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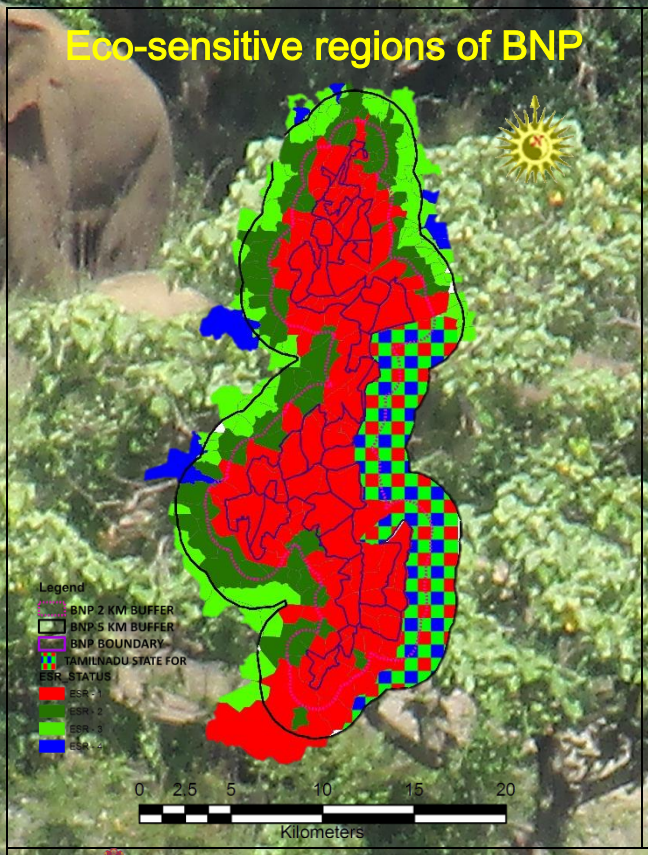
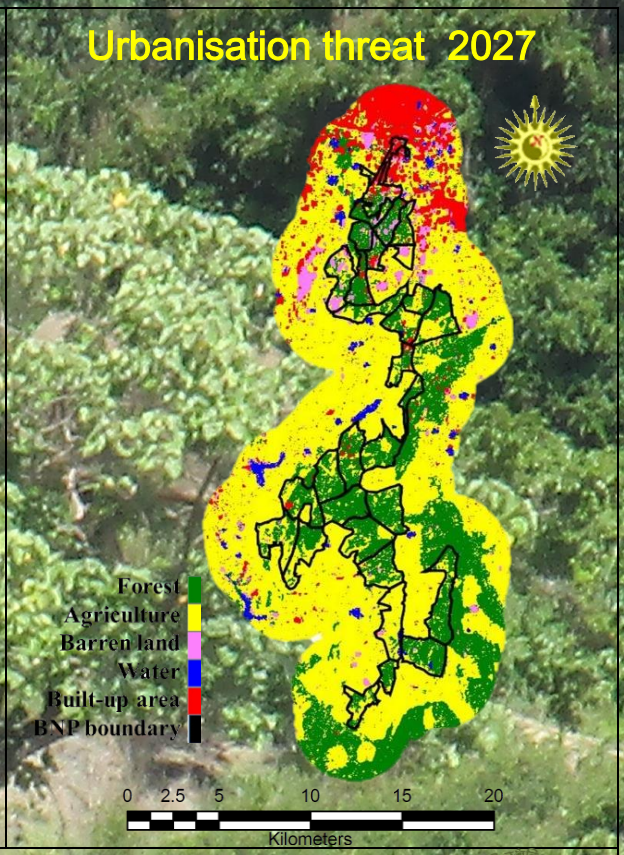
ECOLOGICALLY SENSITIVE ZONES OF BANNERGHATTA NATIONAL PARK (BNP)





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Ministry of Environment, Forest and Climate Change (MoEFCC), GOI.

