then identify particular areas as appropriate for designation as ESAs, ordered on different levels of priority. In all cases so far, the initiative has come from above, and not from the ground level, so much so, that in the absence of local involvement and support, the Kalpavriksh report notes that activists of the Bombay Environmental Action Group can today visit Matheran only under police protection. Surely, WGEEP should not impose its recommendations in this fashion from above, and must promote a process of broad-based public consultations from the ground level up to fulfil its mandate.

Annexure C: An action plan for WGEEP

The action plan of WGEEP may then involve the following steps that may be pursued in parallel:

a) Drawing up a set of criteria for identification of ESAs, based on earlier work such as the Sen Committee report.

b) Put together an information base on the Western Ghats that would support objective identification of potential ESAs arranged in order of priority, and generate a prioritized list of potential ESAs on the basis of such an information base. (Work relevant to steps a and b is being undertaken by the group headed by Dr. Murthy.)

c) Call on different civil society groups to propose areas for protection as ESAs, and to suggest how these areas should be managed on a case by case basis.

d) Call on different local bodies (gram panchayats, taluk panchayats, zilla parishads, and nagarpalikas) to propose areas for protection as ESAs, and to suggest how these areas should be managed on a case by case basis.

With regard to steps c and d, we should finalize a note on ESA for public circulation. I suggest that the note may incorporate the following points: [i] ESAs are not meant to stop development in ways that would hurt local people, but to ensure that development is environment-friendly and people-oriented, as well as serves to preserve ecological heritage on a long-term basis. [ii] There are no set regulations that would prevail in every ESA; rather, the regulations need to be worked out with due respect to local context. So if people in a particular locality believe that theirs is an ecologically fragile area that needs to be protected through a ban on all mining, and highly polluting industries, but that no other regulations are called for, they may propose so. Or they may propose that highly polluting industries be banned throughout the area, but mining may be banned on slopes of greater than 20 degrees, but permitted elsewhere. Or they may propose that no agricultural land should be permitted to be converted to other uses, and that only organic agriculture may be practiced, and so on. [iii] People may therefore make proposals for constitution of ESAs that should include documentation of the following three elements: (a) Ecological value of the area under consideration, (b) Susceptibility of the area to degradation of ecology under 'Business-as-usual' development, (c) Regulatory measures that may be applied in different zones of the proposed ESAs, and (d) Mechanisms for ensuring compliance to regulatory measures that may be applied in different zones of the proposed ESAs. The note may suggest a variety of monitoring mechanisms for consideration, such as (i) establishment of Biodiversity Management Committees under the Biological Diversity Act in all the local bodies at village, wards in urban areas, towns, cities, taluks and zilla levels charged with responsibility for environmental monitoring, and (ii) Revival of the program of Paryavaran Vahinis, along with various Expert and Monitoring Committee mechanisms.

The circulation of the note in English and all state languages should be followed by web-based, video conference-based as well as face-to-face public consultations throughout the Western Ghats tract. We may, for example, convene state level meetings of MLAs, MLCs, and Presidents of ZPs to discuss these issues and build consensus.

e) Assess ESA proposals received from different civil society groups and local bodies, as also the proposals generated on the basis of WGEEP's own information base, and suggest appropriate regulatory measures that need to be put in place for management of different potential ESAs thus identified on a case by case basis.

f) Suggest how the Western Ghats Ecology Authority may operate. We should finalize a note on our proposals on how the Western Ghats Ecology Authority may operate for public circulation based on discussions during our 3rd Meeting on 24th June.

Dear Colleagues, I wish to add two items to the agenda:

1. Site visit to Lavasa as a case study on tourism in Western Ghats
2. Request to BVIEER to help in review of Dangs and Maharashtra Western ghats

I quote the pertinent letter below:

****

Dr Erach Bharucha,

Bharati Vidyapeeth Institute of Environmental Education and Research,Pune

Dear Dr Bharucha,

Sub: Western Ghats Ecology Expert Panel- request on behalf of

Thank you so much for your most kind offer of help in taking forward the work programme of Western Ghats Ecology Expert Panel, particularly in the context of Western Ghats of Dangs and Maharashtra, when we personally met at BVIEER on 15th June. The mandate of WGEEP is as follows:

(i) To assess the current status of ecology of the Western Ghats region.

(ii) To demarcate areas within the Western Ghats Region which need to be notified as ecologically sensitive and to recommend for notification of such areas as ecologically sensitive zones under the Environment (Protection) Act, 1986. In doing so, the Panel shall review the existing reports such as the Mohan Ram Committee Report, Hon'ble Supreme Court's decisions, Recommendations of the National Board for Wildlife and consult all concerned State Governments.

(iii) To make recommendations for the conservation, protection and rejuvenation of the Western Ghats Region following a comprehensive consultation process involving people and Governments of all the concerned States.

(iv) To suggest measures for effective implementation of the notifications issued by the Government of India in the Ministry of Environment and Forests declaring specific areas in the Western Ghats Region as eco-sensitive zones under the Environment (Protection) Act,1986.

(v) To recommend the modalities for the establishment of Western Ghats Ecology Authority under the Environment (Protection) Act, 1986 which will be a professional body to manage the ecology of the region and to ensure its sustainable development with the support of all concerned states.

(vi) To deal with any other relevant environment and ecological issues pertaining to Western Ghats Region, including those which may be referred to it by the Central Government in the Ministry of Environment and Forests.

We would therefore like to request you to draw on BVIEER's own extensive work on the of Western Ghats of Dangs and Maharashtra, as also review other available material and prepare a background paper, if possible in both English and Marathi, addressing our mandate by early August 2010. This could be uploaded on the WGEEP website as well as circulated through other media, followed by an open discussion meeting in the BVIEER auditorium around the third week of August. I also greatly

appreciate the fact that you do not require any specific funding to render this important service to WGEEP.

With personal regards,

Yours sincerely,

Madhav Gadgil

Chairman

Western Ghats Ecology Expert Panel

Minutes of the Fourth Meeting of the Western Ghats Ecology Expert Panel held on 26th to 27th July, 2010 at Thiruvananthapuram, Kerala.

The fourth meeting of the Western Ghats Ecology Expert Panel (WGEEP) was held at Thiruvananthapuram, Kerala on 26th - 27th July, 2010. The following were present:

1. Prof. Madhav Gadgil	Chairman
2. Dr. Ms. Ligia Noronha	Member
3. Dr. V.S. Vijayan	Member
4. Dr. P.L. Gautam	Member
5. Ms. Vidya S. Nayak	Member
6. Dr. R. V. Varma	Member
7. Dr. G. V. Subrahmanyam	Member Secretary

The following Members of the Panel could not attend the meeting:

1. Dr. D.K. Subrahmanyam
2. Prof. (Ms.) Renee Borges
3. Prof. R. Sukumar
4. Shri B.J. Krishnan
5. Dr. K.N. Ganeshaiah
6. Prof. S.P. Gautam
7. Dr. R.R. Navalgund

The Following Special Invitees were present:

1. Dr. Nalini Bhat
   Adviser MoEF
2. Prof. M.K. Prasad
   Executive Chairman
   Kerala Information Mission
3. Dr. C.T.S. Nair
   Executive Vice President
   Kerala State Council for Science, Technology and Environment
4. Dr. S. Narendra Prasad,
   Senior Principal Scientist
   Salim Ali Centre for Ornithology and Natural History

5. Shri. Tony Thomas

   One Earth One Life

6. Shri. S.K. John

   Director, VASUDA

7. Dr. A. Latha

   River Research Centre

8. Shri. A. V. George

   Chairman; Advisory Board WWF-Kerala

9. Shri R. Sridhar

   Progarmme Director, THANAL

10. Shri. S. K. John

    COSTFORD

11. Shri. M. Divakaran

    Joint Director, Western Ghats Cell, Government of Kerala

12. Dr. Sreekumar Chattopadhaya

    Scientist E2, Centre for Earth Science Studies, Akulam

Shri Mullakkara Retnakaran, Hon'ble Minister for Agriculture, Government of Kerala and Shri Binoy Viswom, Hon'ble Minister for Forests, Govt. of Kerala, also addressed the meeting and participated in the discussions.

Dr. R. V. Varma welcomed the Hon'ble Ministers, Members of Panel and the invitees. The Chairman initiated the meeting by thanking the Kerala State Biodiversity Board for organizing the meeting of the Panel at Thiruvananthapuram and then briefly outlined the agenda for the Meeting. He stressed on the need for an integrated, transparent and participative process in identifying the various levels of eco-sensitivity in the Western Ghats. Further, he briefly introduced the four major themes of discussion on biodiversity conservation in Western Ghats and the agenda to be followed in the meeting.

He mentioned that it was very appropriate that this series of discussions was being held at Thiruvananthapuram as Kerala has always being in the forefront of a holistic and participatory approach to environmental issues beginning with their pioneering study of economic, technological, and ecological analysis of Silent Valley in 1979 and the Panchayat-level resource mapping programme of the 1990s.

Shri Mullakkara Retnakaran, Hon'ble Minister for Agriculture, Government of Kerala, discussed the fragility of the Western Ghats and remarked that anthropological changes are rampant in the Western Ghats Region. He further added that organic farming in 50,000 acres of Kerala is moving towards making the agriculture in the state sustainable. He elaborated on the organic farming initiative of the Government of Kerala. This was followed by the discussion on the possible merits of promoting organic farming in the Western Ghats especially in the more eco-sensitive regions.

Shri Binoy Viswom, Hon'ble Minister for Forests. Govt. of Kerala, explained the initiatives taken by the Government of Kerala towards forest conservation in the Western Ghats region of the State of Kerala.

Dr. V. S. Vijaynan made a presentation on experiences and options for sustainable agriculture and horticulture in the Western Ghats, and the relevance of the Protection of Plant Varieties and Farmers' Rights Act. He stressed that after the Green Revolution of the 1960s, rampant use of pesticides has increased from 20 MT in 1953 to 120 MT in 2000. The presence of heavy metals and pesticides in fishes indicate how severely polluted are air, water, soil and food.

Dr. R. Sridhar made a presentation on organic farming in the Western Ghats and correcting 50 years of unsustainable agriculture development. He discussed the various stages from policy formulation to implementation and consultations conducted with all stake holders – farmers, civil society, scientists, department officials. He explained how organic practices are being developed by Kerala Agricultural University in consultation with farmers and NGOs and how changes have been incorporated in due course.

Three other special invitees also shared some experiences:

(i) Sh. Tony Thomas shared his experience on inter-planting in rubber plantations with 80 different species of trees to create a multi-species forest. Notably, the yield of rubber latex has actually increased because of the higher level of humidity in such a plantation.

(ii) Sh. S. K. John shared his experience of no tillage, multi-storeyed, multi-species agriculture / horticulture/ forestry plantations in Wynaad.

(iii) Sh. A.V. George stressed that the low elevation tea plantation is now no longer profitable, and that some way had to be found of making a transition.

Dr. P. L. Gautam gave a background on the Convention on Biological Diversity, National Biodiversity Authority, State Biodiversity Boards and Biodiversity Management Committees. He emphasized the important role of local Biodiversity Management Committees in the conservation and sustainable use of biodiversity resources. He mentioned that a *sui generis* system was being developed for protection of the Intellectual Property Rights of the traditional knowledge holders. Apart from the Biodiversity Act, he also mentioned the related International Conventions and Acts, including the Protection of Plant Varieties and Farmers' Rights Act.

The Chairman suggested that pending the finalization of this *sui generis* system, sensitive information, which may be misappropriated by commercial interests as well as other sensitive information which may unfavorably affect rare and endangered species, should not be included in any public database at this stage. However, it would be very useful to digitize and make publicly available all other information. In particular this would help the National Authority and State Boards to establish communication with the local biodiversity management committees whenever there are applications for accessing biodiversity resources and associated knowledge by commercial enterprises.

Dr. R. V. Varma shared his experiences of established Biodiversity Management Committees and preparation of People's Biodiversity Registers in a number of panchayats in the State of Kerala. He emphasized the need for capacity building of panchayats as well as support by providing expertise in taxonomy efforts. It was felt that establishment of biodiversity

committees and biodiversity registers in panchayats throughout the Western Ghats region would be very desirable.

Prof. M. K. Prasad outlined the emergence and significance of Information and Communication Technology in modern times and shared his experiences of the Kerala Information Mission in organizing information essential for promoting the ecological health of the Western Ghats.

Dr. S. N. Prasad shared the experiences of the use of Open Source Geospatial Tools in conservation; these are software suites for processing spatial data such as maps, satellite data and other geo-referenced data and information.

Dr. C.T.S. Nair presented an analysis of the past, present and future of a green economy and of natural resources. He elaborated on a green economy which is sustainable and resilient in the long run, primarily based on renewable resources, and which maintains and improves ecosystem services besides enhancing inter- and intra-generational equity. He explained the three-pronged approach to accomplish the transition into a green economy via 1) awareness and local action, 2) reforming government policies and regulations, and 3) transforming public sector departments / institutions as major agents.

Dr. R. Sridhar further shared his experience about the role of engineers in a green economy and the difficulties involved in persuading them to consider green technologies.

Dr. S.N. Prasad made a presentation on the status of project on assessing the levels of eco-sensitivity along the Western Ghats being developed by Dr. S.N. Prasad, Dr. MSR Murthy, Ranjit Daniels and Dr K.N. Ganeshiah. The major points emerged include the following: 1) The latest available land use /land cover maps of NRSC (AWIFS) should be used. In addition, the French Institute vegetation maps beginning with the first set of maps dating back from the 1960s may be used for delineating potential climax vegetation and assessing anthropgenic influences. Also data on NDVI for the Western Ghats should be included in the spatial analyses. FSI may also be contacted for obtaining forest density and forest cover maps. A budget for carrying out this work by Drs KN Ganeshiah, Ranjit Daniels, MSR Murthy and SN Prasad for a period of six months was presented.

2) A Track-II initiative to supplement this scientific exercise activity was suggested. In this activity tentative identification of ESAs by the resource persons identified to contribute ~80 different status papers on various themes be initiated immediately. Similarly other existing information bases such as the hotspots of biodiversity identified by the Karnataka Biodiversity Strategy and Action Plan exercise, and any inputs from members of the public should be utilised. The suggested areas along with outputs from activity 1, will then form the basis for field visits by the panel members and subsequently for finalization of ESAs.

Review of actions taken so far:

1. Website: The Western Ghats website is functional and there is good response.
2. Geographical Limits: Various proposals are being considered and for administrative purposes the delineation of the Western Ghats as settled by Dr. M. S. Swaminathan, Member in-charge of the Hill areas in the Planning Commission during 1981 may be taken as a reference.
3. Regarding the issue of assessing the levels of eco-sensitivity along the Western Ghats, Dr. S.N. Prasad made a presentation and defined an 'ecological sensitive area (ESA) as a bio-climatic unit (as demarcated by entire landscapes) in the Western Ghats wherein human impacts have locally caused irreversible changes in the

structure of biological communities (as evident in number/ composition of species and their relative abundances) and their natural habitats'.

It was decided that the Hon. Union Minister for Environment and Forests may be requested to write to various opinion leaders as well as publish in the newspapers a note on 'Ecologically Sensitive Areas' calling for suggestions on this issue. A note on 'Ecologically Sensitive Areas' prepared by WGEEP will be forwarded to the Hon. Minister for further action.

Dr. V. S. Vijayan raised the issue of the need for defining and formulating guidelines for the ESA, as he had done at the third meeting at Dahanu. He felt that unless this is done, no progress can be made in identifying ESAs, which is the primary mandate of the WGEEP.

Dr. Subrahmanyam drew the attention of the Panel to the definition of an ESA as given in the Pronob Sen Report which may be taken as a base for further refinement. The Chairman then pointed out that in that case we would have to declare the whole of Western Ghats as an ESA. Dr. Vijaynan added that this was quite appropriate, and should be done; but in addition we would have to delineate various areas of the Western Ghats according to their conservation importance as ESA class A, B, C and so on. All the shola forests, origin of rivers, biodiversity rich areas should be grouped as class A, where total protection should be given, whereas, Class B and C could be regulated at different levels in terms of human interventions depending on the conservation importance and the socio-economic and environmental setting of the area.

Regarding commissioning of papers, the following is the status as reviewed in the meeting:

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
1	V.B.Savarkar, 464 Rasta Peth, Flat 3, Nr. MSEDC Ltd. Power House, Opposite. Mahalaxmi Motors, Pune-411011. Maharashtra.	Protected Areas Network	Confirmed
2	G S Mohan	Wild relatives of Cultivated Plants and Crop genetic resources	Confirmed
3	D. Padmalal, Environmental Sciences Division, Centre for Earth Science Studies, Thiruvananthapuram, 695031, Kerala	Alluvial sand Mining- the Kerala experience	Confirmed
4	Dr. Ajay Desai Member, Steering Committee Project Elephant B.C. 84, Camp Belgaum Belgaum 590 001.	Elephants	Reminder on 20.7.2010 Telephoned. Will respond soon. Drop if not available.

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
5	A J T Johnsingh, former Dean, Wild Life Institute of India, Bengaluru ---------- Mr. Ashok Kumar, WTI	Wild life poaching	AJT Johnsingh Regretted. Prof. Sukumar contacted Mr. Ashok Kumar who has agreed to write.
6	Kartik Shanker Centre for Ecological Sciences Indian Institute of Science Bangalore 560012	Uropeltid snakes	Confirmed – Considering his ongoing projects on the status and distribution of frogs, lizards and snakes of the Western Ghats, he would prefer to prepare a paper on these groups as a whole rather than on the somewhat narrow theme of uropeltid snakes. This may be agreed to.
7	Bhaskar, formerly UAS, Bengaluru	Balsams	Confirmed – would like to discuss details with Prof. Sukumar
8	K.A.Subramanian Scientist C Zoological Survey of India Western Regional Centre Rawet Road, Sector-29 Vidyanagar Akurdi, PCNT (PO) Pune-411 044	Hill streams	Confirmed
9	T.N.C. Vidya, JNCASR, Bangalore, and N. Basakaran, ANCF, Bangalore	Large mammal populations	Confirmed TNC Vidya wants more time Baskaran - confirmed
10	Ranjit Daniels, Careearth, Chennai Care Earth Trust No 5, 21st Street Thillaiganganagar Chennai 600 061	Birds	Confirmed

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
11	C T S Nair, formerly, FAO, Nilambur Shri S K Khanduri, IFS , "skhanduri ." <skhanduri@sify.com>has agreed to write a paper on working of forests in Kerala.	Working of forests	Regretted. Prof. Madhav Gadgil has been requested to suggest an alternate name
12	E Somanathan, Indian Statistical Institute, Delhi	Incentive based approaches to nature conservation	Confirmed
13	B R Ramesh, French Institute, Pondichery	Trees	Awaiting response Reminder 20.7.2010
14	M D Subash Chandran, CES, IISc, Bengaluru	Sacred groves	Confirmed
15	T R Shankar Raman, Nature Conservation Foundation, 3076/5, IV Cross, Gokulam Park, Mysore - 570 002	Shola- grasslands	Reminder by e-mail 19.7.2010 Telephoned.Will be responding soon
16	A Damodaran, Center for Public Policy, Indian Institute of Management, Bengaluru T R Shankar Raman may suggest	Plantation crops	Regretted. Prof. Madhav Gadgil has been requested to suggest an alternate name
17	Nitin Rai, ATREE, Bengaluru	Tribal Forest Rights Act	Confirmed
18	Ranjan Rao Yerdoor, Nagarika Seva Trust, Gurvayankere Could ask Ranjana Kanhere, Janaarth, Shahada, Nandurbar; 09326160354, janarthorg@rediffmail.com	Joint Forest Management programmes	Awaiting response Reminder 19.7.2010 Contacted on phone. He will send his response soon. May not be able to write.
19	Aparna Watve	Grassy plateaus	Confirmed
20	S N Prasad, SACON	Wetlands	Confirmed
21	Vijay Paranjape	Dams	Confirmed by phone
22	Mrunal Wanarase, Ecological Society, Pune	Regeneration of streams	Confirmed
23	Jay Samant, formerly Shivaji University, Kolhapur	River pollution	Confirmed
24	Kusum Karnik, Shashvat	Religious tourism	Confirmed
25	Vinod Uniyal, WII, Dehra Dun	Ecodeveolpment committees	Confirmed

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
26	K.V.S. Prasad, AME foundation, No. 204, 100 feet ring road, 3rd phase, Banashankari, 2nd block, 3rd stage, Bengaluru, 560085 Shri R. Sridhar, Progarmme Director THANAL has agreed to write	Sustainable agriculture	Regretted
27	Sharad Lele, ATREE, Bengaluru Dr V S Vijayan will suggest an alternative	Watershed management	Regretted
28	Shalini Raghunath, Department of Studies in Folklore, Karnatak University, Dharwad 580 003, Karnataka	Nature in Folklore of central Western Ghats (Karnataka)	Confirmed by phone
29	Pandurang Phaldessai, Member Secretary, Kala Akademy, Panaji, Goa, 91-832-2420451,	Natural resources as reflected in folklore of Goa	Confirmed
30	Dilip Boralkar, Mumbai	Industrial Pollution	Confirmed by phone
31	Shyam Asolekar, IIT, Mumbai;	Functioning of ESA Authority	No response Reminder 20.7.2010 Tephoned : Will respond soon Drop if not available.
32	S. Muralidharan, Sálim Ali Centre for Ornithology and Natural History, Anaikatty Post, Coimbatore - 641 108, Tamil Nadu,.	Pesticides	Confirmed by phone
33	Anil Kumar, MSSRF, Chennai	Wild food plants	Confirmed
34	Shri L. Narayan Reddy, Srinivaspura, Marlenanahalli, Dodaballapura, Hanabe, 561203	Potential of organic farming	Letter sent by speed post. No response. Telephone number does not exist Drop if not available.

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
35	N G Hegde, Formerly of BAIF, Pune	Tree growth on private lands	Confirmed by phone
36	Jayant Kulkarni, Row House 1, Ratan Park Phase 2, 127/5, Sus Road, Pashan Pune 411021	Human–wildlife conflict	Confirmed
37	Sagar Dhara, E-303, Highrise Arparments , Lower Tank, Bund Road Hyderabad 500 080 Let us ask Dr H.C. Sharatchandra, No.66, Belaku, 3rd main, Amarjyothi Layout, Cholanagara, Bangalore-560033, Phone:080 23332480, 2558851, Mob:9448056248, sharatchandra@vsnl.com or sharatchandra@vsnl.net	EIA process	No response Reminder 20.7.2010
38	Mewa Singh, Mysore University, Mysore	Primates	Confirmed
39	Jagdish Krishnaswamy/ Kiran, ATREE, Bengaluru	Criteria for deciding on Ecologically Sensitive Areas	Confirmed
40	Snehlata Nath, Keystone Centre, Groves Hill Road, Kotagiri, Nilgiris, Tamil Nadu	Livelihood security	Confirmed
41	Harini Nagendra, ATREE, Bengaluru Ranjit Daniels may be requested	Landscapes	Regretted Prof. Madhav Gadgil has been requested to suggest an alternate name
42	T R Vijayaraghavan, Let us request: M.S.Viraraghavan Palni Hills Conservation Council Kodaikanal Tamil Nadu; Girija <girija.vira@gmail.com>	Hill stations	Unable to contact. Could not get contact details
43	Anita Varghese, Keystone Centre, Groves Hill Road, Kotagiri, Nilgiris, Tamil Nadu	Non-Timber Forest Produce	Confirmed

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
44	Dr Aravind ATREE	Amphibians	Confirmed
45	Dr Vasudeva College of Forestry Sirsi	Economically important but endangered species	Confirmed
46	Dr Ravikanth ATREE	Conservation of forest genetic resources	Confirmed
47	Mr. D.K. Ved, FRLHT	Medicinal Plants	He will take a few days to send his response
48	NA Madhyastha/Rajendra Mavinkurve Malacology Centre, Poorna Prajna College, Udupi-576101	Land snails of Western Ghats	Confirmed. He wants to include Fresh Water Molluscs and change the title to "Non-Marine Molluscs of WG".
49	PA Sebastian Division of Arachnology, Dept. of Zoology Sacred Heart College Thevara, Cochin-682013, Kerala We may drop this topic	Spiders	E-mails bounced. Unable to get latest contact information. Continuing to find. Drop if not available.
50	Dr Shashidhar Viraktamath University of Agricultural Sciences, Dharwad	Wild bees of Western Ghats: crop pollination deficits	Confirmed
51	Kalyan Kumar Chakravarty (Former Director of Indira Gandhi Rashtriya Manav Sangrahalaya, Ministry of Culture, Bhopal)	Hill forts and cultural heritage, including rock carvings	Confirmed. Wants more time – till November
52	KS Valdiya JNCASR, Bangalore	Geological and palaeobiological heritage (rare rock formations; fossiliferous strata)	Confirmed
53	N M Kamat, Goa University	Ethnomycology of western ghats (focus on edible, medicinal, toxic and hallucinogenic species)	Confirmed
54	D.J.Bhat, Goa University	Microbial habitats and resources-terrestrial	Confirmed

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
55	K.R.Sridhar, Department of Biosciences Mangalore University	Microbial habitats and resources-aquatic	Confirmed
56	Urmila Makhija, Agharkar Research Institute, G.G. Agarkar Road, Pune-411 004	Lichens	E-mail to aripune id bounced. Managed to get another e-mail id and spoke to her on phone. She will respond soon. Drop if not available.
57	K. Gopalkrishna Bhat Dept of Botany, Poornaprajna College, Udupi We may drop this topic	Conservation of Pteridophytes and Gymnosperms of Western Ghats	Regretted Drop if not available.
58	C.Achalender Reddy, I.F.S, Secretary, National Biodiversity Authority, 5th Floor, TICEL Biopark, Taramani, Chennai - 600 113 Tamilnadu, India.	Ecotourism development and opportunities in Western Ghats	Confirmed
59	Norma Alvares, Goa Foundation G-8, St Britto's Apts, Feira Alta, Mapusa, Bardez, Goa – 403507, Ligia will provide an earlier paper by Norma on this topic.	Environmental PIL and judicial activism: A Western Ghats NGO perspective	No response Reminder 20.7.2010 Telephoned – Very doubtful of writing
60	A. Sundara, Director of the Post-Graduate Research Centre of the Karnataka University at Bijapur	Prehistoric and protohistoric cultural heritage of Western Ghats	Confirmed on 21.7.2010 In the USA till end of October. Sent the invitation by e-mail.
61	Raghunandan Raghavan, IAS(Retd), No 1 KPTCL Quarters, Hosakerehalli Main Road, Bangalore 560085	Need for enhancing the role and capacity of the Panchayats for improving governance in the Western Ghats districts,	Confirmed. Needs periodical reminders

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
62	Antonio Mascarenhas, NIO, Dona Paula, Goa, Ligia may suggest alternative	Tourism-Legal, technical, ecological and environmental issues (Goa, Konkan, Coastal Karnataka) esp. w.r.t. CRZ, geo and ecohazards, SLR etc.	Regretted
63	Alito Sequiera, Associate professor, Dept. of Sociology, Goa University, Taleigao, Goa, 08326519308 Ligia may suggest alternative	Tourism–social, cultural issues	No response Reminder 20.7.2010
64	Ranjan Solomon ,149/D, Gina, Maina-Curtorimn Salcete, Goa – 403709, Ligia may suggest alternative	Tourism–cultural, social ethical issues	No response Reminder 20.7.2010 Telephone numbers are not working
65	Dr T T Sreekumar Assistant Professor, Communications and New Media Programme National University of Singapore	Tourism in Kerala–social, cultural impacts	Auto message – Out of town Drop if not available.
66	Ramesh Ganwas, Senior teacher, Govind Gunaji Sawant High School, Sarvona, Bicholim Ligia may suggest alternative	Mining (Konkan and Goa) Mining–people's perspectives	Letter sent by speed post. Awaiting response
67	Rajendra Kerkar, Gonteli, Keri, Sattari, Goa	Mining–Goa, Konkan (social, ecological)	Confirmed
68	Glenn (GMOEA) Ligia may suggest alternative	Mining–Geological and Economic perspective	Unable to get contact details

#	Name	Theme	Status as on 21.7.2010 Confirmed/Regretted/No response/Unable to contact
69	Gujarat Ecological Society	Mining (Gujarat)	Sent an e-mail to the Director requesting him to suggest names of people to write on this theme. No response. Telephoned: They have a new director – Dr. Anil Karnik who is out of town, returning on 26th July.
70	Kanchi Kohli, Kalpavriksh	Mining (Karnataka)	Confirmed. But wants some clarifications before writing.
71	Dr Murthy, NRSC, Hyderabad	Land cover monitoring	Confirmed
72	Pratim Roy Director Keystone Foundation	Tourism	Awaiting response
73	Mathur, WII, Dehra Dun	Wildlife Tourism	Regrets?? Prof. Sukumar to contact
74	M P Nair	Keystone species	Trying to get latest contact information.
75	T R Shankar Raman or V S Vijayan may suggest	Transport infrastructure	
76	Sankaran, KFRI	Invasive species	Confirmed
77	Suresh, EQUATIONS	Tourism in forest areas	Awaiting response Reminder 20.7.2010
78	Gautam, CPCB	Systems of environmental monitoring	Awaiting response Reminder 21.7.2010
79	Kranti Yardi, Bharati Vidyapeeth Institute for Environmental Education and Research, Pune, 020-24275684, kranti@bvieer.edu.in	Maharashtra Western Ghats: an ecological status report	
80	Shamita, Bharati Vidyapeeth Institute for Environmental Education and Research, Pune, 020-24275684, shamita@bvieer.edu.in	Maharashtra Western Ghats: identifying critical areas	

The Chairman informed the Panel of his interaction with the Chairmen of the two Statutory Authorities established by the Ministry of Environment and Forests, GOI, namely, Justice Bhaskaran of Loss of Ecology Authority, Chennai, and Shri Bhure Lal of Environment Protection (Prevention and Control) Authority of Delhi regarding their advice on the nature, constitution, powers and functioning of the proposed Western Ghats Ecology Authority.

The main suggestions that emerged were:

1. The Authority should not merely be a recommendatory authority, but a statutory authority exercising powers conferred under the Environment Protection Act.
2. The Authority should identify specific environmental issues on which it should focus. Examples of such issues could be: protection of upper catchments of rivers, conservation of germplasm of wild relatives of cultivated plants, prevention of groundwater pollution, and so on.
3. Having identified its focal issues the Authority should devise a strategy of dealing with them.
4. The Authority should be in position to arrange for field investigations, marshal facts and institute action.
5. The Authority should liaison with concerned Government agencies and persuade them to act.
6. The Authority should work with people while maintaining an appropriate distance.

The Chairman then introduced the new responsibilities assigned to the Panel by the Ministry of Environment and Forests seeking the comments / opinion of the Panel in respect of the following three projects:

1. Gundia Hydroelectric Project,
2. Puyankutti Hydroelectric Project and
3. Athirappilly Hydroelectric Project

In addition to the above three, the Ministry also sought views on projects in Ratnagiri and Sindhdurg, Maharashtra.

The Chairman requested Dr. Nalini Bhat, Advisor, MoEF, to give the Panel a brief background to the projects referred toabove. Dr. Nalini Bhat briefly explained about the three projects which were being examined in the Ministry for environmental clearance through the Expert Appraisal Committee and to begin with requested the Panel to provide their comments / suggestions on the Gundia Hydroelectric Project in Karnataka. The following points emerged:

(i) The Panel may undertake a site visit to Gundia and Arthirappilly to study the environmental scenario on the ground and the likely environmental impacts on the ecology of the region and on humans settlements.

(ii) The Ministry has initiated Carrying Capacity Studies of mining in Goa and of the Teesta River in Sikkim. Also the Government of Karnataka has initiated a carrying capacity study in Uttar Kannada. The terms of reference of these studies will be studied by the Panel to initiate such studies in Western Ghats Region.

(iii) The Panel opined that it may be appropriate to defer their comments / suggestions on the projects referred to them till the levels of eco-sensitivity in Western Ghats Region are identified and demarcated.

Dr. Ligia Noronha during the interactive discussions suggested the following tentative checklist on things that the Panel needs to focus on, discuss and write about:

1. What regulations regarding development activities are needed to be put in place within the ecological zones identified
2. Key principles of sustainable development that must be followed in the following activities in the districts of the Western Ghats: Plantations, Agriculture, Mining, Ecotourism, Infrastructure needs and Hydroelectric projects
3. Need to study existing Land Use Policies and Plans of Western Ghat states
4. Linking the Panel's work to emerging initiatives for Panchayats
5. Identifying ways to get the acceptance of people: green dividends, benefit sharing etc.
6. Identification of institutional supports: review of Boards, Councils, BMC, ZPs

The next meeting of the Panel will be held in Delhi with the MPs from the Western Ghats Region.

The meeting ended with a vote of thanks to the Chair.

