

Chapter 9

Wildlife and Nature Conservation

9.1 Protected Areas

The first national park in India was declared in 1935, now famous as the Corbett National Park. Since Independence, there has been a steady rise in the number of Protected Areas (PAs) (National Parks and Wildlife Sanctuaries), especially after the enactment of the Wildlife Protection Act in 1972. In 1988, there were 54 national parks and 372 sanctuaries covering a total area of 109,652 sq km. By the year 2000, this number had increased to 566, covering 1,53,000 sq km, or 4.66% of India's geographical area. There are currently about 597 national parks and sanctuaries in India, encompassing 1,54, 572 sq km or 4.74% of the country's geographical area. The latest review of the Wildlife Protected Area Network document brought out by the Wildlife Institute of India, Dehradun, recommends to bring the total area under the Protected Area network to 870, totaling 1,88,764 sq km or 5.74 % of the country's geographical area. This would translate into 163 national parks covering 54,789 sq km or 1.67% and 707 sanctuaries covering 1,33,975 sq km, or 4.07 % of the countries geographical area. Recently, the Bombay Natural History Society, in collaboration with various NGOs and government, has identified 463 important bird areas (IBAs). Out of these 463 IBAs, 199 are not officially protected. Many of these IBAs are extremely important for bird and general biodiversity protection and should be included in the PA network system. Similarly, the Wildlife Trust of India along with the Asian Elephant Research and the Conservation Centre have identified 88 elephant corridors that also need protection and lie outside the PA network

Besides the official PAs, there are numerous sacred groves, scattered all over the country, that are important for biodiversity conservation. Some sacred groves represent forest types that have disappeared from the area. Besides sacred groves, there are many small community conserved areas. Many villagers do not allow hunting in their village ponds and lakes. These serve as excellent habitats for waterfowl. Similarly, the tribal reserves of Andaman and Nicobar are perhaps the best-protected forests left in these emerald islands.

The present Protected Area network has many serious inadequacies. Several biological regions, communities and species are not or only partially represented, and most of the PAs are too small in size to give long-term viability. This could lead to genetic isolation of small populations and result in populations becoming unviable, endangered by all the classic threats of an island biogeographic situation. There is thus an urgent need that the sanctity of the Protected Areas along with their surroundings and linkages, are preserved.

9.1.1 Biosphere Reserves

Apart from the protected areas system mandated under the WPA, 1972, certain areas have also been declared as biosphere reserves by the Government of India. The Wildlife Institute of India states the following as the reason for the formation of Biosphere Reserve (source: <http://www.wii.gov.in/nwdc/biosphere.htm>):

The programme of Biosphere Reserve was initiated under the 'Man and Biosphere' (MAB) programme by UNESCO in 1971. The purpose of the formation of the biosphere reserve is to conserve *in situ* all forms of life, along with its support system, in its totality, so that it could serve as a referral system for monitoring and evaluating changes in natural ecosystems

In the current situation, the selection of a Biosphere Reserve is based on considerations, which are generally ad hoc. In all instances, significant areas of Biosphere Reserves are managed either as Sanctuaries or National Park and as such all the applicable restrictions in such PAs are operative

There is a need to develop guidelines for the formation of Biosphere Reserves, which lay down clearly not only the criteria but also the management implications. In the existing situation, it is not clear as to how the object of a Biosphere Reserve is significantly different from National Parks and Sanctuaries. It is pertinent to point out that only 3 of the 13 Biosphere Reserves meet the criterion of the Man and Biosphere Programme of the UNESCO.

Since management and conservation applications are stricter under the Wildlife Protection Act, it should not be that instead of creating a Park or Sanctuary a Biosphere Reserve be created to avoid the regulations of the WPA. Nor is it advisable to superimpose a biosphere reserve where a PA already exists or to change the category at this juncture. The attempt should be to establish biosphere reserves where it is neither appropriate nor feasible to establish one of the four PA categories listed under the WPA. Some very apt areas where Biosphere Reserves need to be established are the Abhujmar region of Bastar and the Jarwa Reserve in the Andamans.

9.1.2 Species (Fauna and Flora)

Out of the 12,28,153 life forms described till now in the world, India has about 89,451 or 7.28% and more are likely to be discovered. Nearly 60,000 insects have been identified till now. About 3,000 out of the 35,000 described species of crustaceans are found in India. Similarly, its fish fauna is very rich with more than 2,500 fish species known to occur in India. Other life forms consist of 210 species of amphibians, 456 species of reptiles, 1225 species of birds and 390 species of mammals.

There are many species of animals endemic to India or the Indian subcontinent. For example, 36 species of mammals are not found anywhere else in the world. Similarly, we have 176 species of endemic birds and 214 species of reptiles confined to the Indian subcontinent, mainly in India. The highest percentage of endemism is found in amphibians – 128 species of frogs, toads, salamander, etc., out of 209 (61%) are restricted to India. Moreover, for some species India has the major population. For instance, nearly 60% of the world's tigers, 80% of the world's 1 one-horned rhinoceros, 100% of the Asiatic lion, 65% of the Asian elephant and 80% of the world's gharials, are found in India.

India is reported to have 16,500-19,400 taxa of flowering plants, which is approximately 7% of all described species in the world. Of these, nearly 107 species are aquatic. The country has also recorded 48 gymnosperms, 1,135 pteridophytes, 2,850 bryophytes, 2,021 lichens, 6,500 algae and 14,500 fungi. These are only such species that have been described till now. Wild plants contribute significantly to livelihood needs with more

than 1,000 species having been recorded to have food value and more than 3,000 species being recorded for medicinal purposes, besides use in fibre, fodder, gum, dyes, scents, essential oils and for religious purposes, according to the recently concluded NBSAP process.

9.2 Policy, Law and Administrative Set-up at the Government of India

9.2.1 The Current Wildlife Set-up in the Ministry of Environment and Forests

Forest and wildlife are subjects listed in the Concurrent List of the Constitution. At the Central Government level, the Union Ministry of Environment and Forests is responsible for all matters dealing with policy on wildlife conservation, at the State Government levels the Forest Departments under their control implement the national policies. The Wildlife Wing in the Ministry of Environment and Forests, Government of India, is headed by the Director, Wildlife Preservation, who is also designated as the Additional Director General of Forests (Wildlife) to the Government of India.

The Wildlife Wing has three Divisions, namely, Project Tiger Division, Project Elephant Division and Wildlife Division, each headed by an officer designated as Inspector General of Forests. A Deputy Inspector General of Forest (Wildlife) and an Assistant Inspector General and Joint Director (Wildlife) provide support to the Wildlife Wing. These three Divisions look after national policies and projects, international co-ordination, Centrally Sponsored Schemes and State level implementation of activities relating to the conservation of wildlife in Tiger Reserves, Elephant Reserves, national parks and wildlife sanctuaries of India, wildlife laws, International Conventions and Treaties, matters relating to zoos, wildlife conservation, international trade in wildlife and wildlife articles, research, capacity building, major policy interventions, court cases, Parliament related matters, budget, besides a host of other related matters. Two autonomous organizations, the Wildlife Institute of India and the Central Zoo Authority, also headed by officers of the rank equivalent to that of a Joint Secretary to the Government of India are under administrative control of the Wildlife Wing. The Wildlife Institute of India is an academic institute recognized as one of the Centres of Excellence in the country. The Central Zoo Authority is the statutory authority for the recognition and technical development of the zoos in India. The Director, Wildlife Preservation is assisted by four regional subordinate offices, each headed by a Regional Deputy Director, Wildlife Preservation, with headquarters at the four main ports of export and import, viz., Delhi, Mumbai, Chennai and Kolkata, to check on international trade in wildlife and wildlife articles.

9.2.2 Funding Support for Wildlife Conservation

Government of India provides part financial support to the State Governments under certain Centrally-sponsored Schemes. The rest is borne by the State Governments from their own resources. These Centrally Sponsored Schemes include schemes for Development of National Parks and Wildlife Sanctuaries, Project Tiger, Project Elephant, Eco-development, Beneficiary Oriented Tribal Development, Central Sector Scheme on Strengthening of Wildlife Division, grants-in-aid to Wildlife Institute and central grant to the Central Zoo Authority. During the IX Five Year Plan the Wildlife Wing provided

support to the tune of Rs 463.8 crores under these schemes. During the X Five Year Plan the two schemes on tribal development and eco-development have been merged with the schemes on Project Tiger and National Parks and Wildlife Sanctuaries. A new scheme for the Protection of Wildlife outside Protected Areas has been proposed. The outlay for the X Five Year Plan is Rs 820 crores. Further details are given in the reports on the respective Divisions.

9.2.3 Project Tiger Division

Launched in 1973 with nine reserves covering an area of 16,339 sq km., Project Tiger has been extended to 28 reserves in 18 States, encompassing 37,761 sq km. of tiger habitat, with the addition of four new tiger reserves viz. Pakui–Nameri (Arunachal/ Assam: 1206 km²), Bori–Satpura (Madhya Pradesh: 1486 km²), Bhadra (Karnataka: 492 km²) and Pench (Maharashtra: 257 km²). Further, eight potential areas in the country have also been identified for subsequent inclusion under “Project Tiger”.

Project Tiger is an ecosystem based conservation support project in which an optimum presence of tiger indicates that the complex ecosystem is in its prime health. The outlay of assistance provided to the States under the Centrally Sponsored Scheme of Project Tiger was Rs 75 crores in IX Five Year Plan which has been enhanced to Rs 150 crores in the X Five Year Plan with the part-merger of the ongoing C.S.S., “Eco-development of National Parks and Sanctuaries including Tiger Reserves” and the C.S.S. “Beneficiary Oriented Tribal Development”. Complementary inputs for eco-development and voluntary village relocation provided earlier in separate projects have now been merged with Project Tiger as an Umbrella Scheme.

Under the ongoing externally aided “India Eco-development Project”, as many as 572 eco-development committees have been formed in seven Protected Areas covering 75,600 families, to reduce the dependency of local people on Protected Area resources, with reciprocal commitments.

Initiatives have been taken for evolving a trans-boundary cooperation protocol with Bangladesh.

Information and communication technology is being used for linking important tiger reserves in the GIS Domain for evolving a management support system and crime detection, dissemination of information through the web and involving a ‘National Tiger Monitoring and Habitat Evaluation System’ with regional protocols.

“Project Allowance” has been provided under the scheme to field staff working in tiger reserves. 100% Central Assistance is provided for deploying anti-poaching strike squads in Tiger Reserves, apart from expenditure relating to research, veterinary, monitoring and evaluation, compensation to the legal heir of staff / person killed while performing duty, and for monitoring of tiger population. The threat to the tiger is from poaching, to avenge livestock killed, for international trade in its skins, bones and other body parts and due to reduction of undisturbed habitat and the prey base. The tiger population in the country currently stands estimated at 3642, as per 2001- 02 estimate. The impact of Project Tiger is also visible in the form of arresting soil erosion, recharging of ground water regime and enrichment of forest cover in the tiger reserves. Despite recent tiger population reverses, the Project is recognized as a role model for wildlife conservation. As per a recent report

in the media, Project Tiger has been rated as one of the 56 events that changed India since independence.

The project, which was a pioneering effort of a unique kind, has shown how a mega-species could be used to create support for diverse and representative ecosystem conservation, which can and has conserved water, soil, faunal and floral biodiversity and wilderness.

9.2.3.1 The Tiger Task Force Report

Following the uproar caused by the news that the national animal had disappeared from one of the Tiger Reserves, namely Sariska in Rajasthan, the Chairman of the National Board for Wildlife and the Prime Minister of India, Dr. Manmohan Singh, set up a Task Force to assess the situation vis-a-vis Project Tiger and to submit a time-bound report.

Sariska was a crisis waiting to happen and it is bound to occur elsewhere if matters are not rectified. It also brought into limelight the prevalent situation with regard to wildlife conservation in the country, for if this be the situation in one of the oldest reserves of the prime project initiated by the Government for the conservation of the tiger in particular and of nature in general, one can assess the situation in "lesser" parks and wildlife sanctuaries, not to speak of other habitats and of wildlife in the country. Nature conservation efforts unfortunately, have historically always flowed from the 'top': the British, the princes, and a couple of Prime Ministers. The conservation movement has not taken root in rural areas and even in the urban areas outside a segment of society.

Considering the short time given for the task, 'Joining the Dots' is a very well presented and fairly comprehensive report with a number of appropriate suggestions, some known, others brought into greater focus than before. Some of the notable recommendations cover institutional mechanisms such as creation of two separate departments of Environment and of Forests and Wildlife within the MoEF and the creation of a sub-cadre of wildlife specialists and professionals within the forestry services, which this report also stresses upon. It recommends greater powers to the Project Tiger Directorate and periodic independent audit of each reserve; recruitment of local personnel to man the PAs; the traditional hunting tribes and communities living in and around PAs to be integrated in the conservation efforts and the people to be provided alternatives, relaxing minimum educational qualifications, if required; protection by security forces of any reserves threatened by insurgency; a focus on control over wildlife crime including a special bureau to deal with this menace; development of forensic facilities to assist the bureau; a closer bilateral relationship to be built up with China to combat illegal trade; the introduction of a more scientific method of estimating tiger population and monitoring the habitat; a greater emphasis on research to assist better conservation; an urgent and realistic review of villages and people that need to be relocated from Tiger Reserves and of assuring acceptable and beneficial relocation; need of developing linkages with the local people to help both the people and wildlife to co-exist, including payment of compensation; and regulation and management of tourism so that it would assist conservation and not be in conflict with it. It also advocates for the payment for ecological conservation rendered by tiger reserves. The NFC endorses these recommendations.

There are certain aspects of the report with which the NFC is not in agreement with, as is evident from the text of this report. There are also certain omissions and some inadequate assessment of the different dimensions of some of the topics raised in the report

The Task Force Report wants to have “empirical evidence that the use of habitats by people is endangering conservation efforts”. Any rational person can assess for himself the degree of demographic impact by comparing the qualitative and quantitative difference in the biota in the unexploited core area of a national park such as Kanha, which the Task Force visited, and that surrounding the villages on the periphery of Kanha Tiger Reserve. Indeed, it is pertinent to know that when the sal borer epidemic struck the forests around Kanha, lakhs of trees died but the core area of Kanha, which is not demographically impacted, had hardly any infestation. This is because the trees in the reserve had the vigour to resist the infestation and the vigour was there because of the lack of biotic and edaphic pressure on the core area. The sal die off was even more prevalent around the inhabited areas than in areas farther from human habitation. The Tiger Reserves which the task force visited and saw tigers were those in which human habitations have been relocated. If the Task Force had visited the much more problematic ones where there is a greater demographic impact such as Indravati in Chhattisgarh, Nagarjunasagar -Srisailem in Andhra, Palamau in Jharkhand and Simlipal in Orissa, the opinion formed may have been different in this regard. In some states like Rajasthan and Gujarat, practically no forests worth the name survive outside the effectively managed protected areas. It must be accepted that forest dwelling communities of today cannot be kept in idyllic isolation and may well exploit forest for commercial purposes and not just for survival.

9.2.4 Project Elephant Division

Project Elephant is a Centrally Sponsored Scheme for wildlife conservation aimed at a species that, because of its large rangeland requirements and because of the fragmented range elements, often comes in conflict with human populations. The elephant is not a carnivorous predator, but its requirements of fodder and water compete with the requirements of livestock reared by human beings living in and around its habitat. The main thrust of the Project is on improvement of elephant habitat and mitigation of conflict of interest with human communities. The Project was launched in February 1992 for providing the required support to 12 elephant range States of India, keeping in view the requirements of elephant reserves and approved by the Central Government.

An amount of Rs.61.82 crores has been spent under Project Elephant since its inception in February 1992 till 31.3.2003. The outlay for the Project for the X Five Year Plan is Rs 60 crores. Also, Rs.11.68 crores (Rs. 2.00 crores. for the North-East) had been earmarked under the Project during 2003-04. The States receiving central assistance during 2003-04 under Project Elephant include Assam, Arunachal Pradesh, Meghalaya, Nagaland, Tripura, West Bengal, Jharkhand, Uttaranchal, Orissa, Kerala, Tamil Nadu, Andhra Pradesh and Karnataka.