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ECOLOGICALLY SENSITIVE ZONES OF BANNERGHATTA NATIONAL PARK (BNP)

Executive Summary

Bannerghatta National Park: Conservation Importance

- Unique region of biological and ecological importance and are irreplaceable if destroyed;
- Prime habitat for several species of mammals, amphibians, reptiles and birds including the endangered Asian Elephant (*Elephas maximus*), Indian gaur (*Bos gaurus*), Sambar deer (*Cervus unicolor*), Spotted deer (*Axis axis*), Leopard (*Panthera pardus*), Wild dog (*Cuon alpines*), Wild pig (*Sus scrofa*), Sloth bear (*Melurus ursinus*), Common mongoose (*Herpestes vitticollis*), Pangolin (*Manis crassicaudata*), Slender loris (*Loris lardigradus*) and Black naped hare (*Lepus nigricollis*), etc;
- As a terminal point on the northern side of Mysore Elephant Reserve, movement path for Asian Elephants Asian Elephants that migrate from the adjacent Cauvery wildlife Sanctuary of Karnataka and Krishnagiri and Hosur Forest Division of Tamilnadu which is in contiguam with the Nilgiri Biosphere Reserve carved out of Western Ghats forest at Nilgiris stretching through Malaimahadeshwara hills, Biligiri Ranga Temple Sanctuary, Kollegal Forest Division and Sathyamangala Forests of Tamilnadu;
- Crucial watershed for streams such as Antaragange Holé , Rayatmala Holé, Amuthi halla, Muthyala Madu halla, Shankarana halla, Bantana halla, Aane Maduvina halla, Byaladakere halla, Maavina halla and rivers (Arkavathi, Suvarnamukhi, Muthyalamadavu hole, Rayathmala hole, Hebbalahalla and Antharagange, which joins Cauvery river);
- Rich floral and faunal diversity;
- Diversity of herbs and shrubs of medicinal importance;
- Sequester carbon (helps in mitigating global warming) and moderates regional climate (vital for Bangalore);

- Sustains regional hydrology vital for maintaining the hydrologic regime in the river Cauvery.
- There are about 120 human settlements located within 5 km from the BNP boundary and 5 human settlements within BNP. Some of the recently formed settlements are through encroachment of forest lands. Scheduled tribes dominate the settlements located close to the park boundary in the South-East, and South-West and depend on agriculture and livestock rearing for livelihood.
- Scope for research on wild animals and their habitat, the socioeconomic status of the people and monitoring of the changes in flora, fauna, and people.

Need for designating Eco-Sensitive Zones (ESZ) in the vicinity of BNP:

- These regions (ESZ) are ecologically and economically vital and vulnerable to even mild disturbances and hence demand conservation;
- regions for conservation and community usage based on ecological and social / cultural dimensions;
- Protection of animal movement paths would help in mitigating Human-Animal conflicts and also minimizes the instances of wild fauna straying into nearby urban area (Bangalore);
- Degradation of ESZ's due to anthropogenic activities would cause irreversible changes in the structure of biological communities at BNP;
- To reduce biotic pressures on the habitat due to increasing number of human settlements close to the forest boundary;
- play an important role in the conservation of wildlife and its management, particularly when habitats are fragmented, disturbed and are inadequate for their usage as a passage;
- Unplanned rapid urbanisation process at Bangalore would threaten the very existence of BNP;
- Continuation of uncontrolled and unregulated activities apart from senseless approval by environmentally illiterate bureaucracy (evident from proposal for housing layouts, etc.), would impact the rich biodiversity;
- Helps in regulating environmentally malignant activities (sand and granite mining, inappropriate cropping, encroachment of forest lands, etc.);

- Helps in arresting fragmentation of forests and deforestation - the moist deciduous forest covered 50.4% in 1973 and now are about 28.5 % (2015);
- Supports cluster based developmental path based on the locally available resources;

Eco-Sensitive Zones (ESZ) in the vicinity of BNP:

- prioritizes the regions in the BNP buffer regions of 5 km, considering attributes (biological, Geo climatic, Social, etc.) as ESR1 (Regions of highest sensitivity or Ecologically Sensitive Region 1), ESR2 (Regions of higher sensitivity), ESR3 (Regions of high sensitivity) and ESR4 (Regions of moderate sensitivity).
- 69 villages are in ESR 1, 78 villages in ESR 2, 79 villages in ESR 3 and the rest 176 villages are in ESR 4 (in the buffer region of 10 km).
- The ESR 1 represents zone of highest conservation, no further degradation allowed. The ESR-1 reflects all villages within 1km of BNP which are to be treated as high sensitive region of conservation.
- ESR 2 represents a zone of transition for highest conservation and moderate conservation regions.
    - ESR 1 and ESR 2 are "***no go area"*** for any developmental activities involving large scale land cover changes.
- ESR 3 represents moderate conservation region and only regulated development is allowed in these areas.
- ESR 4 represents least diversity areas and the developments are allowed as per the requirement by strict vigilance from regulatory authorities.

Ecologically Sensitive Regions (ESRs') are the 'ecological units' that may be easily affected or harmed. It is a bio-climatic unit (as demarcated by entire landscapes) 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' (Section 3 of the Environment (Protection) Act 1986 (EPA)). This approach of conservation or ecological planning considers spatially both ecological and social dimensions of environmental variables. Ecological sensitive regions with exceptional biotic and abiotic elements are being degraded or lost as a result of unplanned developmental activities. Landscapes sustainability as a basic goal for development requires comprehensive picture of the biophysical and socio-cultural information of a region and this approach provides an opportunities and constraints for decision-making and sustainable management of natural resources. Conservation by

prioritisation of sensitive regions has been widely used to improve ecosystem by conservations practices. This study prioritises the regions in the 5 km buffer region of Bannerghatta National Park (BNP), considering attributes (biological, Geo climatic, Social, etc.) as ESR 1 (Regions of highest sensitivity or Ecologically Sensitive Region 1), ESR2 (Regions of higher sensitivity), ESR3 (Regions of high sensitivity) and ESR4 (Regions of moderate sensitivity).

Sustainable development of a region requires a synoptic ecosystem approach that relates to the dynamics of natural variability and the effects of human interventions on key indicators of biodiversity and productivity. Conservation has become challenging task as in the face of increasing human pressures on ecosystem. An anthropogenic disturbance on landscape is of much higher intensities compared to natural disturbance processes (such as wind and fire), which alter abiotic and biotic environments across wide areas.

The spatial conservation planning considering both ecological and cultural dimensions will results in as ecologically sensitive regions (ESR). Ecological sensitive regions treasure sensitive natural elements that could be degraded or lost as a result of uncontrolled or incompatible development. ESR will aid in demarcating regions for conservation and community usage based on ecological and social / cultural dimensions. Ecological dimension refers to the natural environment such as ecosystems and ecological processes. While, cultural dimension refers to the human culture such as political, social, technological and economic aspects. ESR are identified based on the quality, the scarcity, or the role they play in the ecosystem and culture, to maintain essentially the ecological characteristics and integrity. Section 5(1) of Environment (Protection) Act 1986 (EPA), Ministry of Environment and Forests (MoEF), Government of India regulate the location of industries and carrying out certain operations on the basis of considerations like the ecological sensitivity. The MoEF had set up Committee to identify parameters for designating **Ecologically Sensitive Areas** in the country to counter the rapid deterioration of the environment, both nationally and internationally. The committee has defined ecological sensitivity or fragility as ***permanent and irreparable loss of extant life forms from the world; or significant damage to the natural processes of evolution and speciation***. Eco-sensitive regions have been delineated based on biological, economical, socio cultural values depending upon the context and the area or location for conservation. ESRs are the areas that are ecologically and economically very important but, vulnerable to even mild disturbances and hence demand conservation. These are the `unique' regions that are biologically and ecologically valuable and are hence irreplaceable

if destroyed. The delineation of ESR is done considering a set of variables, which are location specific and represent entire system or mimic major system's functionalities.