Minutes of the Meeting of the MPs of the Western Ghats Region with the Minister of State (I/C) Environment and Forests along with the Members of the Western Ghats Ecology Expert Panel held on 17th August, 2010 at Parliament House Annexe, New Delhi.

A Meeting of the Members of Parliament (MPs) of the Western Ghats Region with the Members of the Western Ghats Ecology Expert Panel (WGEEP) was held under the Chairmanship of Shri Jairam Ramesh, Minister of State (I/C) E&F on 17th August, 2010, at Parliament House Annexe, New Delhi.

Shri Jairam Ramesh, Hon'ble MOS (I/C) E&F initiated the proceedings by welcoming all the MPs and other officials participating in the meeting. He then introduced Dr. Madhav Gadgil, Chairman of the WGEEP as a distinguished ecologist of the country who was also involved in the efforts to protect the Silent Valley area in Kerala. Dr. Gadgil, he stated, is also a member of the National Advisory Council set up by the Government of India under the Chairmanship of Smt. Sonia Gandhi. The Minister mentioned that one of the important mandates of the WGEEP is to demarcate ecologically sensitive areas in the Western Ghasts Region with a view to notifying them under the Environment (Protection) Act, 1986. The Minister also introduced all the members of the WGEEP and the staff of MoEF to the MPs. He then invited Dr. Madhav Gadgil, Chairman, WGEEP to make a presentation on the mandate and the work done so far by the WGEEP including the need to protect, conserve and preserve the region.

Dr. Madhav Gadgil then made a detailed PowerPoint presentation on the Western Ghats Region covering its rich biodiversity, natural and human resources, agrobiodiversity, aesthetic appeal etc. The presentation also covered the impacts of unplanned and destructive development in the region. He then briefed the MPs about WGEEP, its Terms of Reference, the work done by the Panel so far and requested all MPs to provide their valuable inputs to enable the Panel to make realistic recommendations for conservation, protection and rejuvenation of the Western Ghats Region.

The Minister gave a brief background on the constitution of the WGEEP and informed the MPs about the importance of conservation of biological diversity especially in the Western Ghats Region which is one of the World's recognized Biodiversity Hotspots. In this context, he informed the MPs about the forthcoming 10th Conference of Parties (CoP) to the Convention on Biological Diversity (CBD) to be held in Nagoya, Japan in October this year and the 11th CoP, which is being hosted by India in Oct, 2012. He also mentioned that there is a need to have focused attention on the Western Ghats Region as is being done for the Himalayan region.

The Minister then stated that the main idea of today's meeting was to inform the MPs about the working of the WGEEP and that the final aim of the Panel is to identify 'No Go' areas in the Western Ghats Region where no development would be allowed and to identify those areas where development needs to be regulated considering the environmental sensitivity and ecological significance of the region. He also clarified that the intention of the Ministry is not to stop development but to come out with ideas and solutions to integrate environmental issues with development so that we may achieve sustainable development of the region.

He expressed happiness at the remarkable attendance of the MPs from the Western Ghats Region and said that it shows the keen interest the MPs are taking in environmental issues

relating to the Western Ghats Region. With these introductory remarks, he invited the views and suggestions of all the MPs.

All the MPs agreed with the need to protect and preserve the environment of the Western Ghats Region including its Forests, Wildlife and other natural resources. They also congratulated the Minister for having constituted the WGEEP and for convening the meeting of the MPs with Experts which is the first of its kind and they appreciated the democratic process of consultation adopted by the Minister in this regard.

The main points raised by the MPs are summarized State-wise below:-

Kerala:

1. The Athirappilly issue which has already been examined by other Committees of the Ministry should not be re-opened.
2. Demarcation of ecologically sensitive areas should not result in disturbing settled people, i.e. areas where people have been living for centuries should not be disturbed.
3. Cut-throat measures such as providing monitory compensation to adivasis as is being done under the Tiger Project, should not be used in rehabilitating people while preserving forests and wildlife.
4. Biodiversity Committees exist in every Zilla but most of them do not have a specific agenda. MoEF may consider giving a specific agenda to these committees.
5. New Guidelines need to be developed for identifying Ecologically Sensitive Zones (ESZs) as the common man cannot understand these categories. The Guidelines may contain the criteria for identification of ESZs and the level of sensitivity of the area etc. Geomorphologic Zones may also be included in ESZs so that they can be visualized.
6. There are a lot of legal problems and issues in the Western Ghats of Kerala since the promulgation of the Kerala Forests (Vesting and Management of Ecologically Fragile Lands), Act, 2003. In areas already declared as Ecologically Fragile Lands (EFL) under this Act, it is difficult to carry out even normal agricultural activities, such as plucking of coconuts. This aspect needs to be taken into consideration while demarcating ecologically sensitive areas by the WGEEP.
7. In the Idukki- Munnar region, more than 200 acres of Cardamom Plantations have been classified as forest land. The Cardamom Reserve Land and the CHR issues of Idukki district needs to be settled soon.
8. The State of Kerala is in the process of formulating / implementing organic farming policies as pesticides are reaching the rivers, thus polluting the water, food and soil. Presence of heavy metals and pesticides in fish indicates the seriousness of the situation. This needs to be taken into consideration by the WGEEP.
9. The approach of WGEEP in demarcating areas should be realistic and the Panel must consult the State Government, the Panchayats and even people at the grassroot levels before making recommendations.
10. The issues relating to human–wildlife conflicts, especially at Erimala, which is at the boundary between Kerala and Karnataka, need to be resolved.

11. Millions of rupees in fuel can be saved if the Kottam-Ambasamudram Road between Tamil Nadu and Kerala is opened for traffic.
12. At the Periyar, Munnar and Anaimudi areas, no compensation has reached the affected people so far. Whether the Anaimudi area is going to be declared as a Biosphere Reserve or not may be clarified.
13. WGEEP should have more members. Protection of the Western Ghats should not be taken over by environmental fundamentalists.
14. The WGEEP should also identify and document alternative energy projects that are implementable in Kerala as the State is really short of energy and has no gas or coal.
15. Whether it is possible to regenerate biodiversity once it is destroyed may also be clarified.
16. Different Ministries of the Government are implementing several projects / schemes for development of the region which have similar objectives. But, as there is no coordination / interaction between the Ministries it results in duplication of efforts. There should be a more integrated approach to development between the Ministries of Panchayati Raj, Rural Development and Environment & Forests.
17. The pesticide endosulfan already banned by 62 countries of the World is still being used in India. The WGEEP may look into this issue.

Maharashtra:

1. The illegal encroachments in Koyna Wildlife Sanctuary, now declared as Sahayadari Tiger Project in Maharashtra, are serious and need urgent attention of MoEF. More than 500 trees have been cut illegally within the Sanctuary area and over 215 windmills and 10 Resorts have been set up within the premises of the Sanctuary without permission from the Forest Department. A 6.5 Kms stretch of bituminous road has also been constructed under the Prime Minister's Gram Sadak Yojana without requisite permission from the Forest/ Wildlife Department.
2. In 1965, the Koyna Hydro Electric Project displaced more than 100 villages. No justice has been done to these villagers till date, i.e. even after 45 years. WGEEP must keep such realities in mind, while declaring any area as ESA, which may result in displacing people.
3. The main focus of the Government and its policies must be on the improvement of the lives of the common man. We need to protect people first. In Ratnagiri and Raigarh districts there are very high levels of poverty and unemployment, resulting in the men of the villages migrating to Mumbai, leaving only the women and old people in the villages. These areas, therefore urgently need development, which will lead to generation of jobs and alleviation of poverty. This may be kept in mind while declaring 'No Go' areas in the Western Ghats Region of the State.
4. Setting up of a Sewage Treatment Plant in Matheran which has been pending since long needs to be expedited. The WGEEP is requested to undertake a site visit to Matheran which is already a notified eco-sensitive area by the MoEF.
5. The Maharashtra-Krishna Valley Corporation administers more than 11 major dams. Whatever land there is in Satara district, belongs to the Forest Department. Villages in buffer areas should be de-notified. Though there are massive tree plantations in this area under US-aided projects, the villagers do not have enough food from their

lands. Agro- and eco-tourism are the only sources of income for the people in the buffer area.

6. The High Level Monitoring Committee (HLMC) for Mahabaleshwar-Panchgani Region, consists of 7 Members from Government Departments and only 3 members are subject experts. The Chairman of the HLMC is not performing his duties effectively. These issues may be examined/ rectified by the Ministry.
7. In Thane district, several environmental problems are being faced such as: (a) Rampant destruction of mangroves, (b) Indiscriminate land filling of Hazardous Wastes, (c) Effluent Treatment Plants (ETPs) being run by private operators do not maintain the BOD, COD limits specified and thus pollute the rivers affecting the poor fishermen and (d) Levelling of natural hillocks for construction purposes.

Tamil Nadu:

1. There is practically no development at all in the Ambasamudram, Kutrallam areas of Tamil Nadu, except for the Papanasam Hydro Electric Project. The Ambasamudram-Thiruvananthapuram Road has been pending for more than 50 years. But inside the declared forests, there are so many well-laid roads, which, ironically are being used by anti-social elements for illegally cutting and transporting trees.
2. While protection of forests and wildlife is no doubt important, it must also be noted that it leads to increase in human–animal conflicts. Poor village farmers' cultivated areas are destroyed by wild pigs, which sometime also attack people. Elephants routinely enter banana plantations and cause severe loss to the farmers' livelihood.
3. The problems faced by small farmers holding agricultural land adjacent to / bordering forests need special attention. In fact, many such farmers in Tamil Nadu are ready to surrender such lands, as they are unable to do anything with these lands as most of them are classified as protected areas. Whether there is any scheme for providing compensation to such farmers needs to be examined. This issue needs to be kept in mind by the WGEEP while demarcating eco-sensitive zones.
4. There is need for bringing about awareness among school children of the importance of planting trees and they should be encouraged to plant trees in their respective areas.
5. The rope way project between Palni and Kodaikanal – 13 km long – needs to be expedited.

Goa:

1. The State of Goa is narrow with no width. The Goa Panchayats have no land at all. These issues are specific to the State of Goa. The WGEEP must therefore take the State Government into confidence before coming out with recommendations for declaring ESAs in the State.
2. State-owned Forest Corporations, especially those of cash crops such as rubber and cashew, must be replaced by perennial forests.
3. The Forest Department should not limit its role only to distribute saplings – it should also be involved in planting saplings at the appropriate time and in protecting them on a sustained basis.

Karnataka:

1. Income-generating Community Forest programmes are being implemented in every Panchayat of Karnataka and are being received enthusiastically by the people. However, the land on which such forests are to be developed is very degraded. The State Government. is ready to provide plants and the villagers are ready to plant and protect them. MoEF is requested to provide guidance to such programmes under the Green India Mission.

Response of MoS (I/C) E&F

Summing up the discussions, MoS (I/C) E&F made the following points: -

1. As far as Constituency Level issues are concerned, MoS (I/C) E&F will respond to each of the MPs individually.
2. The request of all the MPs of Kerala, regarding Athirappilly issue to be exempted from WGEEP's mandate, was noted by the Minister.
3. Regarding specific areas such as Athirappilly, Pooyankutti, Ratnagiri, Sindhdurg etc. separate 'Status Reports' will be prepared.
4. All the analysis/ findings/ recommendations of the WGEEP will be discussed with all the six concerned State Governments. Demarcation of ESA, 'No Go' areas, 'Go Areas' subject to environmental safeguards will be shared with the State Governments. The working of the WGEEP and demarcation of ESAs will be done in a most democratic manner.
5. The Chairman of WGEEP is the greatest champion of public consultation. The members of WGEEP are fully aware of the need and importance of public consultation. The Panel's work will be done only through an interactive/ democratic process.
6. If any MPs of the concerned state or State Government forward names of experts to be co-opted as members of the WGEEP, it will be considered.
7. MoEF recognizes that the State of Kerala will need a special dispensation, as the area of forest in proportion to the land area is the highest in the State. We cannot wish away settlements where people have been living in the same area for more than 100 years. Such settlements will be given special consideration.
8. Regarding the endosulfan issue, Chairman CPCB has been requested to get a technical report prepared on the implications of the use of endosulfan. With this, the Minister once again thanked all the MPs from the Western Ghats Region for their participation in the Meeting as well as for their valuable suggestions to the WGEEP.
9. After this meeting the WGEEP met separately under the Chairmanship of Prof. Madhav Gadgil and it was decided that the next meeting of the WGEEP will be held at Goa between 26th–29 September, 2010. The meeting will also include a site visit by the Members of the Panel to the mining areas to understand the environmental situation of the mines of the State.

The meeting ended with a vote of thanks to the Chair.

Minutes of the Sixth Meeting of Western Ghats Ecology Expert Panel held at National Institute of Oceanography, Goa between 26–28 September 2010

The Western Ghats Ecology Expert Panel (WGEEP), met on 26th, and 28th September, 2010 at National Institute of Oceanography, Goa.

The following members were present:

Prof. Madhav Gadgil	Chairman
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Prof. (Ms.) Renee Borges	Member
Dr. Ligia Noronha	Member
Ms. Vidya S. Nayak	Member
Dr. G.V. Subrahmanyam	Member Secretary

WGEEP panel members Dr. P.L. Gautam, Chairman, National Biodiversity Authority; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad;Prof. S P Gautam, Chairman, Central Pollution Control Board; Dr. R. Sukumar, IISc, Bengaluru; Dr. K.N. Ganeshiah, UAS, Bengaluru; Dr. R.V. Verma, Chairman, Kerala Biodiversity Board; Dr. D.K. Subramaniam, IISc, Bengaluru, could not attend the meeting. Shri Neeraj Khatri (Deputy Director, MoEF) and Dr. Amit Love, (Deputy Director, MoEF) were also present during the meeting.

The Chairman welcomed the Members of the Panel and briefly explained the agenda items following which the agenda items were taken up individually for discussion. The agenda items are enclosed at Annexure 1.

1) Confirmation of minutes of the 5th meeting of WGEEP

The minutes of the 5th meeting of WGEEP were confirmed without any modifications by the panel.

2) Review of actions taken so far

a) Review of progress of website, geographical delimitation of the Western Ghats and project on levels of ecosensitivity along Western Ghats

The Panel reviewed the progress achieved on the website, geographical delimitation of Western Ghats and Project on levels of ecosensitivity along Western Ghats. The Panel was of the view that the progress achieved was satisfactory.

b) Status of commissioned papers

The status of commissioned papers was examined in detail. The Chairman informed the Panel members that commissioned papers have begin to come in. The following four commissioned papers have been received (i–ii) Landscape and Birds of Western Ghats – Dr. Ranjit Daniels, (iii) Alluvial sand mining – Dr. D. Padmalal, and (iv) Tree growth on private lands – Shri N.G. Hegde

The Chairman asked Dr Vijayan to follow up the commissioned paper on organic agriculture. The Chairman informed the members that Dr. M.H. Swaminath of Karnataka Forest Department has agreed to do a commissioned paper on "Effects of roads, railways, transmission lines on Western Ghats ecology" and Ms. Geetha, IISc Bangalore was requested to send a formal communication to Dr Swaminath about this.

Mr. Edger Ribeiro, former Chief Town Planner, GOI, has received a formal invitation to write a commissioned paper on land use policy in the Western Ghats. The Chairman informed members that the paper on ecosensitive areas to be published in *Current Science* would be ready in 10 days.

Mr. Glenn Kalampavara of GMOEA was also to be asked to contribute a paper on mining issues and practices in Goa.

3) Reporting items

a) Discussion with Director, Town and Regional Planning, Government of Maharastra

Professor Madhav Gadgil, Chairman, WGEEP, informed the panel members about his meeting with Director (Town Planning) Maharastra. He informed the members that the Town and Country Planning Act and Town and Country Planning Code provide the framework for formulating regional plans. He also mentioned that district-level regional plans can be sourced from Director (Town and Country Planning) of each state. The Chairman entrusted responsibilities of the following members for collection of District-wise regional plans

1) Dr Vijayan – Kerala

2) Dr. Renee Borges – Karnataka

3) Shri B.J. Krishnan – Tamil Nadu

The ministry will send letters to the concerned officers in the state governments with copies endorsed to members in this regard

The Chairman mentioned that Prof Sukumar may be requested to send whatever information is available on the Uttara Kanada Carrying Capacity study done by Professor T.V. Ramachandra to be uploaded on the website – www.westernghatsindia.org.

b) Interaction with Karnataka Government's Western Ghats Task force and site visit to proposed Gundia hydroelectric power project site

Prof Madhav Gadgil informed the panel members about the interaction with Karnataka Government's Western Ghats Task force and the site visit to the proposed Gundia hydroelectric power project by two panel members and the Member Secretary of the panel (Professor Madhav Gadgil, Ms Vidya Nayak and Dr. G.V. Subrahmanyam) along with officials of MoEF.

He mentioned about the detailed and productive discussion the Panel members (Professor Madhav Gadgil, Dr. Renee Borges, Ms Vidya Nayak, Dr. G.V. Subrahmanyam) had with State Forest Department officials and Karnataka Government's Western Ghats Task force at Aranaya Bhavan, Bengaluru.

With reference to the site visit to the proposed Gundia hydroelectric power project, Prof Madhav Gadgil informed the members that the Karnataka Power Corporation Limited alleged that it was a 'secret' site visit and that they were not informed. In this regard Prof Madhav Gadgil detailed the chronology of events in undertaking the site visit.

At the outset, a letter was sent to Principal Secretary (Environment), Government of Karnataka three weeks before the proposed visit. Apparently, she was on leave. Ms. Vidya Nayak, Member, WGEEP, arranged the site visit through the Chairman, Biofuel Taskforce, Government of Karnataka, who holds a Minister of State rank in the Government of Karnataka. Karnataka government officials were informed through him. The collector of Hasan district, where the project site is situated, was also informed.

Prof Madhav Gadgil clarified that officials of Karnataka Power Corporation Limited (KPCL) gave him a copy of the presentation given by KPCL to the Expert Appraisal Committee of MoEF. The KPCL officials were also present at the public consultation held at the site and they also met the Collector of Hasan District along with the Panel members. Hence there was nothing 'secret' about the site visit.

During the deliberations among the Panel members it was suggested that clarifications regarding the Gundia visit would be put on the WGEEP website. Further, it was also suggested that Dr. G.V. Subrahmanyam, Advisor, MoEF, could write to the Managing Director of KPCL. Ms Vidya Nayak informed the Panel members that the Gundia visit was publicized using handouts, flyers and the local press.

c) Thematic discussion – Round table with civil society, industry and government of Goa on 27th September 2010

The Panel observed the following points raised by the two major groups:

Points raised by the Goa Foundation and other Environmental Groups:

1. The mining licenses given prior to 1980 have to be revisited and cancelled.
2. All the Wildlife Sanctuaries in the State should be declared under Ecologically Sensitive Areas.
3. Licenses given for mining inside the Sanctuaries should be cancelled.
4. Any orders for de-notifying any area from existing Sanctuaries for any purpose, including mining, shall be revoked in line with the recommendations of the CEC.
5. The proposal of the Goa team to declare four sanctuaries along with adjacent areas as a tiger reserve may be recommended by the WGEEP.
6. The Sahyadri Ecologically Sensitive Area (SESA) proposal of recommending the four Sanctuaries to be notified as an ESA shall be revisited in compliance with the criteria developed for the whole of the Western Ghats by the WGEEP and also considering the proposal of the State Pollution Control Board given in its Environment and Zoning Atlas. Copies of the above proposals should be obtained by the WGEEP.
7. Sacred Groves and Ecosystems of Sadas should be declared as ESAs.
8. Lateritic plateaus in Goa are rich in biodiversity and hence, should be considered for ESAs.
9. Mining in the Thalvadi Irrigation project must be stopped.
10. The Goa Government's proposal for "Zero buffer" for the Sanctuaries shall be rejected outright and fixed at 10 km.
11. There is an indication of increasing incidence of human–wildlife incidence which should also be considered while recommending the area for a buffer zone.

12. Mining leases within a three km radius of wildlife sanctuaries should be terminated.
13. Mining leases in the Selaulim Dam should be revoked.
14. No mining should be permitted in the Forest Working Plan Divisions of North and South Divisions.
15. No forest clearance should be given for mining as there is no land available for compensatory afforestation and, moreover, compensatory afforestation schemes have been a failure.
16. Mining causes depletion of ground water leading to water scarcity in the area.

Points raised by the Federation of Indian Minerals Industries (FIM) Southern Region:

1. Delineation of the Western Ghats needs to be put down on a map which has to be tied to the coordinates of the Survey of India topo-sheets.
2. Similarly, the boundaries of Wildlife Sanctuaries and National Parks have to be accurately defined so that there is no confusion on the ground.
3. The developmental needs of the people and the states have to be considered always keeping in mind ecological and environmental concerns.
4. Mining and agriculture are the only two activities which create value out of mother earth. If minerals are not extracted, their worth is the same as mud.
5. The employment potential of mining is huge as apart from the persons directly employed, an army of people is engaged in loading, transportation and ore treatment plants. It also spawns ancillary activities like workshops, eateries, schools and hospitals. It is estimated that for every person directly employed, ten other jobs are generated.
6. There are also many environmental-friendly technologies available. The use of ripper/ dozers or "surface miners" obviates the need for blasting. In certain deposits, underground mining is an option and the environmental impacts are much less in that case than in open-cast mining.
7. Transportation also plays a major role in pollution. Alternatives like conveyors and aerial ropeways can be considered particularly in hilly terrain.
8. A point to be considered is that in the absence of economic activities, the youth particularly tend to get disaffected and led astray. A case in point is that after the closure of Kudremukh, naxalism has raised its head in the area.
9. Therefore, FIM's suggestion is to declare the present sanctuaries and parks as eco-sensitive areas and leave the rest of the Western Ghats for developmental activities.
10. FIM, from the perspective of a responsible mining industry, will pledge to follow sound mining practices and participate in the overall development of the areas.
11. Not only will mines comply with all environmental laws, many are already going beyond what is statutorily laid down.
12. The mining industry is also willing to contribute 26% of the royalty (over and above the current royalty) towards a Development Fund to be channelized into the areas around the mining areas. It will also follow the Relief and Rehabilitation policy of the government.

13. On the export of iron ore, FIM categorically stated that 90% of exports are iron ore fines and inferior grades which no domestic producer of iron will touch. If a product can be sold economically in the domestic market, which producer will like to export it and that too after paying export duty?

Both the parties expressed their willingness to cooperate with the WGEEP for any further discussion on the issue.

Following the discussion, Dr Vijayan observed that although the economic return from the mining activities have been highlighted, there apparently has been no comprehensive study on the loss/impact on the environment, human health, ground water, biodiversity and other aspects of ecology. Till such a study is done there has to be a moratorium on mining.

The Panel decided to discuss the matter further at the next meeting of the WGEEP scheduled on 28 and 29 October at Pune.

The Panel members expressed their satisfaction on a very meaningful round table discussion with civil society, industry and the government of Goa with a specific focus on iron ore mining in the Goa Western Ghats**.** Dr. Ligia Noronha brought to the notice of the panel that for the Goa meeting, site visit and round table discussion, she had written to government officials on 7 September 2010 by email but got no response from them. Dr. G.V. Subrahmanyam, Advisor, MoEF, had also written to the Secretary (Environment) Goa informing about the meeting of the Panel. The Panel noted the lack of responsiveness of the state government officials.

d) Site visits to iron mines in Goa and Mhadei and Bhagavan Mahavir Wildlife Sanctuary

The Panel members along with officials of the State Forest Department had site visits to the forest and mining regions on the 28th. The Panel members visited the Sankelim iron ore mines of Sesa Goa and were shown the activities in place for ecological restoration in this non-active mine. It was also shown an active new mine that has commenced in the area and that has been made profitable due to the increased demand from China and the rise in iron ore prices. Unfortunately the Panel was unable to see other active mines, despite requests to the Goa Government to arrange for a more detailed visit to the mining region. However, the Panel was given detailed presentations and documentation by non-governmental organizations, and also got responses by the mining industry to issues raised by NGOs on the 27th on mining in Goa. This is documented in the note on that consultation.

The Panel members also visited the Mhadei Sanctuary, Anjuna Dam area and fringes of the Bhagavan Mahavir Wildlife Sanctuary to understand the proposal of the State Forest Department on notification of ecologically sensitive areas around these Sanctuaries. The Panel noted the proximity of some of the mines to the Sanctuaries and reflected on some of the impacts that this proximity could have on the forests. The impact of mining on wildlife corridors was also discussed with State forest officials.

e) Proposed interaction with Secretary (Environment), Government of Maharastra on 30th September 2010

The Chairman informed the Panel members about his scheduled interaction with Secretary (Environment), Government of Maharastra and other officials of the Maharastra Government on 30th September 2010.

f) On-going preparations for visits to Ratnagiri-Sindhudurg districts from 4th to 12th October 2010

Prof Madhav Gadgil informed the panel members that Maharastra Government is well aware about his field visit to Ratnagiri and Sibdhudurg districts. He also mentioned that the collector of Ratnagiri wants to meet him. Further, he informed the Panel Members that while 21 Gram Panchayats of Sindhudurg want to be part of an ecologically sensitive area, on the other hand the vice president of the Zilla Parishad of Kolhapur expressed that the villagers don't want Kolhapur to declared as an ESA. Professor Madhav Gadgil said that he is planning to arrange for a meeting with Zilla Parsihad members and to have an open discussion on ecologically sensitive areas

The Chairman, WGEEP, informed that Dr. Sharat Chandra, ex-Chairman Karnataka Pollution Control Board, has agreed to do a study on the impact of urbanization of Ratnagiri and Sindhudurg districts. He has submitted a proposal to the MoEF for the same and he has been advised by the MoEF to reassess and revise his budgetary requirements.

g) Definition and criteria for identification of ecologically sensitive areas

Prof. Madhav Gadgil initiated the discussion on the criteria for identification of ecologically sensitive areas. He outlined the primary and auxillary criteria listed by the Pronab Sen Committee for designating an area ecologically sensitive. These criteria could be classified based upon biodiversity, ecosystem and geomorphological features. The important parameter in this report for identification of an ecologically sensitive area is the presence of endemic species. Prof Madhav Gadgil mentioned that there is difficulty in using these criteria as the only basis for identification of ecologically sensitive areas in the Western Ghats, as the total area of the Western Ghats would qualify as ecologically sensitive, and it would be necessary to look for additional ways to suggest a more graduated regime of regulations. He suggested that resilience of an ecosystem is now considered to be a more meaningful criterion for characterizing ecological sensitivity. Resilience of an ecosystem could be viewed as the ability of the ecosystem to recover from anthropogenic perturbations. The important issue in using ecosystem resilience as a criterion for assessing ecological sensitivity is how resilience of ecosystems can be measured. Prof Madhav Gadgil elaborated the work carried out by Dr. Ranjit Daniels at the landscape level wherein Dr. Daniels had compared landscapes having undisturbed vegetation and landscapes where vegetation was disturbed due to external perturbations. Based upon the ability of the ecosystems in the disturbed landscapes to recover or maintain themselves ecological sensitivity could be graded. Hence ecosystems could be classified as more or less resilient.

Further Prof. Madhav Gadgil expressed his views that a graduated or layered approach would be a better means to identify the ecologically sensitivity of an area, rather than a binary approach of 'sensitive' and 'not sensitive' areas in terms of ecological sensitivity. The categorization of ecological sensitivity would allow certain sets of activities to be permissible for a certain area depending upon the level and nature of its ecological sensitivity.

h) Notification of ecological sensitive areas around protected areas in Goa

MoEF informed members about the issue of notification of ecologically sensitive areas around National Parks and Wildlife Sanctuaries in all the states. The panel members were also informed that the Goa state government has submitted its proposal for notification of ecologically sensitive area around 6 National Parks and Wildlife Sanctuaries falling within the Western Ghats range. The area to be notified as ecologically sensitive around the 6 National Parks and Wildlife Sanctuaries varied from 0–6 km on a case-to-case basis. MoEF

requested the panel to consider these proposals in its broad mandate of Ecologically Sensitive Areas in the Western Ghats Region.

i) Development issues and ecologically sensitive areas

Shri B.J. Krishnan brought to the notice of the panel that most of the hydel projects are invariably present in areas which can be classified as ecologically sensitive. Dr. Ligia Noronha pointed out that a distinction has to be made between run-of-the-river versus water storage projects. Ms. Vidya S. Nayak highlighted the issue that the whole concept of micro-hydel projects being less environmentally damaging is defeated by the fact that micro-hydel projects need to have grid connectivity resulting in cutting down of forests for laying of power lines. Dr. Ligia Noronha said that there is no justifiable reason for large-scale land requirement for setting up power projects. Further, there is an urgent need for optimizing land area requirement per unit energy produced. Prof. Madhav Gadgil pointed out that environmental impacts of laying transmission lines are not factored into Environmental Impacts Assessment reports.

Prof. Madhav Gadgil suggested that a brainstorming session could be held at IISc, Bengaluru, with specific reference to the power sector and role of power in the development strategy of the Western Ghats. He further suggested that the brainstorming session can cover (i) issues and options related with the power sector and (ii) the role of the power sector in the regional development strategy for the Western Ghats.

Dr. Vijayan wanted to clarify the terms of reference of the Panel under which the development strategy of the Western Ghats will be covered. The Chairman clarified that broad issues relating to development strategy and sector-specific issues related to power, road, railways are covered under item no 3 of the terms of reference of the panel.

4) Decisions needed

a) Future site visits

Chairman, WGEEP, brought out the issue of future site visits for consideration of the members. He suggested one of the areas which can be considered for a site visit is the Western Ghats region between Mumbai and Pune. This segment of the Western Ghats is under tremendous pressure of urbanization. Many residential and tourist complexes are coming up in this region,e.g. projects like Amby valley and Lavasa. Prof Madhav Gadgil suggested that this area requires a special examination. He recommended a small project can be given to T.R. Vijayaraghavan, a retired IAS officer, and to Edgar Rebeiro for this purpose. Travel expenses for these consultants can be met from the money sent to IISc for site visits. It would be a great help to the WGEEP to know what these experts feel about urbanization in the Western Ghats.

b) Future brainstorming sessions

Following the discussion on the issue of future site visits, the issue of future brainstorming sessions was taken up. It was decided that the brainstorming session in Bengaluru would be on Joint Forest Management, and the Power Sector . The members were informed that the Karnataka Forest Department has agreed to participate in the brainstorming session on Joint Forest Management in the Western Ghats.

It was decided that in the second brainstorming session on the power sector, Karnataka Power Corporation Limited would be invited. Furthermore, representatives of all State Electricity Boards of Western Ghat States and representatives of private power companies

would also be invited. The dates of the brainstorming session at Bengaluru were fixed as 18th – 19th November 2010.

c) Next meeting of WGEEP at Pune

It was decided that the next meeting of WGEEP would take place on 28th – 29th October 2010 in Pune at Bharati Vidyapeeth. The Panel meeting would also involve a brainstorming session on the Maharastra Western Ghats and discussion on the spatial database being prepared for WGEEP. Professor Madhav Gadgil informed the panel that Bharati Vidyapeeth has prepared a review of the status of the Western Ghats in Maharastra.

d) Time table

Keeping in view the prescribed Terms of Reference of WGEEP and the scope of work given by the MoEF, the Panel members unanimously felt that the Chairman should ask for an extension of time period for the submission of the report by the Panel.

The Panel members thanked the National Institute of Oceanography for hosting the 6th meeting of the Western Ghats Ecology Expert Panel.

The meeting ended with a vote of thanks to the Chair.

Summary Record of Round Table discussion with Civil Society, Industry and Goa Government held on 27th September 2010 and Site Visit to iron ore mines, Mhadei and Bhagwan Mahavir Wildlife Sanctuary on 28th September 2010

Round Table discussion with Civil Society, Industry and Goa Government

The Western Ghats Expert Ecology Panel (WGEEP) had a round table discussion with civil society, industry and Goa Government on 27 September 2010 at the National Institute of Oceanography (NIO), Goa.

Dr. S. Shetye, Director, NIO, Goa welcomed the members of WGEEP. He expressed his happiness on being able to participate in the deliberations. He mentioned that though the study of the Western Ghats does not directly form part of the mandate of NIO, the degradation of the Western Ghats certainly effects the ecology of coastal areas, the study of which is part of the mandate of NIO.

After the welcome address by the Director, NIO, there was a round of introductions of the participants. Professor Madhav Gadgil, Chairman, Western Ghats Ecology Expert Panel (WGEEP) thanked civil society groups, industry and government for coming to the round table discussion.

Prof Madhav Gadgil gave a brief overview of the terms of reference and main objectives of the WGEEP. The main objectives of the WGEEP are (i) to identify areas which are ecologically sensitive in the Western Ghats, (ii) to identify criteria for their identification and (iii) to determine how ecologically sensitive areas should be managed. He mentioned that ecologically sensitive areas cannot be managed by a rigid set of regulations but they should be managed by graduated regulations which are fine tuned to the local context and should have positive development initiatives. He stressed the need for making a development strategy for Western Ghats which mainstreams environmental concerns into the development process. He also emphasized the making of a road map for development of such a strategy.