The population of elephants in India has increased from about 25,000 in 1992 to over 28,000 in 2001. Five new Elephant Reserves, namely Sonitpur, Dihing-Patkai, Kaziranga Karbi-Anglong, Dhansiri-Lumding and Chirang-Ripu have been recognized in addition to the existing reserves, altogether covering 11 elephant management ranges in India.

Major activities under the Project include: habitat improvement, fire protection, land acquisition for consolidation of habitats and establishment of corridors, procurement of equipment (weapons, tranquillizing sets, wireless sets, vehicles, etc.) for protection, census of elephants, immunization of cattle on the forest fringe, payment of ex-gratia grant for damage to human life and property by elephants, construction of elephant-proof barriers, construction of patrolling tracks and camps, etc.

The main threats to elephant populations arise from the conflict for land, food and water with the people and their livestock and the main thrust of the Project is, therefore, on mitigation of man-elephant conflict and habitat enrichment. The number of human beings killed in encounters with elephants in and around the elephant inhabited forest areas was reported to be 384 during the year 2002-2003. Expenditure on conflict management during 2002-2003 included Rs 2.61 crores financial support provided to the State Governments for taking up anti-depredation measures and Rs 1.69 crores for meeting the expenditure on payment of ex-gratia relief to the victims of elephant depredations. Thirty-eight cases of killing of elephants for ivory were reported from the States. Support was also provided for other related items on habitat improvement, infrastructure, anti-poaching activities, etc., to the State Governments, as proposed in their Annual Plans of Operation.

There is a large population of elephants kept in captivity by people in different parts of the country. Project Elephant has registered 700 elephants by implanting coded microchips for identification of the elephants in Delhi, Assam and Arunachal Pradesh. The Project also brought out a book on Management of Captive Elephants during this period to help in the better maintenance of elephants in captive conditions.

On the international scene, Project Elephant is involved in the program for Monitoring of Illegal Killing of Elephants (MIKE) initiated under the aegis of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES), to which India is a party.

9.2.5 Wildlife Conservation Division

This Division deals with all matters relating to national parks and wildlife sanctuaries not covered by the Project Tiger and the Project Elephant Divisions. The X Five Year Plan outlay for works relating to this Division is of the order of Rs 485 crores. The Division also acts as a nodal point for the Wildlife Institute of India and the Central Zoo Authority, which are autonomous bodies under the administrative control of the Government of India. The two organizations receive support from the Government of India in the form of grants processed by the Wildlife Division. The details on these two bodies are given separately. The Division also handles the Centrally Sponsored Scheme “Development of National Parks and Sanctuaries” and the Central Sector Scheme “Strengthening of Wildlife Division and Consultancies for Wildlife Conservation.”

The Wild Life (Protection) Act, 1972 has been amended with effect from 1 April 2003. The amendments include, inter-alia, provisions that flow from the National Wildlife Action Plan adopted by the country in 2002. Two new categories of protected areas, namely Conservation Reserves and Community Reserves, have been incorporated in the amended Act to facilitate coverage of all biogeographic zones, forest types and wild species of flora and fauna, and peoples’ involvement in establishment and management

of such protected areas. The amendment has also facilitated the issue of certificates of ownership to the bona-fide possessors of animals, animal articles, trophies, etc., derived from animals listed in Schedule I and part II of Schedule II of the Act, who had not been able to declare their possessions earlier. The law has become stricter for the offenders. It also makes clear that PAs which have areas that have had rights extinguished under any legislation, will be deemed to be finally notified (Sections 26-A(b) and Explanation U/S 35(8) of the Act)

9.2.5.1 Conservation of National Parks and Sanctuaries

The Government of India through a Centrally Sponsored Scheme “Development of National Parks and Sanctuaries” provides the financial assistance to national parks and sanctuaries managed by the State Governments. The scheme provides 100% Central assistance on items of works of non-recurring nature. There are a few identified items of recurring nature which are essential and which need support for a few years. The scheme provides assistance on such items on a 50% sharing basis, the matching share coming from the State Government concerned. Under the scheme, an assistance of Rs 72.28 crores was provided to the States during the IX Five Year Plan. The outlay for the X Five Year Plan is Rs 350 crores, which includes the merged schemes for Eco-development and Tribal Rehabilitation.

9.2.5.2 Strengthening of Wildlife Division and Consultancies

Under this Centrally Sponsored Scheme the infrastructural and conservational requirements of the Wildlife Division are met. This Division handles the works of the four sub-ordinate offices of the Deputy Directors, Wildlife Preservation located at Kolkata, Chennai, Mumbai and Delhi, with their supporting offices at Amritsar, Guwahati and Cochin. The function of these offices is to monitor and take measures to check the international trade in wildlife and wildlife articles passing through the ports of entry into and exit from the country. Besides, research proposals from independent research agencies and institutions on applied aspects of wildlife conservation, are also provided support from this head. There are 10 ongoing research projects, dealing mainly with applied wildlife conservation undertaken by various organizations including the BNHS (4), Institute of Environment Education and Research, Pune (1), University of Patna (1), Garhwal University (1), Nature Environment and Wildlife Society (1), Gene Campaign (1) and the Chilika Development Authority (1). The subjects covered relate to wildlife habitats in the Dangs, Rajaji National Park, Western Ghats, ecological studies on the Gangetic Dolphin, Irravady Dolphin, forest spotted owl, vultures, spot-billed pelican, endangered wildlife in West Bengal and genetic diversity in the Western Ghats. The duration of research projects varies between one year and three years and the total support asked for is Rs 88.34 lakhs. Nine more are in the pipeline.

Organization of meetings, workshops, events, awards, etc., is also covered under this scheme. An amount of Rs 10 crores is provided as outlay for this Scheme for the X Five Year Plan.

9.2.6 Central Zoo Authority

The Central Zoo Authority (CZA) was established as a Statutory Authority under the Wild Life (Protection) Act, 1972 in February 1992, with the prime objective of

overseeing the management of zoos and to provide them with the necessary technical and financial inputs to come up to the desired level of management. The Authority specifies the minimum standards for housing, upkeep and veterinary care of the animals kept in a zoo; evaluates and assesses the functioning of the zoos with respect to the prescribed standards or norms and based on it, recognizes or derecognizes zoos. The law does not permit functioning of a zoo in India unless it is recognized by the CZA. The Authority also, inter-alia, identifies endangered species of wild animals for purposes of captive breeding, coordinates the acquisition, exchange and loaning of animals for breeding purpose, coordinates training of zoo personnel in India and outside India, coordinates research in captive breeding and educational programmes and provides technical and other assistance to zoos for their proper management and development on scientific lines.

The Ministry of Environment and Forests provides grants-in-aid to the CZA for providing financial assistance to zoos in the country for improving housing facilities, veterinary facilities and upkeep of animals. During the IX Plan Period, the Authority had provided Rs. 3748.43 lakhs for the welfare of animals in zoos. The X Five Year Plan outlay for the CZA is Rs 75 crores, and 83% of the Grants-in-aid of 1080 lakhs during the year 2002-2003 was released to zoos for improvement of animal housing and upkeep. Administrative and operational cost was kept to the minimum at 5.6% of the total allocation.

The CZA have evaluated 418 zoos in the country and granted recognition to 164 zoos. Since its inception in 1992, 91 zoos have been closed down and their animals rehabilitated appropriately. Cases of these zoos, which were derecognized, are currently being reviewed for their possible re-recognition. Seven mini zoos in Andhra Pradesh, Bihar, Daman and Diu, Himachal Pradesh, Madhya Pradesh and Haryana were closed, and the zoo at Peshwe Park, Pune was shifted to an alternative site at Katraj. Fourteen zoos, which were having inappropriate housing and existing in very small areas have been extended at their existing site or have moved to alternative larger and better areas.

Since January 2002, the CZA has issued wild animal health care guidelines to the zoos and continuous monitoring by the CZA has resulted in the reduction of death rate among tigers in zoo to an all time low since 1995-96 at 9.74%.

For strengthening of diagnostic facility on a zonal basis six veterinary institutions located at Bhubaneswar, Chennai, Guwahati, Bareilly (IVRI), Anand and Jammu have been identified and MoU on modalities finalized and signed with the concerned universities.

In order to infuse new technology in the field of assisted reproduction of endangered species, a laboratory is being constructed in collaboration with the Centre for Cellular and Molecular Biology (CCMB) at Hyderabad.

To facilitate coordination among zoos in *ex-situ* conservation, a website of the Authority was also launched. With a view to bring transparency in functioning of zoos, an inventory of animals giving details of death and birth was published and distributed widely.

Five Rescue Centres for rehabilitating 300 lions and tigers received from circuses have been established at Vandalur (Tamil Nadu), Bannerghatta (Karnataka), Nahargarh (Rajasthan), Visakhapatnam and Tirupati (Andhra Pradesh). In coordination with the Ministry of Social Justice, State Government and field officials, the CZA organized

seizure and transport of 116 lions and 6 tigers from 13 circuses to four rescue centres established by the Central Zoo Authority. A total of 292 animals rescued from circuses have been rehabilitated at these Centres till August 2003. The CZA also coordinated with CITES authorities to rescue 1,800 star tortoises from Singapore and in their rehabilitation at the Nehru Zoological Park, Hyderabad.

In order to upgrade the technical skills of zoo personnel, 70 zookeepers and 30 supervisory level staff were provided training in 2002.

To further the cause of conservation through ex-situ interventions, a premier conservation effort of a new kind, planned breeding programmes for rehabilitating Red Panda and Lion Tailed Macaque in their natural habitats, has been taken up by the CZA. As a part of this programme, release of captive bred Red Panda from the Padmaja Naidu Himalayan Zoological Park, Darjeeling to the Singalila National Park in West Bengal, has been carried out as a first step, on 15 August, 2003.

9.2.7 Wildlife Institute of India

Established in 1982, Wildlife Institute of India (WII) is an autonomous body under the administrative control of the Government of India and is recognized as India's premier institution that provides both capacity building as well as research inputs for improvement of wildlife conservation in India. Under the Central Sector Scheme, grants-in-aid to the Wildlife Institute of India amounted to Rs 50 crores for the X Five Year Plan.

During the past year the Institute trained 20 officers in wildlife management under their 9 month Diploma course, 23 officers under their 3-month Certificate course and 8 students are attending the MSc Wildlife Biology course conducted biennially by the Institute. Short term specialized course modules are also being conducted by the Institute in subjects related to wildlife conservation. The subjects covered by the Institute relate to training in eco-development for biodiversity conservation, wildlife protection law and forensic sciences, environmental impact assessment, wetland conservation and legal issues in wildlife management. Between 2001 and 2003 a total of 91 participants attended the courses. The Institute also provides training inputs to Indian Forest Service officers undergoing different training modules at the Indira Gandhi National Forest Academy, Dehradun. Despite the fact that there are wildlife wings in the States and there are almost 600 PAs in the country, the majority of the PAs are manned by personnel not trained at the WII. Its training facilities are being greatly under utilized, as a result of which the unused training slots are being offered to SAARC countries and others. It is also pertinent to note that even the miniscule number of persons trained at the WII are not, after training, posted in the PAs of the State nor, indeed, into the wildlife wing, all of which defeats the very purpose for which the WII was created. The WII has recently initiated forensic studies and proposed parameters and guidelines.

9.2.8 Olive Ridley Turtle Conservation Project

A significant proportion of the world's Olive Ridley turtle population nests at nesting sites along the eastern coast of India. The endangered species of sea turtles is also a focus of attention of the international community who looks up to India to provide safety to the nesting sites and to the turtle populations that seasonally arrive there for the propagation

of their species. The Sea Turtle Conservation Project initiated by the Ministry of Environment and Forests, in collaboration with UNDP in November 1999, with a total allocation of Rs 1.29 crores, has been completed and the report published by the Wildlife Institute of India. The Project has identified and made an inventory map of the breeding sites of sea turtles, developed guidelines to safeguard the species and minimize turtle mortality caused by human activities. It has also prepared tourism guidelines for eco-tourism in sea turtle areas and has developed national and international cooperative and collaborative plans of action for Sea Turtle Conservation. A significant achievement of the project has been the use of satellite telemetry to trace the migratory route of Olive Ridley turtles in the seas, and the sensitization of fishermen and the State Government of Orissa to the use of the turtle excluder device (TED) by the fishing trawlers, to check turtle mortality in fishing nets

9.2.9 A National Institute of Coastal and Marine Biodiversity at Kanyakumari.

Marine biodiversity has immense potential for contributing to the economy of India as a large part of India's population subsists on the resources available to them along the country's long coastal region, in 53 coastal districts of 10 maritime States and 6 Union Territories including the Andaman and Nicobar and Lakshadweep. Marine biodiversity forms the main employment as well as material generating resource. However, the scientific aspects of the management of marine biodiversity have not received the attention it deserves.

The Ministry of Environment and Forests has initiated the process of establishment of a National Institute for Coastal and Marine Biodiversity. The Wildlife Institute of India, Dehradun, has been entrusted with the task for development of the Institute. An Action Plan for 2003-2004 for the establishment of the Institute has been drawn up by the WII, an amount of Rs 20 lakhs has been provided to it for initiating action for this purpose.

A proposal for allocation of 20 hectares of government land at Kanyakumari has been sent to the Government of Tamil Nadu and it is under their active consideration.

9.2.10 UNF–Unesco World Heritage Programme

The Government of India had received funding support for preparing capacity building and awareness projects for the four world heritage natural sites, namely, Nanda Devi, Kaziranga, Manas and Keoladeo National Parks. The Project Document has been completed and the funding support from UNF-UNESCO is expected. The World Heritage Committee has encouraged India to prepare the tentative list of its outstanding natural sites and submit details for future nominations. Recognition as World Heritage sites helps in improving conservation values and status, socio-economic development through enhanced funding support, increases eco-tourism activity and conservation awareness among the masses. It enhances the significance of the site in the eyes of the people and the government.

9.2.11 Indo-Russian Inter-Governmental Commission

The Working Group on Environment and Natural Resources is an important component of the Indo-Russian Inter-governmental Commission. In its meeting held in April 2003 at Moscow several important decisions were taken which included the Siberian Crane

Conservation Project for introduction of captive bred Siberian Crane chicks in the flock of common cranes, so that the migration of the Siberian Cranes in India can be revived and the loss of this magnificent bird to India in recent years, be regained.

9.2.12 Convention on International Trade in Endangered Species of Wild Flora and Fauna

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), also known as the Washington Convention, is a very important treaty for the conservation of species. CITES came into being in 1976 and currently has more than 160 countries as signatories to it. The CITES through its once-in-two year Conference of Parties and intervening Committee Meetings decides on the protection levels that need to be accorded to various species in international trade, by placing them in the different Appendices. For example species on Appendix I are banned from international trade, those on Appendix II have a certain regulatory regimen on trade and those on Appendix III have regulations applicable only to those species and derivatives that come from a certain region. India was one of the earlier signatories to CITES and has been an active member at all meetings, particularly in the area of tiger, elephant and Tibetan antelope conservation, India has been very pro-active.

A new resolution on the Conservation of Asian Cats was proposed by India in November 2002, during the XII meeting of the Conference of Parties to the CITES. This resolution has been adopted. Whale shark is a highly endangered species. India, Philippines and Madagascar sponsored a joint-proposal for inclusion of whale shark in Appendix II of CITES, which was ratified at the Conference of Parties in Santiago, Chile. India and USA also jointly sponsored a proposal for including all species of roofed turtles of genus *Kachuga*, in Appendix II, which was also ratified in COP XII of CITES.

9.2.13 Others

Other international agreements and instruments, i.e. inter alia the Ramsar Convention, Convention on Migratory Species and International Whaling Commission are discussed under Chapter 18.