Bannerghatta National Park (BNP)

Location	The Bannerghatta National Park (BNP) is situated in the districts of Bangalore Urban and Ramanagaram of the Karnataka State close to the Bannerghatta Biological Park at the North - East corner. National Park is named after the village Bannerghatta an historical pilgrimage centre. The Bannerghatta National Park spreads over an area of 102.74 sq. km, comprising 10 Reserve Forests and declared, as Bannerghatta National Park in the year 2004 vide final notification **No. FEE 19 FWL 98, Bangalore, dated 5th March 2004** . The total area of the park was further increased to 260.51 sq. km by appending three more reserve forests measuring 157.77 sq. km in area drawn from the Kanakapura Range of Ramanagara Division located in the southern part of the park in the year 2011 vide notification **No. FEE 302 FWL 2011-(II), Bangalore, dated 27th December 2011.**
Area	Extent : 260.51 Sq. km
Climate	**Summer**: From mid of February to end of May mean maximum temperature is 27^0 C and the maximum temperature goes up to 34-35^0C.
	Monsoon: The annual monsoon rainfall varies from 625mm to 750mm from June to Mid of November from South West and North-East-monsoons.
	Winter: From November to Mid of February. Mean Minimum temperature is 22°C and it goes down to 12°C and even to 10°C in extreme cases.
Terrain	Undulating with broken chains of bolder strewn hillocks and hills of rocky outcrop and watercourses. The highest peak in National Park are Bilikal Betta and Dodda Ragihalli Betta at an altitude of 1075 and 1035 M above sea level respectively. The lowest ground is the Rayatmalhole at 700m above sea level. Granite sheet rocks characterize the higher hills.

Bannerghatta National Park (BNP) was declared as national park in 1974 with an area of 106.83 sq. km by Government of Karnataka vide Notification No. AFD.61 FWL 74, dated 6-25/9-1974 published in the Karnataka Gazettee dated 9-1-75 in exercise of the powers conferred by sub-section (1) of Section 35 of The Wild Life (Protection) Act, 1972 (Central

Act 53 of 1972). It had comprised 2 reserve forests spread over in the district of Bangalore urban and Bangalore rural. The various plans and proposals were considered by forest department, Government of Karnataka till 2009 to widen and develop the Bannerghatta National Park. These plans were created for reducing the pressure of the people residing in the periphery of the park, reducing human – animal conflict as well as depredation of crop by elephants, habitat improvement for increasing the carrying capacity of the park and the restoration of entire ecosystem. The plan envisaged managing the BNP on sound principles of latest wildlife management practices. Thus the management plan has approved in 2011 by an effective administrative setup with the addition of Kodihalli Range from adjacent Ramanagara Territorial Division for implementing the plan prescriptions. The total area of BNP now encompasses an area of 260.51 sq.km comprising of 13 reserve forests spread over the districts of Bangalore urban, Bangalore rural and Ramanagara as per Vide G. O. No. FEE 302 FWL 2011 (II), dated: 27.12.2011. The boundary of BNP is having highly irregular shape and it measures about 59 km in length and the width varies from 0.3 km to 13.8 km. BNP regions has 31 Beats under 6 ranges for effective management and protection.

Bannerghatta National Park is located in the southern elevated plateau that extends from the foot of the Western Ghats. The plateau receives less than 1000 mm annual precipitation with natural climax vegetation of dry deciduous types and are broadly divided into:

1. *Shorea talura-Terminalia sp-Anogiessus latifolia* series tropical deciduous forest;
2. *Chloroxylon swietenia-Anogiessus latifolia-Albizzia* sp series tropical dry deciduous forest;
3. *Acacia* thorn forest and
4. Riverine gallery forest.