Dr Claude Alvares, Goa Foundation, welcomed the members of WGEEP. On behalf of the Goa Team he thanked WGEEP for giving them an opportunity to present their case. He said that the presentation that was to be made to the Panel was put together by the Goa Foundation and other like-minded people who constitute the "Goa Team". He brought to the attention of WGEEP members the proposal of the Shayadri Ecological Sensitive Area (SESA) which is pending with the Government of India. The area to be notified in this proposal encompasses 4 wildlife sanctuaries of Goa. The Goa Team now proposes a bigger area to be brought under SESA. The new proposal is based upon actual delimitation of Western Ghats based upon geomorphology and vegetation type. Dr. Alvares told the Panel members that the Goa Team has done substantial work on the new SESA proposal. Goa Team is even ready with a draft notification. He further informed the Panel that the modified SESA proposal as projected by the Goa Team is in agreement with the Zoning Atlas developed by the Goa Pollution Control Board and draft Regional Plan of Goa 2021.

He mentioned that Goa has 58% forest cover and that a number of mining leases operate in and around forest areas. The Goa Team has prepared a map which superimposes mining leases on the forest cover map of Goa. According to the Goa Team, mining is incompatible with the ecology of the Western Ghats. It has serious adverse effects on the ecology of the Western Ghats. Some of the recommendations of the Goa Team on mining activities are (i) mining leases within Wildlife Sanctuaries should be permanently cancelled, (ii) mining

around the Selaulim Dam, which is a major source of water for Goa, should be stopped, and (iii) no fresh forest clearances should be given for mining activity since no land is available in Goa for compensatory afforestation programmes.

Dr. Alvares pointed out that according to a Supreme Court order there should be no mining activity within 10 km of a Wildlife Sanctuary. There should be a 10 km buffer zone around a Wildlife Sanctuary whereas the Goa Government has proposed a Zero km buffer in the case of Mhadei and Netravali Wildlife Sanctuaries. He said that this decision of the Government is wrong as most of the overburden dumps are present outside the mining area.

After the presentation of Dr. Alvares, members of the Goa Team gave presentations on different aspects of Western Ghats biodiversity and ecology, mining industry and its effect on the Western Ghats. The Goa Team submitted a dossier to WGEEP which contained a summary of the presentation given to WGEEP along with some other additional documents.

Shri Rajendra Kerkar, environmentalist, made a presentation for declaring the wildlife sanctuaries and adjacent areas in Goa as a tiger reserve. He proposed that the Tiger Reserve would include areas of Bhagwan Mahavir Wildlife Sanctuary/National Park, Cotiago Wildlife Sanctuary, Mhadei Wildlife sanctuary, and Netravali Wildlife Sanctuary.

Prof M.K. Janarthanam, Department of Botany, Goa University, gave a presentation on ecologically sensitive lateritic plateaus of Western Ghats. He highlighted the importance of these plateaus as biodiversity rich areas which support a substantial number of endemic species found in the Western Ghats . He provided evidence from taxonomic and ecological studies that these plateaus are rich in biodiversity and there is every reason to consider them ecologically sensitive.

Dr. Borkar and his colleagues in their presentation highlighted a large number of endemic animal species in the Western Ghats especially in the following groups (i) amphibians, (ii) butterflies, (iii) uropeltid snakes, (iv) arachnids, and (v) birds. Dr. Borkar stressed that much of the diversity is yet to be documented.

Shri Kamlakar Sadhale gave a presentation on 'The Western Ghats and water conservation regime'. He highlighted the importance of the Western Ghats as a catchment area and the adverse effects mining has on the Western Ghats with specific reference to fresh water resources.

Shri Rajendra Kakodkar presented the economic perspective of mining for Western Ghats ecology. He pointed out that the rapid increase in mining in the last 10 years has made low grade and deep seated ores economically viable. He also detailed the economic aspects of mining with respect to revenue, mineable resources, and employment generation. He highlighted the adverse effects of mining on the small state of Goa.

Rama Velip, local villager from Colomba village, highlighted the adverse effects of mining on agriculture and water resources. He pointed out that mining damages surface water bodies by siltation due to which they get choked. The ground water level decreases dramatically near mining areas due to mining activity below the water table level .

Dr. Prabhudesai, a medical doctor practicing in the villages adjacent to mining areas, elaborated upon the public health effects of mining and pointed out the increased incidence of chest disorders due to mining. He also highlighted adverse health effects due to noise pollution.

After the presentations of the Goa Team, Professor Madhav Gadgil, Chairman, WGEEP, called upon the representatives of the mining industry to give their point of view.

The representatives of the mining industry presented their views to the Panel Members. They highlighted the following points.

a) The mining industry plays an important role in employment and revenue generation in Goa.

b) The mining industry is willing to have a dialogue with civil society. It is also willing to contribute towards upgradation of civic infrastructure in areas adjoining mines.

c) The mining industry recognized the fact that an increase in the production capacity of mines has led to a huge strain on the road network of Goa. This has resulted in difficulty to the villages adjoining the roads. Approximately 12,000 trucks transport iron ore across Goa. The increased transportation requirement is used for transporting ore from Goa and ore from there to adjoining land-locked states. The mining industry of Goa is willing to invest in improving the road network used for transportation of the ore.

d) As a responsible industry, the mining industry will comply with all environmental regulations.

e) The mining industry in Goa promotes a policy of sustainable mining through various initiatives apart from utilizing latest technology and reclamation of mined pits.

f) A clear demarcation of the Western Ghats with the coordinates marked and tied to the grid of Survey of India maps will help remove a lot of ambiguity in the mind of the industry as to where to mine.

g) The mining industry agrees that no irreversible damage should be done to the Western Ghats.

h) Complete banning of mining activity is not an option. It provides revenue to the government and provides employment to the local people, but the industry is concerned with the recent rapid increase in mining activity in Goa

i) Goa's mining belt would be under threat if a 10 km buffer zone is notified as an ecosensitive zone.

j) There are procedural delays in the government which is one of the reasons for illegal mining. A prospecting license which should be cleared in 9 months takes 6 years.

k) There should be a development plan as to which areas can be mined for a 20-year period and which can be mined for 5-year period.

l) The depth of surface mining needs to be mentioned in environmental clearances.

Professor Madhav Gadgil asked the Goa Team for their suggestions for regulated mining in Goa.

Dr. Claude Alvares, Director, Goa Foundation, mentioned the following points with respect to regulation of mining activity if it is not banned completely.

(i) There should be a cap on the mining targets for the mining companies. This cap should be based upon the concept of sustainability.

(ii) No mining should be allowed below the water table level of the area. Mining activity below the water table level in Goa has led to drought-like situations in villages adjoining mining lease areas.

(iii) The mining companies should follow the principle of equity in their corporate social responsibility (CSR) activities. The inequitable distribution of CSR activity has led to division of villagers into haves and have-nots.

(iv) The mining companies should be transparent in their functioning and should share information and data on environmental parameters and hydrological maps.

(v) The number of trucks transporting iron ore and their overloading has to be regulated.

After this Dr. Renee Borges, Member, WGEEP, chaired the round table discussion as Professor Madhav Gadgil had to leave for an urgent commitment.

Dr Manoj Borkar, Carmel College, mentioned that the process of EIA should be made transparent. A Biodiversity Cess should be applied on industries for the cause of biodiversity conservation. There should be monitoring of post-environmental clearance of mining activity. Alternative livelihoods for the people which are based upon biodiversity/bioresources should be encouraged.

Mr.Christopher Fonseca, trade union leader, raised the issue of labour welfare. He mentioned that there is no adequate space for mining workers and there are labour problems in the mining industry.

Mr. H Fernandes, representative from the Directorate of Mines, Goa, explained the current status of mining leases in Goa. He also explained that mine closure occurs either when mining lease periods get over or when the deposit is completely extracted.

Mr. Edgar Ribeiro, town planner, stressed the need for addressing environmental concerns by incorporating them into the regional plan of Goa. He highlighted the fact that regional plans are legal documents and hence can be enforced.

a) Many representatives from civil society raised the following points for consideration of WGEEP.

b) There should be a people's audit of the mining companies which should be based upon a fair and just mechanism. There should be committees at the taluka level to oversee mining activities.

c) The social cost of mining should be evaluated and factored into the revenues of the mining companies

d) Transparency is required from both the mining industry and civil society groups.

e) The process of EIA should be done in transparent manner. An independent agency should conduct the EIA; it should not be carried out by consultants at the behest of the project proponent.

Dr. Vijayan, Member, WGEEP, commented on the need to assess the economic value of the ecosystem services provided by forest areas, and that this could be much higher than the revenue that the mining industry gives to the government. He also highlighted there should be rigorous evaluation of EIA reports.

After the participants had expressed their views, Dr. Renee Borges on behalf of the WGEEP thanked NIO for hosting the Round Table Discussion.

Site visit to iron ore mines in Goa and Mhadei and Bhagavan Mahavir Wildlife Sanctuary

The Panel members along with officials of the State Forest Department visited Sanquelim iron ore mines of Sesa Goa. Shri Mahesh Patil, General Manager of the mines, explained the mining plan and the general lay out of the mine to the Panel members. Shri Patil explained to the Panel members that earlier *Acacia auriculiformis* was used in the plantation activity by Sesa but now they are in process of replacing *Acacia auriculiformes* with native species of the region. He further elaborated upon the water conservation measures being carried out in the mines. The Panel members were taken around the mining area. They were shown the various activities of the Mining company for environmental protection and ecological restoration. The Panel members were informed that the company has developed a biodiversity area, fishing pond, medicinal garden, and bamboo area inside the mining lease area. Shri Patil said that the work done by Sesa in Sanquelim mines was a model for reclamation of iron ore mines.

After visiting the iron ore mines the Panel members proceeded to Keri Forest Rest House where Shri Shashi Kumar, Additional Principal Chief Conservator of Forests, Forest Department Goa, welcomed the Panel members and gave a brief overview of forests of Goa. This was followed by a brief presentation by Dr. G. Trinadh Kumar, DCF, (North Goa). The presentation detailed different aspects of forest cover, forest classification and the protected area network in Goa.

Following the presentation, discussion on the proposal of the state government for declaration of ecologically sensitive areas around national parks and wildlife sanctuaries was taken up. The Additional PCCF explained the constraints due to which in certain cases no area was proposed for declaration as ecologically sensitive around a wildlife sanctuary. He highlighted the fact that Goa is a small state and hence enough land is not available for development. On the issue of mining in protected forest areas the Additional PCCF informed the Panel members that no mining activity is being carried out in any protected area in Goa. He further clarified that the state government is not considering any fresh proposal of mining till a Mining Policy is finalized. On the same lines no proposal for diversion of forest land is being considered till a Forest Policy is announced.

From Keri Forest Rest House, the Panel members went to Mhadei Wildlife Sanctuary via the Anjunem Dam area. The State Forest Department officials highlighted the close proximity of human habitation to the Wildlife Sanctuary. They also pointed out the the dense forest cover of the Western Ghat area of the Sanctuary. After visiting the Mhadei Wildlife Sanctuary, the Panel proceeded to Bhagavan Mahavir Wildlife Sanctuary. Enroute the Panel members saw a number on iron ore mines and trucks used for transportation of iron ore. The Panel members were taken to a place on the way from Mollem to Collem which is the boundary of Bhagavan Mahavir Sanctuary where the State government has proposed a zero km buffer to be declared as ecologically sensitive. The State Forest Department officials explained that this was done as the land next to the Wildlife Sanctuary was private land and that declaration of an ecologically sensitive area on private land may reduce the genuine development needs of the landowner. The Panel members felt that there is a need to educate the local people that declaration of an area as ecologically sensitive does not necessarily mean complete ban on development activities. It only restricts activities that can severely impact the ecology of the area. After the site visit the WGEEP members left for NIO.

Minutes of the Seventh Meeting of the Western Ghats Ecology Expert Panel held on 29th October, 2010 at Bharati Vidyapeeth Institute of Environmental Education and Research (BVIEER), Pune.

The seventh meeting of the Western Ghats Ecology Expert Panel (WGEEP) was held on 29th October, 2010 at BVIEER, Pune. The following members of the WGEEP were present:

1. Prof. Madhav Gadgil	Chairman
2. Dr. V.S. Vijayan	Member
3. Prof. (Ms.) Renee Borges	Member
4. Ms. Vidya S. Nayak	Member
5. Prof. R. Sukumar	Member
6. Shri B.J. Krishnan	Member
7. Dr. G. V. Subrahmanyam	Member Secretary

The following Members of the Panel could not attend the meeting:

1. Dr. D.K. Subrahmanyam
2. Dr. R. V. Verma
3. Dr. (Mrs.) Ligia Noronha
4. Dr. P.L. Gautam
5. Prof. S.P. Gautam
6. Dr. K.N. Ganeshaiah

Dr. Erach Barucha, Director, BVEERI; Dr. S. N. Prasad, SACON; Dr. Shamita, BVIEER; Sh. Ashok D'Costa, Turbosketch, Goa; Sh. Manish Kale, C-DAC, Pune and Sh. G. S. Pujari, NRSC, ISRO were also present in the meeting. Shri Neeraj Khatri (Deputy Director, MoEF) was also present during the meeting.

The Chairman welcomed the Members of the Panel and briefly explained the agenda items following which the agenda items were taken up individually for discussion.

1) **Review of actions taken so far**

a) Review of progress of website, geographical delimitation of Western Ghats and project on level of ecosensitivity along Western Ghats

The Panel reviewed the progress achieved on the website, and geographical delimitation of Western Ghats. The Panel was of the opinion that the progress achieved was satisfactory.

Professor Madhav Gadgil, Chairman, WGEEP, stressed the importance of mapping of ecologically sensitive areas in Western Ghats. The Chairman requested Dr. S.N. Prasad, SACON to make a presentation on ecologically sensitive / significant and salient areas of Western Ghats stressing on the proposed protocols and methodologies.

Dr. Prasad discussed the criteria for demarcating ecologically sensitive areas and the division of areas into grids of suitable size depending upon the database available and the vastness of the area.

The Chairman stated that rate of change of degradation/transformation and other changes may be predicted from the satellite images of the 70s and 80s and the level of persistence may reflect how changes took place. Dr. Renee Borges suggested that changes in land use pattern, vegetation and agricultural practices may also reflect the trend of change.

Dr. V.S. Vijayan remarked that levels of resilience depend on the levels of disturbance which in many cases are not known adequately. He observed that the grid size explained by Dr. Prasad during his presentation was too large, approximately 8100 ha (5′ x 5′) and in many cases there will not be any data at all and, in some cases the data available will be too few to determine their priority for conservation. He further explained that after all we are not laying the grids and collecting data via a statistical design, but laying the grids and putting onto them whatever data that are available.

Dr. Vijayan suggested that we could adopt two approaches for identifying the ESA, namely (1) based on the matrix of ecological, geological, climatic and socio-cultural characteristics and (2) areas which require no further information for declaring as ESA, i.e. those which are known for their biodiversity richness and ecological as well as environmental significance. The Panel requested Dr. Vijayan to provide a brief write-up on the methodology which as submitted by him is given below

The panel resolved to adopt the following two-way approach for the identification of ESAs.

Approach-I

Areas which are known for their ecological values

1. All shola forests along with the grasslands and surrounding ecosystems
2. All forests contiguous with the PAs depending on the area
3. All habitat corridors,
4. Catchments of the origin of all rivers
5. Catchments and riverine vegetation of all the rivers originating from the Western Ghats up to the borders of the Western Ghats
6. Steep and degraded slopes
7. Sacred groves
8. Areas known for endemic, endangered species
9. Forests and degraded forests on the slopes
10. Wetlands
11. All Protected Areas
12. Hill Stations
13. Areas with history of landslides and those prone to landslides

Approach-II

Identifying and prioritising ESA based on a matrix of biological, geo-climatic and socio-cultural values

1. *Biological values* would include: **b**iodiversity richness, species rarity, taxon rarity, habitat richness, productivity, ecological resilience, and colonial breeding sites.

2. ***Geo-climatic values*** will cover: topographic features (slope, altitude, aspect etc), **c**limatic features (precipitation, number of wet days) and hazard vulnerability (land slide, fire etc)

3. *Socio- Cultural values* will cover**:** stake-holders' perceptions on ESAs, evolutionary-historical values and cultural-historical values of the area.

These matrices will be developed by the WGEEP based on the available information superimposed on each of the 5′ x 5′ grids covering the entire Western Ghats. The grid getting the highest score will be considered as ecologically highly significant while the lowest less significant.

The areas identified as ESA under Approach-I would also be covered under Approach-II. However, if any of those areas get a lower value under the grid system, the decision under Approach–I would prevail and such areas would be subjected to further investigations of their values.

Professor Madhav Gadgil remarked that the list of criteria for a***reas which are known for their ecological values*** provided by Dr Vijayan has large overlap with the criteria proposed by the Pronab Sen committee. WGEEP may therefore employ all Pronab Sen committee criteria, along with any additional criteria suggested by Dr Vijayan.

Mrs. Vidya Nayak recommended that technical people must also be included in the stakeholders for additional information or detailed information. Dr. R. Sukumar expressed his views about the vulnerability of ecosystems and drew attention to forest fires and the frequency of such fires. Further, he stressed that ownership of land should have no bearing on identification of ecologically sensitive areas.

The Panel recommended that to maintain heterogeneity, 5′×5' grids are more suitable units. Further, it was also suggested that Forest Survey of India be contacted to get any database and maps related to the Western Ghats with forest types.

It was decided that Dr. Sukumar shall write letters to the Forest Survey of India, Deccan Council of Agricultural Research, Mysore and French Institute for various maps and databases.

Further, it was discussed to have images with reference to species and biodiversity data. It was opined that for vegetation 5'×5' grids are not suitable, hence the combination of various grids can be used for validation of plants for which 3.5′x 3.5′ may be used.

The Chairman was of the opinion that one of the objectives of the Panel must be to improve the quality of information.

He informed the members about submission and web publication of the paper 'Mapping Ecologically Sensitive, Significant, and Salient Areas of Western Ghats: Proposed Protocols and Methodology' in *Current Science*. This was done so that wider response can be generated from the scientific community in India.

Dr. Bharucha stressed on individual information with respect to vegetation, endangered species and wetlands. He opined that river catchments and reservoirs have different types of ecologically sensitive areas and these may be categorized region-wise.

b) Proposal to commission Dr. H.C. Sharatchandra to undertake a review of Carrying Capacity of Ratnagiri-Sindhudurg Districts

The proposal of Dr. Sharatchandra on "Assessment of Impacts of Urbanization in Konkan Region covering the districts of Ratnagiri and Sindhudurg" at a total cost of Rs. 11.95 Lakhs for a duration of three months that was submitted to MoEF for financial assistance was placed before the Panel. The Panel was informed by the Member Secretary that the Principal Investigator has sought emoluments at the rate of Rs. 1 lakh/month for three months. It was also proposed in the proposal to hire two external experts with monthly emoluments of Rs. 40,000/-. The Member Secretary informed the members of the Panel that the present proposal of Dr. Sharatchandra was not in conformity with the available research guidelines of the Ministry. Hence, it was not possible to get administrative and financial approval for the Project.

The Panel opined that if the proposal does not meet the guidelines of the MoEF, then the Chairman may be requested to ask BVIEER to undertake the proposed project as per the norms of MoEF. The Panel also suggested that the Panel should go ahead with its work even if the project has not been able to take off.

c) Status of Commissioned papers. Commissioning of a paper on EIA by Ritwick Dutta and his colleagues at EIA Resource and Response Centre (ERC) Western Ghats Cell (http://www.ercindia.org) and commissioning Dr. Ribeiro to undertake a study of the urbanization of the Western Ghats

The Panel decided that Shri Ritwick Dutta and his colleagues would be requested to write a paper on Environmental Impact Assessment and related issues. Dr. Sukumar would send a formal invitation in this regard to Shri Ritwick Dutta. Further, it was also suggested to invite Shri Edgar Riberio to prepare a commissioned paper on the urbanization of the Western Ghats as Dr. Riberio has prepared the Goa Master Plan.

d) It was finalized to commission site visits to Amby Valley and Lavasa City projects and the stretch between Mumbai and Mahableshwar-Panchgani by Shri Edgar Riberio. To facilitate the same, Dr. Bharucha may provide the logistic support and Dr. Shamita/ Kranti of BVEERI may accompany Sh Ribeiro on these visits.

d) Gundia hydroelectric project: assessment of EIA by Dr. M.D. Subhash Chandran

Regarding Gundia project, the following observation were made: (i) The EIA reports were very defective and (ii) Dr. Subhash Chandran may be requested to do the evaluation of the EIA report of Gundia Hydroelectric Power Project, on the same lines as he has agreed for the Athirappilly project.

Dr. Sukumar suggested that WGEEP should not take up any more such EIA projects in future which the Chairman agreed. It was also decided that any new or old project shall be kept pending till the final report of the panel is completed and published. Regarding the Athirappilly project, the Panel was of the opinion that more site visits are required before the final recommendations are made.

Furthermore, the Chairman added that recommendations of the Panel on these Proposals will be given only after the analysis of the Panel on ecologically sensitive areas in the Western Ghats is complete. The Panel will give recommendations regarding these projects based upon the analysis of ecological sensitivity and its criteria.

2) Reporting Items

a) Discussion with Secretary (Environment) and other officials of Government of Maharastra on 30/9/2010 and site visit to Sindhudurg districts

The Chairman made the following observations regarding his discussions with Secretary (Environment) and other officials of Government of Maharastra on 30/9/2010 and the site visit to Sindhudurg districts.

(i) The discussion with Secretary (Environment) and other officials from the state government of Maharastra was very fruitful. The state government officials explained the government's perspective on various issues related to development in the Western Ghats region especially in the Ratnagiri and Sindhudurg region.

(ii) During the visit to Ratnagiri, Chairman observed that inadequate monitoring was being carried out. District Level Environmental Committees at Ratnagiri were not formed. The local *abhyas gat* (study group) at Lote Chemical Industries Complex of MIDC was inactive. It was noted that the *abhyas gat* was formed in 2006, only two meetings have been held so far, and the Common Effluent Treatment Plant is not working properly. In some cases, the effluents are being discharged into the ground water by borewells or transported by tankers to dump in nearby ponds.

(iii) It was observed that local people participated actively during the field visits of the Chairman, WGEEP. During the field visits the severe environmental degradation of Ratnagiri and Sindhudurg districts was also discussed with special emphasis on the ENRON Thermal Power Plant and Ratnagiri Gas Power Project.

(iv) The Chairman informed the Panel members about the perception of local people on ecologically sensitive areas. He mentioned that in Ratnagiri and Sindhudurg districts, 22 villages unanimously resolved that these may be notified as ecologically sensitive areas.

On the other hand the Zilla Parishad of Kolhapur has passed a resolution that no part of their area shall be declared as an ecologically sensitive area.

3) Discussion items

a) Mining

The Panel discussed the various points raised by both the Goa Foundation and the Federation of Indian Minerals Industries (FIMI) Southern Region. It particularly noted two of the points raised by the latter that (a) if minerals are not extracted, the worth of mother earth is the same as mud and, (b) declare the present sanctuaries and parks as eco-sensitive areas and leave the rest of the Western Ghats for development activities.

The panel also noted that during its Goa visit, the panel could visit only one mining site and that there is a need for assessing other mining areas in the State before the panel make its observations/suggestions. The Panel constituted a team consisting of the following members for the same: (i) B. J. Krishnan, (ii) Dr. Ligia Noronha, and (iii) Dr. V. S. Vijayan.

b) Ground water issues

The Panel requested Dr. Renee Borges to follow up on the commissioned paper on Ground water issues.

c) Social perceptions relating to ESAs

The Panel deliberated upon the social perceptions of Ecologically Sensitive Areas at length.

4) Decisions Needed

a) Future site visits

The Panel decided that the site visit to the Athirappilly Project needs to be undertaken before the recommendations on the project site are finalized. It was decided that the site visit would be undertaken during December/January. It was decided that the Panel will request Shri Edgar Riberio to undertake site visits to Amby Valley and Lavasa city projects and also to the stretch between Mumbai and Mahabaleshwar-Panchgani. To facilitate the visits the Panel requested Dr. Erach Bharucha to provide logistic support. The Panel also requested Dr. Shamita Kumar/ Kranti Yardi, BVIEER to accompany Sh Ribeiro on the site visit.

b) Future brainstorming sessions

It was further decided that a full day brainstorming session on 'Role of power sector in the development of the Western Ghats' would be held on 18th November at Centre for Ecological Sciences, IISc Bengaluru, wherein the government sector as well as the private sector would be invited. It was also decided to hold a half-day brainstorming session on 'Joint Forest Management' on 19th November at Centre for Ecological Sciences, IISc Bengaluru.

The Panel decided that the next meeting of WGEEP would be held on 19th November 2010 at IISc, Bengaluru.

The meeting ended with a vote of thanks to the Chair.

Summary Record of Public Consultation with Civil Society, Industry and Government of Maharastra held on 28th October 2010 at Bharati Vidyapeeth Institute of Environmental Education and Research, Pune

The Western Ghats Ecology Expert Panel (WGEEP) held a Public Consultation with civil society, industry and the Government of Maharastra on 28 October 2010 at Bharati Vidyapeeth Institute of Environmental Education and Research (BVIEER), Pune.

1) Dr. Shamita Kumar, BVIEER, Pune welcomed Professor Madhav Gadgil, Chairman, WGEEP, and members of WGEEP to the Public Consultation on the northern Western Ghats. She also welcomed the officials of the government of Maharashtra and the participants to the Public Consultation. She informed the participants that BVIEER had done a study and prepared a discussion paper on the Ecological Status of the northern Western Ghats and Identification of Potential Ecologically Sensitive Areas in the Region.

2) Professor Madhav Gadgil thanked the Participants who had come for the public consultation. This was followed by a round of introduction. The Chairman opined that the participants represent a wide cross section of the society including representatives from government, voluntary groups and students. He was happy to note that a few people from rural areas were also present at the Public Consultation. He hoped that there would be a vigorous discussion on various issues related with the northern Western Ghats.

Chairman highlighted the following two major tasks, which have been assigned to the WGEEP: (i) identify Ecologically Sensitive Areas (ESA) in the Western Ghats and determine how to manage them, and (ii) to propose a management strategy for the Western Ghats which is environment-friendly. To fulfill these tasks, WGEEP has undertaken a range of activities, one of them being commissioning a study and discussion paper by BVIEER on the Ecological Status of the northern Western Ghats which are spread across from the Gujarat Dangs to Goa. He informed the members that BVIEER has prepared a background document which has been uploaded on their website so that people can be exposed to this information and can comment on it. He also welcomed remarks from the participants.

Professor Madhav Gadgil said that the opinions regarding ecologically sensitive areas are highly polarized with some sections of the society supporting the concept while other sections opposing the concept of ESAs. He gave the example of Kodagu wherein the local people wanted Kodagu to be declared as an eco-sensitive area. On the other hand, the Kolhapur Zilla Parishad does not want Kolhapur to be declared as an eco-sensitive area. He stressed the fact that in the past notifications of Ecologically Sensitive Areas have followed a top-down approach wherein the government, judiciary or activist groups led the notification process of an ESA without consulting the local people of the area. He gave examples of where recent government and judicial actions on ESAs met with resentment at local level.

He said that WGEEP was considering and deliberating upon the criteria to identify ecologically sensitive areas and the various management options available for their management. The Chairman highlighted the fact that WGEEP wanted greater participation of the local people in the process of notification of ecologically sensitive areas and that local bodies and local people are taken on board while making management plans for these areas. He highlighted the fact that the recent intent notification by the Government on declaration of Dhandi as an ecologically sensitive area was different in spirit as compared to earlier notifications.

He stressed that the new approach to ecologically sensitive areas was to make environmental protection a participatory activity where local people have an active role in it.

He said that the Public Consultation would focus on potential ecologically sensitive areas in Gujarat, Maharastra and Goa.

3) Dr Erach Bharucha gave a presentation on the discussion paper prepared by BVIEER on the Ecological Status of the northern Western Ghats and the identification of potential ecologically sensitive areas in the region. Dr. Bharucha recollected his long association with the northern Western Ghats and the various ways in which BVIEER is intimately related to this segment of Western Ghats though its activities of environmental education and research. He stressed that the Western Ghats is a living laboratory. He said that in his presentation he would highlight the process used for preparing the report. He outlined the structure of the report which included (i) concepts of ecological sensitivity – the different ways of thinking involved, (ii) effects of threats on the northern Western Ghats, (iii) planning for ESAs which includes categorization of ESAs and prioritizing ESAs, (iv) implementing ESAs including conservation planning and corridoring existing important areas of biodiversity, and (v) judicial implications of ESAs.

Dr. Bharucha highlighted the fact that the northern Western Ghats are a hotspot of biodiversity and are under tremendous anthropogenic pressure due to which they are undergoing rapid changes. He stressed that the northern Western Ghats is the most threatened region of the Western Ghats. Furthermore, the problem is compounded by the fact that the information available on this region is very scarce and is not much publicized. On the contrary he said that lots of information is available on the Western Ghats region south of Goa. He said that there is an urgent need for formulating a development strategy for the region as these areas are multiple-use areas with great ecological value. He informed the members that parts of the Western Ghats region have been traditionally protected due to cultural practices; these areas included sacred groves, origin of rivers, and hill top temples.

He highlighted the fact that the term ecologically sensitive area has been used loosely. He detailed the chronology of major events in the development of the concept of ecologically sensitive areas. Dr. Bharucha elaborated upon the significant threat factors to the northern Western Ghats (NWG) which included (i) extensive wasteful road network, (ii) intensiveness of agriculture, (iii) new township development, (iv) intensive tourism, and (v) invasive species. According to him one of the major effects of these threats was that the pristine vegetation of the northern Western Ghats would become patchy and the natural resources may also be annihilated. He said that in NWG, areas which can be classified as ecologically sensitive could be categorized into three groups viz. (i) protected areas, (ii) buffers of protected areas, and (iii) hill stations as ecologically sensitive areas. According to the study of BVIEER the proposals for future ecologically sensitive areas include (i) reserve and protected forests, (ii) village forests, (iii) catchments of rivers and (iv) catchments of dams, and (v) Important Bird Areas in and outside Protected Areas. He also highlighted the need to conserve specialized highly fragile ecosystems which may be very small but are extremely important. For example, sacred groves, old growth forests, plateau tops, valleys, and waterfalls.

He presented a framework for prioritizing ecologically sensitive areas using a GIS format. In the framework, relative weights are given to ecological characteristics of an area and also to the threats to the ecology of that area. Features such as species richness, habitats of threatened species, and animal corridors are also taken into account. This leads to categorization of an area based on ecological sensitivity into robust, sensitive, highly

sensitive and fragile. The ecologically important areas are then plotted on a taluka-wise map. He mentioned that no portion of the northern Western Ghats can be classified as "robust". Based upon the threats to the ecology of an area, a disturbance index for each area was calculated which was used to map threat levels on a taluka-wise map.

In the end, Dr. Bharucha stated that for successful implementation of the concept of ecologically sensitive areas, people's participation is a must.

4) After the presentation Professor Madhav Gadgil thanked Dr. Bharucha for a lucid exposition of the process of preparing the report by BVIEER. He said that a solid information base should be developed which should be used to arrive at an informed decision. He informed the participants that WGEEP has a limited mandate and it will provide background information to the proposed Western Ghats Ecology Authority. He also stressed the need for reports and documents to be made available in the local language, in the present case Marathi.

5) Professor Vijay Paranjape made a presentation on developmental pressures on the northern Western Ghats. He pointed out that to understand the effects of developmental pressures it is important to understand the nature of pressure and whether anything can be done to mitigate the pressure. Furthermore, he said that his presentation would focus on the effects of threats on the last 3 criteria mentioned in the Pronab Sen Committee report. These criteria basically relate to the geo-morphological features of the Western Ghats. This is so because the major development projects have physical impacts on land and water systems. He pointed out the Mumbai-Thane-Pune-Nashik belt in the northern Western Ghats is the economic growth engine of the country and is a high growth centre. The land prices in this region are very high which has resulted in MIDC and promoters of SEZ to look for areas where land is cheap. These areas are more often than not ecologically sensitive areas. He mentioned that it has to be understood what is meant by sensitivity and the sensitivity is to what. He elaborated that when we talk about sensitivity we imply vulnerability to human interference.

Professor Paranjape futher mentioned that we are following the non-sustainable development path. He gave example of the number of roads that cut across the Western Ghats. He pointed out that the major function of these roads is to connect the coast to peninsular India. Furthermore, these roads not only open avenues for development of an area but are also used as medium for draining the resources of the area. He drew the parallel of the British Raj when roads were constructed to drain resources. Though he mentioned that roads can be used for draining resources he also emphasized the fact that they have definitive positive effects on the development of an area such as better connectivity and education.