9.2.14 Tiger Enumeration Methodology

An all India estimation of tigers is done once in every four years, covering all its habitats in the country, apart from Protected Areas and Tiger Reserves where it is done every two years, and in case of some reserves (e.g. Ranthambhore) every year. Daily tracking records are also kept in Project Tiger areas and record of sightings by visitors are also maintained on a daily basis. The methodology is amenable to being carried out by frontline field staff. The pug marks (foot impressions) of tigers recorded through paper tracings, plaster casts and digital photographs (at some places) which are dated, signed and preserved in the concerned Forests Divisions, enable fixing individual identity, sexing and ageing. These are recorded along with other evidence to arrive at an estimate, after tallying and eliminating duplicates. The methodology yields a total count, rather than a statistical estimate. However, there may be errors in taking paper tracings. Also, there has been a general feeling that tiger numbers may be overestimated in various regions due to several reasons that may include technical and systemic issues. The numbers game puts undue pressure on the system to deliver “a higher tiger count” than

the previous year and this also leads to the failure of a system that otherwise could work in the field in Indian conditions, the authorities giving warped and excessive figures.

The methodology followed so far is based on collection of pugmarks, which are individualistic. In the forthcoming all India estimation, apart from the traditional method, a refined pugmark method having much less scope for human error would be used, in addition to camera traps, for arriving at the population figures density. This would be correlated with relative indices based on evidences for crosschecking. Further, other factors of the habitat would also be taken into account in the Geographical Information System (GIS) domain. For the first time, the Govt. of India would involve itself in the primary data collection.

9.3 Stakeholder Views and Suggestions

In the responses received, the following viewpoints in brief, were put forth:-

9.3.1 Wildlife Management

Most people feel that a separate wing of the Forest Department should look after management and protection of wildlife. The services of an ecologist have been deemed necessary by some for parks and sanctuaries. Others suggest that silviculture in PAs should aim not only at forest protection but also at augmenting herbivore food and habitat enhancement. Stray concerns have been raised about the quality of nourishment that wild animals find. Many hold that changing crop patterns around PAs will minimize man-animal conflicts. On the issue of people and parks, responses range from asking all habitations to be removed from PAs and closing tourism in all seasons, to arguing for the natural rights of the human inhabitants of PAs. No consensus can be said to emerge.

9.3.2 Ecotourism

The common thought is that Ecotourism can boost economy and generate funds for conservation, and that the private sector should be deployed in nature education and ecotourism. A small number of people also feel that ecotourism may disturb the balance in protected areas.

9.3.3 Wildlife and Biodiversity Conservation

- There needs to be an assessment of the extent of livelihood dependence of local communities and their contribution to ecosystem and wildlife conservation.
- The area of PAs must be at least 5% of the geographical area of the country.
- The rights of the people in PAs must be settled in time bound manner.
- Biodiversity conservation must be looked after by the forest department at the central as well as State level, in coordination with other agencies.
- Periodic review is needed of the list of the animals in the different schedules of the Wildlife Protection Act. The species may be added or deleted on the basis of review. The culling /export of the surplus animals may be considered by the Government to avoid man-animal conflict.
- Rules needed for Community Reserves and Conservation Reserves.
- In view of rising PA-people conflicts a third party arbitration mechanism may be explored.

9.4 Controlling Poaching, Illegal Extraction and Trade in Wild Flora and Fauna

It is abundantly clear that poaching and trade seriously affects a wide range of wild species. Measures for field control of poaching vary in quality in protected areas, but are practically non-existent in reserved forests and other categories of forests. Nevertheless, non-PA forest areas are vital for species and habitat conservation as well, for the PA network is only representative of the total forests of the country. Even in case of PAs it is observed that foresters at the level of Range Officers and below are not adequately trained and equipped in their duties. In particular, they lack knowledge of the provisions and practice of Wild Life (Protection) Act and that of the CrPC and IPC, which are just as important to bring an offender to book. The contribution of technical non-governmental agencies in training must be looked into and used wherever appropriate.

The control of poaching and trade can only be achieved by intelligence gathering. This aspect of crime control is often not given the importance it deserves and is a sub-set of traditional anti-poaching operations such as camps, patrols, watchtowers, etc. However, rupee for rupee, building and maintaining information sources (even when there is no poaching problem) is critical to controlling crime. The base principle in crime combating should be that there is always a threat of poaching even if it has not manifested itself. This will be the best pre-emptive step to take.

A distinction not often understood is between anti-poaching and anti-smuggling. The mafia-type gangs operating from cities are the driving force behind poaching. A substantial part of species in trade is meant to be smuggled outside India. Wildlife crime is no different from many other kinds of crime such as narcotics, gunrunning, trafficking in humans, etc., and controlling this requires the same skills, aptitude and equipment as that of any other crime. Though empowered under the WPA, agencies of the government such as the CBI do not take wildlife crime as seriously as it should be taken. Greater motivation, training and empowerment should be provided to non-wildlife enforcement agencies to act in this field. This is particularly true of Customs Department as they are mandated to curb illegal movement of goods internationally. As India has considerably relaxed the import export rules regarding traditional contrabands such as electronic goods, it may well be a good time for them to emphasize on wildlife crime. The World Customs Union has recently placed greater emphasis on environmental crime, including those on derivatives of wild species. As a signatory to CITES, India is committed to enforce regulations arising out of it and it is in her interest to do so. . It would also be pertinent to point out that the Committee on Prevention of Illegal Trade in Wildlife and Wildlife Products or the Subramaniam Committee in its report of 1994 had recommended a number of measures for the control of poaching and trade. Partial implementation of the recommendations made in the report had taken place but the creation of a specialized wildlife crime unit and that to provide legal training and support to wildlife law enforcement agencies are still languishing.

9.5 Rationalization of PA Boundaries, Relocation of Settlements and Upgradation and Finalization of the PA Network

A large number of people reside within Indian PAs. This acute problem with all the ramifications of man-animal and people-park conflicts on the one hand, and the denial of

basic facilities to the people on the other, has to be approached on several fronts. There is an increasing realization amongst the people living in the PAs that as long as they reside in the PAs there will always be conflict and their access to the market, availability of goods and services like transport, medical facilities and education, will always be hampered. Many forest communities are willing to move out of such areas if they are given adequate alternative land and other means of livelihood.

Although 'Protected Areas' in the form of National Parks, Sanctuaries and Closed Areas were in existence in the Wild Life (Protection) Act, 1972, yet statutorily "Protected Areas" have been defined only in 2002 through an amendment in the Wild Life (Protection) Act, 1972. The relevant provision reads as follows: "(24A) 'Protected area' means a national park, a sanctuary, a conservation reserve or a community reserve notified under sections 18, 35, 36A and 36C of the Act;" Further, the amendment also substituted the heading in Chapter IV i.e. "SANCTUARIES, NATIONAL PARK AND CLOSED AREAS", for 'PROTECTED AREAS'. The concept of protected areas as defined in the Act does not include administrative categories such as Biosphere Reserves, Tiger Reserves and Elephant Reserves.

Further, new PAs are getting increasingly difficult to form. The reasons for the same are:

1. Delayed procedure for the settlement of rights, where required.
2. In recent years, a PA has become politically and socially unpopular due to the fear of displacement, denial of access to bio-resources, etc., especially since the degradation of non-PA areas has left the PAs with more bio-resources in comparison with the neighbouring forests.
3. The protection afforded in PAs has also led to an increase in animal populations within PAs, which has led to greater raids on neighbouring crops and livestock and thus greater man-animal conflicts.

The creation of Protected Areas are only taking place to compensate for the loss of forests due to developmental projects and are specifically insisted upon in Clearance Conditions of the Ministry of Environment and Forests e.g., the clearance condition of the Lower Subansari, which recommended for the catchments area of the Dam to be declared as a National Park, and the Human River Project adjoining Tadoba Andheri Tiger Reserve wherein submerged area is to be declared as Sanctuary while submerging prime Tiger Corridor. The clearance of the Narmada Sagar Project in Madhya Pradesh also lays down the setting up of PAs in adjacent forests, which the State has not fulfilled so far.

9.6 Achieving Linkages between the PA system

Corridors or linkages between protected habitats must be considered a vital conservation need for biodiversity conservation and conflict reduction mechanism. Such corridors or linkages must be planned keeping in mind animal migrations or movements, representations of ecological gradients between habitats, the needs of local communities as well as planned developmental projects. A number of such areas have been identified and prioritized. For example the Wildlife Trust of India and the Asian Elephant Research and Conservation Centre have recently brought out a publication identifying all the important Elephant Corridors of India, which has been ratified by State Forest

Departments. Similarly the BNHS has coordinated the Important Bird Area programme in India. The Bio-geographic report by Rodgers and Panwar¹ mentioned above also recommends the conservation of numerous identified corridors.

Once identified, prioritized and agreed to, respective State Governments must declare them and either make them part of existing protected areas, or declare them as Ecologically Sensitive Areas under the EPA. If extension of existing PAs – either a National Park or Sanctuary – is not possible then corridors could be covered under a Conservation Reserve and on private land under a Community Reserve. Agro/farm forestry and afforestation under the Lok Vaniki can also be encouraged and actively supported to provide forest cover on private lands.

Ecologically Sensitive Areas (ESAs) are declared under the provisions of the Environment (Protection) Act, 1986 and the E.P Rules of 1986. The power to declare the same is vested in the Central Government. Declaration of ESA is a centralized process and aims at addressing specific environmental threats such as mining, industrialization, construction etc in ecologically sensitive areas.

9.7 Improved Management of Protected Areas

It is regrettable that despite conclusive evidence that the nation's incalculable natural wealth vests in our effectively managed protected areas and indeed, have a long-term future mainly in these entities, the forest departments of the States continue to regard them and the wildlife wings in whose charge they are or should be, as unimportant or even extraneous. Protected areas are viewed not as the regulators of water and the last havens of hope of our virgin and climax forests and biotic communities both faunal and floral, but as wasted resources. This mindset prevails despite the change in priorities from the National Forest Policy of 1952 to the current one of 1988 and despite the fact that experience has taught that usage once allowed, cannot be effectively regulated and that the nation's needs cannot be fulfilled by exploiting the less than 2% of the area that is inviolate today. The PAs and the parent wildlife wings, therefore, are today "suffered" by the State Governments, not supported for what they are and what they mean to the nation. This attitude is reflected in the lack of importance that is accorded to them, and which in turn manifests itself in financial allocations, allotment of personnel and lack of support to fulfill management pre-requisites and implementation of law.

Firstly, the Wildlife Wings and the PAs are treated as "dumping" grounds of unwanted officers and staff of the forest departments. Such personnel neither have the interest and aptitude for, nor training in wildlife management and once posted, would make endeavours to get away from their postings. It is significant that the few officers in the States trained in the WII are not given wildlife postings, and the few officers interested in nature conservation and committed to it, are persuaded to go elsewhere. The officer corps which mans the PA system and the Wildlife Wings, therefore, are mostly unprofessional, disinterested and even disgruntled.

Protection is the very basis of conservation, especially in a poor and populous country like India, with its mounting demographic impact. It is ironic, therefore, that the inverse

¹ Rodgers, W. A., Panwar, H. S. and Mathur V. B. 2000. *Wildlife protected area network in India*. – A review. Dehradun, Wildlife Institute of India.

pyramid manifests itself at the cutting edge of conservation i.e. the forest guard/beat guard/ wildlife/ game guard level. This is so in territorial forest divisions as it is in PAs. While the number of officers has increased, the area/size of the forest/ wildlife guard beat has remained constant for the last sixty years or more, in the whole country. Furthermore, while recruitment of vacancies continues in the case of officers, those of these field staff remain unfulfilled due to financial constraints and the daily wagers who used to complement these field personnel, are also being mostly discontinued. The average age of the forest/wildlife guard is now over 40 years in most States and over 50 in some. In decades gone by, a single guard could patrol alone. That is not possible anymore. Training in wildlife management is mostly not imparted to the subordinate staff either by their superiors, or in a training school.

A further manifestation of the disregard and distrust of PAs and of the Wildlife Wings, is that the Chief Wildlife Warden, usually a person next in seniority to the PCCFs, is often not fully in control of the PAs ostensibly under his charge, and has no control over wildlife conservation in the territorial divisions. The personnel of the PAs report frequently to the territorial DFOs, who are also their drawing and disbursing officers. The control of the buffer areas surrounding PAs, even major National Parks and Tiger Reserves, are still vested with territorial DFOs and not with officers, even of the rank of Conservators, in charge of the PAs concerned. This prevents the PA managers from involving the local people in eco-development activities and as buffers to the core areas of the PAs. MoEF had issued instructions that the Chief Wildlife Warden should make an entry in the CRs of Territorial DFOs as to the contribution made by them for nature conservation. Nowhere is this directive followed.

Each PA should have a Management Plan, for not only for the PA itself, but also for the buffer and it would cover tourism as well. Most PAs, including National Parks do not have them or they are not updated.

Certain duties enjoined upon the PA managers by the Wildlife Protection Act are still not being carried out in a number of PAs. Amongst them are cattle immunization (Section 33-A), registration of arms (Section 34) and removal of encroachments (34-A), etc. Section 29 of the Act pertaining to the removal of forest produce for the improvement and better management of the PA, was being misused by the State Governments for continued exploitation of the PA under the garb of improvement and better management! As a result, this section was amended in 2002, and which now not only makes such removal more stringent and accountable, but also lays down that forest produce so accrued shall be given to the local people for their bona fide use. However, in violation of the letter and spirit of this law, some State Governments still continue to exploit PAs. The extraction of tendu leaves, sal seed and other forest produce is also banned now under law in Parks and Sanctuaries. Yet, some States still continue with the practice under some excuse or the other. If the law enforcers themselves violate the law, how effectively can they prevent others from doing so?

9.8 Promoting Research and Monitoring

Knowledge about a species, ecosystem and ecological processes is essential for better management of PAs and for better conservation of species, especially when most PAs are becoming 'islands' in a sea of humanity. Basic research is required to know the carrying

capacity of PAs and of different ecosystems, to reduce man-animal conflict, to know the impacts of long-term overgrazing, collection of minor forest products, fire, floods, tourism etc, and also to know the benefits that PAs and ecosystems accrue to the nation and to local communities. While everyone acknowledges the role of forests, grasslands, and wetlands in maintaining the water regime of an area or of a river system, there is hardly any empirical data on this aspect in our country. Many species e.g. rhino, lion, swamp deer, hispid hare, have recovered from very small numbers with a small genetic base. At the same time, fragmentation of habitat/ecosystem is creating small isolated populations. There is no long-term study on genetic deterioration of small populations. With increasing human population (India's population is estimated to reach 1.4 to 1.5 billion mark in another 40-45 years before leveling off), habitats/PAs will become more isolated, with very little chance of natural dispersal/movement of some animals from PAs into a larger landscape.

One of the goals of setting up PAs is to increase our understanding of the ecosystems and biological processes, for the advancement of science. This can only be achieved through Research and Monitoring. Research and Monitoring are also essential for planning conservation management and for evaluating its efficacy. This also includes monitoring impact of climate change on natural habitats. Despite the importance of research, there is no legislation that promotes and facilitates research in natural habitats, whether these are PAs, reserved forests, community land, farmland, etc. In fact, there are several legislations that discourage research. The interpretation of 'research' (permits, funds, entry, etc) is often left to the whims and fancies of decision makers. Fundamental research on species and ecosystems may look academic to a PA manager but it is essential for the advancement of science and also for long-term monitoring of species/ecosystem. Both fundamental and applied research should be encouraged, especially the latter. Moreover, basics of research methodologies, and the importance and appreciation of research should be taught to PA managers during their training in Dehradun and other forest institutes. Presently, many PA managers discourage and deprecate research and researchers. Wildlife disease is an emerging threat all over the world due to various reasons. While we have veterinarians in every district, who mainly look after domestic animals, we lack good wildlife vets. We do not have vets even in national parks. There is no short-term or long-term monitoring of wildlife diseases in any PA in India. There is not much research on the introduction and reintroduction of species. With increasing fragmentation of habitats and local extinction of some species, there is a need to gain knowledge about introduction and reintroduction and rehabilitation. For example, the Grey Hornbill (*Tockus Birorstris*) has become extinct in the Gir; possibly due to hunting pressure a couple of decades ago. However, the situation has improved and the area is better protected now. Can we reintroduce the grey hornbill in Gir? Is the habitat suitable? How many pairs need to be reintroduced? We need to know all this before any reintroduction attempt is made. Similarly, there is a need to captive-breed and reintroduce the Great Indian Bustard in suitable areas in Rajasthan, Gujarat and possibly Madhya Pradesh. However, before this is done, a feasibility study needs to be done for each area. Investigations and research also needs to be done to evolve techniques to mass capture, translocate and rehabilitate certain species like the nilgai, blackbuck and wild pig.