The forest types cover moist deciduous, dry deciduous forests, thorny scrub and grass lands with rich flora and fauna Historical vegetation of the district is in undisturbed parts such as the core areas of Chikkaragalli betta are with dense jungle of *Shorea talura-Terminalia sp-Anogiessus latifolia* series forest. *Shorea talura* tree being a member of Dipterocarpaceae (all other family members of Dipterocarpaceae occur in evergreen to semi-evergreen forest) is an endangered tree as per IUCN category. The distribution of this forest type in less disturbed areas highlights the ecological importance of the area. These forest types have disappeared in most other areas with high anthropogenic pressure and vegetation mainly consists of *Chloroxylon swietenia-Anogiessus latifolia-Albizzia* series. These ecologically fragile regions

are undergoing severe land cover changes due to anthropogenic pressures. The landscape consists of fragmented forest patches, interspersed agricultural lands, pastures, habitations, etc. BNP is one of the oldest habitats of Asian elephants, supporting 100-150 population and large number of 200-300 migratory population also noticed from adjoining Tali reserve forest and Kaveri wild life sanctuary.

The land use analysis has been carried out in BNP and in buffer region (5 km). Land use changes within BNP region are minimal as compared to buffer region. The moist deciduous forest covered 50.4% (1973) and now 28.5 % (2015) due to anthropogenic pressure in BNP and its environs. Forests in Ragihalli, Manjunatha, Yelavantha, Bettahalli regions with good protection measures show minimal disturbance. However, implications of unplanned urbanization are evident in the buffer regions. Land use analyses in the buffer region (5 km) analysis highlights of urban sprawl in peri-urban regions has fragmented, dispersed urban patches in periphery accounting to 5462 ha (built-up area). The region has lost moist deciduous cover from 26.1 to 13.8 % with an increase in horticulture 8.5 to 11% (1973-2015). The region had lost the large tracts of deciduous cover in Kanakapura taluk, Anekal taluk regions due to intensified horticulture activities and deforestation. The current study prioritizes the regions in the BNP buffer regions of 5 km, considering attributes (biological, Geo climatic, Social, etc.) as ESR1 (Regions of highest sensitivity or Ecologically Sensitive Region 1), ESR2 (Regions of higher sensitivity), ESR3 (Regions of high sensitivity) and ESR4 (Regions of moderate sensitivity).

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The Community based Conservation (CBC) of ESR 2 & 3 is essential as conservation of biological diversity (or wildlife) depends on the extent of involvement of local communities in decision-making, monitoring and regular management. Local communities knowledge and

experience of wildlife and their habitats, would be invaluable in conservation endevours. This would also help the BNP administration in delineating the region for further usage by local communities on sustainable basis. The uncontrolled development should be discouraged in and around of pristine lakes, primeval forest patches, perennial water bodies. The village forest committees' (VFCs) should be formed on priority for promoting conservation initiatives. The members should be involved for afforestation, wild life protection and controlling deforestation activities. Monitoring committee should be formed under the guidance of district forest officer (DFO) with powers conferred by subsection-3 of Environment Protection Act, 1986. The committee should include a representative from forest department, a representative from urban development (BDA), a representative of non-government organization, who are active in the field of conservation, an expert in forest ecology and environment, one of the village forest committee members (VFC), a representative from local stake holders. Suggestions regarding the management of ESR are:

1. Restrictions on large scale land cover changes;
2. Encouragement to organic farming;
3. No monoculture plantation of exotics like Eucalyptus, Acacia, etc.;
4. Extraction of medicinal plants only with strict regulations;
5. Appropriate cropping – to minimize instances of human animal conflicts, restrictions on the cultivation of elephant preferred crops such as paddy (*Oryza sativa*), banana (*Musa paradisiaca*) and ragi (*Eleusine coracana*) in ESR 2 and ESR 3 villages.
6. Ban on hazardous or toxic waste processing units;
7. Restoration of land cover through appropriate catchment area treatment plans for reducing silt yield in the catchment;
8. Setting up fodder farms to support local livestock population;
9. Ban large scale mining;
10. Controlled quarrying and sustainable sand mining;
11. Involving education institutions to document biodiversity in the neighbourhood (village level);
12. Eco clubs at all schools and students to take part in environment monitoring (part of curriculum);
13. Setting up agro processing industries, cottage industries to support local livelihood;
14. Collection of NTFP through local people (complete removal of contract system);