Professor Paranjape called the Western Ghats the "Water Towers" of Peninsular India. He elaborated this by saying that the Western Ghats spread over a length of 1600 km with a width of 30 km have a huge catchement area. This with a dense forest cover makes them a very important water source. He highlighted the fact that in 1990 there were 49 dams which have now gone up to 63 in 2010. Further, he pointed out that there is no valley in the northern Western Ghats which does not have a dam.

He pointed out these dams have given an opportunity to private developers which now want to purchase land next to the dams reservoir as it provides a scenic view of the reservoir. To get this land private developers have made a case by saying that they are developing new tourist resorts which would, when developed, take away pressures from tourist places such as Matheran, Panchgani, and Mahabaleshwar. He further explained that

these private developers have been able to get vast tracts of land to the extent of 1000 ha which included forest land, "watan land"– land belonging to the local tribal community. This, he said, was made possible by a series of Government of Maharastra notifications which facilitated this transfer. He gave examples of Amby valley and Lavasa in this regard. He further emphasized the fact that this kind of new urbanization and tourism development is not in the interest of common people and is a major threat to the ecology of the northern Western Ghats. He said these developments are for the elite in society. Furthermore, such activities are damaging the ecology of the Western Ghats by cutting down vast tracts of forests and increasing soil erosion.

He contrasted this by mentioning that Matheran has been a tourist resort for common people since 1850. Nearly 16,50,000 common people visit Matheran annually. He highlighted the case of Mahabaleshwar and Panchgani where the 52 villages want tourists to come so they can earn their livelihood. He said village-based tourism needs to be encouraged. He said the villagers should be made proud of their heritage and made to plan their own development plans. In Mahabaleshwar 16 different occupation committees have been formed which regulate their own occupation activities.

He said the local people should be made to appreciate the concept of ecologically sensitive area and this can be done by more people-to-people contact. He also stressed the need of translating government notifications into Marathi so that the people can understand what is written in them. He pointed out that the main thing which needs to be done is to reduce the vulnerability of the areas.

He gave another example wherein 23 villages were relocated when Pawana Dam was built. These villages demanded water from the Dam; out of the 23 villages only two villages have been given water while the rest of the water was diverted to Pimpri-Chinchawad industrial estate. He said such kind of development can in no way be called people-centric development.

6) Professor Sukumar, Member, WGEEP, enquired about the legal status of land before it was given to Lavasa. Professor Paranjape replied that the land given to Lavasa included forest land, irrigation land, social forestry land, agricultural land and *watan* land or tribal land.

Professor Paranjape highlighted the fact that presently the whole swathe of land with Lavasa is denuded and lacks vegetation cover. He said Lavasa will become green but not with native species.

7) After his talk, Prof Paranjape commented upon the notion of Carrying Capacity of an area. He said that the results of Carrying Capacity studies depend upon the assumptions which are made and with relation to which resource Carrying Capacity is being estimated.

He further highlighted the issue of how village people cannot make a structured development plan in the conventional sense. The local villagers are aware of their needs based upon which they can make a different kind of development plan which is targeted towards fulfilling needs. He said that there is difference between an official plan and the villagers' perspective on planning.

7) Dr. Archana Godbole highlighted the fact that the time of one month given by WGEEP is too short for the villagers of Ratnagiri and Sindhudurg to be able to develop their development plans. Professor Madhav Gadgil explained to the participants that WGEEP has requested the Gram Sabhas to give what they visualize as their development objectives, with a focus on management of ecologically sensitive areas, and not a development plan. This

was done with an aim to trigger the process of people's involvement in development planning. He further clarified that the elements of the plan can come from people's suggestions.

8) Dr. Farooq Wadia informed the participants on the brief history of the Mahabaleshwar ecologically sensitive area. He said that there was deforestation happening in Mahabaleshwar and Panchgani following which the Bombay Environment Action Group initiated the proposal for declaring Mahabaleshwar as an ESA and also formulated the regional plan of the area. Following this, the Committee set up by the MoEF for the Ecologically Sensitive Area has made a significant contribution towards the 2nd regional plan for the region.

9) Professor V.B. Mathur, Dean, Wildlife Institute of India, gave a presentation on the Serial Nomination of the Western Ghats for inscription on the World Heritage List to the WGEEP. He gave a brief overview about the World Heritage Convention, and that it is a unique legal instrument for protection of the cultural and natural landscape. He mentioned that the natural heritage included physical and biological formations. He informed the Panel members that there are 911 world heritage sites. He also outlined the criteria for inscription on the World Heritage List. The Western Ghats region has been chosen for nomination under the natural heritage category. The Western Ghats fulfill two important criteria for nomination to the World Heritage list. These two criteria are (i) outstanding example of significant ongoing ecological and biological processes and (ii) most important and significant natural habitats for *in situ* conservation of biological diversity. He informed the members that nominations under natural heritage sites are evaluated by IUCN, while nominations for cultural sites are evaluated by ICOMOS. He said that for serial nomination of the Western Ghats as World Heritage Sites, the sites selected were chosen from Protected Areas i.e. Wildlife Sanctuaries and National parks from different Western Ghats states.

Professor Mathur detailed the methodology adopted for the purpose. He mentioned that Gujarat and Goa were hesitant in putting up their Protected Areas for nomination. He informed that recently a team for IUCN was in India to evaluate the proposals for inscription to the World Heritage List. It was pointed out that the IUCN team and officials of Karanataka Forest Department faced a hostile public reaction in Kodagu. Professor Madhav Gadgil highlighted that people's participation is a must for conservation efforts to be successful. He said that State Forest Departments should take note of this. Prof. Mathur said that, besides the honour and recognition, the importance of being inscribed on the World Heritage list is direct and indirect financial benefits which can be used for conservation and the development of local communities.

10) Dr. Savarkar, Former Director, Wildlife Institute of India gave a talk on the notion of ecologically sensitive areas and their management. He said the main intention of his talk is to provoke the gathering and make the deliberations more participatory. He commented upon the suggestion made by Dr. Bharucha on corridoring Protected Areas of the Western Ghats. He said that the definitions of corridors are very varied. He pointed out that there is a management system to look into buffers of protected areas.

He said that the process of village-level planning which has been suggested as one of the methods for management of Ecologically Sensitive Areas can be emulated from the ecodevelopment planning projects. He informed the members in these projects micro planning at village level has been successfully carried out by State Forest Departments. He also stressed the need for capacity building at village level institutions to undertake these planning initiatives. He pointed out that monitoring at ground level is of paramount

importance. This can help in carrying out mid-course corrections. He pointed out that the state Forest Departments have a planning process which is nearly 130 years old and now the new mandate for the forest sector is preservation of biological diversity.

Professor Madhav Gadgil clarified that planning needs for ecodevelopment projects and ecologically sensitive area are different. The WGEEP can make a mention in its report that planning for ecologically sensitive area is a long-term process and the plan can be formulated in one or two years.

After this Prof Paranjape, Dr Savarkar, and Dr. Bharucha chaired the session designated for interaction with the participants. The following issues emerged:

a) Cumulative effects of projects need to be considered rather than evaluating them on an individual basis. The example was given of micro- and mini-hydel projects below 5 MW which do not require an EIA or environmental clearance but if many projects come near by each other there could be a significant impact.

b) The issue of declaring 10 km area around Protected Areas as ecologically sensitive areas was highlighted. Participants were concerned as to what would happen to the people living in these areas; will they be relocated? It was clarified by the Chairs of the session that no displacement of people would be required. Declaration of ecologically sensitive areas would bar only environmentally unsound activities. They said buffer areas and ecologically sensitive areas are multiple use areas. Professor Madhav Gadgil clarified that graded regulations would be put in place for the management of ecologically sensitive areas to reduce the level of conflict.

c) The development of Regional Plans and the planning process in Ecologically Sensitive Areas was discussed. Dr Bharucha said regional plans are sometimes insensitive to ecology and show much greater concern for urban development. With reference to the participation of local villagers in planning process, a mention was made that villagers do not have a sectoral perspective towards planning since they look at issues as a whole. It was felt that a certain level of facilitation and capacity building would be required for microplanning with villagers.

Dr. G.V. Subrahmanyam pointed out that after declaration of an Ecologically Sensitive Area, the Zonal Master Plan has to be developed within a period of two years . Professor Madhav Gadgil clarified that even though the state government is involved in this planning, the Constitution of India has now empowered village bodies to make their own plans. Such an exercise has been done in Kerala. Dr. Vijayan pointed out that in Kerala there is a Centre for Local Self-Government which trains Panchayat Heads on how to make development plans. This helps in getting the notion of development from bottom-up and not from top-down. The issue of integration of different village plans was also discussed.

d) It was suggested that in the given scenario of rapid urbanization in the northern Western Ghats, especially in areas near Pune, there is an urgent need to restrict development of land by a Government Policy. The city fringe has become a zone of development. The city dwellers are purchasing village lands and developing them. It was felt that while evolving any policies on restriction of certain activities it has to be kept in mind that people who have preserved their natural resources should not be punished.

e) The management strategy for private forests in Ecologically Sensitive Areas was also discussed. It was felt that the owners of private forests should be compensated in some measure through conservation service charge as has been done in Costa Rica.

f) The importance of the northern Western Ghats being a hotspot of biodiversity was highlighted. It was pointed out that there are 26 micro centres of biological evolution in this region. It was highlighted that the Panchgani lateritic plateau is a type locality of many species. Further, the fact that certain areas of northern Western Ghats such as Dhapoli in Ratnagiri District are repositories and archives of fossils was also highlighted.

g) The Chairs of this session concluded by saying that to effectively implement the concept of ecologically sensitive areas there has to be a common frame of reference for different Government Departments. Furthermore, there has to be integration between various Government Departments. There has to be a cohesive association between different citizens groups working in the northern Western Ghats as is the case in Southern Western Ghats so that more results are delivered. Government orders and notifications need to be simplified so that local people can understand and make use of them.

h) Finally, it was pointed out by the Chairman, WGEEP, that the role of WGEEP was to collate information and provide recommendations to the Government on Ecologically Sensitive Areas. It was envisaged that there would be a seamless transition from WGEEP to the Western Ghats Ecology Authority.

At the end of the Public Consultation Professor Madhav Gadgil, Chairman, WGEEP, thanked the participants for coming to this meeting. He also thanked BVIEER and its faculty, staff and students for organization of this Public Consulation.

Dr. Shamita Kumar, Vice President, BVIEER, proposed a formal vote of thanks to the WGEEP and the participants in the Public Consultation.

Minutes of the Eighth Meeting of the Western Ghats Ecology Expert Panel (WGEEP) held at the Indian Institute of Science, Bengaluru, on 19 November 2010

The Western Ghats Ecology Expert Panel met on 19th November 2010 at Indian Institute of Science, Bengaluru.

The following members were present:-

Prof. Madhav Gadgil	Chairman
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Dr. K.N. Ganeshaiah	Member
Prof. (Ms.) Renee Borges	Member
Dr. Ligia Noronha	Member
Ms. Vidya S. Nayak	Member
Dr. G.V. Subrahmanyam	Member Secretary

Dr. P.L. Gautam, Chairman, National Biodiversity Authority; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad; Prof. S P Gautam, Chairman, Central Pollution Control Board; Dr. R. Sukumar, IISc. Bengaluru; Dr. R.V. Verma, Chairman, Kerala Biodiversity Board; Dr. D.K. Subramaniam, IISc, Bengaluru; all Members of the Panel could not attend the meeting. Dr. Amit Love, (Deputy Director, MoEF) was also present during the meeting.

The Chairman welcomed the Members of the Panel and briefly explained the agenda items following which the agenda items were taken up individually for discussion.

1) **Review of actions taken so far**

a) Review of progress of website, geographical delimitation of Western Ghats and project on level of ecosensitivity along the Western Ghats

The Chairman informed the members that the Panel website had some problems of effective navigation and search options. Dr. Ganeshsiah, who is the nodal person managing the Panel website, informed the Panel members that these problems have now been rectified.

b) Proposal to commission Dr. H.C. Sharatchandra to undertake a review of Carrying Capacity of Ratnagiri-Sindhudurg Districts

Dr. G.V. Subrahmanyam, Member Secretary, WGEEP, informed the Panel that the proposal of Dr. Sharatchandra in the present form was not according to the Research Guidelines of the Ministry. The honorarium proposed by Dr. Sharatchandra was also not in accordance with the guidelines. Hence, the Ministry would not be able to support the project. The Panel noted the inability of the Ministry to fund the proposal in the present form and decided to drop the proposal.

c) Status of commissioned papers

The Panel was informed that most of the experts, who had been contacted to prepare commissioned papers for the Panel, have agreed. Of the total commissioned papers, IISc had

received 22 papers from different authors till date. The Panel was informed that 20 papers have already been uploaded on the website of the Panel.

d) Proposed study by Shri Ribeiro pertaining to urbanization of Western Ghats

The Chairman, WGEEP, informed the Panel that Shri Ribeiro, a senior town planner, would undertake a study on the urbanization of the Western Ghats region between Mumbai and Mahabaleshwar. For this he would undertake site visits of the region from 28 November 2010 to 1 December 2010. Shri Riberio would give his suggestions on issues related to urbanization after the site visits. BVIEER has kindly agreed to provide logistical support for the site visit. The budget for the site visits would be met from the funds released by the MoEF to IISc.

2) Discussion items

a & b) Mining & social perceptions relating to ESAs

Dr. Ligia Noronha, Member (WGEEP) gave a brief presentation on the mining sector in Goa with specific focus on the management regimes and environmental effects of mining. She also covered the issue of demarcation of ecologically sensitive areas around the protected areas in Goa. Professor Madhav Gadgil suggested that broad suggestions on issues related to mining could be incorporated into the regional development strategy. He also suggested that with reference to developmental activities we should recommend the process and not the exact targets. He also said that usage of available information should be made. Shri B.J Krishnan mentioned that mining is a destructive activity and the Panel should help in rejuvenation of the Western Ghats. Dr. Vijayan emphasized that mining also has severe negative impacts on biodiversity of the area. The Panel decided to take a final view on the matter after the site visit by Dr Vijayan and Shri B.J. Krishnan to the mines.

Following the discussion on mining, Dr. Vijayan raised the issue of identification of ecologically sensitive areas and the methodology adopted for the same. Dr. Vijayan brought his write-up on the methodology for assessment of ESAs to the notice of the Panel. Professor Madhav Gadgil informed the members that as Dr Vijayan's criteria had many things in common with the Pronab Sen Committee Criteria,.therefore each locality (grid) would be graded according to the methodology developed by the Panel and the Pronab Sen Criteria. This would lead to accommodation of the list of criteria given by Dr. Vijayan. He also stressed the fact that the Pronab Sen criteria would be properly scored.

c) Reforming the EIA process

The Chairman informed the panel members that as much of the debate in the Western Ghats involves major development activities it is timely that the Panel examines the environmental impact assessment process for these activities.

Dr. H. C. Sharatchandra, former Chairman, Karnataka Pollution Control Board, gave a presentation to the panel on "EIA notification: Issues and Challenges". He divided his talk into two parts: (i) SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the EIA process and (ii) issues related to public participation. He covered the definition of EIA and the process and steps involved in the EIA. He also gave a brief chronology of the development of the EIA process in India. He informed the panel that the latest notification which is being used to undertake EIA is the 2006 notification of the Ministry. He said that the EIA process could be foolproof if we have well defined legal structure and a good regulatory structure.

He highlighted the following lacunae in the current EIA process: (i) insufficient baseline environmental data, (ii) reliability of data in the EIA reports, (iii) kind and type of scoping, (iv) issues related with public consultation, and (v) cumulative versus individual effects of developmental activities. According to him, the decentralization of EIA process to SEAC (State Expert Appraisal Committee) and SEIAA (State Environmental Impact Assessment Authority) has led to increase in malpractices in the process. He suggested the following to strengthen the EIA process: (i) the the importance of EIA should be explained to industry in a proactive manner, (ii) information about the project and the EIA document should be given to the people well in time, (iii) vernacular languages should be used to communicate the environmental impacts of the developmental activity, and (iv) regional EIAs should be carried out to study cumulative impacts.

After the presentation, Dr. G.V. Subrahmanyam, Advisor, MoEF and Member Secretary, WGEEP, explained to the Panel members in detail the genesis of the EIA notification of 2006 and the broad principles on which the notification is based. Dr. Ligia Noronha said that the role of SPCB is central in the EIA process. Professor Madhav Gadgil informed the members about his experiences with the EIA process. He stressed that it is of utmost importance to study and find out what happens at the ground level both before and after environmental clearances are given. He informed the Panel members that in certain cases the government officials are not aware as to what is happening at the ground level. Dr. Sharatchandra pointed out the lack of coordination between different governmental agencies involved in the regulation of the environment. Professor Madhav Gadgil said that lot is to be desired from the data presented in the EIA reports.

d) Draft report of the study tour of Ratnagiri-Sindhudurg-Kolhapur Districts

Professor Madhav Gadgil presented his draft tour report on Ratnagiri-Sindhudurg-Kolhapur Districts to the Panel. He briefed the Panel about the structure of the report, the methodology adopted and the main observations presented in the report. The Panel noted the contents of the report and approved it. The Panel also noted the contents of the letter from Dr. Archana Godbole to Shri Jairam Ramesh, Hon'ble Minister of State (I/C), Environment and Forests, regarding the conduct of WGEEP in undertaking study tours. The Panel suggested that since the Study Tour Report answers all the queries raised by Dr. Archana Godbole and the same would be uploaded on the MoEF website, a specific response to her may not be necessary.

3. Decisions needed

a) Next steps

The Panel decided to have the next meeting of the Panel in Kerala from 27th to 29th of January 2011. It was also decided that the Panel would visit the Athirappilly Hydroelectric Power Project site and have two brainstorming sessions on (i) water resources in the Western Ghats and (ii) local self-governance in the Western Ghats in Kerala during this period. The panel agreed to adhere to the stipulated time frame allotted by the MoEF.

The meeting ended with a vote of thanks to the Chair.

Summary Record of the Brainstorming Session on Role of Power Sector in Development of Western Ghats held at Indian Institute of Science, Bengaluru, on 18 November 2010

Professor Madhav Gadgil, Chairman, Western Ghats Ecology Expert Panel (WGEEP) welcomed the participants to the brainstorming session on behalf of the WGEEP. He informed the participants that a whole range of issues including environmental, social and economic issues which are related with the power sector would be covered.

He said that one of the concerns with respect to the environmental clearances given to power projects, which are located in close proximity to each other, is that the impacts of such power plants are considered on an individual basis, and not on a cumulative basis. He added that the topography of Western Ghats is such that pollutants generated by power plants can get concentrated in certain areas. He also pointed out that EIAs are deficient in important details and are carried out with a careless attitude. He informed the participants that the Panel would try to develop a perspective on what details are missed out during the EIA process.

Professor Madhav Gadgil informed the participants that WGEEP aims to address two major issues, viz. (i) identification of ecologically sensitive areas and their management in the Western Ghats, and (ii) a regional development strategy for the Western Ghats. He further said that a methodology for the identification of ecologically sensitive areas in the Western Ghats has been put up on the website of the Panel and suggestions on it from the participants are welcome. Professor Gadgil also mentioned that WGEEP is also preparing a detailed database on Western Ghats Ecology, which would also be used for the identification of ecologically sensitive areas.

Prof Madhav Gadgil said that the Panel is getting inputs from the local communities living in Western Ghats on what they think is important and needs to be preserved. He highlighted the case of lateritic plateaus found in Maharastra, Goa and North Karanataka. These plateaus are one of the richest in terms of endemic herbaceous species in India but EIA studies would mention these plateaus are barren. The reason is that EIAs are carried out during the dry season when the plateau lacks vegetation. He said the local people of these plateaus in Maharastra have written poems in Marathi which describe the rich wealth of these areas but this rich biodiversity is never reflected in EIAs. He said these inputs could be got from local people.

In the broader context of developing a regional development strategy, brainstorming sessions on important sectors such as power, mining etc. are being held. The present session would focus on the context in which power development in the Western Ghats needs to take place. Finally, he said that the WGEEP would make recommendations, which would form the basis of the Western Ghats Ecology Authority.

Professor Madhav Gadgil observed that there are participants from civil society, academics, public and private power companies and corporations. There was a round of introductions.

Shri Y.B. Ramakrishna, Chairman, Biofuels Taskforce, Government of Karanataka, spoke on "Meeting Energy Needs through Renewables and Demand Side Management:

Various possibilities in Karnataka". He highlighted the fact that as a society we were refusing to leave old paradigms. He mentioned the fact that fossil fuels which are non-renewable in nature, have driven the world economy in the last century. Further, he added that the use of fossil fuels have had an adverse impact on the environment. He informed the

gathering about a new concept in measuring fossil fuel requirement – cubic mile of oil (CMO). According to recent estimates while humanity is consuming 1.06 cubic mile of oil/year, the proven oil reserves in the world are 43 CMO, the gas reserves are 42 CMO while the coal reserves come to about 122 CMO. He then elaborated on the fact that conversion technologies adopted in the past were not very efficient and that while the conversion efficiency was nearly 38 %, the rest of the energy was wasted. He stressed the fact that there is an urgent need to adopt conversion technologies which are more efficient. Shri Ramakrisha elaborated on the power scenario in Karnataka and highlighted the fact that the capacity utilization was very low. He stressed upon the fact that if there was proper utilization of the installed capacity there would be no deficiency of power. Shri Ramakrishna specifically commented upon micro- and mini-hydel projects. He said that the power lines which are needed to evacuate power from the plants lead to fragmentation of forest areas. According to him it would be meaningful to have micro- and mini-power projects which cater to local demand and not to the grid. Finally he covered the options available for power generation from renewable sources and presented an integrated plan to manage the power sector. Dr. A. K. Sharma, formerly at NTPC, enquired about the measures taken by the Karnataka Government on the energy efficiency front and the roadmap for use of alternate energy sources. Discussion took place on how demand forecasts are made based upon the rate of growth of GDP, use of energy efficiency measures and use of alternate energy sources.

Shri Shankar Sharma, power policy analyst, spoke on the impact of power projects on the Western Ghats. At the outset, Shri Sharma pointed out that we should aim to protect all the ecologically sensitive areas of the country which include the Western Ghats, Eastern Ghats, wetlands, and forests of Central India. Otherwise we are not solving the problem but only postponing it. According to him development activity of the scale being discussed here has effects across the different regions. He said that the power sector development in the Western Ghats has done more harm than good.

He mentioned that the impacts of conventional power plants could be categorized into economic, social and environmental costs. In his presentation he focused on the environmental costs. In the Western Ghats, the power generation infrastructure includes dams, thermal power plants, nuclear power plants and large-scale wind farms. He elaborated upon the environmental effects of the different types of power plants, the major one being loss of forest cover. He remarked upon the utility of the Green India Mission when deforestation is occurring due to the irrational development of the power sector. Shri Sharma further added that as a country we should look at per capita forest cover which is very low. He also summarized the role of the power sector in GHG (greenhouse gas) emissions.

Shri Sharma highlighted the inequities in the distribution of power in the country and the inefficiencies in the power sector. He flagged the issue of high transmission and distribution losses. Further, he spelt out a future action plan for the power sector which included effective demand side management, highest possible level of energy efficiencies, optimal levels of energy conservation, and widespread use of distributed renewable energy sources.

After the presentation, Dr. V.M. Shastri, JSW Energy, clarified that in the case of run-of-the river projects methane emissions are not an environmental problem. Dr. Shyam said that adequate safe guards are now put in place with respect to disposal of fly ash from coal-fired power plants. He also commented upon lack of evidence for reservoir-induced seismicity as presented by Shri Sharma.

Professor J Srinivasan, Chairman, Divecha Centre for Climate Change, IISc, Bengaluru, spoke on the effect of air pollution on human health and the modelling of cumulative impacts of development projects on air quality. In his presentation, he covered issues related to air pollution and human health, aerosol dispersion, the Gaussian plume model, and dispersion of air pollutants. He also highlighted the use of models in prediction of the cumulative impacts of power plants on air quality. He covered these issues through various case studies. He also mentioned the environmental issues related with fly ash generated from coal-based power plants including radioactivity in fly ash.

Dr P.J. Paul of Aerospace Engineering Department, Indian Institute of Science, Bengaluru, gave a talk on the use of biomass for power generation. He said a mechanism needs to be developed for collection and utilization of agricultural residues effectively. The cost of power generated through agricultural residues is directly related to the cost of the agricultural residues. He mentioned that there is a non-formal mechanism for collection of agricultural biomass. He informed the participants about the amount of agricultural residue generated in Karnataka. He added that in Karnataka 1000 MW is produced from biomass-based power plants. Following the presentation a brief discussion took place on the use of biomass for power generation versus the alternative uses of biomass including its use as farmyard manure.

Dr. P. Vethamony, National Insititute of Oceanography, gave a presentation on the effect of power plants on marine ecosystems. He said that industries have been set up both on the east and west coasts of India. These industries have become clustered in selected areas along the coast with the exception of Goa. Dr Vethamony said that due to the rapid pace of industrial development, assessment of singular or individual impact of projects is not reasonable. He gave example of the Gulf of Kutch where many industrial activities such as refineries, fertilized plants, and thermal power plants are being set up. He also highlighted the presence of the Marine National Park and Sanctuary on the southern coast of the Gulf of Kutch. He detailed the parameters which were monitored during the study carried out in the Gulf of Kutch. With reference to the proposed power plants, which are going to come up on the west coast, he elaborated upon a case study of one such power plant Finally, he provided typical oceanographic investigations which are required to be carried out for an impact assessment study of power plants .

Dr. T.V. Ramachandra, CES, IISc, gave a presentation on the “Options for Energy Generation in Uttara Kanada District”. In his presentation, Dr. Ramachandra gave an overview of the energy scenario in Karnataka explaining the sector-wise breakup, the present installed capacity and growth in the installed capacity. He outlined the methodology adopted for the estimation of solar energy, wind energy and bioenergy potential in Uttara Kanada. He highlighted the alternatives to establishment of mega power projects which included environmentally sound design, use of bioresources in power generation, micro/mini/small hydroprojects. He explained the concept of environmentally sound design using the Bedthi hydroelectric project. Following the presentation there was a discussion on how even after reducing the submergence area of a Dam the electricity production remained the same.

Ashwin Gambhir, Energy Group, Prayas (Pune) gave a presentation on “Electricity Need and Future Outlook: Need for Mid-course Correction”. At the outset he said that the power sector cannot be examined at a regional level in view of the national grid coming up. Shri Gambhir focused on the inequity in electricity availability and distribution. He said that as a country we have not been able to use the increase in electricity production to increase the Human Development Index (HDI) of the country. We can achieve higher HDI by providing electricity to the poor. He further added that the efforts on clean energy production should

focus on energy efficiency measures which would reduce the need for capacity addition. Furthermore, he said that post E-Act 2003 the demand and supply of electricity is seen at the national level and that the number of power plants given environmental clearances would exceed the base load energy need till 2020. As a mid-course correction he suggested that projects which are not in an advanced stage of implementation can be screened based on environmental and social criteria. In the post-2020 scenarion Shri Gambhir suggested a relook at the following issues: (i) type of industrialization, (ii) tariff policy, and (iii) need for promotion of small renewable projects.

Shri E.A.S. Sarma in his presentation highlighted the invincible link between ecology and livelihood of people. He stressed upon the concept of promoting energy efficiency and the role of the Bureau of Energy Efficiency in it. He said that the marginal social cost of the development of the power sector is very high and that for every MW of power produced there are people who suffer. He stressed the need for power sector planning. Furthermore, he pointed out that the proposed merchant power plants, which have been given environmental clearances in the Konkan region, would produce 15, 600 MW of power. If all these power plants come up then there would be surplus power in the region. He said that it was very difficult for state governments to handle power from merchant power plants. He gave the example of Enron in this regard where the State was not able to handle 2400MW.

Shri Sarma highlighted the fact that because all these power plants are coming up in the Konkan region, the cumulative impact of these plants should be assessed. He also opined that to make the process of EIA more meaningful, the EIA consultants should be delinked from the developers. Finally, two legal principles which are central to the debate on environmental issues were highlighted, viz. (i) the doctrine of public trust, and (ii) the precautionary principle approach. Shri Sarma said that the Government holds the natural resources of the country in public trust and acts as a trustee of these resources.

After the presentations from civil society, the presentations from industry representatives were taken up.

Shri S. Ramesh, Chief Engineer, Karnataka Power Corporation Limited (KPCL) gave a presentation about the proposed Gundia Hydro Power Project. He explained the mandate of KPCL and its brief history. He highlighted the fact that power production was not difficult but transmitting the power was difficult to manage. Furthermore, he explained the practical aspects of renewable energy and the experiences of KPCL with renewable energy. He explained in detail the layout and design of the Gundia Hydro project. He gave clarifications on the issues of forest and environmental clearances of the project, use of non-submergence area and land requirement for transmission lines.

Shri M.G. Waghmare, Executive Director, Mahagenco, gave a presentation on the proposed Dhopawe Thermal Power Project. In his talk he explained the sectorwise installed capacity of Mahagenco, the demand shortfall as per the 17th EPS and the capacity-addition programme of Mahagenco. He elaborately detailed the clearances obtained for the Dhopawe project, details of the project, the EIA and environmental monitoring stations. He also emphasized the site selection aspects of the Dhopawe project site. He explained that the site is a lateritic plateau and does not have any threatened plant species. After the presentations, clarifications were sought from Shri Waghmare with respect to the status of the farmers of the area, adverse environmental effects of the power plant with respect to water resources, mango orchards, common pasture land, effect on fish landings, and the access of the fishermen to the sea.

Dr V.M. Shastri, JSW Energy, gave a presentation on a 4 x 300 MW thermal power plant at Jaigad to be set up by JSW. He provided a brief background of the JSW group. He explained the property plan, statutory clearances obtained for the project and the environmental protection measures taken. Following this he detailed the specially commissioned impact studies carried out with respect to the effect of power plant emissions on mango plantations. He also elaborated upon the land use, land cover and mango plantations in a 10 km radius of the power plant. Further, he spelt out the status of legal cases and the environmental clearance given by MoEF. He also exhibited the compliance table with EC and the amended EC of MoEF including provision for FGD. He explained the ash evacuation plan and the CSR and environmental protection activity by JSW.

Summary Record of the Brainstorming Session on Role of Joint Forest Management (JFM) in the Western Ghats held at Indian Institute of Science, Bengaluru, on 19 November 2010

Professor Madhav Gadgil, Chairman, WGEEP, initiated the proceedings for the brainstorming session on the role of joint forest management in the Western Ghats. He told the participants about the main objectives of the Panel, viz. (i) identification of ecologically sensitive areas and their management in the Western Ghats, (ii) regional development strategy for the Western Ghats, and (iii) modalities for the formation of the Western Ghats Ecology Authority. The Chairman informed the participants that very fruitful and productive brainstorming session have been held on the following topics (i) iron ore mining in Goa, (ii) pressures of urbanization in the Western Ghats in Pune, and (iii) role of the power sector in the Western Ghats at Bangalore. He said that the idea of organizing the half-day brainstorming session on Joint Forest Management came from the interaction with the Western Ghats Task Force, Government of Karnataka.

The Chairman suggested that the participants should focus their presentations on the JFM experience, its future and role in the Western Ghats. He also suggested that the participants should consider newer legislations enacted by the Government of India such as the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act and its role/impact on JFM. This was followed by a round of introduction of the participants.

Shri A.K. Joshi, PCCF, Maharasatra, at the outset mentioned that the Western Ghats is a hotspot of biodiversity and areas such as the Kas Plateau in Maharastra is being considered by the UN and IUCN Committee for nomination as a World Heritage Site. He highlighted the fact that Ratnagiri and Sindhudurg areas of Maharastra Western Ghats are highly forested areas. The Forest Survey of India has reported a forest cover of nearly 49%. He contrasted this fact with the designated reserve forest area of the districts, which is about 10.8 %. This is because most of the forested area is primarily private land.

Shri Joshi gave a brief overview of administrative and legal instruments available through which tree cover of private areas can be protected. One such act is the Tree Act. This act relates to legal protection of 15–16 tree species which are present in the Schedule of the Tree Act. He informed the participants that the tree density in the Western Ghats is around 800 trees/hectare and most of the tree species are not listed in the Schedule of the Tree Act. Other than the scheduled trees, people are free to cut trees for their own personal use from community lands.

Felling of trees can also be contained by the Land Revenue code which regulates felling of trees in sensitive areas such as water courses on revenue land. Another legislation wherein the preservation of forest is vested with the government is the Maharastra Private Forest Acquisition Act. He informed the participants as most of the forest lands are under private holding they are outside any legal protection. Further, 49 mining proposals which are located in the Western Ghats of Maharastra are not covered by regulation.