There are some well-managed PAs (e.g. Corbett, Kaziranga, Periyar, etc) where data on major vertebrate fauna have been collected for many decades. Many PA managers also keep scientific information. Each DFO/RFO/Forester keeps a daily diary, sometimes with valuable information on sightings of larger animals, forest fires, poaching cases, etc but unfortunately, there is no system where this valuable information is also made available to researchers. Forest officials are required to submit their diaries/records to their superiors, but these records disappear in the office files or are thrown out after some time. If a researcher or an institute sends copies of a report/paper to the Forest Department, they are often not available after some time.

India is one of the largest producers and consumers of fertilizers and pesticides. Except for some academic research in universities and government institutes, there is no long-term research on the harmful and persistent effect of pesticides on wildlife, particularly birds, fish and amphibians. Many apparently common bird species are no more common, especially in farmlands, and many amphibians and fish have declined due to pesticide pollution of the water systems.

9.9 *Ecotourism*

The cardinal principle when considering tourism, and all other issues, in National Parks, Sanctuaries and other protected areas is that in all such areas the conservation interests of wildlife, both fauna and flora and of their habitats, must be considered paramount. All other interests must be secondary to this prime and over-riding consideration.

Protected areas are essential for the long-term health of the country as they form what may well be the only remaining nucleus of biodiversity and an invaluable gene pool. They must be conserved with that objective in mind. Pristine eco-systems, unmodified by human efforts are the aim and not creating reservoirs of animals in manicured settings!

Protected Areas should not be viewed as a mere facility for recreation but rather as a site for preserving an area of natural diversity, including both fauna and flora, that in addition affords nature lovers an opportunity to observe wildlife in its natural state and to have communion with nature.

The temptation to develop tourism at the cost of wildlife interests must be firmly resisted. While it is true that tourism can generate valuable and needed financial inputs to national parks, wildlife sanctuaries and other protected areas, this must never be at the cost of the interests of wildlife.

Tourism in PAs has the potential to prevent illegal activities such as illegal felling of trees, poaching, encroachments, etc. However uncontrolled tourism disturbs wildlife and even hinders their breeding behavior. Tourism properly regulated can be force for conservation, and create amongst the visitors on empathy for nature and particularly for the PA in question, while it is also true that indiscriminate unregulated tourism can destroy PAs.

In most areas, with only a very few exceptions, all the revenues from tourism go to the consolidated fund of the State Government and are not available directly to the PA. In any case the earnings from wildlife tourism are insignificant compared to the amount spent in maintaining the PAs. Mechanism should be set up for ploughing back the revenues earned and the PAs should also be in a position to receive donations and

assistance from well-meaning NGO's, institutions, organizations directly rather than only through the department at the State level.

In view of the fact that the conditions prevalent in different protected areas vary widely and also change over time, it is essential that the precise tourism practices permitted in any area be decided after careful consideration of the local situation and then according to a written and approved tourism plan for the particular protected area. 'The Tourism Plan' should be a distinct section of the 'Protected Area Management Plan'. Tourism activities –those permitted and those prohibited- should therefore not be left to the whims of an individual PA manager but should as a matter of policy be prescribed in the Management Plan and be known to all. If there has to be changes from time to time, they should be well reasoned and not sudden.

Tourism zones should be clearly defined. The Tourism Plan must also be revised and updated periodically. No new tourist facilities and complexes be established where a 5 km radius of a PA without the prior approval of the State Wildlife Board.

Development around the protected area, particularly in the buffer zone, must be to protect the eco-system and as far as possible to exert a centrifugal pressure on human populations in the area. Steps that serve to attract a population to these sensitive areas are not in the long-term interest of the PA.

Tourism does not occur in Protected Areas alone but is also a feature of other forested areas, particularly those located in mountains near hill stations, along trekking routes and around water bodies. In such situations too the authorities must take steps to educate the public about being eco-sensitive, to avoid damaging natural flora and to ensure that there is no fire hazard caused by their careless picnicking.

There is an especial category of visitors to several protected areas that need particular attention. Pilgrimages to very well known and deeply revered sites impinge on several protected areas where literally thousands of pilgrims go to temples and other sites within PAs. Fortunately, the biggest influx occurs annually on pre-determined anniversaries, so special arrangements can be made. Some of the best known are the annual pilgrimage to Sabrimala in the Periyar Tiger Reserve, to the fort in Bandhavgarh by the Kabir Panthis, in Sariska to the ancient temples. Even in Ranthambore the temple in the fort on the hill attracts vast numbers of worshippers. Many, if not most PA's have a temple associated with it and worshippers do want and need access. Keeping in mind the religious sentiment of the people and the long-standing tradition of allowing access, it is not practical to cut-off access to these sites. However, it is important that the park and forest authorities ensure that traffic is regulated and the safety of both wildlife and pilgrims is ensured. Permitted periods and routes can be delineated and public awareness enhanced to make the annual event eco-sensitive. Religious bodies and NGOs can be usefully harnessed to be a force for conservation. The aim should be to not only protect the PA and wildlife, but to try and send back pilgrims as a force for conservation.

9.10 Mitigating Man-Animal Conflict

Man-animal conflict is going to be the most important issue that will threaten wildlife in India in the coming years. With over 60% of the world's tigers, 65% of its elephants, 80% of the Asian rhinos and 100% of Asian lions, the country is home to a large number

of the world's mega-fauna. It is also home to over one billion human beings. Large animals need space to live, move, breed and feed. Inevitably, with fast shrinking habitat they come into conflict with human beings. This is accentuated by human development unthinkingly cutting into their migration paths, breeding grounds or core habitats. Conflict will be most acute when both animals and man first come into contact i.e. a new road cutting through a park, new settlements coming up in forest. There can be no more poignant example than the 11 elephants that were poisoned in 2001 in the reserve forests around Nameri Wildlife Sanctuary in Assam due to illegal encroachment of forest. Conflict will reduce either if the animal components have diminished in a landscape to an extent that there is no problem or if well thought out conflict mitigation measures that involve landscape level planning and local site level implementation, is put in place. In most cases, be it with elephants in North Bengal, leopards in Maharashtra or the western Himalaya, blackbuck in western India or nilgai in northern India, the final solution lies only in land use planning and implementation. Interim solutions include putting up barriers between man and animal, shifting problem animals or illegal encroachers out of conflict areas, etc. The current issues can be considered by looking at the three major species specific conflicts that occur in India involving elephants, carnivores (especially big cats) and ungulates, although, monkeys and bears also cause high levels of conflict in urban and Himalayan belts, respectively.

- a) **Elephants** are large, migratory beings that require large habitats connected by well-established movement paths, which when they lie outside the habitat and when they connect two strips of habitat are called corridors. Broadly, man-elephant conflict can be addressed and mitigated in four ways: (1) Introducing barriers such as trenches, fences or repellants such as crackers, watcher squads etc between the elephant and man (2) Change in cropping patterns around elephant areas to include non-palatable crops i.e. diminishing of attractants (3) Securing corridors of elephant movement (4) Culling or capture of rogues and problem herds. The first method is the most often used for temporary alleviation and when using this it is important to see that barriers do not impede migration, as this will only increase conflict and is used largely to enclose human settlements rather than fence elephant habitat. The second and third are extremely important long-term measures that need to be done for any semblance of a permanent resolution of the problem. The last method should only be used in case of identified and established rogue animals and in such cases, mercy killings are warranted. Capture of elephants should not be encouraged as it increases aggression and conflict in the herd and because the overall utility of elephants in captivity is decreasing in the modern context. Capture of entire problem herds could be attempted as has been done in Sri Lanka, but the question then would be as to where could they be translocated to.
- b) **Large carnivores** (especially big cats): The emphasis should be on leopards and in certain areas tigers, or wolves. The critical fact to consider here is that on most occasions such conflict is due to lack of the correct sized prey, the increased familiarity of the animal to man and a lack of understanding of wildcat or canid biology. Prey-base is the most important factor to consider for ameliorating such conflict. Local subsistence hunting is what normally depletes such prey-base and this should be stopped. Problem animals, if identified as threats to human life, must be eliminated and not caught and kept in captivity. Translocation of animals must be

done after obtaining adequate knowledge of species biology. This may be done under strictly scientifically monitored manner only and in case of big cats with an essential pre-requisite of radio-collared monitoring.

- c) **Ungulates:** There is recurring and severe conflict between crop grazing ungulates that live in proximity of human beings such as the nilgai, blackbuck, etc., in many parts of India. The emphasis should be on protection of crop using intensive protection methods during peak raiding periods. This should be a priority wildlife conservation measure as crop damage is driving local people into poisoning indiscriminately, sometimes leading to casualties of humans, livestock and much more endangered animals. Conflict must therefore be viewed as a very important threat to wildlife in the current scenario. A very appropriate measure would be to develop alternatives to the current cropping pattern, involving agriculture experts/institutions and taking into consideration the animal/bird species that are causing the major damage in a given area, the soil and climate suitable to the crops suggested as alternatives, their profitability, etc. For instance, it is known that crops like chillies, “jeera”, “karela” and aloe vera are not damaged by blackbuck and others.

Lack of compensation or delay in the disbursement for the damage causes to the life and property by wild animals, is another cause for the animosity against PAs and species.

Compensation could be divided broadly with two categories – for death of a human being and secondly death to livestock and damage to crops and other property.

Normally, it takes weeks, if not months before compensation is paid and that too often after paying a bribe to expedite payment. The compensation amount is frequently very meagre and retribution comes by way of poisoning of carnivores, electrocution by dangling live wires, trapping or outright killing.

An example could be had from the endeavor of the tiger conservation programme of WWF-India under which arrangements were made to reward anyone bringing news of a carnivore kill, making compensation payment within the day if possible and then having paid full compensation of the value of the animal, to be decided by the elders of the affected village, taking possession of the kill and then allowing the killer to have its food. This would prevent the concerned predator from hunting again, of the “kill” being taken away, and prevent the kill from being poisoned, as it would be watched over by a nominee of the people and being paid for it. The most important impact of the efficacy of the system was that not one tiger or panther was poisoned in the vicinity of the Corbett National Park despite over 1500 livestock having been killed, over a period of about 15 months.

Human kills should be compensated even more expeditiously, but they are not.

Attempts have been made to insure crops against damage by wild animals. The commercial banks, however, are very reluctant to insure. This needs to be pursued and an acceptable formula for crop damage insurance needs to be worked out.

Paying compensation by government for damage caused to crops by wild animals such as the elephant, wild pigs, or blackbuck, is very problematic and involves on spot inspection and assessment of damage, to be done by the “lower” staff, and numerous complaints of corruption have occurred. . It was attempted in Meghalaya for two years, but was given up for the expenses of almost 60 lakhs in compensation it was causing.

9.11 Ex-situ Conservation

The priority of conservation must overwhelmingly be upon in-situ conservation, as thereby protection is accorded not only to species as naturally evolved in biotic communities, but in the process, habitats, ecosystems, biodiversity and wilderness itself are also protected. Nonetheless, with the threat of extinction facing so many species of flora and fauna, especially micro fauna, ex-situ conservation assumes increasing importance.

The guiding principle should be that no living species however insignificant or useless it may appear to be, should be allowed to go extinct. There are two methods of insuring this as a safeguard against extinction in the wild.

- a) Propagation in captivity, and
- b) Gene bank preservation of genetic material/ and cloning/resurrection of the species that may have gone extinct.

As regards (a) above, India has a large number of zoos and safari parks, some owned by the government, others by municipal and other bodies. Almost universally the upkeep and management is well below acceptable standards. Furthermore, instead of complementing in-situ conservation, zoos and safari parks are a drain upon it. Capture of wild specimens for zoos has now luckily stopped, but unhygienic conditions prevalent in zoos result in almost universal infestation of animal diseases like TB, which precludes the possibility of captive animals being released into the wild for the danger of contagion to wild populations. Besides, to give one example, the Chatbir Zoo of Haryana consumed over 80% of the State's outlay on wildlife, thereby eating into the capital that could well have served the fund-starved PAs and other in-situ conservation efforts in the State, and in the process they had over 40 tigers which were of no conservation use and over 80 lions of mixed Afro-Indian strain, which were worse than useless from the wildlife standpoint. Zoos must also serve as centres for arousing empathy for animate beings and a love for and interest in the nation's fauna, and not just places for recreation. Our zoos have failed on this account as well. Happily, with the establishment of the Central Zoo Authority of the Government of India, things are improving.

In the context of (b), it may be appropriate to mention the case of the Indian or Asiatic cheetah (*Acinonyx jubatus venaticus*), which is the only large Indian mammal that has gone extinct in the last hundred years. Project Tiger has proved that under the aegis of a mega species like the tiger, its prey species and diverse habitats can also be saved. The reintroduction of the cheetah – through cloning of the Asiatic race with genetic material derived from Iran – would arouse great interest and pride. This project is vital not only for this superb animal, but for its endangered prey species and its arid and semiarid habitats, which are fast depleting. If genetic propagation of the Asiatic race poses too many problems, introduction of the African cheetah from Namibia is also a possibility.

Biotechnology as a science has perhaps the greatest potential for providing health, sustenance and well being to mankind, in the face of exponential population increase. Genetics play a major role in this science and, from the economic standpoint, the most valuable gene pools of all are the wild counterparts of species domesticated and

cultivated by man. The human race has a terrible track record of depleting, degenerating and making extinct the wild counterparts of the species, both floral and faunal, that it has domesticated and used. The wild dromedary and the Kouprey, the progenitor of our domestic cattle, are but two examples. Ironically, however, nobody takes any notice. The syndrome continues in India and no one seems even to notice.

The wild buffalo (*Bubalus bubalis*) is a classic example of “genetic swamping” of the living dead. There are more domesticated buffalo in the world than all the other livestock species put together. The wild animals are far larger than their domesticated brethren, and the foetus of a calf sired by a wild bull is so large that mortality of the mother is a common feature during birth. The wild buffalo from the human welfare viewpoint is perhaps the most valuable wild animal in the world. There are now possibly no true wild buffaloes outside India.

In India, in the recent past, they occurred only in Assam and Chhattisgarh; and in Nepal only in the Kosi Tappu Sanctuary. The ones in Kaziranga got degenerated in past decades, as did the Kosi Tappu population. Manas Tiger Reserve in Assam had the largest surviving “pure” wild buffalo. But no more. Genetic degeneration has changed the composition of the entire population. The malaise has started affecting the remnant population in the Udanti sanctuary in Raipur. There are perhaps less than 30 true wild buffalo left in the world, severely pursued and harried in the insurgent – controlled Indravati National Park in Bastar. The Government is at present not even contemplating a serious programme to save the genetic purity of this magnificent animal.

The progenitor of the domestic fowl is the red jungle fowl, another most “valuable” genetic resource for man. But here too crossbreeding with domestic fowl has started and the wild counterparts are being affected. Interbreeding is also occurring amongst wild and domestic pigs. In the Andaman and Nicobar Islands, the survival of the indigenous and ecologically adapted Andaman pig (*Sus scrofa andamanensis*) as a wild taxa is under threat.

Wild mangoes perhaps exist nowhere in India except in the Satpura National Park in Madhya Pradesh. Wild citrus, wild rice and others are also threatened by genetic infusion from domestic counterparts.

A special survival strategy will have to be worked out to save the remaining truly wild buffalo on the highest priority. Domesticated chickens and pigs should not be allowed within National Parks and efforts need to be made to segregate the wild and domestic stocks of these two animals.

Genetic material will have to be kept of the pure wild buffalo, if any do remain by the time this action is initiated, to someday revive the species in a test tube. The same is true of many gravely endangered faunal and floral life forms.