15. Development of forest nurseries of local species through the active participation of local villagers;
16. Incentives to VFC's for conservation and protection of forests.
17. Creation of fodder reserves: It is very necessary to enrich the forests impoverished of wild animal fodder plants, using the land resources of poor-grade monoculture plantations, degraded forests, abandoned mine areas, underneath high tension power lines and such identified stretches.
18. Creation/maintenance of water bodies: Water bodies are to be created intermittently in the forest areas so that the movement of animals in dry months could be minimized. Several old village ponds and tanks need desilting and maintenance. Watershed based forest management is critical for creating healthy habitats for elephants and other wildlife.
19. Ban all human activities (such as quarrying, stone crushers, sand mining, firewood collection, lopping, Non-Timber Forest Produce (NTFP) collection and access road) including cattle grazing in wildlife corridor to ensure uninterrupted movement of elephants.
20. Augment the width of the corridor by appending the fringe area along the northern side (area at Jaipuradoddi, etc.) with the native floral species.
21. Considerable loss of crops (particularly Ragi) could be avoided during the harvest stages (ready to harvest/ harvested but kept in crop fields for drying/stored in the open for processing) by advancing the processing of crops (drying and separation of grain from husk) thus reducing exposure of these crops to the elephants. This can be achieved by following improved farm based practices such as better drying and storing facilities.
22. De-silt and deepen the elephant proof trenches immediately after the monsoon and grow grass or any other suitable vegetation to minimise future erosion.
23. Adopting Clustering Approaches: Ecology Integrated Sustainable Development - Integrated clustering of villages for inclusive growth promoting eco-friendly, local resources, local skill and man-power based thematic developmental programmes through laying a stronger foundation for sustainable growth.
24. Micro-finance and revival of village centred enterprises and clustering of villages for thematic development programmes can greatly improve financial and livelihood security of rural homes, and could provide largest venues for women empowerment.

Cluster-based economic development approach is considered an important aspect of a broader re-orientation of research and economic policy towards laying the foundations of a microeconomic approach for prosperity and growth. The past decades were under the spell of macroeconomics and the creation of market institutions in developing economies. While there is now fairly broad consensus on the type of macroeconomic and legal conditions necessary to achieve economic progress, it is also becoming clearer that these conditions are not sufficient. As a new approach to help economies reap the full potential of an improved macroeconomic and legal context cluster-based efforts have received a lot of attention. Clusters are groups of companies and institutions co-located in a specific geographic region and linked by interdependencies in providing a related group of products and/or services. Because of the proximity among them – both in terms of geography and of activities – cluster constituents enjoy the economic benefits of several types of positive location-specific externalities.

Cluster facilitators and need for institutional structure for implementation: Village panchayats form ideal units for implementation of cluster approach for integrated eco-friendly development. The success of cluster based development programmes will depend on the active participation of facilitators. The various Government departments, financial institutions and NGOs will have active roles to play for the success of the integrated cluster-based approach. In addition there is also need for block level facilitator committees for scrutinsation of developmental plans and review of progress achieved. The role of some facilitators, are indicated below:

Forests and wildlife departments: As forests constitute a major asset of the district the Forest Department need to be strengthened with adequate manpower at ground level.

- Development of nurseries involving local people. People be encouraged and guided to make nurseries of native forest trees and medicinal plants
- It is suggested to look into the feasibility of purchase of medicinal plants or their products by the Forest Department itself, or by the local VFCs from the producers at fair prices, and the sale/supply of these goods to pharmaceuticals to be undertaken by the Forest Department itself. This recommendation is being made so as to stop rampant illegal collection and trade of medicinal plants from the wild.
- The local ayurvedic pharmaceuticals (within the district), and local people to be engaged in cultivation and value addition to medicinal plants be supplied with

medicinal plants/products on priority basis to enrich the local economy and employment potential