Regarding the JFM experience in Maharastra he said that there are 15,500 villages which are present on the periphery of forest areas in Maharastra. Nearly 12,000 forest committees have been formed and around 3000 are doing good work. He said that under the Tukaram Van Yojana, awards are given to the JFM Committees doing good work. He pointed out that JFM Committees need to work in a more responsible manner.

Shri Bhagwan Singh, Additional PCCF, Tamil Nadu, gave a presentation on Joint Forest Management in Tamil Nadu. He gave a brief profile of forests of Tamil Nadu. He informed the participants that the JFM movement started in Tamil Nadu through Japanese funding in

1997. He elaborated on the basic principles of JFM and the empowerment of the local communities through JFM. He informed the participants about JFM initiatives in Tamil Nadu.

Shri Singh provided information on the administrative mechanisms for the implementation of JFM programmes. At the State level the Chief Secretary is the head of the JFM Committee. At the District level the JFM Committee is chaired by the District Collector and has members from the village council. The Divisional Forest Officer is the Member Secretary of the Committee. This committee basically coordinates the activities of various line Departments.

Villages adjoining forest areas, which could have an impact on the forests, are selected for formulation of Village Forest Committees. The Village Forest Committee (VFC) has one willing male or female member from each household. The President of the committee is selected by election. The Member Secretary of the Village Forest Committee is the Range Forest Officer. Shri Singh informed the participants that the Executive Committee of the VFC decides on issues such as disbursement of microcredit finances and choice of species to be planted.

He then elaborated on the various activities carried out under JFM which included employment schemes, microcredit financing, village- and community-development activities. He also stressed the achievements of the JFM programme.

Ms Madhu Sarin enquired about the administrative mechanism of the JFM schemes and the role of the Range Forest Officer vis-à-vis the power of drawing and disbursing grants, following which discussion on the issue of the Forest Rights Act and Joint Forest Management ensued.

Dr. M.H. Swaminath, Additional PCCF, Karnataka Forest Department, gave his reflections on JFM activities. At the outset he gave a brief profile of the forest area in Karnataka. He informed the members that the total forest area in Karnataka is 4.2 million hectares of which 1.7 million hectares is in the Western Ghats. He also informed the members that the Western Ghats are spread across 6 districts. In the 1990s there was a big gap between the Forest Department and the local people. At that time JFM became a handy tool to bridge the gap between the local people and the forest department. The JFM project was initiated with the DFID (Department for Interntional Development, UK) project in Uttar Kanada which took up ecorestoration of degraded forests. Dr Swaminath told the participants that when the project funding from DFID stopped, the village forest committees became non-functional due to the financial crisis. This happened due to inadequate institutional development. According to Dr. Swaminath, in Karnataka there are nearly 4000 VFCs of which 40 % may be actually working. He said that VFCs are working wherever the funds from Government of India are still operational. He said that the state Forest Department is trying to revive the VFCs.

The benefit-sharing mechanism at the beginning of the programme was 50 % to the local people; however, this was not a big incentive for the local people. The benefit-sharing mechanism was since revised. The state forest department has also devised a benefit-sharing mechanism in which 75 % goes to the VFCs and 25 % goes to the state pool. Dr. Swaminath was apprehensive about the accountability of the VFC in the absence of the Range Forest Officer. He said that the VFC constitution is similar to that of Tamil Nadu. He also informed the participants that the state forest department is trying to give more rights to the local people for NTFPs and grazing. Presently the forest department has control over these issues.

Following the presentation of Dr. Swaminath, the following issues were flagged by the participants: (i) the degraded nature of forests given to VFCs, (ii) the empowerment of elected members of the VFCs, (iii) blanket rights on NTFPs for the local communities, and (iv) the issue of settlement of forest rights. Professor Madhav Gadgil enquired about the community forest resources provision of the Forest Rights Act. Shri Yerdoor, Nagarika Seva Trust, enquired about bottlenecks in the implementation of JFM. It was brought out during the discussions that the basic philosophy of the JFM is defeated when the Forest Department thinks itself as the owner and gives benefits to the people. The issue of settlement of Forest Rights in Karnataka was also discussed.

Shri K.S. Reddy, CCF (Regional Office, MoEF, Bengaluru), informed the members that 20 – 25 million hectares of degraded forests are present in the country of which 3 million hectares are those degraded forest areas which are not able to support biological productivity. Hence the quality of such sites is low. He said that it is important to recognize the difference between site quality of different areas. Further, he added that JFM activitites will not be able to solve the problem of degradation of those forests whose site quality is very low. Those degraded forest sites which have the potential to support productivity should be taken up under JFM and these sites should be protected and restored. According to Shri Reddy full rights can be given to the local people but the key to this would be the principle of sustainable harvest, and reduction of anthropogenic pressures. He said that one of the crucial issues is the allocation of land resources for specific purposes such as for fuel wood versus tobacco. Shri Reddy said that settlement of forest rights is an on-going process.

Ms Madhu Sarin, CSD, spoke about "Community Control on Natural Resources". She talked about the experiences gained from Sukhomajri in Haryana. At the outset she highlighted the following two points regarding the participation of local communities in natural resources management: (i) power should rest in the villages and not with the government, (ii) the principle of equity has to be followed. She elaborated the second point – every one in a community who incurs the cost of protection of a natural resource should have an equal share in that natural resource. She added that protection of natural resources willfully by the local communities leads to "social fencing" of that resource from exploitation. She added that the Forest Conservation Act and other such acts have created walls of mistrust between the government and the local people. She said that the notification of forest areas under FCA is *ad hoc* and lacks a clear rationale.

She informed the participants that the JFM movement started in the 1980s and the Haryana JFM Policy was much before the Government of India policy of 1 June 1990. According to her the following should be key considerations in JFM programmes: (i) to have autonomous self-governing institutions with no government servant as its member, (ii) to recognize people–resource linkages for which government institutions should enter into location-specific agreements with the local communities, (iii) the existing customary boundaries and use patterns should be recognized, and (iv) to strengthen existing livelihoods of the local communities.

She highlighted the following drawbacks in the JFM programme as it is practiced: (i) JFM practiced by the Forest Departments is – we decide, you participate, (ii) JFM talks about conditional entitlements and not rights, (iii) MoUs entered into cannot be implemented in the true sense, and (iv) villagers are confined to degraded forest areas. Ms Sarin said that the genesis of the Forest Rights Act was the massive abuse of the JFM programme. She pointed out that local people had to gratify the local officials to get their due under JFM. She added that the Forest Rights Act provides a means for restoration to communities what was

already theirs and to try to undo the historical injustice done to them. She highlighted the point that in many states tribal rights have not been settled.

Shri Mohan Hirabhai Hiralal, Covenor, Vrikshamitra (Gadchiroli, Maharastra), in his presentation highlighted the various legislative and administrative mechanisms through which forest rights of local communities can be recognized. He highlighted the fact that JFM should be considered an important tool for Participatory Forest Management wherever forest rights are not covered by the Forest Rights Act, 2006 or under sec 28 of the IFA, 1927. He elaborated on the methodology for recognition of community forest rights under FRA, 2006, IFA 1927 and through JFM.

Shri Hiralal stressed the need for recognizing the Gram Sabha or Mohallasabha as the basic unit of governance. He gave the example of Mendha (Lekha) where the government has recognized Gram Sabha under FRA 2006. He detailed the modalities which need to be carried out for the recognizing the Gram Sabha or Mohallasabha as the basic unit of governance. Further he highlighted how the Gram Sabha can also serve in the role of different committees such as the Community Forest Committee, Village Biodiversity Management Committee and JFM committee. He elaborated on good governance practices which need to be undertaken under the Gram Sabha model. In the end he summarized the Gram Sabha model by stating that in the villages, the local people are the government. He invoked the concept of direct democracy and stressed on the strength of the individual within a community.

Rajeeva, from Nagarik Seva Trust, spoke in Kannada regarding his grassroots experience in Dakshin Kannada district. His talk has been translated and summarized below. He informed the participants that the first Village Forest Committee was set up in Dakshin Kannada district under the DFID project. He said that the money received by the VFC is completely retained by the State Forest Department and is spent entirely under the control of the Forest Range Officer. The President of the VFC is merely told to sign. He said that can people can ask for the accounts in General Body Meeting but the officials at the village level do not know the details of involvement of other line departments. He also mentioned that the NTFPs are never shared with the local community. In some cases the NTFPs are stolen from the forest and the VFC has no control on them.

He highlighted the fact that under the JFM programme, tree plantation did happen on a sizeable area of land and that microplans were made at the village level. He said that the MoU is one-sided. He highlighted the fact that local people are told to conserve nearby forest areas but they do not have any say in their management. The eco-development committees near National Parks have no involvement of people.

Dr Ganeshaiah asked whether there were any comparative studies demonstrating better forest stock under Joint Forest Management. Shri Reddy informed that studies in Andhra Pradesh had revealed no significant difference in forest stocks under and outside Joint Forest Management.

Minutes of the Ninth Meeting of Western Ghats Ecology Expert Panel (WGEEP) held at Kerala Forest Research Institute, Peechi on 28 January 2011

The Western Ghats Ecology Expert Panel met on 28th January 2011 at Kerala Forest Research Institute, Thrissur.

The following members were present:-

Prof. Madhav Gadgil	Chairman
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Dr. R.V.Varma	Member
Dr. Renee Borges	Member
Prof R. Sukumar	Member
Ms. Vidya S. Nayak	Member
Dr. G.V. Subrahmanyam	Member Secretary

Dr. Ligia Noronha, TERI, New Delhi; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad; Prof. S P Gautam, Chairman, Central Pollution Control Board; Dr. D.K. Subramaniam, IISc, Bengaluru; Dr. K.N. Ganeshaiah, UAS, Bangalore; all Members of the Panel could not attend the meeting. Dr. Amit Love (Deputy Director, MoEF) was also present during the meeting.

Special Invitees

Shri Devrat Mehta, Chairman, High Level Monitoring Committee, Mahabaleshwar-Panchgani Ecosensitive Area

Dr. S.N. Prasad, Senior Principal Scientist, SACON, Hyderabad

Dr. K.A. Subramaniam, ZSI, Pune

The Chairman welcomed the Members of the Panel and initiated the discussion on the identification of ecologically sensitive areas in the Western Ghats region. Prof Madhav Gadgil outlined a proposal wherein the whole Western Ghats region could be classified as Ecological Sensitive Area and it could be further classified into different zones with varied degree of regulatory and promotional activities depending upon the ecological sensitivity of each zone. This would be followed by development of detailed guidelines for preparation of development plans for each zone. The Chairman suggested that such guidelines for each of the zones would be developed through a worshop in collaboration with Kerala Institute of Local Administration (KILA).

Professor Madhav Gadgil informed the Panel about the resolutions passed by 22 Gramsabhas of Ratnagiri and Sindhudurg regions for declaring their areas as ecologically sensitive areas. Most of these villages are located in the vicinity of mines. He further said that most of the resolutions were in Marathi. Prof Gadgil read out one such resolution, which was translated from Marathi into English. Professor Madhav Gadgil informed the Panel members that most of the other Gramsabha proposals were on similar lines to the one

he read out. The Gramsabhas resolutions also included a tentative management plan for the areas under their jurisdiction.

Shri Devrat Mehta, Chairman, High Level Monitoring Committee (HLMC), Mahabaleshwar-Panchgani Ecosensitive Area gave a talk on the Mahabaleshwar-Panchgani Ecosensitive Area and the issues relating to the management of the same. He informed the Panel that the main objective in setting up the Mahabaleshwar-Panchgani Ecosensitive Area was to maintain the green cover of the area. The state govenment agreed to the proposal of maintaining green cover and declaration of an ecologically sensitive area at the outset, but was not very clear as to what an ecosensitive area notification meant. Thus, now the State Government has developed an apathy towards the Mahabaleshwar-Panchgani Ecosensitive Area.

Shri Mehta gave a brief history of the Mahabaleshwar-Panchgani EcoSensitive Area with respect to the notification and the setting up of the High Level Monitoring Committee. He informed the Panel that he took over as Chairman, HLMC, in November 2009. Further, Shri Mehta also informed the Panel members that after taking over as Chairman, he has made separate subcommittees and prepared a Draft Regional Plan for the area. The draft Regional Plan keeps the specific requirements of the ESA in focus. He highlighted the fact that as per the ESA notifications, a Regional Plan can be approved when the Tourism Plan of the area is also approved. Shri Mehta suggested that the approval of the Regional Plan and the preparation of the tourism plan should be delinked in this particular instance. According to him, the framework for activities can be defined in the regional plan and the detailed plan of activities could be given in *subzonal plans* – such as the tourism master plan. He informed the Panel members that the HLMC has laid down the criteria for development of the Tourism Master Plan.

Shri Devrat Mehta informed the Panel that in the absence of concrete guidelines, some people have misused schemes for promotion of tourism for illegal construction. He gave the example of the Bed and Breakfast scheme, which was launched to promote homestead tourism by local people, but was used as a guise for illegal construction and running of hotels by non-residents. Shri Mehta read out the draft regional plan of the Mahabaleshwar-Panchgani area and explained the various initiatives launched by the HLMC. He also informed the Panel that the HLMC has created a broad framework for the development of the Tourism Master Plan for the region which has been sent to the State Government.

Shri Mehta highlighted the fact that under the ESA notification, a Monitoring Committee is set up but actually the Monitoring Committee is quite ineffective in carrying out management functions. He said that in such a case there should be a provision in the notification which enables the Monitoring Committee to take action against offenders. For this, he said there is a need to earmark offices through which the HLMC will take action. He emphasized that there is no need to earmark any actual staff for this purpose. He also added that powers need to be devolved to the HLMC if effective management of ESAs needs to be carried out**.** He suggested that the composition of the HLMC should not be loaded towards government officials, and that it would be more meaningful to have subject experts. He also suggested that there should be a buffer zone around an ESA. Further, he said that the MoEF should appoint coordinators for each state for the administration of Ecologically Sensitive Areas.

Dr. S.N. Prasad made a presentation on "Assessing Levels of Ecological Sensitivity of Western Ghats". Dr Prasad explained the grid size for developing a spatially explicit database. He also explained the various parameters used for arriving at ecological sensitivity

scores for the grids. He also mentioned the sources of information for each parameter. Dr. Prasad presented the ecological sensitivity scores for grids in the states of Kerala, Tamil Nadu, and Karnataka. He explained the various layers which have been developed as overlays on the Google Earth images.

After the presentation, Prof R. Sukumar sought clarifications on the boundaries and delimitation of the Western Ghats. Prof Sukumar also explained the geographical distribution of elephants across the Western Ghats region. He informed the Panel Members that he would pass on the information on boundaries of elephant reserves to Dr. Prasad for incorporation into the geospatial database being developed for the Panel. Shri B. J. Krishnan enquired about the scores allotted to the Nilgiri region. Dr Prasad requested Sri B.J. Krishnan to send material relating to Palni hills for incorporation in the database. Dr. K. Subramaniam, ZSI, was also requested to provide the following data for incorporation in the geospatial database: (i) invertebrate taxa especially on dragonflies and damsel flies, (ii) dams present in the Western Ghats region, and (iii) watershed boundaries for major rivers.

Dr. S.N. Prasad informed the Panel Members that no weights have been attached to the parameters used for arriving at ecological sensitivity scores. Further, the issue of correlation between the variables could be examined at a later date using available statistical tools.

Representatives from Cauvery Sene (a citizens group), Madikeri, Kodagu, presented a proposal to declare Kodagu as an ecologically sensitive area. They requested the Panel members to recommend imposition of a moratorium till the proposal of Kodagu is examined by the Ministry for declaring it as an ecologically sensitive area. After the presentation, Dr. V.S. Vijayan enquired from the Kodagu team whether the local panchayats have been consulted on the proposal for making Kodagu an ecologically sensitive area. Prof R. Sukumar sought clarifications on the land rights of the local community and the legal problems which could be involved with issuing a moratorium on development activity in the region.

Ms. Prakruti Srivastava, DIG (WL), Ministry of Environment and Forests, gave a presentation on the notification of ecologically sensitive areas around National Parks and Wildlife Sanctuaries spread across the country. She explained in detail the genesis of the proposal and chronology of events. She informed the Panel Members that of the 619 PAs present in the country, the Ministry had received only 5 proposals as on date and only 1 notification has taken place. She informed the Panel Members that the Wildlife Division of the Ministry is preparing guidelines to be followed for the notification of ecologically sensitive areas around Protected Areas.

She explained the draft guidelines to the Panel members. It was suggested by the Panel that it would be meaningful to have public consultations with local bodies such as Panchayats before formulating the ESA proposals. The Panel also suggested that a representative from the Panchayat/Biodiversity Managament Committee/Village Forest Committee should be a member of the Committee which will be set up for each PA to decide on the extent of the ecologically sensitive area around that PA as suggested in the draft guidelines.

The Chairman initiated discussion on the time line for submission of the report to the Ministry. The Chairman suggested that he would develop an outline and the broad contents of the report by early February which would then be sent to all Panel Members for comments. After receiving comments and suggestions on the draft outline, the Chairman will incorporate the views and suggestion of the members and prepare a draft report by March 2011.

Dr. V.S. Vijayan sought clarification on what is the view of the panel on the concept ecologically sensitive areas in the Western Ghats and the methodology for development of concrete proposals for ecologically sensitive areas. The Chairman suggested that ESA rankings for the grids would be made available in the coming 15 days. After that each of the Panel Members can study the grid-based sensitivity rankings for the entire Western Ghats. This would be followed by a meeting of the Panel in early March to finalize the proposals regarding ESAs.

Prof R. Sukumar suggested that after preparation of the draft report it could be uploaded on the Ministry's web site for public comments. These comments can then be considered by the Panel and the final report be prepared for submission to the Ministry. Dr. Renee Borges suggested that if all the members are coming to IISc Bengaluru in early March then the brainstorming session on land use planning could be organized during that period also.

Professor Madhav Gadgil suggested that during the March meeting of the Panel the proposals for ecological sensitive areas would be finalized. The Chairman proposed that, based upon the ecological sensitivity scores, the Western Ghats region could be categorized into 5 zones. This zonation of the Western Ghats would then be put on the web for public comments. Of the five zones, zone 5 may be treated as the most sensitive zone which needs to be highly protected. The Chairman proposed that the detailed guidelines for the management of each zone could be developed in collaboration with the Kerala Institute of Local Administration. For this a workshop may be organized in May where experts from different areas could be called.

Prof Sukumar said that the proposed zonation should be based upon the ecological sensitivity scores and grid analysis and it should not be limited to political/state or legislative boundaries. Dr. Vijayan said that ground truthing should be carried out to check the reliability of the ecological sensitivity scores for each grid. Dr.R.V.Varma said that sites which have small areas but high conservation values and are outside the typical PA network can be protected with the approval of State Government as Community Reserves under the Wildlife Protection Act. Following this a discussion ensued with respect to notification of areas under the Wildlife Protection Act or Environment (Protection) Act.

Finally, the WGEEP visualized the following timeline for concluding its activities:

(i) An interim report outlining the ecological sensitivity scores for the entire Western Ghats will be prepared by 1/3/11.

(ii) This report would be discussed at the next meeting of WGEEP scheduled to be held in Bengaluru from 3rd to 5th March 2011.

(iii) Based on the discussions a revised report will be prepared and discussed at the Panel meeting proposed to be held around 23/3/2011 in Delhi with the Hon'ble Minister for Environment and Forests.

(iv) The Draft report prepared after deliberations will be uploaded on the Ministry of Environment and Forests website for public comments.

(v) A 4-day workshop will be held at Kerala Institute of Local Administration, Thrissur in early May 2011 to suggest guidelines for development planning for different regions of Western Ghats taking into account their level of ecological sensitivity.

(vi) A final report based upon the inputs received from this workshop, and from the public, will be submitted by 30 June 2011.

Dr. G.V. Subrahmanyam enquired about the view of the Panel on the issue of declaration of ecologically sensitive areas around National Parks and Wildlife Sanctuaries. Professor Madhav Gadgil clarified that the Panel has unaninmously recommended to the Wildlife Division of the Ministry that a component of public consultation should be added in the guidelines for declaration of ecologically sensitive zone around protected areas. Further, a representative of local bodies should be a member of the Committee to be set up for each Protected Area which will decide on the extent of ecological sensitive zone around the PA. He said that till such time that the draft guidelines are finalized the proposals for ESAs may be put on hold.

Shri B.J. Krishnan said that management plans needs to be developed for ecologically sensitive areas and clear administrative mechanism also needs to be worked out. Dr. R.V. Varma suggested that the Biodiversity Monitoring Committees set up under the Biological Diversity Act can provide a focal point for the administration of ecologically sensitive areas. Ms Vidya Nayak and Shri B.J. Krishnan commented that BMCs are not functioning effectively in Karnataka and Tamil Nadu. Hence the use of BMCs as focal points for administering ESAs needs to be revisited. This was followed by detailed discussions on the governance mechanisms for ESAs and the regulatory powers of the Western Ghats Ecology Authority under section 5 of the EPA.

Next steps

The Panel decided to have the next meeting of the Panel in Bengaluru from 3rd to 5th of March 2011 at Indian Institute of Science. It was also decided to have a brainstorming session on land use planning in the Western Ghats on 3rd March 2011.

The meeting ended with a vote of thanks to the Chair.

Summary Record of the Brainstorming Session on Water Resources Planning in the Western Ghats held at Kerala Forest Research Institute (KFRI), Peechi, on 27 January 2011

Dr. K.V. Sankaran, Director, KFRI, welcomed the WGEEP members and the participants of the brainstorming session. He also said that it was the privilege of KFRI to host the WGEEP meeting at KFRI. He requested the Panel members to visit the various Divisions of the Institute to familiarize themselves with work carried out by the Institute in the area of tropical forest ecology.

Professor Madhav Gadgil, Chairman, WGEEP, thanked Dr. K.V. Sankaran for hosting the meeting of WGEEP at KFRI. He informed the participants that he has been associated with KFRI in various ways in the past. This was followed by a round of introductions.

Prof Gadgil welcomed the participants to the brainstorming session on Water Resources Planning in Western Ghats organized by WGEEP. He informed the house that WGEEP has been organizing brainstorming sessions on important themes related to Western Ghats. He said that earlier brainstorming sessions have been held on (i) organic agriculture in Kerala, (ii) iron ore mining at Goa, (iii) pressures of urbanization in Western Ghats at Pune, (iv) role of the power sector and role of Joint Forest Management in the Western Ghats at Bangalore.

Professor Gadgil recollected his recent experiences with respect to how water resources are impacted upon by development activities and how these are reported in EIA reports. He gave the example of a specific case in Goa where a mine was located inside a sacred grove and was damaging many springs which are present in the area. The EIA report stated that there were no water courses in the area. The environmental clearance mentioned that

natural water courses should not be tampered with. Professor Madhav Gadgil informed the participants that according to the interpretation of the mine manager, EIA notification specified water courses as nullahs and not springs. Further, the toposheet did not have any blue line demarcating water courses. Through this example, he highlighted the fact that there is inadequate information on water resources in the upper reaches of the Western Ghats.

Prof Gadgil gave another example of forest areas in Ratnagiri District. He said that the Zoning Atlas for Siting of Industries (ZASI) mentions there is 2.5 % forest area in the district, whereas the satellite imagery shows around 42 % forest area, since most of the forest area in Ratnagiri is private forest area. Prescriptions for siting of industries takes into account only 2.5 % forest area. The Zoning Atlas for Siting of industries also gives consideration to major rivers only and not other natural water sources.

Shri Samir Mehta, South Asia Programme Director, International Rivers, gave a presentation on "Water and Natural Resources Governance within ESAs – the Challenges in Implementation". He informed the participants that he was associated with the planning process of Matheran and Mahabaleshwar-Panchgani ecologically sensitive areas and was also involved in the vision document for the Mt Abu ESA notification.

Shri Samir Mehta said that the procedure followed for the development of the regional plan of ecologically sensitive areas is laid down by the Town Planning Act. Generally, the Town Planning Acts are not amenable to ESA planning, as they are related more to regulation of land use. Every state government has its own methodology and procedures for town planning. He said the that regional planning process has worked for town planning and transport but not in the case of ecologically sensitive areas.

He explained the process followed in the preparation of the regional plan with respect to the ecologically sensitive areas in Maharastra. After the Gazette notification of an Ecologically Sensitive Area, the Government of Maharastra set up a regional planning board which included elected representatives of the Government and two members of civil society. The regional planning board had three subcommittees under it, one subcommittee each on tourism, environment and land use. He said that the Land Use committee which is chaired by the Collector compiles recommendations of the Environment and Tourism Subcommittee. Shri Mehta said that none of the members of the regional planning board talk about issues related with environment and ecology. The regional plan so developed is biased towards development and lays down land use zoning only.

He highlighted the fact that all through the planning process no line organizations are identified for implementation of policies and programmes. Further, there is no integration and coordination between different government departments. He gave the example of the Western Ghats Development Programme which was started in 1974–1975 by the Government of Maharastra in this regard.

Shri Samir Mehta stressed on the need for following the precautionary principle in ecologically sensitive areas. He suggested that the process of planning for ecologically sensitive areas should be from the perspective of effective management of natural resources. He highlighted the case of the Matheran Ecologically Sensitive Area where even after 7 years the Master Plan has not been developed. According to him the major concern is the process of how to meaningfully engage the state government in the process of planning for ecologically sensitive areas.

Shri Samir Mehta proposed that the Ministry should identify Line Departments and spell out workplans for each of them in an accompanying document and not in the main notification itself, as is conventionally done by many Ministries of the Government. He suggested that the Panel should lay down the process for development of the Master Plan including identification of stakeholders. This process should also facilitate out-of-the-box thinking in the government.

According to Shri S. Mehta, the Western Ghats Ecology Authority (WGEA) for the whole Western Ghats will not work smoothly as the requirements for each of the Western Ghats states may be different. He suggested that the WGEA should have sub panels for each of the Western Ghats states with a common Chairman for the whole Authority. Furthermore, the Ministry of Environment and Forests can set up a Western Ghats Regional Office of the MoEF for the purpose of administration of the Western Ghats. He added that the WGEA should have a conflict resolution expert who engages the different parties on interest-based negotiations rather than position-based negotiations.

Shri S. Mehta also commented on the functioning of the WGEEP. He said that WGEEP has undertaken the process of public consultation but interest groups have not been given adequate time to participate in the public consultation. He commended the WGEEP on the brilliant work which has been carried out developing a geospatial database wherein geographical grids have been assigned ecological sensitivity scores.

On the issue of construction of dams on the rivers in the Western Ghats region, Shri Samir Mehta said that no big dams should be allowed in the Western Ghats. He emphasized that even run-of-the-river projects are not good in the case of west-flowing rivers of the Western Ghats region. The down-stream effects of dams need to be studied for the complete river till the river meets the sea. He highlighted the concept of environment flows of the river. He mentioned that according to stipulations there should be 15 % environmental flow in the river but this is not followed in the process of dam design.

After the talk, Dr. Renee Borges commented that it was not good that the committees involved in the planning process of Ecological Sensitive Areas work independently. Shri Devrat Mehta said that in the case of Mahabaleshwar-Panchgani the High Level Monitoring Committee set up by MoEF has given the overall guidelines to the different committees involved in the preparation of the regional plan due to which the regional plan of Mahabaleshwar-Panchgani could be salvaged. He brought the issue of what should form part of the zonal plan or and what should be included in the subzonal plans. He informed the members that the Mahabaleshwar-Panchgani notification is 10 years old. Dr VS Vijayan said that public consultation should be undertaken after the draft plan is ready.

Dr K.J. Joy, National Convener, Forum for Policy Dialogue on Water Conflicts in India, gave a presentation on “Water resources planning and people's livelihoods in the Northern part of the Western Ghats:The case of Warana Basin”. He said that the work presented was carried out under the Live Diverse project undertaken in the Warana basin of Maharastra. He informed the participants that the people of the study area have suffered double displacement, first when the Warana Dam was constructed and then when the Chandoli National Park was created. Dr Joy gave a brief profile of the area which included watershed details. He informed the members that the Warana river is a tributary of the Krishna and forms part of the larger Krishna Basin. He also presented the water use profile of the area.

He highlighted the relationship between livelihood and biomass resources. The local people generated their livelihood from direct use of biomass, by modifying the biomass, or by selling the biomass. He also brought out the intricate linkage between biomass generation

and availability of water resources. Further, he mentioned that social arrangements can modify biomass use. Hence, these social arrangements should be considered in the planning process.

He said that under the programme the basin was categorized into three different zones. Zone 1 was the upper part of the basin. The area in Zone 1 had steep slopes and the area for undertaking agriculture was very limited. The economy of Zone 1 could be called a money order economy. Zone 1 was a surplus water/biomass zone after taking into consideration the biomass requirement for livelihood, the water resources required to raise the biomass, and water requirement for domestic use. This surplus water/biomass could be used for development of ecotourism in the area.

Zone 2 was a transitional zone. Zone 2 was mainly rainfed with some irrigation facility. This zone was deficient in water and biomass requirement. The efficient use of water is the key issue for this zone. Efficient use of water resources could be achieved by equitable access to water resources and better choice of crops and better agronomic practices. It was suggested that biomass processing for income generation through non-agricultural pathways should be the key activity.

Zone 3 was a heavily irrigated zone and was dominated heavily by sugarcane cultivation. Recommendations for the zone included promotion of water-saving techniques so that excess water can be used in Zone 2. Further, broad basing of the cropping pattern and processing of biomass was also recommended.

Prof Janakarajan, Madras Institute of Development Studies, gave a presentation on "Vulnerabilities of East-Flowing Rivers: Some Issues and Concerns". Prof Janakrajan said that the Western Ghats are the foundation for south India in terms of water resources and biodiversity. The major east-flowing rivers, which originated in the Western Ghats, are the Krishna, Godavari, Pennar and Cauvery. Prof Jankarajan gave basic details of the east-flowing rivers which included the catchment area, average annual potential and utilizable surface water potential. He highlighted the inter-state nature of these rivers. He stressed upon the critical issues, which concern the entire east-flowing rivers of the Western Ghats. These include upstream development, increasing pollution load, delta vulnerability and water conflicts.

Prof Janakarajan also highlighted the following issues which need contextualization in terms of water resources: (i) unsustainable development, (ii) persistent poverty, (iii) uncontrolled urbanization, and (iv) myopic sectoral approach for growth and development. Following this he gave a brief overview of the pressures on the Krishna river including high pollution load. He explained in detail disturbing features of the River Cauvery basin. Some of them were: (i) highly used, urbanized and water deficit basin, (ii) high level of pollution, (iii) negligible environmental flow in river except during the monsoons, and (iv) saline ingress in the delta region. He covered the delta vulnerabilities of the Cauvery Delta. Further, Prof Janakarajan also outlined the impact of climate change on coastal ecosystems and coastal agriculture.

He summed up by saying that east-flowing rivers and their river basins are the food basket of India. This region has become increasingly vulnerable due to high level of pollution and rapid urbanization. As a way forward he suggested that pollution of the rivers should be reduced, the intimate link between the delta region and the upper reaches of the river needs to be recognized and there should be a comprehensive policy backed by legislation for better river basin management as well as better enforcement and monitoring mechanisms for pollution control.

After the presentation, Prof Sukumar enquired about the reduced flow in the Cauvery river. Dr. R.V. Varma asked about the effect of seawater ingress on well water quality.

Shree Padre, Water Journalist, spoke on "Water Conservation in the Lateritic Zone of Western Ghats – Lessons from Experience". Shri Padre informed the participants that the history of open wells went back 4500 years. He said that if an open well cannot yield water in the Western Ghats then it cannot yield water anywhere. He said the local people in the Western Ghats have developed ingenious methods for rainwater harvesting and augmentation of their local water supply. Shri Padre stressed on the important role of media in highlighting these local innovations for water conservation, which have not been documented as yet. He said that now people have started to recognize the importance of local rainwater harvesting techniques. The concept of recharge wells is becoming popular in Bengaluru.

Shri Padre gave examples of water conservation and augmentation measures on lateritic hill tops. He elaborated the cases of *Johars* and *Madakas or nullah-bunds* where the local people make a temporary check dam along drainage lines of a depression on lateritic hill tops. In this method advantage is taken of depression shape wherein the depression has a bottleneck-like feature on the main drainage line, which is plugged to retain water at a minimal cost. Shri Padre suggested that such areas on lateritic hill tops where *Madakas* can be made should be reserved for public purposes. According to him this will bring down the costs of watershed development.

He also suggested that abandoned laterite quarries should also be left untouched so that they can also act as points for water recharge. Shri Padre also elaborated upon the following examples of local innovations for water conservation and augmentation (i) *Kutta* – temporary check dam, (ii) *Surangas* – gravity irrigation, (iii) use of abandoned termite mounds as water recharge points, and (iv) creation of percolation ponds in 5 % area of a rice field. Shri Padre stressed upon the importance of vegetation in recharge of ground water and the fact that ground water recharge can be enhanced by protection of natural vegetation in an area.