9.12 Recovery of Endangered Species

There are a number of species of fauna and flora, listed under Schedule I of the Wild Life (Protection) Act, 1972, which are critically endangered. They need to have special recovery plans prepared to ensure their recovery and to prevent extinction, local or total. Under these individual plans, which need to be revised every five years or so, the

prevalent status and distribution of the species, its coverage under the PA system and which prominent habitats are left out of it, the threats, etc., would be assessed. The concerned States, assisted and motivated by MoEF, would be responsible for the implementation. Species covered under special projects like Project Elephant etc., need not have such recovery plans

The Indian Wildlife Protection Act has various schedules and species/taxon are included in different schedules depending upon threat levels. However, there is a misguided tendency that as soon as anyone suggests to the MoEF to include a particular taxon in Schedule I (mostly without any basic information), the MoEF obliges. The MoEF and the State Forest Departments think that just by including a species in Schedule I or Schedule II, their responsibility is over and the species is safe. It is suggested that this tendency to include every species in Schedule I should be stopped. We further suggest that detailed status and threat assessments of each species and taxa should be done by experts and only on the basis of their opinion species should be included in various schedules.

9.13 Relocation and Rehabilitation of Species

Relocation and rehabilitation of species is done mainly for three reasons. Firstly, to translocate excess or troublesome individuals and groups of species (which has been dealt with under item 5.12), secondly, to reintroduce species locally made extinct or to augment populations rendered critically low, and thirdly to rescue temporarily displaced individual wild animals.

As regards the first category above, while it may be necessary to destroy individual animals that may be dangerous to human life, the option of translocation and rehabilitation should be explored in the case of animals harmful to human property. Only where such an option is not feasible should the option of destruction as vermin or permanent captivity, be undertaken. It must be borne in mind that while there may be excess of certain species in some parts, the species is not surplus everywhere in its habitat in the country. An example in point is the nilgai. It could be translocated to many PAs where it could augment the prey base of the tiger. It could be introduced in the Kuno-Palpur Sanctuary in Madhya Pradesh where shortage of prey is one of the factors hampering the re-introduction of the lion. The proposal of the re-introduction of the lion in Kuno-Palpur has also been delayed greatly and the process must now be expedited on a priority basis.

The techniques of mass capture, translocation and rehabilitation of herds of animals as social units, especially of “bothersome” species like the nilgai, blackbuck and wild pig, have not been developed as yet in India. This, despite the WII having been assigned this special task and the Southern African countries who are the world leaders in this field, having offered India their expertise. The MoEF and WII need to take up this work urgently and evolve techniques which are suitable to India for mass capture, translocation and rehabilitation, and then pass on the techniques to the State Governments, who can then establish special units for this purpose. In this endeavour, captured animals must not be kept captive unduly long or to contact pathogens which are the bane of our captive animals.

In the case of reintroduction of the second category above – i.e. where they have become locally extinct or greatly reduced in numbers – it must be first ascertained, through a

detailed analysis, as to the reasons for the local extinction or severe reduction and what needs to be done to overcome these constraints. Only when these deleterious factors have been overcome should the reintroduction be carried out. The individuals/herds so reintroduced, need to be constantly monitored.

9.14 Genetic Degeneration

A most insidious and overlooked aspect of loss of biodiversity and the extinction of gene pools in the wild, is the inter-breeding between wild species and their domestic counterparts. This is particularly relevant in the case of the wild buffalo (*Bubulus bubalis*), the red jungle fowl (*Gallus gallus gallus*) and the wild pig (*Sus scrofa*). There are more domestic buffalo in the world than any other domestic livestock, but surviving wild population of pure wild buffalo is perhaps restricted to the relict, isolated groups totalling less than 30 in the insurgency plagued Indravati National Park in Chhattisgarh, and a few individuals in the Udanti Sanctuary in the same State. The red jungle fowl, with the grey one (*Gallus sonnerati*), is the progenitor of all domestic fowl, but studies have revealed that inter-breeding between the domestic fowl and wild red jungle fowl has occurred to a far greater extent than believed, with the consequent loss of the wild genetic resource. The ubiquitous domestic pig is breeding with the wild specimens, with the same result. In the Andaman and Nicobar Islands, they have their own indigenous races (*Sus scrofa andamanensis*, etc.). Thus, genetic “swamping” may well now cause the very extinction of these isolated indigenous races on which the local tribes, like the Jarawas, depend for their protein intake.

The intrinsic value of these wild genetic resources as the counterparts of the country’s most common domesticated animals and birds is incalculable. Yet no attention is being paid to this loss of biodiversity so important to human welfare.

9.15 Restoration Ecology

During the last 100 odd years, massive plantations of exotic trees have taken place, all over India. Sometimes prime forest was cut down to plant fast-growing, commercial timber and fuelwood trees. However, during the last 10 years, the Forest Department has stopped or curtailed growing such exotics in protected areas. There are many protected areas where these exotics or introduced species have matured and are ready for harvesting (e.g. teak and eucalyptus in Dudwa National Park in Uttar Pradesh, eucalyptus, pine and *Acacia mearnsii* in Mukurthi National Park in Tamil Nadu, teak again in Buxa tiger reserve, etc.) but due to the national park status of the sites, the State Forest Departments have not harvested them.

At the same time, trees growing outside forests (TOFs), including farm forestry, play more important role in meeting national timber requirements than government forests. Present level of availability of timber is more from TOFs than government forests. Productivity is much higher and cost of timber production is much lower under farm forestry, as compared to forests (natural forests as well as plantations).

9.16 Involvement of the Military and Paramilitary

Armed and paramilitary forces deployed on the nation’s borders have effective control over vast habitats that are critical to a number of montane and other species. Their active involvement in the conservation of these areas would not only prevent poaching by these

personnel themselves as has been the case in the past, but will prevent poaching and habitat degradation by others, prevent illegal transit of wildlife products and will provide periodic data to the wildlife authorities concerned as to the status and distribution of a large number of taxa about which very little is known. Similarly, if sensitized, the Air Force and the Navy could also be of invaluable help in this regard, to both carry out surveys in remote areas and to prevent illegal traffic in wildlife products.

The Army has set up a special unit called the Environment and Ecology Cell, which deals with conservation aspects. It has been in touch with the MoEF for a number of years. It would be appropriate if MoEF, the cell and concerned State Governments work out collaborative projects in different selected areas for long-term conservation efforts, involving strict protection of areas and species, especially endangered species, their status surveys, and the prevention of the passage of illegal wildlife trade.

The Indian Army today is one of the largest landholders in the country with establishments located in different ecosystems and biogeographic zones. Their locations, deployment, and nature of duty, binds them with land and nature. Today, the real estate of the Army comprises 62 cantonments, 192 military stations, depots/training establishments, maneuver areas, firing ranges and military farms.

The Indian Army is deployed in many areas rich in ecological diversity, like the Rann of Kutch, the Thar Desert, the length and breadth of the Himalaya, the tropical rain forests of northeast India, the Western Ghats and the Andaman and Nicobar Islands. This and the fact that the bulk of the manpower is recruited from rural areas, gives the jawan an edge in understanding nature and the intricate web of life. The very organizational structure, training, motivation, discipline inter-communications and mobility, make the Army ideally suited for environmental protection, when not otherwise employed on the prime task of national security.

9.17 Recommendations

[111] A serious attempt must be made to rationalize protected area boundaries by implementing the recommendations of the committees appointed for this purpose earlier and taking up work in states where there may be no such reports. The leadership and funds must come from Ministry of Environment and Forests. In lieu of the areas that would be excised from the protected areas in pursuance of this effort, the states on their part would add other larger human settlement-free habitats to the protected areas concerned, or to others, within their states. There must be a quid pro quo, with the approval of the Supreme Court. By this exercise, a large number of human settlements on the periphery of the protected areas could be excluded, some huge protected areas which are only on paper like the Solapur Sanctuary in Maharashtra and the National Chambal Sanctuary between Rajasthan and Madhya Pradesh, could be made practical and effective, as smaller sized protected areas. In lieu, other larger trouble-free areas could be added to the protected area system, the caveat being that dereservation of inhabited areas from protected areas to be only done after the areas chosen to be added to the protected area system in lieu of those dereservations, would be first notified as protected areas

[112] In keeping with the Supreme Court directives, after undertaking a rationalization of park/sanctuary boundaries, those rights that need to be acquired should be acquired and those rights in sanctuaries that can be allowed to be exercised

- keeping the long-term conservation of that sanctuary in view, should be allowed to continue as per the provisions of the Wild Life (Protection) Act.*
- [113] *In keeping with the 2002 Amendment of the Wild Life (Protection) Act, parks and sanctuaries should be regarded as final and wherever legal action still remains in view of the said amendment, it should be completed in a time-bound programme.*
- [114] *Though it would not be feasible to relocate all the human settlements that would still remain in the protected areas, certain settlements that are particularly problematic because they are in the middle of the protected areas or occupying some crucial habitat, could be motivated to move out voluntarily. The best solution would be to give resident communities a choice of degraded forestland away from the protected area (if non-forest land is not available) and more land than they would surrender, grants for building houses and all facilities that would be available under the National Policy on Resettlement and Rehabilitation, 2003. Non-government organizations must be involved to monitor the requirements of the people and a generous package must be provided. The land must come from the state governments, the resettlement costs from the Government of India, and no 'Net Present Value' would be calculated for the forestland to be allocated. The cost of translocation of villages from protected areas would thus be far lower than that projected (e.g. 3200 crores for 273 villages cited by the Tiger Task Force, 2005) and not all villages are required to be relocated from the protected areas. This work of translocation must be accorded very high priority and the central government must provide the funds in a phased manner,*
- [115] *A clear reason for the establishment of a protected area be established from the outset, i.e. conservation of endangered species, representative wildlife habitat; tourism; catchment area protection of a dam, etc. Every protected area should be given a clear mandate and necessary conservation measures should be taken up with that mandate in mind. The protected area manager should be judged whether that mandate has been achieved, and not by taking easy conservation options. New protected areas should be established in consultation with local people.*
- [116] *Protected area managers do not have a clear mandate, vision and priorities vis-à-vis the protected area they are in charge of. Most protected areas do not still have management plans. This combined with the protected area manager's lack of knowledge and commitment leads them to undertake "development" of their protected area through construction activities like road building, constructions, watch towers, etc, which are often uncalled for and even detrimental to conservation.*
- [117] *Each protected area should have a comprehensive management plan, which needs to be followed and revised periodically*
- [118] *The State Governments must forthwith stop illegal activities banned under the Wild Life (Protection) Act, such as the continued exploitation of protected area areas for commercial or other purposes, including collection of tendu leaves, sal seed, harra and mahua fruit, etc.*
- [119] *The financial outlays given to protected areas, and to nature conservation and control of illegal wildlife trade, need to be substantially enhanced.*
- [120] *A system should be developed where important records are maintained for posterity in each district/state. Here, proper training to record accurately and scientifically becomes important. A protocol for data maintenance, storage and retrieval should be devised. Each protected area should also develop a library where research reports and papers are maintained.*

- [121] *A concerted effort be made to identify which sanctuary or portions thereof can be upgraded into a national park, where human habitations or rights do not exist or where they need to be acquired on a priority basis.*
- [122] *Whenever possible, protected areas should have linkages with other protected areas and habitats by extension of the protected areas over the corridors – either as national parks or sanctuaries and where that is not possible by establishing Conservation Reserves or Community Reserves. Tree cover over these identified linkages may also be achieved by encouraging and actively supporting van-vaniki and farm-/agroforestry on private lands. Such linkages be given adequate on-ground protection and ecologically harmful activities in these areas be restricted and regulated.*
- [123] *Linkages between management actions in protected areas falling in the same biogeographic region must be kept in mind at all times.*
- [124] *In all endeavors and decision making related to wildlife tourism, the axiom would be that tourism must be in consonance with and subservient to the long-term conservation interests of the protected area, habitat or species it relates to, and never the other way round.*
- [125] *Entry into the protected area must be regulated according to an assessment of the capacity of that protected area to absorb vehicles / tourists without impinging on the interest of wildlife and the habitat.*
- [126] *Besides the designated tourism zone, protected area authorities must choose alternate ranges to throw open to tourists on a one or two year rotational basis. In protected areas where there is a heavy rush of tourists, those visiting parks for longer periods may be refused re-admission to the designated tourism zone and first offered entry into the alternate range opened for tourism. In areas of low tourist pressure, the alternate zone may be offered as a choice.*
- [127] *No attempts to develop recreational facilities in the protected area or its buffer area should be permitted. Park managers must ensure that even private sector entrepreneurs do not do so.*
- [128] *Existing tourist complexes should be constructed in a way that they merge with the surrounding landscape and as far as possible use local material*
- [129] *Resorts set up for wildlife and ecotourism must undertake to ensure that at least 60% of their staff and 40% of their salary expenses go to local residents of the area. This must be rigorously enforced, especially in tribal areas.*
- [130] *A clear reason for the establishment of a protected area be established from the outset, i.e. conservation of endangered species, representative wildlife habitat; tourism; catchment area protection of a dam, etc. Every protected area should be given a clear mandate and necessary conservation measures should be taken up with that mandate in mind. The protected area manager should be judged whether that mandate has been achieved, and not by taking easy conservation options. New protected areas should be established in consultation with local people.*
- [131] *Funds generated by tourism should not go to the public exchequer. Rather they should go for eco-development of the local communities, especially the tribals. A special fund should be created for this purpose, as has been attempted in some states. Donations made by visitors should also go into this fund, which could also cater to the welfare needs of the protected area staff. As funds given by Government of India are often kept back by the State Governments, such funds for individual protected areas could also provide an alternative source or routing financial assistance.*

- [132] *Besides being trained to serve as wildlife guides, local and tribal people should be involved in anti poaching activities. They should also be encouraged to develop and improve local handicrafts.*
- [133] *Protected area authorities must train and certify local wildlife guides to accompany tourists into the park. Any infringement of protected area rules by tourists must be punished by a suspension of the guide for a week in the first instance and for six months on subsequent occasions. A similar discipline should be enforced on vehicles for hire to visiting tourists or even those belonging to tourist resorts in the area.*
- [134] *Interpretation Centres should be developed to provide visitors with an opportunity to learn about the local flora and fauna and the role of the protected area in protecting and conserving the environment and wildlife. These centres can also be used for training the cadre of guides and motivating schoolchildren and youth.*
- [135] *Material in the form of user-friendly guidebooks on the protected area's, giving maps, flora and fauna and some information on the important rivers and other geographical features need to be published. They should also include information on the historical as well cultural importance of the area to make the visit informative and meaningful. as well as the "dos" and "don'ts" while visiting the protected areas.*
- [136] *A system should be developed where important records are maintained for posterity in each district/state. Here, proper training to record accurately and scientifically becomes important. A protocol for data maintenance, storage and retrieval should be devised. Each protected area should also develop a library where research reports and papers are maintained.*
- [137] *The Wildlife Wings and protected areas should be manned by personnel with interest and aptitude. A sub-cadre needs to be developed for this. This would ensure the four prerequisites – selection of the appropriate personnel, longevity of tenure, training and prevention of posting of unsuitable persons. If personnel of such requirements are not available from the IFS or SFS, they should be recruited from the open field.*
- [138] *An ecologist must be available on the staff or as an advisor to the managers of important protected areas.*
- [139] *The protected area managers, and not the territorial authorities of the Forest Department, should have full and effective control over their protected areas, and also of their buffers and corridors to the extent possible. Linkages with the local people should be built up in the buffers.*
- [140] *The Chief Wildlife Warden should have full and effective control, including financial control, over the protected areas and buffers and over the officers and staff, which man them.*
- [141] *The Chief Wildlife Warden needs to make entries in the annual confidential reports (ACRs) of territorial Conservator of Forests, DCFs and ACFs as to the work done by them vis-à-vis nature conservation.*
- [142] *The duties enjoined upon protected area managers and the Chief Wildlife Warden under the Wild Life (Protection) Act, needs to be conscientiously carried out in both letter and spirit.*
- [143] *Training and motivation must be provided to the protected area personnel, including promotional avenues and cadre management.*