- NTFP collection (removal of contract system of middle men) and value addition, Developing bee-keeping involving forests. As bee-keeping is recommended as an important activity for almost all clusters, roadsides, common lands, under-stocked or degraded forest patches around villages be planted with appropriate nectar plant species.
- Contract system for collection of NTFP from forests found to be highly detrimental to forests and biodiversity and economic well-being of local people be stopped forthwith and co-management system involving local people be adopted.
- Production of bamboo based products by local craftsman and effective utilization of bamboo for local development is important
- Use of alternative energy sources replacing firewood
- Development of degraded forest patches for tree farming, medicinal plants and fodder,
- Promoting backwater, mangrove, and beach tourism, development of rural tourism and home stays in the vicinity of forests and wildlife areas
- Regular conduct of training in bird-watching, wildlife studies, trekking trails, hygiene and solid waste management involving VFCs, local youth in forest and wildlife related tourism areas be arranged with view of generating eco-friendly employment potential.
- Utilization of weeds and harvestable trees/tree parts, bamboos, canes etc. from plantations or other designated areas for vegetable dyes, medicines, weaving, furniture, handmade paper, sports goods production
- The Department to consider pooling back good part of income from VFC managed areas into sustainable income generating activities in the cluster level

Eco-tourism Department: Integrated community based eco-tourism development is being conceptualised to benefit some clusters of adjoining local self government units as a strategy to address high incidence of poverty among the communities while such areas are teeming with tourism potential

- Developing integrated community based eco-tourism
- Assistance in building aesthetic cottages/rooms as part of home stays of bonafide locals or local VFCs. Local grass root level tourism related enterprises to be preferred against construction and commercial lobby.

- Developing tourism awareness in the appropriate panchayat clusters. Conducting programmes on safeguarding local cultures, performing arts and biodiversity.
- Training youth in tourism/homestay management.
- Fostering tourism related entrepreneurship among the local people so as to increase self-employment opportunities in rural areas and small towns.
- Getting necessary registration/licenses for village home stays managed by individuals/VFCs/communities, and exhibiting details on location-wise home-stays through web pages

Horticulture Department

- Facilitate farming of desired crops only under insurance coverage.
- Training in preservation of fruits and vegetables to women.
- Promoting organic cultivation for exports and Indian markets.

Financial institutions:

Government financing and micro-financing institutions to step in to promote cluster level development programmes through local panchayats, VFCs, BMCs, NGOs, departments, societies etc. Financing from charitable and voluntary organizations and NGOs and not-for profit financiers to be considered and may be recommended by related departments. Crop insurance, preferably, in identified human-wildlife conflict zone is highly necessary for future of biodiversity conservation. Financial literacy is very critical for participatory development progrmmes envisaged.

Mining and Geology

- Mining in the region to be phased out.
- Mining of stones/sand etc. from VFC/BMC jurisdiction areas be limited to bonafide local use and in any case not to be transported outside local area as is deemed fit by the joint decision of VFC-BMC and Forest and Mining-Geology departments.

District administration/Zilla panchayat

- Thin plastic carry bags production and sale to be banned, so as to promote locally produced cloth and paper bags.

- Hoteliers and bulk purchasers of milk to purchase milk in larger containers, which the milk producers are to use mandatorily and need based.
- Use of plastic disposable cups and plates to be banned so as to reduce environmental hazards and to provide market for locally produced biodegradable eco-friendly products.
- Imposition of fines/cleaning charges be levied on polluters at all levels
- Toilet facility within reach of every household

Education Department (Primary and Secondary): Earlier initiatives with high school students and teachers in Western Ghats show, they are effective in documenting many aspects of biodiversity and related knowledge existing at village level. With a reasonable time, say one or two days spent on motivating them and familiarizing them with the concepts of biodiversity documentation and data collection formats, they could contribute substantially towards building up a dynamic database at village level ready for integration into the People's Biodiversity Registers. They are more effective in meeting and interviewing organic farmers, in noting down details on traditional cultivars, collecting details on sacred groves, major wildlife related details etc.