Dr. Renee Borges sought clarification on how abandoned termite mounds act as recharge points for ground water. The participants appreciated the illustrated presentation of Shri Padre for documenting the local techniques of water conservation in the Western Ghats.

Dr. A. Latha, River Research Centre, gave a presentation on "Decentralized River Basin Planning for West-Flowing Rivers". She stressed upon the fact that rivers and landscapes are intricately connected. Hence, river basin planning was a must. She highlighted the wrong approaches which have been adopted in the past with reference to forests and rivers. Some of them are (i) building more and more water storage structures ignoring the need to maintain environmental flow in the river, (ii) considering river as conduits of pollution, (iii) neglecting the importance of river in riparian ecology, (iv) delinking land use and river ecology, (v) keeping primary users away from the planning process, and (vi) reclaiming wetlands.

Dr. Latha stressed on the importance of maintaining environmental flow in the river. She said that in the case of the Western Ghats we are dealing with a highly fragile landscape. She highlighted the facts that (i) Western Ghat rivers originate at high elevations in the Ghats and reach the sea in less than 50 km, and (ii) nearly 1/3rd of their river basin is in the Western Ghats. Thus there is an intricate link between the ecology of the Western Ghats and the river flows. Dr. Latha informed the participants that due to faulty planning rivers are not reaching

the sea in the summer season; consequently there are unnatural flow fluctuations, and fisheries are being adversely affected.

According to her, it is imperative now to undertake catchment-level planning and management. The suggestions given by Dr. Latha included basin-level impact study of large dam projects, origin of rivers to be declared as "no go" areas, free-flowing biodiversity-rich strectches of rivers be declared as ESAs, and no environmental clearance be given to new dams in overdeveloped and closing basins. She said that there is an urgent need for government departments, local bodies and river basin communities to understand ecology of rivers. Further, if any meaningful solution is to be developed, involvement of local communities in implementation, planning and management of river basins is a must. She listed the enabling steps which should be taken up by the government in this regard. The major one involves creating an institutional environment for participatory decentralized river basin managament. Dr. A. Latha also detailed activities to be undertaken as part of a river basin plan.

Dr. K. A. Subramaniam, ZSI, Pune, gave a presentation on "Biodiversity and Status of Riverine Ecosystems of the Western Ghats". Dr. Subramaniam showed the different river basins present in the Western Ghats. He also showed the different ecological zones of a typical river, viz. (i) headwater zone, (ii) mid reach, and (iii) floodplains. Dr. Subramaniam showed the different types of stream habitats found in the Western Ghats. He also illustrated the different types of wetland habitats found in the Western Ghats which include *Myristica* swamps, high altitude streams and bogs. Dr. Subramaniam gave a brief overview of the floral and faunal diversity of the riverine ecosystems in the Western Ghats. He highlighted the unique species of aquatic macroinvertebrates, odonates, fishes, amphibians and reptiles found in the Western Ghats. Dr Subramaniam stressed the high degree of endemicity in various taxa. He focussed on the distribution of endemic Odonata and Amphibia in the Western Ghats which were clustered in the southern Western Ghats.

After giving a brief overview of the biodiversity associated with riverine ecosystems of the Western Ghats, Dr. Subramaniam listed the major threats associated with rivers in the Western Ghats, the major threat being dams and hydroelectric power projects. Dr Subramaniam presented the various dammed river basins and sub-basins in the Western Ghats. He highlighted an important fact that there are very few river basins in the Western Ghats which do not have any dams. He also showed the other threats associated with riverine ecosystems of the Western Ghats which include mining, deforestation, development of road infrastructure, sand mining, plantation development, unplanned tourism, pollution and biological invasions. Finally, he suggested measures for biological conservation in the Western Ghats.

Shri Sudhidhendra Sharma, Director, Ecological Foundation, gave a talk on "Integrating Ecosystem Services in Water Resources Planning for the Western Ghats". He started his talk by saying that during the deliberations the participants have only stated the obvious and have not focussed upon what needs to be done. He commented upon the tasks which the proposed Western Ghats Ecology Authority has to perform and the fact that the Western Ghats are spread across many states.

Shri Sharma gave the example of New York city where the local government decided to invest in the protection of upland areas to improve the quality water rather than setting up of a conventional water treatment plant. The people residing in the upland areas were given monetary incentives for maintaining the catchment areas. Through this case study Shri Sharma made out a case for payment of ecosystem services to the local communities. He

gave another example of one such case in Assam wherein downstream communities pay for ecosystem services to the upstream communities. He said that this system has been in operation successfully and the local communities have worked out a mutually acceptable compensation mechanism.

Shri Sharma said that the difficult part in payment for ecosystem services is how to compute values for ecosystem services. He added that there are many case studies where payment for ecosystem services has been undertaken as a mode for environmental protection. He gave examples of China and Australia where payment for ecosystems services has been adopted. He commented that in the case of environmental protection, the market is the problem and also the solution.

Following the presentation of Shri Sharma a discussion ensued on the importance and relevance of ecological economics in solving environmental problems.

Shri Devrat Mehta, Chairman, High Level Monitoring Committee, Mahabaleshwar-Panchgani, spoke about "Management of Rivers and Lakes of the Western Ghats". He gave examples where the planning processes were undertaken with a well meaning objective of environmental protection. He talked about the planning process which was undertaken for lake districts in Maharastra with the purpose of promoting tourism in the early 80s. According to the plan, no development was allowed in the 100m zone around the lake and the FSI (Floor Space Index) was regulated in the zone between 100m–500m from the lake. Any construction activity was to be merged with the landscape and felling of trees was completely banned. This plan was not approved by the then government due to political interests. He also gave the example of Waghora river and Ajanta and Ellora caves. Shri Mehta said that under the Ajanta and Ellora development plan, land was bought along the river to protect the Ajanta and Ellora caves and the riverine ecology.

He stressed on the need for development of regulations for areas adjacent to rivers and lakes and hill top areas. He pointed out that due to the CRZ notification private developers have moved away from the coast and have started developing on hill tops adjacent to the coastal zone. Furthermore he informed the participants that the developer becomes the planning authority when townships occupy and area of more than 100 acres. He discussed the cases of Ambi Valley and Lavasa.

Dr. S. N Prasad, SACON, and Dr. K.A. Subramaniam, ZSI, spoke on "Conservation of Aquatic Ecosystems of the Western Ghats". Dr Prasad gave a talk on the geospatial database being developed for WGEEP and how the information on endemic fish species would be introduced as an overlay on the Google Earth map. He also informed the participants that seven parameters have been used to arrive at the ESA rankings. He informed the members that as all the information has not been incorporated in the database, some of the grids which had low ecological sensitivity rankings had endemic species in them.

Open Discussion

The brainstorming session on Water Resources Planning was followed by an open discussion by the participants and WGEEP Panel Members.

Professor Madhav Gadgil, Chariman, WGEEP, outlined the major tasks which the Panel will undertake, viz. (i) assignment of sensitivity scores to all parts of the Western Ghats, (ii) preparation of guidelines for regulation and promotion of activities under various sectors for areas in relation to their sensitivity scores, (iii) designing a participatory process for preparation of environmentally and socially sustainable development plans for the Western Ghats region. He informed the participants about the time line which the WGEEP is

envisaging for submission of the report. Further, he told the participants that the draft report of the Panel would be uploaded on the Ministry's web site for comments from the public. Prof Gadgil stressed upon the need for effective water resources planning in Ecologically Sensitive Areas.

Dr. Joy highlighted the issue of how the Western Ghats Ecology Authority will relate to other regulatory authorities such as the Maharastra Water Regulatory Authority (MWRA). The MWRA has the authority to settle entitlements and inter-sectoral use of water resources. He also pointed that there are various government regulations on water-related issues. The Panel will have to consider them while defining the authority of WGEA.

Dr. Joy also pointed out that there is no need for any large water impoundments in the head water zone of the rivers in Mahrastra. He informed the members that even with many large dams, the irrigated area in Maharastra is only 17 %. According to him it would be more meaningful to have local water harvesting structures in the villages so that water can be made available locally for irrigation and other uses. Dr. Joy also commented on the regulation of mining activity in the Western Ghats region. He said that mining should be regulated by a two-pronged approach, viz (i) mining companies should be made to strictly adhere to the environmental clearance conditions, and (ii) they should undertake ecorestoration of mined-out areas.

Dr. Vijayan said that the Panel should clearly demarcate "No Go" areas in the Western Ghats and the Panel should make a clear recommendation for adoption of green technologies and organic agriculture in the Western Ghats. On the issue of dams, Dr Vijayan said that no large dams should be allowed in the Western Ghats. He also said that the whole Western Ghats should be declared as an ecosensitive area having different zones of varying ecological sensitivity.

Prof Madhav Gadgil asked whether the Panel will be able to make a case for declaring the whole Western Ghats as an ecologically sensitive area.

Ms. Vidiya Nayak said that subsidy to fertilizer companies should be stopped and the money could be directly transferred to the farmers for promotion of organic agriculture. Prof Madhav Gadgil commented that different alternatives have to be explored for this. Dr. V.S. Vijayan said that the amount given in subsidies should be made explicit. Prof Sukumar said that organic agriculture in Western Ghats should be encouraged. He also commented that farmers have to be given economic incentives such as tax breaks for promotion of organic agriculture. Dr Vijayan said that use of pesticides has been promoted by marketing activities of shopkeepers.

Shri B.J. Krishnan said that the concept of declaring the whole Western Ghats as an Ecologically Sensitive Area with zones of varied degree of ecological sensitivity was commendable. Further, he said that organic agriculture can be implemented in the Western Ghats in a phased manner. Dr. R.V. Varma suggested that the Panel should recommend that the Western Ghats should be made a pesticide-free zone. He invited the attention of the Panel to the endosulfan problem in Kerala.

Dr. Latha said that plantations in Western Ghats should be made pesticide-free in a phased manner. She said the cost of plantations is increasing, and to make plantations pesticide-free planters should be involved in the process. She also suggested that planters should be involved in the process of eco-restoration of old plantations and they should be involved in welfare schemes in their areas.

Dr. Varma also opined that conservation of forests of the Western Ghats is important for water security of the region. He said that the Panel should declare over-exploited regions of rivers in the Western Ghats as ecologically sensitive. Shri Sameer Mehta was of the opinion that no dams should be allowed in the Western Ghats region. He suggested that if any water regulation has to be considered it should be for the purpose of drinking and irrigation only, and not for power generation. He also said that there should be provision for decommissioning of existing dams on Western Ghats rivers and these dams should not be replaced by new dams.

Shri Padre highlighted the issue that traditional knowledge related to water conservation is not taken into account. Dr. Latha added that riparian river basin restoration activities should be taken up through involvement of local self-governments. Dr. Vidya Nayak suggested that schools should also be involved in the environment movement.

Dr. Renee Borges raised the issue of the use of ground water in the Western Ghats and the regulations which govern such use. It was suggested that there is an urgent need for a study of catchment hydrology and the movement of water in lateritic formations.

Dr. Latha stressed on the following non-negotiables which should be kept in mind while planning for ESAs: (i) no inter-linking of rivers, (ii) no pesticide use in plantations, (iii) no plantation activity in the shola regions of the Western Ghats, and (iv) downstream impacts of water regulation structures to be studied.

Prof Sukumar suggested that special schemes should have to be developed for Ecologically Sensitive Areas. Regarding regulation of rivers in the Western Ghats, Prof Sukumar suggested that the concept of environmental flows should be central to the planning process. Prof Sukumar sought clarification on the issue of private developers becoming planners in the Western Ghats region with respect to the specific instances of Lavasa and Amby Valley. He also highlighted the fact that government funds are not utilized in a proper manner. He suggested that the government should use CAMPA funds for payment for ecological services programmes in Western Ghats states. Under such programmes, local people having private forests could be remunerated for protection of the forests. Similarly, incentives should be provided to planters who undertake eco-restoration programmes.

Summary Record of the Brainstorming Session on Decentralized Planning in Western Ghats held at Kerala Forest Research Institute (KFRI), Peechi on 28 January 2011

Professor Madhav Gadgil, Chairman, Western Ghats Ecology Expert Panel, welcomed the participants to the brainstorming session on Devolution of Powers to Local Self-Governments in Relation to the Environment. He thanked Shri S.M. Vijayanand, Special Chief Secretary, Department of Local Self-Government, Government of Kerala, and Prof M.K. Prasad, Chief, Information Kerala Mission. Prof Gadgil recollected the exceptional work carried out by Kerala Sasthra Sahitya Parishad (KSSP) in the area of the environment.

He said that through the brainstorming session the Panel wants to understand how to administer the whole of the Western Ghats if it is declared as an ecologically sensitive area, and what are the options.

Shri S. M. Vijayanand, Special Chief Secretary, Government of Kerala, gave a presentation on "Decentralization – Learning from the Kerala Experience with special reference to environment". Shri Vijayanand informed the participants there was no organized self-governance in Kerala till 1995. The devolution of power to people in Kerala was done with a big bang approach. The power from the state was transferred to Panchayats in one go and the mechanisms for implementation were built afterwards. The responsibilities were given first and the capacities were built at a later stage. The core of the Local Self-Government Model is that the elected Panchayat is the executive authority and the government servant is the ex-officio Secretary to the Panchayat. The people's group and volunteer groups provide the technical core of the local government. The initial focus of the Local governments was on the planning process which then went on to management of natural resources. Ecodevelopment of the area was a natural corollary to the decentralization.

Shri Vijayanand gave a brief profile of the Panchayati Raj institutions in Kerala. He then explained the various *F*s involved in the decentralization process. These were (i) functions, (ii) functionaries, (iii) finances, (iv) framework, (v) freedom, (vi) fraternity, and (v) functionings. Shri Vijayanand said that there is a clear division of responsibility between the Local Governments and the state governments. This is important because accountability mechanisms work effectively if the power to implement is clear. The Local Self-Governments have an important role with respect to development of infrastructure and provision of services, as well as human development functions in their areas. In other matters there is overlap with state government functions which is also clearly decided. He said that in Kerala the state government has no executive control over Local Governments.

Shri Vijayanand informed the participants that work and workers go together. He said that along with devolution of work, the staff from various departments have been transferred to Local Governments. The Local Governments have the power to assign and review work, and have disciplinary and fiscal control over the staff. Issues such as recruitment are handled by the state government. Within this model there is a concept of ex-officio secretary to the local government. There is a code of conduct for the officers and representative of Local Self-Government which is enforceable.

Shri Vijayanand said that fiscal decentralization has been carried out in a transparent manner. No discretion is allowed for allocation of funds to the Local Governments. It is done through a fixed worked out formula. This is done keeping in view the works carried out by Local Governments and the State Finance Commission recommendations. The majority of the centrally-sponsored schemes of the Ministry of Rural Development are implemented through Local Governments including the MGNREGS (Mahatma Gandhi National Rural

Employment Guarantee Scheme). Shri Vijayanand outlined the major parameters which define the quality of funds transferred to Local Governments.

He also explained in detail the framework developed within which the Local Governments function in Kerala. He elaborated that there is a strong legal framework which is provided by the Panchayati Raj Act and other such acts. The accountability system developed is very robust and the administrative systems are in the process of being institutionalized. Further, local self-governance is based upon rigorous participatory planning methodology. There are working groups which deal with separate sectors including environment and natural resource management. There is also a provision of an Ombudsman and an Apellate Authority.

In the Kerala model of decentralization, a high degree of autonomy has been given to Local Governments in the use of available resources and in taking decisions. There is freedom from executive interference. The Local Self-Governments in Kerala function along with a host of related institutions which act in a complementary and enabling way to the Local Governments. Some of the institutions are (i) State Development Council, (ii) Kerala Institute of Local Administration, and (iii) Information Kerala Mission. Shri Vijayanand highlighted the significant achievements of the decentralization process. According to him, decentralization has resulted in (i) diffused development stimulus which has an impact on reduction of intra-state inequality, (ii) strong pro-poor expenditure, (iii) improvement in service delivery and infrastructure, and (iv) transparency in administration and better peoples' participation. He also highlighted his concerns with respect to decentralization. They related to a weakening in the administrative capacities of the officials, planning based on negotiated priorities not data analysis, and resources being thinly spread out.

Shri Vijayanand explained in detail the role of Local Self-Governments in activities related to the environment. These activities included Resource Mapping, preparation of Watershed Status Reports, Master Plans, Biodiversity Registers, and State of Environment Reports. He also informed the participants that Local Governments are also involved in energy planning. Finally, he said that in the future the Local Self-Governance will have to focus on (i) good governance, (ii) natural resource management, (iii) improved planning techniques, and (iv) new measures of accountability.

After the presentation there was an open discussion on various aspects related with decentralization. Prof Madhav Gadgil said that the Kerala model for decentralization will provide key inputs into the recommendations of the Panel relating to administration of ecologically sensitive areas. He also commented that MNREGS is an important tool which could be used for ecorestoration of degraded lands.

Dr. Vijayan pointed out that the activities undertaken in the MNREGS should be with participation of the local people. He gave examples of failed experiences in the early phases of its implementation in Kerala.

Shri Devrat Mehta sought clarifications on how exactly the system of Ombudsman works with special reference to the Local Self-Governments. Shri Vijayanand explained the constitution of the Ombudsman which had members from civil society, judiciary and the government.

Dr. R.V. Varma informed the members that preparation of PBR (Peoples' Biodiversity Register) is mandatory for Local Self-Governments, for which money is provided by the State Biodiversity Board. The Biodiversity Board also provided money for organizing awareness programmes for school children.

Dr. Vijayan said that the whole Western Ghats should be declared as an ecosensitive area and then zones of varying ecological sensitivity should be defined as in the case of CRZ. He said that planning for ESAs should be based on ground truthing at the village level and the livelihood issues of the people should be addressed. Shri B.J. Krishnan commented that the development plan for ESAs should be loosely structured by listing down the activities which can be undertaken in the zone. Dr. Vijayan said that the notification should have certain restrictive activities, banned activities, and certain activities which should be promoted.

Prof Madhav Gadgil said that he is in favour of people-based planning for ESAs rather than centralized planning. He said that detailed guidelines for each zone in the Western Ghats ESA can be made with the involvement of the Kerala Institute of Local Administration.

Summary record of the Public Consultation at Athirappilly on 29 January 2011

Field Visit

The six-member panel headed by Prof.Madhav Gadgil reached Athirappilly by 7 a.m. They visited the riparian forest within the project area and also the tribal hamlet at Vazhachal. They also visited the submergible areas and the Athirappilly waterfalls. On their return they met Ms.V.K.Geetha, a member of the Kadar community who has gone to court against the Athirappilly Hydro Electric Project and listened to her. She explained that the livelihood of the Kadar tribes solely depends on the forests and the river and they should not be displaced. During the discussions with the tribal representatives it was mentioned that the community rights of the tribals as per the Forest Rights Act were not recognised. The forest officials present at the site were also not able to clarify the points raised by the committee.

Hearing at Panchayat Office

Shri B.D. Devassy, MLA, Chalakkudy, argued in favour of the project and pleaded before the committee not to oppose it. The Panchayat President of Athirappilly Mr.Baby K.Thomas, and the Ward Member Mr.Mulari Chakkathara, strongly opposed the construction of the hydroelectric dam. The Block Panchayat President Mrs.Leena mentioned that she is a local person who has analysed the various pros and cons of the proposed project. She indicated that agencies like Pollution Control Board and Kerala State Electricity Board gave wrong information on many issues. She said she has a lot of interest in protecting the river base and also the rights of the Kadar community and was against the proposal for the hydroelectric project. The Vice President of the Athirappilly Panchayat Mrs. Devi also argued against the project. Mr. K.S. Sathish Kumar pleaded for the project and informed that permission was already obtained in the past. He also said that the project would be beneficial for the tribals and also suggested that the waterfall be retained. The Panchayat Members Ms. Sicily Antony and Ms. Jaya Thampi spoke in favour of the project. The Ward Member Ms. Sandhya Unnikrishnan, who is also a tribal argued in favour of the project and also suggested that the waterfall be maintained intact and also the livelihood of the tribals in the area be protected.

Hearing at Aroormuzhi Community Hall

At the public consultation meting at Aroormuzhi Community Hall, 27 people spoke. All those who spoke feared that the project will adversely affect the drinking and irrigation water needs of the people and also the current tourism activities on which hundreds of local people depend on for their livelihood. Smt. Ammini Amma, leader of the Athirappilly struggle, opined that there had been a steady decrease in the river flow during the last 45 years. She also submitted photographs of the Athirappilly water fall taken during the

monsoon and summer. Shri T.N. Radhakrishnan, ex–MLA, warned that people living in the constituencies of Kodagara, Chalakkudy, Kodungallor, Vadakekara and Angamali would face untold sufferings if the project is implemented, as the diminishing water levels in the Chalakudi river will reduce water flow in the canals of the river leading to severe drought in the above constituencies. The Chalakkudy River Protection Forum Chairman Shri. K.K. Shelley also feared that the proposed dam will lead to destruction of 1400 ha of agricultural land. According to Dr. P.M. Joy implementation of the Athirappilly dam would also affect the Periyar river. He further stated that the water flow from Poringalkuthu to Edamalayar will result in decreased production of electricity in Edamalayar and lowering of water level in the Periyar. Construction of the dam at huge costs to produce very little electricity is a waste. The same view was also expressed by Shri. Shilu Chali of the Forest Protection Samithi who added that the proposed project would also lead to destruction of the natural riparian forest and displacement of more than 200 odd families of Schedule Castes and Schedule Tribes. Shri Gopala Krishnan, representative of the N.S.S. Karayogam, also vehemently opposed the proposed project. According to Shri Shajan Puthenvelikara and Shri Antony Putharipal another adverse impact of the proposed project on the river and downstream population was that when the water flow in the Chalakudy river decreases seepage of saline water will destroy cultivation and also result in shortage of drinking water. Former Panchayat Presidents Shri N.R. Satheesan and Shri Muhammed mentioned about the chances of earthquakes occurring in the area, if the dam is constructed. Others who spoke against the project included Mr. M.V. Gangadharan, Mr. K. Rajan, Mr. V.T. Balaram, Mr. Dilik Divakaran, Paulson Kodiyan, Chandra Sekharan, Sivankutty, E.M. George, Shakeer, Janaki, Geetha and Jesna Alfus. All of them expressed their concern and opposed the proposal for the construction of the dam.

Public Consultation of technical group

At the beginning itself, Prof.Madhav Gadgil, Chairman, WGEEP explained the mandate of the Panel and also mentioned that the strategy would be the overall development of the Western Ghats with due consideration for conservation of biodiversity. The panel is also trying to identify ecologically significant areas based on scientific data. The various technical groups present were the Kerala State Electricity Board (KSEB), Irrigation Department, Tribal Welfare Department, Tropical Botanical Research Institute, Kerala Forest Research Institute, Kerala State Biodiversity Board and two NGOs – River Research Centre and Kerala Sasthra Sahithya Parishad.

The KSEB placed before the committee their arguments in favour of the project with a power point presentation. They also explained past issues related to the project. The Irrigation Department mentioned that there would not be any problem if the project comes through. The Tourism Department was of the view that, if the project comes though more tourists will visit the area.

The Forest Department took a neutral stand and did not specifically mention any matter for or against the project. They also mentioned that the earlier decision in favour of the project has not been changed and also reported that the Forest Rights Act came into force later. The tribal welfare department informed the Panel that the issues related to title deeds of the tribals are in its final stage. They also wanted the interests of the tribals be protected. The TBGRI, which has done an EIA at the instance of KSEB, supported the project. The KFRI which did a study of the value of the biodiversity of Vazhachal highlighted the biodiversity richness of the area and also the unique riparian forest ecosystem. The Kerala State Biodiversity Board also highlighted the importance of the biodiversity in the area, especially the rich and endemic fish fauna and also the presence of several unique invertebrates and

microbes which have not been studied in detail. The Board in fact wanted a multi-institutional team to conduct an in-depth study on the biodiversity of the area.

The River Research Centre made a detailed presentation (with 4 experts in different fields) and questioned the reliability of facts provided by KSEB and others who supported the project. Clarifications on many technical issues were not readily available and Prof. Gadgil suggested that KSEB provide these details by mail. He said that MoEF will also put these clarifications on the website of WGEEP for the people to see and react. The Kerala Sasthra Sahithya Parishad suggested that as per the EIA, alternatives have to be suggested. According to them a hydroelectric project with reduced power generation than the 163 mega watts as originally proposed may be thought of.

Prof. Madhav Gadgil assured participants that the various issues raised will be considered and the report will be handed over to MoEF by March 2011. The final decision will be taken by the MoEF.

After the Technical Consultations on the Athirappilly Hydroelectric project, citizens groups from Goa and Mangalore gave detailed presentations on the Sahyadri Ecologically Sensitive Area (SESA) and Kodachadri Ecologically Senstive Area (KESA), respectively, to the WGEEP.

Summary Record of the Brainstorming Session on land use policy in the Western Ghats held at Indian Institute of Science, Bengaluru, on 3rd March 2011.

Prof Gadgil welcomed the participants to the brainstorming session on land use policy in the Western Ghats organized by the Western Ghats Ecology Expert Panel (WGEEP). He informed the house that WGEEP has been organizing brainstorming sessions on important themes related to Western Ghats. Further, he said that earlier brainstorming sessions have been held on (i) organic agriculture in Kerala, (ii) iron ore mining at Goa, (iii) pressures of urbanization in Western Ghats at Pune, (iv) role of power sector and role of Joint Forest Management in Western Ghats at Bangalore (v) water resources planning in Western Ghats in Kerala and (vi) decentralized planning in Western Ghats in Kerala.

Shri Edgar Ribeiro, former Chief Town Planner, Government of India, spoke on the Land Use Policy for the Western Ghats. He stressed upon the fact that land has become a scarce resource in India with the increasing population level. This has not only restricted the policy options available but has also made implementation of programmes difficult. The spatial structure of India is also changing with rapid urbanization taking place. He said that there is an urgent need for an urban and rural land use policy at the state level. He said that the 73rd and 74th constitutional amendments have supported development of statutory spatial plans for integrated development plans of the Government. He said that now plans can be developed at the state, district, municipality, panchayat and electoral ward level. According to him the plans should have a 20-year perspective and 5-year programmes. He emphasized that laws governing development planning need to be strengthened.

Further, he said that it was imperative that development planning law is the only law in the state which regulates land use in both urban and rural areas. He added that the practice to have development plans made by Industrial Development Corporations has led to lot of abuse and conflicts on land use. The same is happening with SEZs. He highlighted the fact that a lot of land is going outside statutory spatial frameworks in the form of PPP (Public Private Partnership) projects. Prof. Ribeiro stressed that spatial development plans should therefore be the key to land use policy which should be based on sustainable development

principles. He suggested that as a priority activity a state land use policy could be made for the six Western Ghats states and each state policy should be approved by the Central government in terms of national policies, safeguarding operational uses and infrastructure development etc.

Prof. Ribeiro informed the participants that there are 40 revenue districts in the Western Ghats and spatial development plans for each district should be developed. It should be a three-tier exercise at the district level (regional), municipalities and panchayat level (settlements level), and electoral ward level (local areas). These spatial plans should have a 20-year perspective and 5-year programme plans. These plans would have land use maps, with a matrix of activities for each land use and a development control chart for each land use zone. Further, there would be sub plans related to transportation, services and environment. He said that out of the six Western Ghats states, 5 have three tier (District – Taluka (block) –settlement) panchayati raj institutions while Goa has two tier (District – settlement) system.

A critical component of the Regional (even Settlement) plan is the presence of ecosensitive zones. Through demarcation of ecosensitve zones on the Regional Development Plans, they would get credence on statutory Development Plans. The Goa Regional Plan 2021 is a good example of this. Finally, he said that for success in implementation of this system there has to be a synergy between the State Development Planning Board and the State Planning Commission, which regulates development plan funds.

Shri Y.B. Ramakrishna, Executive Chairman, Karnataka State Biofuel Taskforce, gave a presentation on Bio Fuels–Land Management issues with specific reference to the Western Ghats . He gave a brief introduction about the biofuel status at global, national and state level (Karnataka). He stressed that degraded and fallow lands could be brought under biofuel cultivation. This would yield benefits to the local people. He explained how the biofuel plantation, extraction and production could work on a participatory and decentralized mode. Finally he said that A pragmatic land use policy needs to be adopted for taking up ecologically sustainable and socially acceptable developmental projects and that biofuel plantations with local species may be promoted on *betta* land, *kumki* land and all marginal and fallow lands with total participation of communities.

Ms T.M. Sudha, Senior Town Planner, Department of Town and Country Planning, Kerala, gave a presentation on "Opportunities in Participatory Planning in Evolving a Land Use Policy for the Western Ghats Region". Ms Sudha gave an introduction about Kerala including an overview of the Kerala Western Ghats. Ms Sudha highlighted the peculiarities of land holdings and settlements in Kerala which included scattered homesteads and a rural–urban continuum. She said that urban sprawl is very common in Kerala and the per capita land availability is very low. To limit urban sprawl a judicious land use policy alongwith a comprehensive development plan which includes concerns of the environment was required.

In the specific case of the Western Ghats, the Kerala Government has involved local bodies such as Panchayati Raj institutions for implementation of programmes under the Western Ghats Development Programme. It has strengthened people's groups such as Self-Help Groups, Neighborhood Groups, User Groups, and Kudumbashree (State Ppverty Eradication Mission of Government of Kerala). The Kerala Government has also initiated the formulation of District Development Plans in a participatory mode with the involvement of people, local governments (Panchayati Raj Institutions), line departments, NGOs and technical support provided by the Town and Country Planning Department. This pilot

project has been taken up in Kollam district. For the formulation of the District Development Plans, a District-Level Technical Committee was set up which had subcommittees on different thematic areas including those related with the environment. Finally, she said that decentralized participatory planning was an opportunity to respond to local requirements and conservation needs.

Dr. Gopal Kadekodi, Centre for Multi-Disciplinary Development Research, Dharwad, gave a presentation on socioeconomic considerations for forest land use management . Dr. Kadekodi at the outset said that the land use problem could be seen in the context of an optimum resource use paradigm where the equilibrium situation is arrived at after looking at the supply side and the competing uses available. He said that forests are a kind of equilibrium resource keeping in view of the land being covered by them and the many ecosystem services which are useful for humans. He added that the main problem in the current context is the best land use option between agriculture and non-agriculture. He gave examples of land use and land cover changes in the Western Ghats with specific reference to conversions of forest land for different uses including mining and dams.

Dr Kadekodi provided a framework on how to capture the social cost of forest land conversion and the mechanism of how to deal with the conversion of forest land. He said that this can be done by compensating the loss of social marginal cost and developing institutions to implement the compensatory principle. He informed the participants that to arrive at an estimate of the social marginal cost, forest resources and biodiversity have to be valued in an ecological and economic framework. He explained the valuation framework and various types of values associated with forest resources. Finally, he gave the example of the Net Present Value concept developed by the Kanchan Chopra Committee to value forest resources. This exercise suggested an allocation of compensation for forest loss amongst different stakeholders including the local community, state and central governments. However, this recommendation was not incorporated by the Supreme Court in its judgment.

Dr. Seema Purushothaman, ATREE, Bangalore, gave a presentation on land use regulations for poverty reduction in the forest peripheries of the Western Ghats. At the outset, Dr. Purushothaman commented upon the utility and success of market-based instruments and economic valuation in conservation of resources. During her presentation she highlighted the intricate link between land use and poverty, the policies which affect land use, and governance of common property resources. She explained the policies which affect land use in forest peripheries. She also explained the policy and enforcement gaps which could aggravate poverty by a case study of Anaikutty area in Tamil Nadu. Dr Purushothaman also covered issues related to governance of common property resources (CPRs). She gave details of a case study wherein the conventional wisdom regarding CPRs was challenged and the reasons for the same. In the end, she provided a new approach for governance of CPRs.

Dr. Jagdish Krishnaswamy, ATREE, gave a presentation on "Effects of Land-Cover Change on Hydrology in the Western Ghats". Dr. Krishnaswamy informed the members that different ecosystems and different forest types partition input rainfall into different hydrological components in a differential manner. He explained the basic water balance model and various hypotheses on the effects of forest loss on stream water yield. He presented data from case studies carried out by him to test these hypotheses in wet and dry forest regions. For the wet regions, one of the main conclusions was that forests generate more delayed stream flows and rainfall falling on forested areas spends more time in forest ecosystems as compared to degraded forest and plantation areas. In the drier areas, there is a view that increase in the number of trees increases evapotranspiration which leads to reduced stream flow. According to Dr. Krishnaswamy, the tradeoff between increased

carbon storage by plantation activities vis-à-vis hydrological effects of massive plantation activities need to be carefully examined. Finally, Dr. Krishnaswamy said that hydrological services are very sensitive to land-cover change and there are synergies between hydrological services, carbon storage and sequestration, and biodiversity conservation.