- [144] *The forest service as a whole be mandated to combat wildlife crime and undergo basic level training in this regard. For combating specific wildlife crime (poaching, trading and smuggling), training be imparted to field wildlife staff, taking the assistance of specialized technical agencies, governmental or non-governmental, in doing so*
- [145] *Intelligence gathering be given adequate resources as contingency funds allocated to the Chief Wildlife Warden and managers of important protected areas, and special groups of personnel be trained in it and this be budgeted as a regular part of anti-poaching operations. Wherever possible, special “cells” to deal with organized illicit trade in wildlife be set up and suitable persons from the police or other departments be taken on deputation.*
- [146] *To assist the ‘cells’ to curb illicit trade in wildlife products, expertise in wildlife forensics should be developed in each state, preferably in an established institution or laboratory equipped with the requisite tools, in collaboration with the Wildlife Institute of India.*
- [147] *Each State and Regional Deputy Directors of Wildlife Preservation under the Government of India, should set up computerized database on illegal wildlife trade and the ongoing cases in court. These would feed a national level database in the Ministry of Environment and Forests.*
- [148] *The role of non-wildlife agencies in curbing wildlife crime is to be underscored and they be given adequate mandate, training and incentive to help Government curb wildlife trade.*
- [149] *All forest protection staff must have group insurance against death, disease and disability by the state to increase their morale and as a staff welfare measure.*
- [150] *The broad recommendations of the Subramaniam Committee report of 1994, especially the formation of the wildlife crime unit and the provision of legal training and support to wildlife law enforcement agencies, be implemented.*
- [151] *Government should enforce CITES more stringently and cooperate more with other nations in doing so, especially our neighbouring nations, as ultimately this would be in the country’s interest in preventing illegal trade. Recently, the Association of South East Asian Nations (ASEAN) has decided to set up a ASEAN Wildlife Enforcement Network (ASEAN-WEN). Government of India must join the process and both provide and seek cooperation from this set-up, and endeavor to establish a similar set-up for South-Asia or South Asian Association of Regional Cooperation.*
- [152] *There have been numerous instances of wild animals being deliberately electrocuted by cutting overhead wires, amongst them elephants, rhinos and tigers. Livestock and humans have also perished. As far as possible, no electric lines be laid over national parks and sanctuaries and those that exist should be safeguarded against such vandalism and misuse.*
- [153] *Though two new categories of protected areas have now been recognized under the amended Wild Life (Protection) Act, namely, Conservation Reserves and Community Reserves, hardly any new protected area under these two categories have been established. As demographic restrictions envisaged under these two categories are far less than in the case of national parks or sanctuaries, a definitive effort needs to be undertaken by each state to identify and designate protected areas under these two new categories. The Ministry of Environment and Forests needs to undertake a survey to identify areas, which have potential*

- under these two categories of protected areas and need to persuade the States to establish them, providing financial and other support for the same.*
- [154] *Situations in which biosphere reserves can be set up be delineated and it be ensured that they follow the principles as laid down in the Man and Biosphere programme in so far as it is not inconsistent with domestic legislation relating to conservation and management of natural resources. It would also be useful to include biosphere reserves within the legal framework, either through a separate legislation or through its inclusion in the Biological Diversity Act, 2002 or similar legislation.*
- [155] *Biosphere reserves should not be established in lieu of national parks or sanctuaries but when due to demographic factors the establishment of a national park, sanctuary, Conservation Reserve or Community Reserve is not feasible. It would also be improper to impose a Biosphere Reserve over an existing park or sanctuary, as that causes a dichotomy and confusion in approach and management.*
- [156] *Significant wildlife habitats including biological corridors where immediate declaration as protected area is not possible, be designated as ecologically sensitive areas (ESAs) under the Environment (Protection) Act, 1986, (EPA) with a view to restrict certain identified hazardous activities as also change in land-use pattern. Ecologically sensitive areas should also include areas such as elephant corridors, important bird areas, etc.*
- [157] *Specified areas, including buffer zones of protected areas be designated as ecologically sensitive areas (ESA) with a view to restrict identified hazardous activities. This process should be based on a comprehensive and realistic assessment of the current threat perception in the area surrounding a protected area. An ad hoc and arbitrary fixation of ESA, such as a blanket restriction, is likely to be counterproductive and can create hurdles in the creation of new protected areas (PAs). Control of effluents and emission levels must be enforced and PA managers must be involved in this control activity.*
- [158] *Since the power to declare protected areas largely vests with the State Government, similarly, the concurrent power to declare ecologically sensitive areas should also vest with the state government.*
- [159] *Mitigation measures for man-animal conflict must be both long-term and short-term. Short-term measures may include barriers after considering whether they act as barriers to wildlife movement or not, scaring and repelling techniques etc. Long-term measures must include establishment of animal corridors, elephants being a priority, attempting alternate cropping patterns around forests and areas seriously impacted by wild ungulates and having wildlife clearances as a mandatory part of broader environmental clearances of development projects.*
- [160] *Catching and translocating animals should not be seen as the easiest and most politically-expedient solution to conflict, although it could be advisable in some cases) and must be done only after the troublesome animals have been identified, and when the biology of the species and its needs are taken into account and monitoring measures are in place. Capture of social beings such as elephants in particular is counterproductive to conflict resolution, unless whole herds as social units are translocated. It must be borne in mind that according to the Wild Life (Protection) Act as recently amended, the capture of Schedule I animals should only be done after its release area has been identified and the release must be done in the prescribed time-frame.*

- [161] *Compensation mechanisms must be reviewed and schemes put under way in areas of man-animal conflict. Compensation must be paid immediately and without hindrance, and it must be commensurate with the damage caused and there must be transparency in the whole operation. Attempt should be made to have crop insurance against damage by wild animals around major protected areas.*
- [162] *A very important field of applied research and its extension to field application, which would greatly assist in reducing man-animal conflict, is identification of crops, which could be planted around protected areas and elsewhere to reduce the quantum of crop-raiding by species such as nilgai, blackbuck, wild pigs and elephants. Needless to say, such crops should be suitable for the area and be remunerative.*
- [163] *Except perhaps for the tiger, elephant and rhino, there is no long-term monitoring of most of our endangered species. As birds are easy to monitor and are a good indicator of habitat quality, long-term monitoring protocols should be developed for all our protected areas. Universities and non-government organizations should also take up regular monitoring of birds and other wildlife outside protected areas. The Government of India should encourage and fund animal and bird monitoring and migration.*
- [164] *Prioritizations such as that of Rodgers and Panwar (1988)² and others brought out by the Wildlife Institute of India, be seriously considered and gaps in the protection of habitats of endangered species, unique or threatened ecotypes, deficiency in coverage of biome and biographic representation, or some other factor, be rectified by adding on such critical areas to the protected area network. Wherever possible, this should be by establishment of a National Park or Sanctuary. If it is not feasible to establish any of these two categories of protected area, then Conservation Reserves or where land is privately owned, Community Reserves could be established. The help of non-government organizations may be taken in this wherever considered appropriate.*
- [165] *Ex-situ conservation should start complementing in-situ conservation, both from the captive propagation and educational standpoints.*
- [166] *It is essential to store genetic material of gravely endangered species in gene banks, as a safeguard against extinction in the wild, and both the Zoological Survey of India and the Botanical Survey of India should ensure this. At an opportune time, not only can the species be regenerated in captive conditions, but if adequate measures have been taken, can also be introduced into the wild. A very significant development has been the establishment of the Laboratory for Culture of Endangered Species (LaCONES) by the Centre for Cellular and Molecular Biology (CCMB) at Hyderabad, to undertake this important task. All support needs to be given to LaCONES in this regard to save the genes of endangered species and to help recover species from genetic 'degeneration'.*
- [167] *As a very valuable experiment both to restore a locally extinct mega-species and to conserve its endangered prey-base and habitat, as well as to inculcate national pride and interest, a serious effort be made to re-introduce the cheetah into the wild in India.*
- [168] *If any captive reared population of any species is sought to be introduced into the wild, it must be carefully and clinically assessed to ascertain that they do not carry pathogens, which could be conveyed to the wild population.*

² Rodgers, W. A., Panwar, H. S. 1988. *Planning a protected area network in India*. Dehradun, Wildlife Institute of India

- [169] *Scientific re-assessment of the status of each species/taxon should be done by experts and thereafter they be reassigned under the Schedules of the Wild Life (Protection) Act. Such reassessment should be done every five years*
- [170] *All those species that are in Schedule I, the Government of India, with the help of State Forest Department and experts, should start Species Recovery Plans. Sufficient funds and expertise should be provided for Species Recovery Plans. The aims should be that once these Species Recovery Plans are successfully executed, and the status of the species is improved, it could be down listed to Schedule II or Schedule III. It should be considered a credit to the Ministry of Environment and Forests and the concerned state Forest Department that a species has recovered and is no longer under threat of extinction. For some species it may take 15-20 years to recover, but it should be seen that systems are in place that help the species to recover. Periodic monitoring of the status of each species would be very essential. At the same time, if status of a particular species deteriorates, it should be upgraded to a higher Schedule and a Species Recovery Plan is started. Even for so-called common species, whose populations are on the decline, there should be targeted recovery plans, mainly by saving their habitats. An indicative list of species for whom recovery plans need are a top priority, are: Malabar civet, hangul, , wild buffalo, Nicobar megapod, Andaman teal, white-winged wood duck, pygmy hog, greater adjutant stork, Ladakh urial, Gangetic dolphin, Jerdon's courser, vultures, and greater one-horned rhinoceros*
- [171] *Project Elephant and Project Tiger have shown that by targeting rare and flagship species, many habitats and associated species can be saved. However, there are many species/habitats that are not covered by these two Central government schemes, e.g. grasslands, wetlands, high altitude mountain, riverine and marine environment. Certain species and their habitats need urgent attention of the Ministry of Environment and Forests and state governments to formulate projects in the fashion of Project Tiger. The snow leopard, the great Indian bustard, the Gangetic dolphin and the dugong are prominent examples for this purpose.*
- [172] *To protect the highly endangered great Indian bustard (less than 500 left in the whole world), lesser florican, Bengal florican and other grassland associated flora and fauna, Project Bustard should be initiated. As protection of grasslands would greatly benefit livestock, the Ministry of Agriculture and Animal Husbandry should also be involved. These bustards are found in at least ten states of India and therefore, it is vital to develop a centrally coordinated and funded scheme.*
- [173] *The snow leopard of the Himalaya is one of the most famous flagship species of the ecosystem where it lives. This ecosystem is also very fragile and coming under increasing human impact. Most of the rivers of north India originate from snow leopard habitats, so it is in the national interest to protect and nurture such habitats. As the snow leopard is found in five states (Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Sikkim and Arunachal Pradesh), it is necessary to develop a centrally funded and coordinated scheme called Project Snow Leopard. An attempt had been made in this direction in the 1980s, but Ministry of Environment and Forests later merged the scheme with the on- going C.S.S on development of national parks*
- [174] *The lion has established permanent habitats in the Girnar, along the Saurashtra coast, Hipavadli in Amreli district and elsewhere. The Government of Gujarat should declare Girnar as a sanctuary and bring the outlying lion population in*

- Saurashtra within an overall lion conservation programme, and approach the entire lion populations on a zonal or landscape basis.*
- [175] *India has five species of sea turtles and the world's largest known turtle breeding beaches for the Olive Ridley sea turtle (Gahrimatha, Devi and Rushikulya river mouths in Orissa). Mechanized fishing trawlers have created new problems for these sea creatures, as they have to come to the beach to lay eggs, sometimes twice a year. As the turtles found near the coasts of West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Maharashtra, Goa, Gujarat and Andaman and Nicobar Islands face various problems, some general and some site-specific, a centrally-sponsored scheme is necessary to save them. Moreover, the State Forest Departments are not geared to protect turtle habitats. Only a long-term central scheme would be effective.*
- [176] *The terrestrial tortoises are today one of the most threatened group of animals in the country. The commonest species, the star tortoise, is affected by illegal trade. The Travancore tortoise and the Assam tortoise are gravely endangered due to habitat destruction and other factors. Recovery Plans are needed for these species.*
- [177] *The Wildlife Institute of India, in collaboration with countries/organizations which have the requisite expertise, must evolve techniques suitable for group capture of species like the nilgai, blackbuck and wild pig. After due testing, the techniques should be transferred to the states, who should set up special 'cells' for such capture and translocation.*
- [178] *Thereafter, locally excess animals and those that are proving to be intractably harmful to crops and other property, need to be captured, relocated and rehabilitated where they could be accommodated without causing the same problems to the local people. In this endeavor, the Government of India should render financial support, at least in the initial phase.*
- [179] *In this operation, every effort must be made to reduce the trauma and injury and the chances of contraction of pathogens during captivity. The period of captivity must be very short.*
- [180] *After careful analysis and overcoming or mitigating the factors leading to local extinction or reduction, certain species need to be re-introduced in some protected areas. For this again, special techniques for capture and translocation need to be evolved. Some examples of this category are the reintroduction of rhinoceros and the eastern swamp deer in Manas; the gharial in the Brahmaputra and Beki in Assam; the gaur in Bandhavgarh; the blackbuck in Kanha; the tiger in Sariska; the wild buffalo from Indravati to Barnawapara in Chhattisgarh or Kanha in Madhya Pradesh; the hog deer in Corbett National Park; the pygmy hog in Nameri National Park and elsewhere in Assam and, of course, the lion in Kuno-Palpur in Madhya Pradesh. Besides, the possibility of introducing the brow-antlered deer from the captive populations, in Pobitara in Assam, needs to be explored. This would be a special case of introduction into a new habitat, as its previous habitats in Manipur are now not viable any more and the total world population of this taxon is now confined to the Keibul Lamjao National Park in Manipur. All endeavours must be made to bring back the Siberian crane to Bharatpur, if necessary, from the more numerous eastern population now migrating between China and Russia. The need to undertake a re-introduction of the cheetah in India, after careful study and prior preparation, has been mentioned elsewhere.*

- [181] *The re-introduction of the lion in the designated protected area of Kunu-Palpur be expedited on a priority basis. The Chairman of the National Board of Wildlife could request the Chief Minister of Gujarat for the translocation of lions that have strayed out of the Gir, to the project site of Kunu-Palpur.*
- [182] *Studies be undertaken by the Centre for Cellular and Molecular Biology of Hyderabad to identify the extent of genetic ‘swamping’ occurring in the current populations of wild buffalo and in sample areas in the case of the red jungle fowl and wild pig. The studies also need to identify the surviving populations that can be termed as truly wild and parameters to judge the wild specimens of these species.*
- [183] *The same studies should recommend corrective/administrative action to curb the threat and to retrieve the situation to the extent possible, with special recovery plans for the wild buffalo and for wild pig in the Andamans.*
- [184] *Investigations leading to practical recommendations, be carried out to prevent future inbreeding between domestic and wild jungle fowl, pig and wild buffalo, specially around protected areas*
- [185] *In the interim period, a special effort and plan needs to be undertaken to save the surviving wild buffalo populations that are apparently least genetically “swamped” and at the same time the most threatened, in Chhattisgarh.*
- [186] *The Ministry of Environment and Forests and State Forest Departments develop centres of restoration ecology and to remove exotic species, even from a national park, after thorough investigation. The Ministry of Environment and Forests should develop a nodal agency that should look in to this problem and involve ecologists, conservation non-government organizations and media.*
- [187] *Strict guidelines should be developed for the removal of exotic trees and restoration of natural habitats. No commercial interest should be involved to remove exotic trees and they could be supplied first to the local people as per the provisions of the Wild Life (Protection) Act. However, the money generated from the sale of such timber should go back to the protected area.*
- [188] *The following species are candidates for priority intervention by the Indian Armed Forces, Border Security Force Indo-Tibetan Border Police and coast guards. It is recommended that species programmes be initiated in conjunction with them for these species:*
- Northern Command - Ladakh: black-necked crane, snow leopard, Tibetan argali, ibex, Ladakh urial, Tibetan antelope and Tibetan gazelle; Jammu and Kashmir: markhor, hangul, western tragopan*
- Eastern Command: clouded leopard, snow leopard, Tibetan gazelle, Tibetan argali, and takin; Orissa: Oliver Ridley turtle*
- Southern Command - Gulf of Mannar: Dugong, corals; Lakshadweep: Leatherback turtle, hawksbill turtle, giant clams and corals; Andaman and*

Nicobar Islands: Leatherback turtle, hawksbill turtle, dugong, whales, sharks, giant clams, Nicobar megapod

Western Command – Gujarat: Dugong and whale shark

Central Command - Musk deer, western tragopan, Himalayan tahr and serow

[189] *The Indian Armed Forces can arrange environmental training programmes for officers and jawans through their Green Governance initiative. Army training manual on environment can be developed in a structured format, which will then form an integral part of Army training.*

[190] *Army, Navy, Indo-Tibetan Border Police, Border Security Force and coast guards should also contribute in prevention of smuggling of wildlife products along the borders.*

Chapter 10

Forests of the North-East

After extensive interactions with the governments of States and Union Territories across India, the Commission recognizes the distinctive nature of problems and the existence of a high proportion of forests and biodiversity in Northeast India. As such, a chapter has been devoted to this area

10.1 Biological Diversity

Special mention needs to be made at this stage of the rich and varied biological wealth of this region. It is acknowledged to be one of the few 'Hot Spots' of biodiversity in the world.

The conservation of this biodiversity is of great significance for even the economy of these States, especially when taxonomic findings are better documented; and systematic studies done of the ecological and economic potential in terms of nutrition, medicine, organic fertilizers and pesticides, etc. In such a situation, important areas of biological significance having gene pools of a variety of fauna and flora, often endemic, require special conservation measures. This has been partially recognized in the declaration of some areas as Sanctuaries and National Parks and also in the inclusion of several species in the Schedule-I of the Wild Life (Protection) Act, 1972. The position in respect of the extent and coverage of these protected areas is brought out in Table 10.1:

Table 10.1: Extent and Coverage of Protected Areas in Northeast India

Name of the State	Geographical Area (sq km)	Number of National Parks and Sanctuaries	Area in sq km	Percentage of WLS Protected Areas to Geographical Area of the States	Remarks
Arunachal Pradesh	83743	10	9246	11.00	NP-1 WLS-9
Assam	78438	9	1894	2.41	NP-2 WLS-7
Manipur	22327	3	227	1.07	NP-1 WLS-2
Meghalaya	22429	5	421	1.88	NP-2 WLS-3
Mizoram	21089	4	941	4.46	NP-2 WLS-2
Nagaland	16579	4	222	1.34	NP-Nil WLS-4
Tripura	10486	4	604	5.75	NP-Nil WLS-4
Total	255083	39	13555	5.31	NP-8 WLS-31

NP- National Park WLS-Wildlife Sanctuaries

As per the World Conservation strategy, 10% of the land area of the country should be under Protected Area network. This may not be possible to be adopted for the general areas of the country because of the high density of population. The population density of the North-East being generally low and the niches of biodiversity being large, it is therefore, desired that forest cover of the North-East extending into representative biogeographic regions and biotic Provinces, should also be to the extent of 10% to 15% of the land area.

10.2 Land Tenure System and Legal Aspects

10.2.1 Land Tenure System

Northeastern India stands unique in having separate land tenure systems compared to the general situation in India. Out of the total forest cover of this area, about 35% belongs to Government under reserved forests, protected forests and protected areas and the Government have control over it. But the forests of the District Council, village communities and private ownership in different States of the North-East have different status and management.

In Arunachal Pradesh, the indigenous people, living traditionally acquire their rights over as much land and forests as they inherit. Shifting cultivation is practiced on hill slopes on land owned by the villagers. Traditionally the village is a unit of administration by itself and the boundaries of the lands belonging to the villagers are very clearly known to the village elders and these are respected by the neighbouring villages. The Village Council divides the cultivated lands and distributes them amongst the clans living within the village, who in turn subdivide them amongst the members of each clan. The right of the persons engaged in shifting cultivation cannot be transferred to others outside the village community. Within the same village, the land transfer can take place only with the consent of the village clan. In case of land that is developed permanently, customary law demands that the rights can be transferred to any one belonging to another clan or sub-tribe or tribal group, with the consent of the village clan to which the land belonged. No land can be sold to non-tribal people.

In Assam, the areas permanently dedicated to forestry have been notified as reserved forests or proposed reserved forests under the Assam Forest Regulation and District Council Forest Act. All reserved and proposed reserved forests are well surveyed, well demarcated and duly notified. The reserved forests constituted under the Assam Forest Regulation before coming into effect of the District Council Forest Act, are not included in the 6th schedule of the Constitution. However, these reserved forests in hill districts, since couple of years back, have been allowed to be managed by the District Council under scientific Management Plans prepared under the State authority. Generally, no rights are allowed in reserved forests.

However, there are many encroachments in reserved forest and their magnitude is not less than 3000 sq km. While legally all such people should be evicted, these encroachments are continuing due to various reasons.

In Manipur, over 60% of the total forest area is still unclassified. The Manipur Land Revenue and Land Reforms (MLR & LR) Act 1960, declares that all lands including forests, mines and minerals, which are not the property of any person are the property of

the State. The landowners in their individual lands have permanent and heritable transferable rights over the land and its use. Land ceiling has been imposed wherein a maximum of five ha of irrigated land can be owned by a family of five members and for each additional member of the family 1/2 ha may be owned. The ceiling is 10 ha, in case of non-irrigated land. This Act also prohibits transfer of tribal land to a non-tribal and land rights are thus acquired by (1) inheritance (2) transfer (3) allotment of new land by Government. Transfer of land owned by tribal to a non-tribal may be possible only after permission from the Deputy Commissioner and consent of the District council. However, M.L.R. & L.R. Act, 1960 does not apply to hill areas where 70% of the forests are located. The land tenure system in these hill villages is governed by the customs and traditions of the tribes that inhabit such areas and these are basically of two broad types viz. Naga and Kuki. However, there is one common factor, that the rights over land can be acquired by clearing jungles, in addition to acquisition through inheritance and transfer.

In Meghalaya, 72.98% of the land of the State falls under community ownership. This also includes clan land and “rikynti” land, which are not strictly community land. The rest consist of land acquired by the Government for its establishment and land assessed for land revenue, which includes towns, bazaar land, homestead land, basti or paddy lands, etc. The land tenure system is different from district to district and each of the predominant tribal community follows its own traditional system. In the Khasi Hills, one category of land belongs to the community, and even if a member has a right to occupy a portion of the land, he has no transferable right. In the second category, land is set apart exclusively for certain clans, specially the original founders of villages. Such clans enjoy absolute right of occupancy of the land as well as heritable and transferable rights. In the Jantia hills, the Government did not recognise private ownership of high lands, but allowed anyone to cultivate them.

In the Garo hills, there are two types of land tenure systems. In one category i.e. “akhing” land, the individual families have only temporary right for cultivation. In the other category, which are basically lands in the plains, permanent cultivation is allowed. All these lands are assessed for land revenue, the rate of which is fixed either permanently or temporarily for a period.

In Mizoram, about 51% of the forests are unclassified and 11% of the forest area is controlled by the District Council. Most of the unclassified forests are owned by the Village Councils. Parts of these forests are kept as village safety and supply reserves and in rest of the areas of forests, Jhuming is extensively practised. No systematic survey and demarcation has so far been carried out in Mizoram. By and large almost the entire forest areas have been affected in the past by Jhuming; resulting in clearance of primary tree cover and leading to degradation of land, except in the southeastern part of the Lunglei district and southern parts of Chhimtuipui district. Land rights accrue on permanent occupancy of either agricultural or residential areas, especially in wet rice cultivation, terraced rice cultivation and fruit plantation in permanent plots. The Jhumias do not have such rights. The jhum lands being property of village community, the ownership of such land is shared amongst the community. The ownership during the period of cultivation is decided by a lottery once in a year.

In Nagaland, about 93% of the total forest areas is still unclassified. In most of the tribal groups immovable landed properties are recognised in four categories. (1) private land (2) clan land (3) morung land, and (4) common village land. Most of the unclassified forests belong to any of these categories. The jhum land does not belong to individuals. It is the property of entire community and the people living in the village. The Naga Jhum Land Regulation Act 1946, gave the original inhabitants absolute right over their jhum land and recognised their eligibility for the practice of shifting cultivation, grazing of cattle, etc. Naga Forest Act, 1968 gives the Government absolute right to carve out forest reserves and acquire any plot of land for its purpose.

In Tripura, about 29% of the Forest area is still unclassified. In 1960, the Tripura Land Revenue and Land Reforms Act was passed, which declares that all lands which are not the property of any person are the property of the State. This Act abolished the intermediary rights bringing the raiyats into direct contact with the State. The raiyats are entitled to construct buildings, wells, tanks, etc., and improve the land for better cultivation. Under this Act, there is also land ceiling based on family size. For a family of one person the ceiling is 2 ha If a family consists of 5 members the limit is 4 ha In case of more members in the family, for each additional member 0.6 ha is granted, subject to a ceiling of 7.2 ha Transfer of land by a tribal to non-tribal is not valid unless the transaction has the written consent of the Collector.

The rights and concessions in the North-East region also go mostly by tradition and precedence. There has been little codification of such rights and concessions being enjoyed by the people of the region, particularly the tribals. There exists a distinct undercurrent of opinion within the individuals, communities and District Councils to interpret any order banning the use of land, extraction of forest produce as aimed, at not only the livelihood security but the ethnic identity and aspiration of the population. Often, they refer to the Article 371 and Article 244 (VI Schedule) of the Constitution as a support to their absolute ownership and right to use the land. However, the relevant clauses in 6th schedule give the local people the right to manage the land and forest produce and most people in the North-East have been noted to manage the forest resources in a sustainable manner.

10.2.2 Legal Aspects

The application of Acts of Parliament to the various States in the North-East vary from State to State, and sometimes from district to district within the same State.

The two main provisions which govern the applicability of Acts of Parliament and the State Legislature to the Northeastern region are Article 371 and 244 of the Constitution. In so far as the State of Nagaland is concerned, Article 371 A of the Constitution states that "No Act of Parliament in respect of:-

- (a) Religious or social practices of the Nagas,
- (b) Naga customary law and procedures,
- (c) Administration of civil and criminal justice involving decisions according to Naga customary law and

- (d) Ownership and transfer of land and its resources shall apply to the State of Nagaland unless the Legislative Assembly of Nagaland by a resolution so decides.

Thus, the Forest (Conservation) Act, 1980 passed by Parliament would not perhaps apply to the State of Nagaland. It is, however, noted that by way of an executive order, the State Government has extended the application of the Forest (Conservation) Act 1980 to the forests declared as “Reserved” vide Notification No. FOR- 58/82 dated 3.7.86. This covers only 3% of the forest area of the State.

With regard to the State of Assam, generally all Acts of Parliament apply, except as modified for the Sixth Schedule Areas of Karbi Anglong and North Cachar Hills. Here, it is specified that the above said District Councils (Sixth Schedule Areas) shall have among others, the powers to make laws with respect to:

- i) The allotment, occupation or use or the selling of land other than any land which is a reserved forest, for the purposes of agriculture or grazing or for residential or other non-agricultural purposes or for any other purposes likely to promote the interests of the inhabitants of any village or town.
- ii) The management of any forest not being a reserve forest.
- iii) The regulation of the practice of jhum or other forms of shifting cultivation and
- iv) Alienation of land

“Reserved forest” means any area which is a reserved forest under the Assam Forest Regulation 1891 or under any other law for the time being in force in the area.

It is noted that the State Government of Assam has entrusted the management of even the reserved forests to the above said District Councils. With respect to the State of Manipur, a similar provision exists in the Hill Areas of the State. This is governed by the Manipur (Hill Area) District Council Act, 1971 which empowers the Hill Area District Councils to control and administer the following matters:

- i) The allotment, occupation or use, or the setting apart of land, other than land acquired for any public purpose or land which is a reserved forest, for the purpose of agriculture or grazing or for residential or other non-agricultural purposes or for any other purposes likely to promote the interests of the inhabitants of any village or town situated within the autonomous district for which that council is constituted,
- (ii) the management of any forest not being a reserved forest, and
- (iii) the regulation of the practice of jhum or other form of shifting cultivation.

However, in the absence of any specific provision in the Constitution, it cannot be said that the Forest (Conservation) Act, 1980 does not apply to the State of Manipur, although in practice the Hill Areas unclassified forests have remained outside the Central Act. In any event, Article 371 C of the Constitution clearly states that the executive power of the Union shall tend to the giving of directions to the State as to the administration of the Hill Areas.

In so far as the State of Mizoram is concerned, it is governed by Article 371 G of the Constitution for the State and Section 12 B of the Sixth Schedule in so far as the notified tribal areas are concerned. According to Article 371 G, notwithstanding anything in the Constitution, no Act of Parliament in respect of,

- i) religious or social practices of the Mizos,
- ii) Mizo customary law and procedure,
- iii) administration of civil and criminal justice involving decision according to Mizo customary law, and
- iv) ownership and transfer of land.

shall apply to the State of Mizoram unless the Legislative Assembly of the State of Mizoram by a resolution so decides. Provided that nothing shall apply to any Central Act in force in the Union Territory Mizoram, immediately before the commencement of the Constitution (Fifty Third Amendment) Act, 1986. In view of the provision to the Article, the Forest (Conservation) Act, 1980 would apply to the State of Mizoram. In so far as the Sixth Schedule Areas in the State of Mizoram are concerned, three Councils lie in Chhimpluipui District and are:

- (a) the Chakma District,
- (b) the Mara District, and
- (c) the Hai District.

They enjoy the same privileges and power as most other Sixth Schedule Areas as indicated for the State of Assam.

Similar is the case with the States of Meghalaya and Tripura and the Sixth Schedule Areas within these States.

In so far as the State of Arunachal Pradesh is concerned, all Acts of Parliament apply to the State.

Border Problems

There are border problems in the North-East, between the following States:

Assam-Nagaland
Assam-Arunachal Pradesh
Assam-Meghalaya, and
Assam-Mizoram

The border problems have mainly arisen out of Notification of boundaries of the erstwhile State of Assam, both during British Rule and consequently at the time when reorganization of the North-eastern States took place. These are matters to be sorted out by the Central Government and the State Governments, as per law and mutual agreement.

The border disputes have resulted in the absence of effective Government control over the disputed areas which has further resulted in large-scale encroachment and destruction of forests. In addition, there are problems of illicit felling of timber along the Tripura-Bangladesh border and of illegal trade in border along the Manipur-Myanmar border.

10.3 Shifting Cultivation

Shifting cultivation (locally called “Jhuming”) which is slash and burn agriculture, is practiced over a large part of the North- Eastern States and is a traditional practice over generations. Though reliable figures about the exact extent of jhum land and other related

practices are not available, broad estimates indicate that out of the total area of 25.5 million ha of land in North-East, about 3 million ha is under settled agriculture and about 2.7 million ha is under jhum. At any given time roughly about one-sixth of the total jhum land is under current jhum. It is the tribal population that practices shifting cultivation and which comprises 80% and more of the total population in the States of Arunachal Pradesh, Manipur, Mizoram and Nagaland. Approximately 4.5 lakhs families are reported to be involved in shifting cultivation in the region (Table 10.2). The Ao tribe in the Mokokchung District of Nagaland reportedly has the best model of shifting cultivation. The entire area is divided into 10 coups with a 40-year cycle.

Table 10.2 - Shifting Cultivation in Northeastern Region

State	Annual area under shifting cultivation	Fallow period (in years)	Minimum area under shifting cultivation one time or other (sq km)	No. of families practising shifting cultivation.
Arunachal Pradesh	700	3-10	2100	54000
Assam	696	2-10	1392	58000
Manipur	900	4-7	3600	70000
Meghalaya	530	5-7	2550	52290
Mizoram	630	3-4	1890	50000
Nagaland	190	5-8	1913	116046
Tripura	223	5-9	1115	43000
Total	3869			443336

As against the figure of 3,869 sq km under shifting cultivation estimated by the Task Force, *State of Forest Report 2003* estimates the area under shifting cultivation as 5,476 sq km., break-up of which has been given in Table 10.3.