Dr. Shrinivas Badiger, ATREE, gave a presentation on agricultural land use changes and cropping system choices in Western Ghats catchments: hydrological regime changes and implications for food-security and livelihoods. Dr. Badiger said that areas which have high forest cover have high water availability in generic terms. He said that changes in agricultural land use patterns in upper, mid-stream and lower catchments has led to depletion in stream/river flow regimes and aquifer reserves. He explained this by a case study of Malaprabha basin where there has been intensification of agriculture and increase in sugarcane cultivation which has led to depletion in stream flows (especially post-monsoon dry season) and groundwater levels. He concluded that agricultural land-use regulation is inevitable to improve the ecosystem functions of upper catchments.

Dr. T.R. Shankar Raman, Nature Conservation Foundation, Mysore, gave a presentation on "Plantations and Land Use Change in the Western Ghats: Conservation, Restoration and Sustainable Agriculture". Dr. Shankar Raman informed the members that most rainforest fragments found in tea and coffee plantations are private forest areas. The level of habitat modification determines the species composition of these forest fragments. He brought out the importance of these forest fragments as refugia and as corridors for wildlife. He said that the forest fragments present in plantations and riparian tracts need to be conserved due to the important role they play as wildlife habitat and corridors. Dr. Raman said that riparian tracts are little strips of vegetation which have disproportionately high value. He stressed the fact that there is a need to ecologically restore these forest fragments and riparian strips. He showed the various steps involved in the ecological restoration of these fragments.

Dr. Shankar Raman also highlighted the work being carried out to identify native shade trees for tea and coffee plantations. This activity becomes important as the area under plantations is increasing. He stressed upon the ecosystem services provided by native biodiversity to the coffee plantations. Dr. Shankar Raman informed the participants of schemes of fostering responsible land use in these plantations by giving business incentives for sustainable agriculture. He mentioned about the growing demand for tea and coffee which have conservation certification such as that of the Rainforest Alliance. This certification is given to plantations which meet certain fixed standards.

Finally, Dr. Shankar Raman talked about conservation initiatives and the effects of linear intrusions such as roads and transmission lines on rain forest. He suggested the need for a policy on linear intrusion in rain forest areas and the scheme of activities which could be taken up in this regard on a priority basis.

After the presentation there was an open discussion of land use policy and development planning. Dr. Gopal Kadekodi said that development planning should take into account the land capability and the capacity of land to support development. He further added that GIS should be used to overlay societal preferences on different types of land. Dr. T.R. Shankar Raman said that there should be an incentive scheme for undertaking ecological restoration by the local people. Prof Madhav Gadgil highlighted the importance of riparian strips in Western Ghats ecology. He informed the members that the riparian strip next to river Kayadhu in Hingoli District is an important habitat for native grasses and legumes in Maharastra. The local people maintain these riparian strips and harvest these native grass species for their use.

Prof. Ribeiro made a case for sound development planning for sustainable development. This was followed by a discussion on what development means, and that development as it is understood today is for whom and for what purpose. Shri B.J. Krishnan said that there should be a role for local communities in the formulation of development control rules. Ms Sudha said that development should have a common definition and there should be clear parameters for development.

Professor Madhav Gadgil discussed the proposal to undertake participatory planning of ecologically sensitive areas at the electoral ward level. Ms Sudha said that we should guide and educate the local people to formulate plans for ecologically sensitive areas.

Minutes of the Tenth Meeting of Western Ghats Ecology Expert Panel (WGEEP) held at Indian Institute of Science, Bengaluru, on 4th and 5th March 2011 preceded by a brainstorming session on land use policy held on 3rd March 2011

The Western Ghats Ecology Expert Panel met on 4th March 2011 at Indian Institute of Science, Bengaluru.

The following members were present:

Prof. Madhav Gadgil	Chairman
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Dr. R.V.Varma	Member
Dr. Renee Borges	Member
Dr. K.N. Ganeshaiah	Member
Ms. Vidya S. Nayak	Member
Dr. G.V. Subrahmanyam	Member Secretary

Dr. Ligia Noronha, TERI, New Delhi; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad; Prof. S P Gautam, Chairman, Central Pollution Control Board; Dr. D.K. Subramaniam, IISc, Bengaluru; Prof R. Sukumar, IISc, Bengaluru; all Members of the Panel could not attend the meeting. Dr. Amit Love (Deputy Director, MoEF) was also present during the meeting.

The Chairman welcomed the Members of the Panel. He informed the members that there would be four presentations followed by Panel deliberations which would form the agenda for the day. The presentations were on: (i) adaptive agroforestry in the Western Ghats region by P. R. Sheshagiri Rao, (ii) the framework and components of the WGEEP report by Prof Madhav Gadgil, (iii) geospatial database for assessment of ecologically sensitivity by Dr. S. N. Prasad, and (iv) SESA proposal by Prof Madhav Gadgil.

Shri P. R. Sheshagiri Rao gave a presentation on "Adaptive Agroforestry in the Western Ghats region". He explained what is meant by adaptive agroforestry and how it is different from conventional agroforestry. Typically, adaptive agroforestry is characterized by very high tree density and a short rotation period coupled with activities to nurture and improve soil quality. He indicated the areas of the country where this technology could be applied. Shri Rao explained the principles of the technology in detail with examples. He said that if this technology has to be applied in the Western Ghats area it would have to be adapted for the special context. Shri Rao further added that different verticals involved in the process would have to be integrated, viz. production, market, policy and information. He pointed out some limiting factors for which the technology will have to be fine tuned in the specific case of the Western Ghats. Some of the limiting factors are: (i) high rainfall, (ii) steep slopes, and (iii) lateritic soils. Shri Rao also highlighted the opportunities, which are available in the Western Ghats region with respect to this technology. He finally detailed how the opportunities available in the Western Ghats region could be used for the success of the technology.

Professor Madhav Gadgil gave a presentation on the framework and components of the WGEEP report. At the outset there was a discussion on the format of the report. It was decided that the report would have three parts: (i) executive summary, (ii) main report, (iii) anexures to the report. Following this, discussion took place on various components of the report.

a. Prof Madhav Gadgil covered the quotations, which have to be included in the introductory section, followed by TORs of the Panel and the activities undertaken by the Panel in the last one year. It was suggested that the development of the website of the Panel be included in the activities of the Panel.

b. The setting of Western Ghats in terms of its boundaries, landscapes and ecosystem were then elaborated. There was a discussion on the demarcation of the boundaries of the Western Ghats. Dr Ganeshaiah informed the members that a lot work had been carried out for the demarcation of the Western Ghats. The criteria used included geographic continuity, slope and forest type. There was also a discussion on the history of the demarcation of the Western Ghats boundaries wherein different criteria such as geology, administrative boundaries and vegetation have been used for demarcation. Professor Madhav Gadgil gave the example of Bhimashankar in Pune district, a very hilly area, but not classified as hilly, due to which certain forms of soil conservation measures could not be carried out. The importance of boundary setting was discussed. The Chairman said that the Panel advocates a layered, nuanced, participatory approach so that boundaries will not be discontinuities and therefore will not be of undue significance.

c. The threats faced by the Western Ghats and the challenges faced by local communities inhabiting the region were discussed. Following this, Professor Madhav Gadgil delved upon the pillars of sustainable development, and the real meaning of the word development. He then discussed the paths which could be followed to achieve development.

d. Prof Madhav Gadgil elaborated upon the currently available tools such as Town and Country Planning Act, Hill Stations and Lake Districts Policy, Zoning Atlases for Siting of Industries, environment and forest related legislations. He also covered the new conservation initiatives such as community conservation areas in Udumbanchola in Idukki, positive incentives for conservation as in the case of Kerala mangroves and restoration of rainforest patches in plantation areas. Further, Prof Gadgil also brought to the notice of the members the ecodevelopment committee of the Periyar Tiger Reserve. He also stressed upon the role of people in environmental monitoring of pollution and the case of the Paryavaran Vahini Scheme of the Ministry. He also narrated the experience in implementation of the PESA (Panchayat Extension to the Scheduled Areas) Act, the case of development planning and democratic devolution of power. He talked about the Kerala experience and the Goa decentralization approach in planning. It was also decided that biosphere reserves would also be discussed in the report as a management tool.

e. Following this, the Chairman elaborated upon the Pronab Sen criteria for determination of ecological sensitivity. He said that if the Pronab Sen Criteria are applied all of the Western Ghats will classify as ecologically sensitive. He said that the Panel envisages adopting a graduated approach for ecologically sensitive spanning from highly sensitive to less sensitive. He then discussed the guidelines prescribed by the Wildlife Division of the Ministry to notify ecologically sensitive areas around the national parks and wildlife sanctuaries.

f. Professor Madhav Gadgil said that there would be a section on the methodology adopted by the Panel for identification of ecologically sensitive areas using the geospatial grid-based approach where ecological sensitivity was scored. He also said that the section will also include inputs from the general public as in the case of Gram Sabhas of Ratnagiri and Sindhudurg districts and the proposals from NGOs as in the case of Kodagu, Sahayadri and Kodachadri ecologically sensitive area proposals. This will be followed by the statewise rankings of ecological sensitivity. The ecological sensitivity scores would range from lowest to highest sensitivity.

g. This would be followed by a section which will detail how conservation can be married with development. The entire Western Ghats could be made a model for sustainable development and a laboratory for fashioning development programmes compatible with nature conservation and social justice.The development strategy for each of the zones with different levels of ecological sensitivity would be elaborated upon. This section would include environmental policies of Uttarakhand, Himachal Pradesh, and Sikkim as case studies.

h. Prof Gadgil mentioned the specific recommendations given by various groups including those of Kodagu and Ratnagiri to manage their respective ecologically sensitive areas. He detailed issues related with land use, water policy, community lands, forest areas, and promotion of traditional practices of local communities. Further, Prof Gadgil also elaborated the approach which has to be followed for sectors like agriculture, organized industry, mining, power, tourism, transport, communication, human settlements, health, science and technology.

i. Prof Gadgil stressed upon the importance of managing information and the creation of an accessible, transparent, participatory database on the environmental resources of the Western Ghats. He also talked about the political institutions which would be required for administering these ecologically sensitive areas and the importance of democratic devolution of power. He also stressed upon the important role of social audits and engaging people in planning and monitoring of environmental resources. He specifically highlighted the Paryavaran Vahini initiative. Prof Gadgil talked about legal and administrative provisions towards environmental protection and that reforms are required in them. He said that policies in the Western Ghats should be made to promote social harmony and not to create social divides. He suggested that economic growth in the Western Ghats region should be tailored to the carrying capacity of the area. Finally he talked about the scope and powers of the proposed Western Ghats Ecology Authority.

j. It was decided that the indicated members would provide information on the following topics for inclusion in the report.

Dr. V.S. Vijayan

(i) Adverse effects of hydroelectric power projects (Slide 12)

(ii) Excessive use pesticides in agriculture (Slide 14)

(iii) Tourism in Munnar (Slide 23)

(iv) Promotion of organic agriculture (Slide 59)

(v) Use of GMOs in Western Ghats (Slide 59)

(vi) Environmental ombudsman (Slide 93)

Dr. R.V. Varma

(i) Encroachment in the Western Ghats (Slide 12)

(ii) Pilgrimage tourism (Slide 14)

(iii) Community conservation area – Udumbanchola (Slide 26)

(iv) Incentives to private owners of mangrove areas (Slide 26)

(v) Biological diversity – Kerala model (Slide 27)

(vi) Conversion of cardamom hill reserve to rubber plantations (Slide 58)

(vii) Effect of plantation of spices and condiments on environment (Slide 58)

(ix) Introduction of exotic fishes (Slide 63)

(x) Promoting traditional conservation practices (Slide 72)

(xi) Biodiversity and tribal cooperation (Slide 74)

(xii) Biodiversity awareness programmes (Slide 86)

(xiii) Centre–State institutional arrangements (Slide 93)

Shri B.J. Krishnan

(i) Forest rights (Slide 12)

(ii) Biodiversity and tribals – Keystone Foundation (Slide 74)

Dr. Renee Borges

(i) Environmental Policy – Bhutan (Slide 49)

(ii) Risk evaluation of GM crops (Slide 59)

(iii) Invasive species (Slide 84)

Ms. Vidya Nayak

(i) DANIDA report (Slide 23)

(ii) Joint Forest Managament – Dakshin Kannada experience (Slide 28)

(iii) Water diversion structures (Slide 57)

(iv) Swapping of land for resettlement (Slide 58)

(v) Grazing lands and social forestry (Slide 64)

(vi) Promoting traditional conservation practices (Slide 72)

Dr. T.R. Shankar Raman

(i) Promotion of organic tea (Slide 59)

Dr. Jagdish Krishnaswamy/ Dr. Badiger

(i) Effect of plantations on water use of an area (Slide 57)

The following information would be provided by the Ministry

(i) Loss of Ecology Authority and polluter pays principle (Slide 14)

(ii) Ecodevelopment Committee of Periyar (Slide 20)

(iii) Attapadi case study (slide 20)

(iv) EIA process (Slide 24)

(v) Process of declaration of ecologically sensitive areas under EPA 1986, number of ecologically sensitive areas declared till date.

(vi) UNESCO heritage site proposal for Western Ghats (Slide 37)

(vii) State-wise policy for protection of environment – Uttarakhand, Sikkim, Himachal Pradesh. (Slide 49)

The Panel noted the contents of the letter sent by the Nilgiri Wildlife and Environment Association addressed to the Hon'ble MOS (I/C) E&F on the public consultation held in Ootacamund on 18th January 2011.

This was followed by a detailed presentation by Dr. S.N. Prasad on the grid-wise ecological sensitivity scores for the states of Karnataka, Tamil Nadu and Kerala. He explained to the members the variables which have been used for arriving at sensitivity scores and the meaning of the different sensitivity scores. He also explained to the members that special ecosystems such as riparian forests have been added as a separate layer on the map. This will facilitate highlighting sensitivity where riparian forests are present. The Panel members went through the grid-wise sensitivity scores for the states of Karnataka, Kerala and Tamil Nadu.

The meeting of the Panel continued on the 5th March 2011.

Minutes of the Tenth Meeting The Western Ghats Ecology Expert Panel again met again on 5th March 2011 at Indian Institute of Science, Bengaluru for the Tenth Meeting of Western Ghats Ecology Expert Panel (WGEEP).

The following members were present:-

Prof. Madhav Gadgil	Chairman
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Dr. R.V.Varma	Member
Dr. Renee Borges	Member
Prof R. Sukumar	Member
Ms. Vidya S. Nayak	Member
Dr. G.V. Subrahmanyam	Member Secretary

Dr. Ligia Noronha, TERI, New Delhi; Dr. K.N. Ganeshaiah, Member; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad; Prof. S P Gautam, Chairman, Central Pollution Control Board; Dr. D.K. Subramaniam, IISc, Bengaluru; all Members of the Panel could not attend the meeting. Dr. Amit Love (Deputy Director, MoEF) was also present during the meeting.

The Chairman welcomed the Members of the Panel and informed them that the agenda for the day was (i) deliberations with representatives of Save Western Ghats Movement, (ii) presentation on the geospatial database for assessment of ecologically sensitivity, and (iii) presentation on the SESA proposal with specific reference to the mandate of the Western Ghats Ecology Authority and recommendations with respect to the authority.

Shri Somnath Sen, SWGM, said that the Save Western Ghats Movement has a rich body of experience at policy and ground level and through this interaction wanted to flag key issues and contribute to the thinking of the Panel.

Shri Pratim Roy gave a brief history of the genesis of WGEEP and the role of SWGM in Western Ghats conservation. He flagged the issue of demarcation of Ecologically Sensitive Areas in the Western Ghats and how to put science into practice at the ground level. He stressed the need to make decentralized environmental governance as local as possible.

Dr. Latha commented upon the ESA methodology. She appreciated the methodology developed by the Panel and said that as per their expectations the Protected Areas got higher ecological sensitivity scores. This was because there was more information available about them. She further added that the grid-based sensitivity scores provide the basis for developing different zones of ecological sensitivity. Dr. Latha commented that the grid methodology can be further enriched by inclusion of more factors. One such factor which should be included in the methodology is rivers and the associated riparian forests.

Professor Madhav Gadgil commented upon the suggestions made by members of SWGM. He said that the Panel will recommend a graduated approach to ecological sensitivity, i.e. there would be zones of different ecological sensitivity rather than an ESA versus no ESA approach. Further, the Panel would recommend graded management regimes which would be developed by a decentralized participatory approach. He also said that the inputs from

the local people would be taken into account while finalizing the ecologically sensitive areas. Prof Gadgil further said that the Panel will also adopt a participatory approach in development planning and prioritization and the participation of the local people may be at the electoral ward level.

Dr. Archana Godbole commented that threats should be made a factor and should be quantified for arriving at the ecological sensitivity scores of different areas. The quantification of threats is a more important variable than the IUCN categories which have been used.

Shri Somnath Sen requested the Panel to indicate issues under consideration of the Panel so that the SWGM can contribute meaningfully.

Professor Madhav Gadgil gave a brief overview of the important issues being considered by the Panel. Some of the issues were (i) protection of stretches of rivers which are relatively undisturbed, eg. some stretches of the Aghanashini, (ii) area-specific development issues such as Amby valley and Lavasa.

He said that the Panel is deliberating whether certain activities may be regulated all across the Western Ghats such as the use of GMOs. Then there may be specific recommendations for certain areas such as Munnar. He also suggested that the Panel would try to suggest the process by which local participatory inputs play a major role in the formulating of development plans. The process will be finalized at a workshop at the Kerala Institute of Local Administration. Professor Gadgil said that the Panel envisaged submission of the final report by June 30, 2011.

Prof Gadgil said that the Panel is envisaging recommending that the Western Ghats Ecology Authority should be a statutory body and not a recommendatory, advisory or monitoring body. Further, it would not be a unitary authority, but would have state level bodies whose details would have to be worked out.

Shri Samir Mehta said that the composition of WGEA is a critical factor in its success. The important question is whether the WGEA will have the local elected representatives members in it or not and the number of government officials, civil society representatives to be included. He stressed that for effective running of WGEA, political buy-in of the WGEA is important. He also highlighted changes which will have to be brought into the EIA process specifically keeping in view the recommendations of WGEEP and the role and mandate of WGEA.

Shri Mehta suggested that the state-level committees under the WGEA should be mandated to demarcate the boundaries of specific ESAs. He stressed upon that fact that public consultation should be held before the ESA notification is carried out. It was also suggested that the WGEA should be an automonous, professional body which has civil society representatives and its decisions should be based on rigorous science. The office of the WGEA could be located at the Regional offices of the Ministry. The members also discussed the use of CAMPA funds by the Authority for data collection.

Professor Madhav Gadgil informed the participants that he had had discussions with the Chairpersons of the three existing authorities set up by the Ministry, viz. Dahanu Authority, Loss of Ecology Authority, and Bhure Lal Authority. He said that generally professional bodies do not have elected representatives. He also said that the Panel is trying to formulate the role of WGEA in the EIA process.

Professor Gadgil said that detailed boundaries of the ESAs would be worked out through a bottom-up approach. Further, he added the Panel does not visualize just two levels of sensitivity and rather there would be different zones of ecological sensitivity. These zones would be demarcated using the participatory approach. Professor Gadgil also discussed about advantages of direct democracy in decision making on issues related to the environment. He gave the example of Goa in this regard. He added that the financial resources of WGEA and the use of CAMPA funds would be deliberated upon.

Dr. V.S. Vijayan said that WGEA should be system-centered and not individual-centered. He further said that only green technologies should be allowed in the entire Western Ghats region. Prof. Raman Sukumar said that WGEA should not be on the lines of NTCA (National Tiger Conservation Authority) where the members are not informed about decisions. He gave the example of the BRT Tiger Reserve in this regard where the members of NTCA learned about the decision *post facto*.

Shri B.J. Krishnan said that the Panel has come to the decision of a graduated approach rather than a "Go–No go" approach through a democratic and harmonious process. He also said that through the graduated approach the Panel aims to minimize the scope of exploitation of the Western Ghats region. Shri Krishnan further added that the grid-based approach is an inclusive one and that the Panel was open to suggestions for improvement.

Dr. Latha enquired about the process of ESA planning and how it relates to Local Self-Government (LSG) in the planning process. She said that the exact demarcation of boundaries of ESAs is a must for effective planning. She raised the issue of whether notification of ESAs will be done sequentially or simultaneously. She said these things should be specifically addressed by the Panel in their report. Prof Madhav Gadgil said that the example of the Goa Regional Plan 2021 where the planning process was carried using the bottom-up approach will be considered while evolving a process for involvement of LSGs in ESA planning.

Dr. Archana Godbole enquired about areas which will not qualify for ecological sensitivity based upon the grid-based scores but also need to be protected. Prof Gadgil clarified that in such circumstances a detailed case should be made out and the Panel might invoke the precautionary principle in such cases. Prof Raman Sukumar said that though the process of identification and demarcation of ESAs is dynamic in nature, it should not become *ad hoc* and discretionary. There should be a 20-year perspective and 5-year planning.

Ms Snehlata Nath said that in areas which get low ecological sensitivity scores, ecological restoration should be recommended by the Panel. She also said that if people's perception was also quantified and included in the grid methodology, the rankings may change. She added that a forum should be created for people's participation and a mechanism should be put in place for conflict resolution and this should be part of the WGEA mechanism.

Prof R. Sukumar suggested that an incentive structure should be worked out for the local people who are involved in conservation efforts using CAMPA funds. Dr. R.V. Varma mentioned that the Kerala State Biodiversity Board is giving incentives to people for protection of heronries. Ms. Vidya Nayak said that CAMPA funds should be used for ecological restoration programmes. Prof Madhav Gadgil told the participants that local communities can also be given incentives under the Protection of Plant Varieties and Farmers' Rights Act where the local people conserve the indigenous cultivars of crop plants. Ms. Vidya Nayak suggested that Biodiversity Management Committees and Village Forest Committees should be strengthened.

Shri Madhu Ramnath, Palni Hills Conservation Council, gave a brief profile of the Palni Hills. He stressed the fact that most of the pristine and threatened areas of the region are outside the PA network. According to him the Panel should recommend ecological restoration of degraded areas in the Palni region.

Ms Latha said that there should be a plan for long term monitoring of downstream impacts of dams. She also stressed the concept of environmental flows. She suggested that funds generated by the government from sand mining should be used for conservation and restoration initiatives. Prof Madhav Gadgil said that it would be meaningful if she could give the list of parameters which should be monitored for downstream effects.

Prof Madhav Gadgil thanked the members of the SWGM for their interaction with the Panel and told them to suggest four representatives of SWGM which would attend the workshop in KILA from 3rd-5th of May.

This was followed by a presentation by Dr. S.N. Prasad on geospatial analysis for assessment of ecological sensitivity scores. It was suggested that the ecological sensitivity scores could be colour coded and the range of colours would follow the VIBGYOR spectrum. Voilet will indicate lowest ecological sensitivity score whereas red would indicate highest ecological sensitivity score. Prof Madhav Gadgil suggested that it would be meaningful to look specifically at special ecosystems such as lateritic plateaus, sholas and cloud forests, grasslands and riparian forests in the geospatial grid analysis.

Prof Madhav Gadgil gave a presentation on the SESA proposal. The SESA proposal provided a primer for discussion about the mandate, composition and function of the Western Ghats Ecology Authority. The presentation was followed by discussion on the ambit and scope of the Western Ghats Ecology Authority and demarcation of ecologically sensitive areas in Western Ghats.

Prof Madhav Gadgil proposed that the entire Western Ghats could be classified as an Ecologically Significant Area, out of which selected areas could be notified as Ecologically Sensitive Area in legal terms. Prof Raman Sukumar supported the proposal that the entire Western Ghats be declared as an Ecologically Significant Area with selected areas being notified as Ecologically Sensitive Area. This was followed by a discussion on whether the whole Western Ghats should be notified as Ecologically Sensitive Area or the Western Ghats would be designated as an Ecologically Sensitive Area with selected areas being notified as ecologically sensitive areas. Shri Vijayan supported the idea that the entire Western Ghats be legally notified as an Ecologically Sensitive Area.

Dr. R.V. Varma said that state governments would not agree with the proposal of the entire Western Ghats being declared as a Ecologically Sensitive Area. Dr. G.V. Subrahmanyam pointed out that declaring the Western Ghats as an Ecologically Sensitive Area would also affect the EIA process as all the projects which would earlier be classified as category B projects would become Category A projects. Prof Madhav Gadgil said that declaration of the whole Western Ghats as an ESA would centralize a lot of power with the Union Government which is not a good practice. This is exemplified in the case of mining in Goa.

Shri B.J. Krishnan said that planning and management of ESAs should be pro-people. Dr. Renee Borges said that the Panel should provide prescriptions for development planning of the Western Ghats. Prof Madhav Gadgil said that through the model of ecologically significant and ecological sensitive areas, the Panel will try to inject better practices of development planning in the Western Ghats.

Finally, it was decided that the Western Ghats could be declared as an Ecologically Significant Area. Within this ecologically significant matrix, Ecologically Sensitive Areas would be notified. Each group of Panel members would look after the particular states allocated to them. This group would demarcate Ecologically Sensitive Areas in their respective states and provide guidelines for participatory development planning. It was also decided that WGEA should have statutory powers and it should have state-level committees which would firm up proposals of Ecologically Sensitive Areas of each state. The WGEA would promote environmentally sound development in the Western Ghats.

The meeting ended with a vote of thanks to the Chair.

Minutes of the Eleventh Meeting of Western Ghats Ecology Expert Panel (WGEEP) held at Paryavaran Bhavan, New Delhi, on 24th March 2011 with the Hon'ble MOS (I/C) E&F

The Western Ghats Ecology Expert Panel met on 24th March 2011 at Paryavaran Bhavan, New Delhi with the Hon'ble MOS (I/C) E&F.

The following members were present:-

Prof. Madhav Gadgil	Chairman
Prof S.P. Gautam	Member
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Dr. R.V.Varma	Member
Dr. Ligia Noronha	Member
Ms. Vidya S. Nayak	Member
Dr. G.V. Subrahmanyam	Member Secretary

Co-opted expert member

Dr. S.N. Prasad, SACON, Hyderabad

Special Invitees

Dr. P.J. Dilip Kumar, Director General of Forests & Special Secretary, Ministry of Environment & Forests (MoEF), Government of India

Shri Jagdish Kishwan, Additional Director General of Forests (Wildlife), MoEF

Shri A.K. Srivastava, Inspector General of Forests (Wildlife), MoEF

Shri B.M.S. Rathore, Joint Secretary, MoEF

Dr. K.N. Ganeshaiah, UAS, Bangalore; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad; Dr. D.K. Subramaniam, IISc, Bengaluru; Prof R. Sukumar, IISc, Bengaluru, Dr Renee Borges, IISc, Bengaluru, all Members of the Panel could not attend the meeting. Shri Neeraj Khatri (Deputy Director, MoEF) and Dr. Amit Love (Deputy Director, MoEF) were also present during the meeting.

Professor Madhav Gadgil gave a presentation on the framework and components of the WGEEP report.

At the outset, Prof Madhav Gadgil, Chairman, Western Ghats Ecology Expert Panel (WGEEP) covered the material that will form part of the introductory section of the report. This included a few quotations and extracts of an article published by Ram Guha in Outlook Magazine. Following this there would be a section on the TORs of the Panel and the activities undertaken by the Panel during the past year.

Prof Gadgil elaborated on the contents of the section on Demarcation of Western Ghats Boundaries. He said that the boundaries of the Western Ghats are not very rigid and the Western Ghats have very strong westward and eastward linkages. He added that the administrative definition of the Western Ghats has no implications in terms of environmental regulation and the actual boundaries of the Western Ghats. WGEEP proposes to demarcate geographical boundaries on the basis of slope, elevation and continuity of hilly

tracts. Prof Gadgil explained the implications of demarcation of the Western Ghats with respect to management and regulatory regimes which would be adopted in the Western Ghats vis-à-vis other areas. He said that there were two possible alternatives (i) develop recklessly – conserve thoughtlessly (ii) develop thoughtfully – conserve thoughtfully. He informed the members that the Panel advocates a layered, nuanced, participatory approach, so that boundaries will not be discontinuities and therefore will not be of undue significance.

Prof Gadgil covered the material which would be included in the section on the environmental setting of the Western Ghats in terms of its landscapes, and ecosystems. He then dwelt on the challenges faced with respect to the governance of environment and natural resources and also listed case studies from the Western Ghats where the governance of natural resources and the environment has left a lot to be desired. He said that the Panel advocates for moving towards sustainable and inclusive growth whereas at present exclusionary development and exclusionary conservation is being followed. Further, Prof Gadgil said that for moving towards sustainable development the following doctrines/principles have to be put in practice (i) public trust doctrine, (ii) polluter pays principle, and (iii) precautionary principle. Prof Madhav Gadgil elaborated upon the currently available legal and policy instruments available for the management of the environment and natural resources of the Western Ghats region. He supplemented these with case studies highlighting the strengths/weaknesses of these legal and policy tools in administering the environment and natural resources in Western Ghats region. Prof Gadgil covered the new conservation initiatives such as community conservation areas in Udumbanchola in Idukki, positive incentives for conservation as in the case of Kerala mangroves and restoration of rainforest patches in plantation areas. Further, he stressed upon the fact that provisions of the Forest Conservation Act and Forest Rights Act have not been applied fully in the Western Ghats. He gave examples of forest clearances given for mining in Goa and non-implementation of Forest Rights Act in Athirappilly, Gundia and Goa.

This was followed by an elaboration on the Pronab Sen criteria for determination of ecological sensitivity. He said that that the Pronab Sen Committee did not provide for any guidelines for the management of Ecologically Sensitive Areas (ESAs). The Panel envisages a graduated approach for the management of ESAs. The ecologically sensitive areas would be graded from highly sensitive to less sensitive rather than by using a "go, no-go" approach. He gave the example of the graded management regime that has been adopted in the Goa Regional Plan 2021.

He then discussed the guidelines prescribed by the Wildlife Division of the Ministry to notify ESAs around the National Parks and Wildlife Sanctuaries. Prof Gadgil listed the activities that are prohibited, regulated or to be promoted in ESAs as per the guidelines. He informed the members that as per the guidelines green technologies have to be actively promoted in ESAs. He highlighted the fact that wind mills which are considered to be a green technology and are exempt from any kind of Environmental Impact Assessment have led to wide spread deforestation in the Western Ghats. According to him, this issue of wind mills required serious consideration. Hon'ble MOS (I/C) E&F suggested that the Panel should examine this issue in detail in its report.

Prof Madhav Gadgil elaborated upon the methodology adopted by the Panel for identification of ecologically sensitive areas using a geospatial grid-based approach where ecological sensitivity was scored. He also mentioned that WGEEP will also consider inputs from the local public as in the case of Gram Sabhas of Ratnagiri and Sindhudurg districts

and proposals from NGOs as in the case of Kodagu, Sahayadri and Kodachadri ESA proposals to demarcate ecologically sensitive areas.

Further, he said that since the entire Western Ghats qualifies as an ecologically sensitive area as per the Pronab Sen criteria, the WGEEP proposes to classify the entire Western Ghats as an *Ecologically Significant Area* and in this Ecologically Significant Matrix, selected areas could be notified as Ecologically Sensitive Areas in legal terms. He elaborated that there would be different zones of ecological sensitivity which would vary from zones of highest sensitivity to zones of low sensitivity. The nomenclature of the zones could be ecosenstive core, ESZ1, ESZ2, ESZ3 and the ecologically significant matrix.

After the section of demarcation on ESAs there would be a section on management regimes to be adopted in the Western Ghats. Prof Gadgil said that the Western Ghats would serve as a laboratory where development programmes that are compatible with nature conservation and that promote social justice would be followed. The management strategy developed for the Western Ghats would focus on conservation and efficient use of resources. He said that WGEEP proposes to prepare a development strategy for various sectors with respect to the Ecosensitive core, ESZ1, ESZ2, ESZ 3 and ecologically significant matrix. Prof Gadgil further added that a participatory approach would be adopted for the formulation of the development strategy for each area. He said that lessons could be taken from the environmental policies of Sikkim, Uttarakhand and Himachal Pradesh and also from other countries such as Costa Rica, Australia and Norway. Further, he added that Payment for Ecosystem Services could provide a model for incentivizing conservation and sustainable development as has been done in Australia and Costa Rica.

Prof Gadgil gave a brief idea for the proposed Western Ghats Ecology Authority (WGEA) and said that the WGEA would have statutory powers. Further, he added that WGEA would have State Level Committees, which would firm up proposals for Ecologically Sensitive Areas of each state. The WGEA would promote environmentally sound development of the Western Ghats.