Table 10.3 - Forest Cover affected due to Shifting Cultivation (area in km²)³

State	Dense Forest	Open Forest	Total
Arunachal Pradesh	663	262	925
Assam	272	337	609
Manipur	125	730	855
Meghalaya	141	543	684
Mizoram	351	336	687
Nagaland	321	1011	1332
Tripura	221	163	384
Total	2094	3382	5476

There are various theories about the impact of shifting cultivation, which have been advocated from time to time. These are reflected in the report of Dhebar Commission. (1960-61), the report of Task Force of the Planning Commission on development of tribal areas in 1973, the report of the National Commission on Agriculture in 1976, the report of FAC, UNFPA, 1980, and Task Force on shifting cultivation of the Ministry of

³ *State of Forest Report 2003*. Dehra Dun. FSI.

Agriculture 1983. While in some reports, jhum cultivation has been termed as a pernicious practice, not only in terms of destroying forest wealth, but also accelerating soil erosion, in other reports instead of condemning it as an evil practice, there have been suggestions to regulate the shifting cultivation on scientific lines, so as to limit its disadvantages and to promote fertility of the soil. However, all the reports have indicated gradual phasing out of the shifting cultivation by permanent agricultural practices.

In early parts of this century, the jhum cycle used to be more than 30 years, but because of fall in productivity of the land and increase in human population, the cycle has now come down to three to six years generally, even though in some of the States in localized areas the cycle up to 15 to 20 years are still seen. It is this general decline of the shifting cultivation cycle that has become a threat to the ecology soil stability, fertility and biodiversity of this region and has become a concern for the States of this region. With the shortening of the jhum cycle, the land does not have time to recover, even bamboo, which is the first succession of forest crop after the abandonment of the cyclic Jhum cultivation does not have adequate time to grow back.

The North-Eastern Council (NEC) with the mandate to help balanced development of the North-East, started pilot projects in these States during the 5th Plan period for the settlement of Jhum families to permanent agriculture on developed lands. The pilot projects started in 1974-75 and were normalized in 1978-79. The average investment per family for weaning over shifting cultivation to settled cultivation was about Rs.5,000/- to start with, which increased to Rs. 20,000/- per family in early 80's, Rs.30,000/- per family in late 80s and about Rs.50,000/- per family currently. However, the total families settled so far by the process are about 6000 only, against roughly 4.5 lakhs of families involved in Jhum cultivation.

The evaluation of pilot projects of Jhum control schemes of North-East by the Administrative Staff College of India, Hyderabad, indicate that the average land area provided to each family for such settled cultivation is about 1.6 ha minimum being 1 ha in Manipur with a maximum of 2.2 ha in Nagaland. The work included land development, soil conservation, irrigation facility, horticultural development and agricultural input in the form of seeds, fertilizers, etc. With shift to settled cultivation from shifting cultivation, the requirement of Jhum land per family has come down and reduction varies from 60% in Manipur to 22% in Meghalaya. In Mizoram the settled families have stopped Jhum cultivation. A study by the Forest Survey of India indicates that while there has been an overall decline of shifting cultivation area in North-East by about 14%, it showed increase in Arunachal Pradesh and significant increase in Assam.

The reason for the schemes taken up for resettling jhumias not showing commendable progress, has been attributed by the Administrative Staff College of India, Hyderabad in their evaluation report, to inadequate irrigation facilities, lack of post project period extension services, technical assistance, lack of communication and marketing facilities and inadequate land area provided. The general suggestions that have come up to improve the situation includes proper education and awareness of tribal families, expansion and extension of irrigation, communication and marketing facilities, better financial support, proper training and visit programmes, increasing the support period and agricultural input. There is also reference to the need to increase credit facilities to the Jhum families and sensitisation of the jhumias to adopt improved agricultural practices,

conservation measures, crop pattern as developed by the Indian Council of Agricultural Research (ICAR), as well as adoption of agroforestry programme wherever possible. While there is no reference to the gender issues in this context, it requires greater attention as women are engaged in jhuming in large numbers and look to it for increasing food security of their families.

10.4 The Dilemma

The forests in this region are amongst the richest in biodiversity in the world and contain endangered and endemic species of fauna and flora. They are the most extensive in the sub-continent, yet the areas under the control of the various State Forest Departments are amongst the smallest. As much as 65% of the land area is covered by forest, extending to 80% or more in the hilly tracts. The land tenure systems are unique and communities and individuals own the large majority of forests. The forests are not mapped and the politico-social system is such that if there is any doubt about the ownership of a particular piece of land or forest, the claims of the community or individual will prevail in the absence of records. Almost all the hilly tracts with some exceptions as in Sikkim, are clear-felled and burnt for shifting cultivation, whose felling cycle has now become totally untenable, reduced from 30 years felling cycle of pre-independence era to 2 to 3 years now in some cases. All attempts earlier to wean away the people from this self-destructive practice have not succeeded, though there is now a growing antipathy amongst the people themselves towards this age-old practice, which is now becoming increasingly unremunerative.. Forests and their management with the concomitant practice of shifting cultivation should form the top priority in governance and should obtain the greatest attention and allocation of resources from the States concerned, from the Central Government and the North-Eastern Council (NEC). Forests affect the life and life-styles of a higher percentage of people of each State of the North-East than of any other State in India. But they receive amongst the lowest priority in both attention and in financial allocation. To compound matters further, there are boundary disputes between the States and problems of wood, wildlife poaching and smuggling with bordering countries of Myanmar and Bangladesh.

A large number of reports and recommendations have been made, but none have been implemented to any great extent. Amongst the most recent is the report of the Rajamani Committee (Report of the Expert Committee on North-East, MoEF, June 1977), whose recommendations this Commission also endorses. Some of the suggestions of this report are highlighted and augmented below.

Various research organizations like universities and the ICAR Centre at Bara Pani have been engaged in developing models for different geo-climatic zones, by which the adverse affects of shifting cultivation could be reduced. These initiatives included :-

- ICAR three-tier model (experiment by ICAR)
- NEPED (Nagaland Environment Protection and Economic Development (Experiment by Government of Nagaland)
- Salt models (sloping agriculture land technology (Experiment by EBPIHED)
- SWEET (Sloping Watershed and Environment Engineering Technology (Experiment by SFRI)

- Intensive watershed based livestock production system (Experiment by ICAR)
- Modified shifting cultivation practices undertaken by Jhumias with introduction of cash crops like large cardamom, medicinal plants, broom grass, betel leaf and betel nut, cinnamon, fruit orchards and orchid cultivation (documented by RCNAEB and SFRI)

The practice of shifting cultivation leads to large-scale deforestation, soil and nutrient loss, and invasion by weeds. A great threat to biodiversity is posed due to this practice. The shifting cultivation practiced on slopes in these high rainfall areas causes downstream siltation of the water bodies. Market forces and change in the social milieu have led to a reduction in the authority of the community leaders who have not been able to influence the jhumia families as before, to make the Jhum cycles more viable. Shifting cultivation has to be made ecologically sustainable, if it is indeed allowed to be continued. Substituting the prevailing agriculture practice with farm forestry and horticulture may ensure ecological security in the region. The advantages of farm forestry would facilitate greater biomass production, reduced soil disturbances and greater production of fodder and fuelwood. A positive recent development is that the jhumias of the North-East are themselves coming to realize the increasing unproductivity of shifting cultivation which is not commensurate with the effort put in and are themselves increasingly keen to change to alternative means of livelihood. Government must facilitate this changeover. During a field visit by a member of the NFC, it was revealed that the villages are not fully dependent on shifting cultivation and a substantial portion of their income is derived from employment, trade and other sources. The tribal population mainly depends on renewable resources of firewood, fodder, timber, water and animal husbandry and is not willing to move out of its natural habitat. These resources are drawn from the forest patches surrounding the habitations. Productivity from forests is much higher than agriculture in the hills of northeastern forests.

The Village Forest Committees constituted for the protection and development of the degraded forests are providing alternate employment opportunities to the tribal. This initiative can engage some of the tribals away from shifting cultivation. Generating adequate employment opportunities during the lean season of forestry operations will also prevent tribals from practicing shifting cultivation. Employing tribals under rural employment schemes would also divert their attention to an economically viable option of sustained livelihood. By encouraging cooperative efforts for carrying out forest-based activities, i.e. basket making, rope making, cane furniture, processing of minor forest produce, honey collection, etc. may be made commercially viable by providing proper marketing facilities. This will discourage them from practising shifting cultivation and help them economically, and assist in the phasing out of the practice of shifting cultivation.

The total literacy campaign may be implemented to increase the literacy rate. Services of various NGOs and voluntary agencies, besides the regular government machinery, may be availed of for educating tribal women and children. The problems of the North-Eastern States have to be handled with a holistic mission approach where the problems of forests cannot be dealt in isolation. The issues like employment, agriculture, literacy and poverty are to be addressed simultaneously with forest management to get a solution.

The status of demarcation of forest areas is very fluid and there are instances where encroachments are legalized to the benefit of encroachers in the absence of appropriate maps and boundaries available to the SFDs. This leads to disputes in settlement and is reflected in Working Plans. The preparation of Working Plans and obtaining due approval from the Government of India also should be done on priority basis. As most of these States are forest dominated, the scope of other options is limited.

The North-East contains the highest number of endangered and vulnerable plant and animal species in the country. Eleven species of medicinal plants are critically endangered, five more are endangered and three are vulnerable. Agarwood and the yew (*Taxus walliciana*) are hugely overexploited and all 'edible' species including elephants in two States, are hunted for food or medicine. Poaching for ivory, horn and pelt is on the increase. The coverage of protected areas in this region is less than 6% of the geographic area, which is far short of the 10% recommended by the World Conservation Union for areas rich in biodiversity and low in human population. PA coverage particularly needs to be extended in Manipur, Nagaland and Meghalaya, which have less than 2% of their respective land areas under the PA network.

For the safety of settled agriculture and social system, conservation of forest resources in Assam and Brahmaputra valley is most essential. Only with such conservation can the area progress towards a positive change. If the nexus between politician, bureaucrat and contractor goes on developing, as is the case in Assam, Uttaranchal, Himachal, and Kashmir, then any attempt of development will be diminished and then the exploited tribal people will try to take revenge. It is, therefore, necessary that the government and the Indian society at large consider very seriously the problems, resources, possibilities and difficulties of north-eastern States bordering China, Burma, and Bhutan and have been peaceful so far.

10.5 Recommendations

[191] *The traditional rights of the North-eastern people's forest and land must be honoured. They should have the right to conserve, manage and utilize their forest.*

[192] *Weaning away of the jhumias from shifting cultivation by improved animal husbandry, horticulture, settled agriculture, apiculture and other appropriate agricultural and pastoral practices and occupations. In this context, it is pertinent to note that the Administrative Staff College of India, Hyderabad has reported (1989) that approximately 4.5 lakh families of this region were practicing shifting cultivation and that the total cost of weaning one family away from shifting cultivation was Rs.50,000. This would have made the total outlay worth Rs. 2,250 crores, which was not too high a requirement if phased over some 10 or 15 years. The situation may have changed, but a detailed assessment of the acceptable alternatives and the financial requirements thereof need to be carried out and given the highest priority in administrative attention and allocation.*

[193] *While the process of weaning away people from shifting cultivation must be encouraged, in the meantime;*

a) *Increase security of land tenure for shifting cultivators for both the agricultural and fallow phases by reconsidering the classification of shifting*

cultivation areas and categorizing them as agricultural land with adaptive forest management in the fallow period.

- b) Strengthen and capacitate customary institutions for improved local level governance, management of tribal, community-based natural resources, and tenurial access and control.*
 - c) Reorient existing credit policies to be sensitive and proactive to situations where common property regimes apply.*
 - d) Encourage coordination among different government agencies that have responsibilities for aspects of shifting cultivation especially forestry, agriculture, rural development.*
- [194] *Propagation and sale of medicinal plants in the North-East would be a very promising proposition to provide to the land-owner in the region an alternative to jhuming. A special ecologically sustainable programme needs to be undertaken in this regard.*
- [195] *Bamboo is the most versatile crop of the North-East and its management and protection can be best served if the propagation, cultivation, management, harvesting, value addition and marketing is done through a “mission mode” and the mandate is with the Ministry of Environment and Forests, Government of India. Bamboo is a fire-succession plant and grows profusely in the North-East. There must be facilities for its commercial usage.*
- [196] *Agroforestry is another very viable alternative. But to ensure its success there should be no hindrance to the harvest, transportation and sale of the produce. Mizoram has taken up teak plantation on a large scale. But the farmers must be enabled to extract this tree without waiting for government clearances.*
- [197] *ICAR Centre at Barapani has developed many models for agro-climatic zone settled agriculture, with horticulture / poultry etc. to make livelihood self-sustaining and remunerative. This activity needs to be encouraged and supported.*
- [198] *The Central Government and the North-Eastern Council must play a much more proactive role in forest conservation and in the phasing out of shifting cultivation. This would include greater financial allocations, more schemes for afforestation, regeneration, eco-development, agriculture, animal husbandry and development of local arts and crafts.*
- [199] *Village Councils and individuals have donated land for the setting up of parks and sanctuaries, and in some instances have sold forestlands as well. Murlem and Dampa in Mizoram, Mehow in Arunachal Pradesh and Nokrek in Meghalaya are some examples. This trend must be encouraged and the local people should be associated with the protected areas and must derive economic benefit from them through tourism, etc. The people of Murlem are prepared to add another 50 sq km to the Murlem National Park if an alternative road to the village was developed for them and some eco-development activity was initiated.*
- [200] *Wherever possible, Community Reserves under the Wild Life (Protection) Act be set up on community lands and sacred groves (called Lyngdohs in Meghalaya) and the concerned tribal community should be involved in its conservation and management and a sense of pride in these protected areas should be inculcated. In this respect;*

A complete inventory of sacred forests in the region should be undertaken. These should be registered either with the Autonomous District Councils or with the State Forest Department under the existing Acts and Rules.

The survey for different components of biodiversity in each sacred forest should be completed on an urgent basis.

The sacred forests should be brought under the protected area network, including Community Reserves, without altering the land ownership status. The interventions, if at all required, as in case of degraded ones, may be designed by the government agencies jointly with the communities. Due approval must be taken from the traditional institutions administering the sacred forests, before initiating such interventions.

There should be an umbrella scheme of the government for conserving the community forest areas including the sacred forests. Development of adjoining community forests areas is essential to meet the biomass needs of the community, thereby reducing the pressure on the sacred forests. Such schemes should be implemented jointly by the Forest Department and the concerned traditional institution. Under the scheme, provision should be made for incentives to the tribal people, who are conserving/preserving the sacred forest

The sacred forests can no more be protected based only on religious beliefs. Therefore, it is essential to educate the people about the scientific value of such forests and the conservation ethos should be blended with the religious beliefs.

The diversity of ecosystem services derived from the sacred forests must be recognized and valuation of such services must be done. The policy for adopting the 'user pay' principle in respect of these services must be developed and the benefits must be given to the people who are protecting the sacred forests.

- [201] In forests, prone to organized or large scale violations or insurgency, special protection staff or para-military forces need to be deployed to prevent illicit felling, encroachment, infiltrations, smuggling and poaching, especially on the international borders and in insurgency affected areas.*
- [202] The Forest Survey of India needs to be assigned the task of periodically undertaking detailed remote-sensing of the forest areas and tree cover to assess qualitative and quantitative changes, including extent of invasion of exotics and changes in the type of tree cover.*
- [203] The forest of the various communities, individuals and of the Forest Department itself needs to be cadastrally surveyed and physically marked and mapped.*
- [204] Disputed boundaries between the North-eastern States has created problems of lack of control, resulting in encroachment and illicit felling. Boundary disputes must be settled as urgently as possible, under the aegis of Government of India*
- [205] There is illegal traffic of wood, wildlife and forest products between the North-eastern States and Myanmar on one side and Bangladesh on the other. This must be stopped by the paramilitary forces on the borders.*