After the presentation on the framework and components of WGEEP report by Prof Madhav Gadgil, Hon'ble MOS (I/C) E&F appreciated the work done by the Panel and gave a go-ahead signal to the Panel to finalize the WGEEP report. Hon'ble MOS (I/C) E&F left the meeting after giving his comments.

Prof Madhav Gadgil expressed his satisfaction that the Hon'ble Minister had given a clear signal for finalization of the Report. He added that the Panel should now assess the items that need to be executed for finalization of the report. Prof Gadgil opined that it would be meaningful to introduce threats as a variable in the geospatial grid methodology for calculating ecological sensitivity. Dr. S. N. Prasad clarified that presently it would be difficult to quantify the threats in the stipulated period of time. Prof Gadgil suggested that as a first step dams, highways, railways and mines could be depicted on the geospatial map.

Detailed discussion took place on the status of identification and demarcation of Ecologically Sensitive Areas in various Western Ghat states. It was decided that the WGEEP members responsible for each of the allotted states would give broad proposals of ESAs for their respective states. They would also suggest the process and guidelines for development planning of the ESAs with full rationale. The complete proposals for ESAs would be prepared by adopting the participatory approach with the involvement of the local people in the planning process. The participatory process would be finalized in the next meeting of the Panel at Kerala Institute of Local Administration from 3rd to 5th of May 2011.

There was discussion on the issue of management of areas which have low ecological sensitivity scores due to degradation of the environment but require urgent attention so that mitigative measures and ecological restoration programmes can be initiated as in the case of Munnar in Kerala.

The meeting ended with a vote of thanks to the Chair.

Minutes of the twelth Meeting of Western Ghats Ecology Expert Panel (WGEEP) and Expert Consultative Meeting held at Kerala Institute of Local Administration, Thrissur, from 3rd to 5th May 2011

The Western Ghats Ecology Expert Panel met from 3rd to 5th May 2011 at Kerala Institute of Local Administration, Thrissur

The following members of the WGEEP were present:-

Prof. Madhav Gadgil	Chairman
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Dr. R.V.Varma	Member
Prof R. Sukumar	Member
Dr. Renee Borges	Member
Dr. Ligia Noronha	Member
Ms. Vidya S. Nayak	Member
Dr. G.V. Subrahmanyam	Member Secretary

Dr. K.N. Ganeshaiah, UAS, Bengaluru; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad; Prof. S P Gautam, Chairman, Central Pollution Control Board; Dr. D.K. Subramaniam, IISc, Bengaluru; all Members of the Panel could not attend the meeting. Shri Neeraj Khatri (Deputy Director, MoEF) and Dr. Amit Love (Deputy Director, MoEF) were also present during the meeting.

The Panel Meeting and the Expert Consultative Meeting took place simultaneously. The meetings were spread across three days from 3rd to 5th May 2011.

Professor Madhav Gadgil, Chairman, Western Ghats Ecology Expert Panel (WGEEP), welcomed the participants and thanked them for accepting the invitation on behalf of the WGEEP. Professor N. Ramakantan, Director, Kerala Institute of Local Administration (KILA), welcomed the participants and the members of WGEEP to the KILA.

Prof Madhav Gadgil highlighted the main tasks entrusted to the Panel by the Ministry, viz. (i) identification of ecologically sensitive areas in the Western Ghats and suggesting management strategies for them, (ii) proposing an overall development strategy for the Western Ghats for their protection and rejuvenation, and (iii) providing recommendations on the proposed Western Ghats Ecology Authority. Prof Gadgil briefly explained the agenda items for 3rd, 4th and 5th May following which the agenda items for 3rd May 2011 were taken up individually for discussion.

Dr. V.S.Vijayan gave a presentation on assignment of sensitivity scores to different parts of Kerala Western Ghats. He also identified the panchayats which were present in the proposed ecologically sensitive areas.

Prof M.K Prasad made a presentation on "Development Plans based on Sustainable Use and Conservation of Natural Resources: Guidelines for Gram Panchayats"

Shri S.M. Vijayanand, Additional Chief Secretary, Government of Kerala, spoke on the planning process adopted at the District and Local Self-Governments levels. He listed the

various steps involved in the planning process which included (i) situation analysis, (ii) consultations, (iii) strategy setting, (iv) issues and options, and (v) resource allocation. He further elaborated on the institutional framework involved in the planning process such as District Planning Committees, Technical Advisory Groups, and Volunteer Technical Core. He mentioned that the District Planning process could easily be integrated with central plan schemes.

In the specific case of planning for Ecologically Sensitive Areas he stressed that the existing institutions should be built upon rather than creating a new institutional framework. He further mentioned that the planning should be more objectiv- based rather than based on specific sectors. This will help in the integration of the functioning of various departments towards a common objective.

Shri Vijayanand suggested that a Model Plan with sustainable development at its focus could be prepared for the Panchayats. This plan could then be implemented in selected panchayats on a pilot scale. He said that WGEEP could guide the development of such plans. Prof Madhav Gadgil said that the Panel could provide guidelines for the development of such a model plan. He further requested Dr CTS Nair, Executive Vice President, Kerala State Council for Science and Technology, to be the Convener of the group which would formulate the Plan. This was followed by discussion on various aspects of development planning and the ways in which development plans are implemented.

Dr. CTS Nair said that the main challenges are (i) how decentralization and decentralized planning can break Departmental Silos, (ii) how we can build on existing institutions to fulfill the objectives of model plans, (iii) how greater transparency can be brought into the system, and (iv) how existing science can be brought into action.

Day 2: 4 May 2011

Professor Madhav Gadgil explained the agenda for the day. He also suggested that the WGEEP member handling the specific thematic area would chair deliberations on that thematic area.

At the outset, Professor Sukumar explained the rationale and the basis for delimitation of the spatial limits of the Western Ghats. He clarified that WGEEP has used an ecological basis for the demarcation of the Western Ghats. Prof M.K. Prasad opined that if the Western Ghats definition adopted by the WGEEP does not coincide with the official government definition there might be problems with respect to implementation of different schemes. It was clarified that the present definition encompasses all the Western Ghats taluks which are covered by the government definition, hence there would be no problem.

Shri B.J. Krishnan presented the constitution, mandate and functioning of the proposed Western Ghats Ecology Authority (WGEA). At the outset, Shri Krishnan gave a brief description of the Environment (Protection) Act and the sections that are relevant to the establishment of the Authority. He covered in detail the salient features of the Authority, viz. nature and role of the Authority, functions and powers of WGEA, legal framework and institutional structure, composition of the Authority, tenure and secretariat of the Authority, finances, honorarium and allowances of members.

Shri Krishnan said that the WGEA would be a statutory authority with a two-tiered system of one umbrella Central authority with state-level authorities. He detailed the constitution of the Umbrella Authority and the state Authorities. The chairman of the Authority would be a retired Supreme Court judge or an eminent scientist.

After the presentation of Shri Krishnan, there was detailed discussion on various aspects of the proposed WGEA, its mandate, constitution, powers and functioning. Shri Samir Mehta,

International Rivers, highlighted the facts that the powers and jurisdiction of the umbrella WGEA and state authorities should be different otherwise there are chances of conflicts. Shri Sanjay Upadhyay, Advocate, Supreme Court of India, enquired about the linkages of the proposed Authority with other statutory authorities in the area of environment and asked about the need to have statutory authorities which have similar or overlapping powers. He gave the example of the National Green Tribunal, State environmental appraisal authorities and Central and State Pollution Control Boards in this regard.

Prof K.P. Kannan opined that in the present form the proposed WGEA was highly unitary in nature. Shri Sanjay Upadhyay suggested that the umbrella WGEA should act as an appellate authority only in the case of inter-state issues and not matters related with one state alone. Dr. A.K. Shyam highlighted the issues related with the present institutional mechanism for appraising and conducting EIA vis-à-vis establishment of the proposed authority. He also commented upon lack of adequate representation of scientists in the Authority. Dr. V.S. Vijayan suggested that the Chairman, National Biodiversity Authority, should also be a member of the proposed WGEA.

Prof M.K. Prasad said that rather than setting up new regulatory bodies we should activate institutions and institutional mechanism which are not performing. Shri R.K. Garg said that the point of concern is that even though there are institutions and laws with relation to the environment, development is being carried out in an unregulated manner. The important issue is one of effective implementation of existing regulations and plugging the lacunae in existing authorities and institutions. He suggested that the proposed WGEA should have a watchdog function which gives feedback to plug the deficiencies and lacunae of the system rather than functioning as a regulatory body.

It was felt that the proposed WGEA should not be a strict regulatory body but it should have a watchdog function and that its recommendations should be binding. Prof Madhav Gadgil said that there are a number of regulatory bodies with overlapping powers. It would be meaningful if the proposed WGEA monitors and points out the lacunae in the already existing institutions and institutional mechanisms.

Dr. H.C. Sharatchandra presented an alternative framework for the proposed WGEA which was more in line with the views which were expressed.

This was followed by a presentation by Dr. Ligia Noronha on development planning, governance and the role of Panchayati Raj institutions.

Ms. Prakriti Srivastava, Deputy Inspector General (Wildlife), Ministry of Environment and Forests, Government of India, made a presentation on the guidelines formulated by the Ministry for demarcation of ecologically sensitive areas around National Parks and Wildlife Sanctuaries. She gave a brief overview of the chronology of events upto the issue of guidelines by the Wildlife Division of the Ministry. She highlighted the fact that the Ministry has given lot of leverage to site-specificity of the ecological sensitive area around protected areas by setting up of a three-member committee. She said that the report of the Committee would bring out protection needs, development needs and conservation needs based upon which specific proposals for demarcation of ecologically sensitive areas would be assessed.

Prof Gadgil sought clarifications on the following issues regarding demarcation of ecologically sensitive areas around protected areas: (i) have any surveys have been undertaken of areas surrounding PAs which have to be notified as ecologically sensitive areas, (ii) have any functions been visualized for areas around PAs in the context of biodiversity conservation, (iii) what is the process of delineating ESA around PAs – who was involved, how this was done? (iv) what is the process of deciding on regulatory measures; are these generic or context-specific?

Dr. Ligia Naronha sought clarifications on the proposals of ecologically sensitive areas around PAs in Goa. Dr. Latha enquired about the process by which the proposals are forwarded from the states and at what juncture public consultations are held. Dr. G.V. Subrahmanyam explained the process of notification in detail.

Dr. Ligia Naronha made a presentation on the ecological sensitivity scores of Goa. She explained that as per the Goa Regional Plan 2021 nearly 80% of Goa is covered under ecologically sensitive zones. There are two ecologically sensitive zones, viz. ESZ 1 and ESZ 2. ESZ 1 comprises Government and private forests, National Parks, Wildlife Sanctuaries, mangrove forest and water bodies. No new development is allowed in this zone. ESZ 2 comprises paddy area and *khazan* lands, command areas, salt pans and heritage zones. Only regulated development is allowed in these areas. The presentation was followed by detailed discussions on the mining scenario in Goa and environmental impacts of mining. Various methods were discussed for regulation of the mining sector in Goa.

Prof Madhav Gadgil made a presentation on the demarcation of ecologically sensitive areas in Maharastra.

Day 3: 5 May 2011

Shri Raghu Babu, GIZ (Gesellschaft für Internationale Zusammenarbeit**)**, Delhi gave a presentation on the use of Zoning Atlas for Siting of Industries (ZASI) as a tool for development planning of ecologically sensitive areas. He explained the basic principles involved in the development of a Zoning Atlas. He also gave an illustrative example of developing regional plan for Tripura

After the presentation, Prof Madhav Gadgil sought clarifications from Shri Raghu Babu regarding the Zoning Atlas for Ratnagiri and Sindhudurg districts with particular reference to forest area in the districts. Prof Gadgil opined that the Zoning Atlas for Ratnagiri and Sindhudurg districts has mixed up legal and operational landuse categories. Dr. Sharatchandra said that Zoning Atlases had not been used for development planning in the country. Prof Madhav Gadgil said that in the present form the planning approach followed for development of Zoning Atlases and Regional Plans tends to follow a top–down approach. It would be desirable that Planning should be bottom–up just as in the Kerala model for Development Planning.

The draft WGEEP report outline was deliberated upon in detail. This was followed by a detailed discussion on the sector-wise regional development strategy which was fine tuned with the different levels of ecological sensitivity. The following sectors were discussed in detail: agriculture, forestry, tourism, transport and communication, power. Prof Madhav Gadgil suggested that the detailed write ups for each sectors that would be included in the report be prepared in the following format: (i) issues, (ii) measures suggested, (iii) on-going decision-making process, and (iv) implementing the contemplated measures, (v) action Points for WGEA

Finally, the Panel decided to have the next meeting at the Centre for Ecological Sciences, Indian Institute of Science, Bengaluru, on 20th and 21st June 2011.

The meeting ended with a vote of thanks to the Chair.

Minutes of the thirteenth meeting of Western Ghats Ecology Expert Panel (WGEEP) held at Indian Institute of Science, Bengaluru, from 20th to 21st June 2011

The Western Ghats Ecology Expert Panel met from 20th to 21st June 2011 at Indian Institute of Science, Bengaluru.

The following members of the WGEEP were present:-

Prof. Madhav Gadgil	Chairman
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Dr. R.V.Varma	Member
Prof R. Sukumar	Member
Dr. Ligia Noronha	Member
Ms. Vidya S. Nayak	Member
Dr. G.V. Subrahmanyam	Member Secretary

Dr. K.N. Ganeshaiah, UAS, Bengaluru; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad; Prof. S P Gautam, Chairman, Central Pollution Control Board; Dr. D.K. Subramaniam, IISc, Bengaluru; Dr Renee Borges, IISc, Bengaluru; all Members of the Panel could not attend the meeting. Dr. S.N. Prasad, SACON, Hyderabad and Dr. M.D. Subhash Chandran, CES, IISc also participated in the meeting. Dr. Amit Love (Deputy Director, MoEF) was also present during the meeting.

1. Dr S.N. Prasad gave an elaborate presentation on the geospatial database used for arriving at ecological sensitivity scores. He explained in detail the methodology adopted for scoring the variables used in the geospatial database. The variables used in the geospatial database are (i) elevation, (ii) slope, (iii) % forest cover, (iv) unique evergreen elements, (v) edge, (vi) riparian forests, (vii) endemic plants, and (viii) IUCN Red List category (mammals). He also elaborately explained the process of normalization of variables while calculating ecological sensitivity scores. It was decided that the raw data used in the geospatial database should be made available in the public domain and the detailed methodology used in the geospatial database be clearly brought out in the WGEEP report.

After detailed deliberations it was decided that the Western Ghats would be classified into 3 zones differing in ecological sensitivity, viz. (i) ESZ1, (ii) ESZ2 and (iii) ESZ3 while Protected Areas would be a separate zone by themselves. Protected Areas were given a special status as they are covered under the Wildlife Protection Act. The color scheme, which would be used for the depiction of these zones on the maps, was also finalized. Prof R. Sukumar suggested that habitat connectivity should be added as a variable in the geospatial database for assessing the ecological sensitivity of an area. Prof Madhav Gadgil suggested that the proposals of civil society groups for declaration of ecologically sensitive areas in the Western Ghats should be overlaid on this 4-zone map of the Western Ghats.

This was followed by a discussion on the methodology for demarcation and delineation of ESZ 1, ESZ 2 and ESZ 3 in the Western Ghats. It was agreed that scores of National Parks

and Wildlife Sanctuaries can be taken as the bench mark value for defining the lower cut off value for ESZ1, i.e. all grids which had ecological sensitivity scores equal to or higher than the lowest score of any grid in Protected Areas would be considered in ESZ 1. Prof R. Sukumar and Dr. Ligia Noronha said that it was important to identify outliers if such a methodology is adopted.

2. The Western Ghats Natural Heritage proposal submitted by the Government to UNESCO was discussed by WGEEP. It was felt that there is a need for greater participation of local people and communities in formulation and implementation of the Western Ghats National Heritage proposal.

3. Dr. G.V. Subrahmanyam raised the issue of the guidelines of the Wildlife Division of the Ministry with reference to demarcation of ecologically sensitive areas around National Parks and Wildlife Sanctuaries and how these guidelines can be integrated with the Panel's Recommendations. Prof. Madhav Gadgil said that the Wildlife Division should suitably consider WGEEP's recommendations regarding demarcation of ecologically sensitive zones.

4. Shri B.J. Krishnan gave a talk on the powers, functions and constitution of the proposed Western Ghats Ecology Authority (WGEA). This was followed by a detailed point-wise discussion on the draft note prepared by Shri B.J. Krishnan on the WGEA.

5. Prof Madhav Gadgil informed the Panel members that it would be advisable for the WGEEP to submit an interim report on the matters referred to WGEEP by June 30, 2011. The issues referred to the WGEA are (i) moratorium on setting up of new industry and mining in Ratnagiri and Sindhudurg districts of Maharashtra, (ii) Gundia hydroelectric power project, Karnataka, (iii) Athirappilly Hydroelectric Power Project, Kerala, and (iv) mining in Goa. All these issues were discussed in detail by the Panel.

6. Dr. Ligia Noronha gave a presentation on the mining sector in the state of Goa. M.D. Subash Chandran gave a talk on the Gundia Hydroelectric Power Project covering the chronological details of the project and the environmental and ecological impacts of the proposed project. He also provided an overview of the forest types of the area and the unique endemic species found in the project area of the Gundia Hydroelectric Power Project. Prof. Madhav Gadgil presented the salient points of his detailed report on Ratnagiri and Sindhudurg districts.

7. Dr. V.S. Vijayan gave a presentation on the Athirappilly Hydroelectric Power Project in Kerala. He detailed the chronological events with respect to the EIA process, environmental clearances and the cases in the High Court of Kerala. He further brought out the objections, which have been raised by the civil society groups on the techno-economic feasibility of the project and adverse environmental impacts of the project. He highlighted the fact that construction of the Athirappilly dam will adversely effect the biodiversity of the area and lead to the destruction of lowland riparian forests; Dr Vijayan provided details of the biodiversity elements of the Athirappilly area. He also highlighted that the forest rights of the *Kadars* which are a Primitive Tribal Group inhabiting the area have not been settled under the Forests Right Act by the State Government.

8. After the presentations, Prof. Madhav Gadgil drew the attention of members to the ecological security of pristine rivers in the Western Ghats. He gave the example of Aghanashini River as one such pristine river. This was followed by a discussion on whether pristine river stretches in Western Ghats region could be considered as ecologically sensitive areas.

9. Dr Ligia Naronha said that special emphasis should be given to protection of critical habitats and there should be a section in the WGEEP report dealing with these habitats. Prof Raman Sukumar was requested to write a note in this regard for WGEEP report. It was decided that the Panel would recommend that the Ministry could initiate a study on riverine and riparian ecosystems in the Western Ghats. It was decided that Dr. R.V. Varma, Chairman, Kerala State Biodiversity Board, could act as a focal point for implementing the study across the Western Ghats.

10. It was decided that the final WGEEP report would include sector-wise guidelines for ESZ1, ESZ2 and ESZ3 in a matrix form. Prof. R. Sukumar initiated the discussion on the broad sector-wise guidelines for the different ecosensitive zones, viz. ESZ1, ESZ2 and ESZ3. The following sectors were deliberated in detail: mining, power, roads and highways, infrastructure, industries, tourism, agriculture and plantations. The broad regulatory and promotional activities were discussed. It was decided that the panel would give broad policy recommendations for each sector. Detailed sectoral guidelines would be finalized by the proposed Western Ghats Ecology Authority in consultation with the local communities.

11. Finally, the framework of the WGEEP report was deliberated upon by the members. The contents of the reports were discussed. It was suggested that the report may have sections on delineation of ecologically sensitive areas, a broad introduction to the Western Ghats which would include the environmental setting, critical habitats, the boundary of the Western Ghats region, sector-wise guidelines, governance issues, nature of powers and functions of the proposed Western Ghats Ecology Authority, and Appendices. It was decided that many case studies would be incorporated in the relevant sections, which would highlight specific issues related to the Western Ghats region.

12. This was followed by a discussion on timelines and the expected date for submission of the final report of the Panel. The Panel felt that keeping in view the complex issues, which would be addressed in the WGEEP report, it would be meaningful to seek an extension of the tenure of the Panel till 31 Aug 2011. In this regard a specific request can be sent on behalf of the Panel to the Hon'ble MEF by Prof Madhav Gadgil, Chairman, WGEEP. It was also decided that the Panel would meet on 16–17 August 2011 at CES, Indian Institute of Science, Bengaluru, to finalize the report.

The meeting ended with a vote of thanks to the Chair.

Minutes of the fourteenth meeting of Western Ghats Ecology Expert Panel (WGEEP) held at Indian Institute of Science, Bengaluru, from 16th to 17th August 2011

The Western Ghats Ecology Expert Panel met from 16th to 17th August 2011 at Indian Institute of Science, Bengaluru.

The following members of the WGEEP were present:-

Prof. Madhav Gadgil	Chairman
Shri B J Krishnan	Member
Dr. V.S. Vijayan	Member
Prof R. Sukumar	Member
Ms. Vidya S. Nayak	Member
Dr. Renee Borges	Member
Dr. G.V. Subrahmanyam	Member Secretary

Dr. R.V.Varma, Chairman, Kerala State Biodiversity Board; Dr. Ligia Noronha, TERI, Delhi; Dr. K.N. Ganeshaiah, UAS, Bengaluru; Dr. R.R. Navalgund, Director, Space Application Centre, Ahmedabad; Prof. S P Gautam, Chairman, Central Pollution Control Board; Dr. D.K. Subramaniam, IISc, Bengaluru; all Members of the Panel could not attend the meeting. Dr. S.N. Prasad, SACON, Hyderabad, and Shri Sanjay Upadhyay, Advocate, Supreme Court of India and Managing Patner, ELDF, New Delhi, also participated in the meeting. Dr. Amit Love (Deputy Director, MoEF) was also present during the meeting.

1. Prof Madhav Gadgil, Chairman, WGEEP, initiated the meeting by saying that as this was the last meeting of the WGEEP all the substantive sections of the report should be deliberated upon and finalized. He informed the members that Dr. Ligia Noronha, member, WGEEP, has volunteered to finalize the draft final report. Further, he added that it has been suggested that the executive summary of the report should be made concise to make it more meaningful. Prof Gadgil also said that Panel should stick to the timeline of 31 August 2011 for submission of the report.

2. Prof Gadgil projected the contents page of the draft final report. He then projected each section of the draft final report in chronological order and gave a brief summary of the section while highlighting the substantive points.

3. Prof Gadgil went through the initial sections of the report, which dealt with the Introduction to the report, mandate of the Panel, organization of the report and the activities undertaken by the Panel. He informed the members that the details of the activities undertaken by the Panel would be given in the Appendices.

4. This was followed by a section on the boundaries of the Western Ghats. The members of the Panel discussed in detail the delimitation of Western Ghat boundaries. Dr. Vijayan opined that if altitude was used as one of the criteria for delimiting the boundaries of Western Ghats then crucial riparian habitats present on the western slopes of the Western Ghats may be left out. Dr. Renee Borges also highlighted the case of steep escarpments present in the Bhimashankar area of the Maharashtra Western Ghats that may also be left

out. Finally, it was decided by the Panel that the boundaries proposed by WGEEP could rationalized and firmed up by the proposed Western Ghats Ecology Authority.

5. Dr. S.N. Prasad made a detailed presentation on the geospatial database on ecological sensitivity. He presented the outputs of the project which included state-wise details on ecological sensitivity grid scores, maps delineating eco-sensitive zones with taluka boundaries and also the boundaries of the Western Ghats from the ecological point of view. The database generated has been made available in the public domain. The WGEEP has accepted the findings of the study which formed the basis for delineating and demarcating the eco-sensitive zones in the Western Ghats region.

6. After this section, the sections on the environmental setting of the Western Ghats and the concept of "develop sustainably and conserve thoughtfully" was projected. Prof. Gadgil initiated the discussion on categorizing the whole Western Ghats into three zones of varied ecological sensitivity and the implications of such a zonation. The members deliberated upon the methodology adopted for classifying the Western Ghats into three zones, viz ESZ1, ESZ2 and ESZ3, and the ESZ assignment to various talukas of Western Ghats. It was felt that the main text of the WGEEP report should have a succinct summary of the methodology adopted whereas the details of the methodology could be given in the Appendix. The detailed methodology would also include the limitations of the methodology adopted.

7. The terms Ecologically Sensitive Area (ESA) and Ecologically Sensitive Zone (ESZ) were discussed by the members with special reference to implementation of provisions which would be given in the proposed draft notification. It was felt that the proposals for declaration of ESAs received from civil society groups and generated through the process of active public participation by WGEEP would be tabulated and presented in a separate box in the main report.

8. After this the section of the existing ESZs and the lessons learnt was projected. The institutional mechanism for administering ESAs was discussed in detail. The Panel felt that the three-tiered approach suggested by it wherein there would be a Central Western Ghats Ecology Authority and six State Western Ghat Ecology Authorities followed by District Ecology Committees would provide a good mechnism for managing the ecology and environment of the Western Ghats. The District Ecology Committees would act as an agency of the WGEA for implementation of various plans. The Panel also deliberated upon the relative advantages of the District Ecology Committees over the High Level Monitoring Committees (HLMCs) which are presently being set up for each ESA which is notified. The members discussed the experiences gained from the establishment of the present ESAs, and the management of these ESAs through HLMCs. The case study provided by Shri Devrat Mehta, Chairman, High Level Monitoring Committee, Mahabaleshwar-Panchagani was discussed. The Panel members were of the opinion that management of ESAs should be people-oriented.

The section on buffering of protected areas detailed the experiences and case studies on declaration of ESAs around Protected Areas. As per the decision of the Indian Board of Wildlife and Supreme Court directions, the Government has to declare areas around National Parks and Wildlife Sanctuaries as a ecologically sensitive areas. These areas would act as a buffer for the protected area buffer. Professor Madhav Gadgil informed the members that case studies relating to declaration of ecologically sensitive areas around protected areas would be included in the report. One of the case studies relates to

Bhimashankar Wildlife Sanctuary in Maharastra wherein a large wind mill project was coming up.

9. This was followed by detailed discussion on the section containing broad sectoral guidelines for ESZ1, ESZ2 and ESZ3. Dr. Vijayan said that the use of chemical fertilizers should be completely phased out from the Western Ghats over a fixed period of time. After deliberations, the Panel recognized the importance and relevance of moving towards organic agriculture but felt that rather than prescribing fixed timelines it would be more prudent to create enabling policies which promote organic agriculture. It was decided that the Panel would recommend provisions such as subsidies given to the fertilizer industry be used for the promotion of organic agriculture.

Ms Vidya Nayak highlighted the importance of regulating uncontrolled industrial development in coastal areas because they will also adversely affect the ecology of the Western Ghats. She also flagged the issue of land use and establishment of SEZs in the Western Ghats. The Panel members carefully went through the prescribed guidelines for each sector in ESZ1, ESZ2 and ESZ3 and agreed upon the prescriptions provided therein.

After this the section dealing with the specific cases of Gundia and Athirappilly hydroelectric projects was discussed and this was followed by discussion on the industrial development and mining in Ratnagiri and Sindhudurg districts of Maharastra and iron ore mining in Goa. The panel finalized the recommendations for all the four matters referred to it by the Ministry of Environment and Forests, Government of India.

10. Prof Madhav Gadgil initiated discussion on the modalities for submission of the WGEEP's report to the Government. He also flagged items which would finally constitute the main report of WGEEP. It was decided that the report of WGEEP will have two parts. Part 1 would be the main report of WGEEP covering all the TORs of the Panel while Part 2 would include elaborate discussions on the ecology of the Western Ghats and detailed write ups on various sectors.

11. Prof Madhav Gadgil initiated the discussion on the structure and function of the proposed Western Ghats Ecology Authority. He projected the section of the report, which deals with the proposed WGEA. Prof Gadgil highlighted a few salient points to initiate discussion on WGEA which were (i) concept of Environmental Ombudsman, (ii) charging fees from project proponents for EIA, (iii) the possibility of the Biodiversity Management Committee (BMC) acting as the District Ecology Committee, and (iv) empanelment of EIA consultants. The members of the Panel were in agreement on the concept of having an Environmental Ombudsman in the District Ecology Committee. It was felt that the Biodiversity Management Committee should not be given the role of a District Ecology Committee as the role, mandate and composition of these two committees differ greatly.

12. There was detailed discussion on the role of WGEA in the EIA process. It was felt by the members that the concept of collection of fees by WGEA might create a conflict of interest. Shri Sanjay Upadhyay, Advocate, Supreme Court of India and Managing Partner, ELDF, New Delhi, was of the opinion that WGEA should be free from any fee collected from project proponents. Dr. V.S. Vijayan also expressed similar views. This was followed by discussion on the empanelment of EIA consultants and selection of competent agencies to do EIA. Dr G.V. Subrahmanyam informed the Panel members that there is already a scheme for accreditation of EIA consultants and the project proponent is free to choose from the accredited consultants. Prof Raman Sukumar opined that it should be clarified whether WGEA will be a body selecting Competent Agencies for doing EIA or be a body which

would give professional opinion on specific projects. Dr. G.V. Subramanyam was of the opinion that WGEA should be a professional body.

Prof Gadgil said that WGEA should catalyze the process wherein people's groups do careful analysis of the environmental impacts of development projects and that WGEA should promote independent data generation on Western Ghat ecology and biodiversity by citizens' groups.

13. Prof Gadgil requested Shri Sanjay Upadhyay to provide his views on the proposed WGEA. At the outset, Shri Sanjay Upadhyay mentioned that he has prepared a write up on the proposed WGEA. In his write up, he has used the formulation of Shri B.J. Krishnan on the proposed Authority and supplemented it with additional points.

14. Shri Sanjay Upadhyay projected the salient points with reference to powers, functions, composition and constitution of WGEA. Some of the salient points were:

(i) Respective State Governments would be consulted before constitution of the Central and State WGEAs as is done in the case of SEIAA.

(ii) The recommendations of the WGEA would be "ordinarily binding" on the lines of the National Board of Wildlife resolutions.

(iii) The boundaries of the ESZ1, ESZ2 and ESZ3 would be provisional and the notification of these will suggest the process for firming up and rationalizing these boundaries with a comprehensive process of public participation.

(iv) The members of the proposed WGEA would be technical experts and eminent people with practical experience.

(v) The District Ecology Committee (DEC) would be the nodal agency for public participation at the grassroots level. The DEC would be involved in the planning process at the district level and mainstream environmental concerns into the planning process. It would be the body to scrutinize district plans with respect to the ecology of the Western Ghats.

(vi) The authority would check the veracity of facts presented in EIAs carried out for developmental projects to be undertaken in this region. Shri Sanjay Upadhyay also detailed the basic tenets of the proposed notification for the Western Ghats Ecology Authority.

15. Professor Madhav Gadgil thanked Shri Sanjay Upadhyay for preparing a note on the proposed WGEA and for giving a presentation on this topic to the Panel at a very short notice.

16. Finally, after detailed deliberations on the contents of the draft final report the Panel members adopted the draft final report of Western Ghats Ecology Expert Panel and authorized the Chairman to submit the final report to the Ministry.

17. Dr. G. V. Subrahmamyam, Member Secretary, WGEEP, proposed a formal vote of thanks to the Chairman and the members of the Panel for their active and whole-hearted participation in the deliberations of the Panel.

Given the environmental sensitivity and ecological significance of the Western Ghats region and the complex interstate nature of its geography, The Ministry of Environment & Forests constituted a Western Ghats Ecology Expert Panel.

The Terms of Reference of the Committee are as under:

i. to assess the current status of ecology of the Western Ghats region.

ii. to demarcate areas within the Western Ghats Region which need to be notified as ecologically sensitive and to recommend for notification of such areas as ecologically sensitive zones under the Environment (Protection) Act, 1986. In doing so, the Panel shall review the existing reports such as the Pronab Sen Committee report and Dr. T.S. Vijayraghavan Committee Report, Hon'ble Supreme Court's directions, Recommendations, of the National Board for Wildlife and consult all concerned State Governments.

iii. to make recommendations for the conservation, protection and rejuvenation of the Western Ghats Region following a comprehensive consultation process involving people and Governments of all the concerned States.

iv. to suggest measures for effective implementation of the notifications issued by the Government of India in the Ministry of Environment and Forests declaring specific areas in the Western Ghats Region as Eco-sensitive zones under the Environment (Protection) Act, 1986.

v. to recommend the modalities for the establishment of Western Ghats Ecology Authority under the Environment (Protection) Act, 1986 which will be a professional body to manage the ecology of the region and to ensure its sustainable development with the support of all concerned states.

vi. to deal with any other relevant environment and ecological issues pertaining to Western Ghats Region, including those which may be referred to it by the Central Government in the Ministry of Environment and Forests.

जहाँ है हरियाली।
वहाँ है खुशहाली।।

Ministry of Environment and Forests
Government of India