



The Way to Make the Forest More Beneficial For Livelihood of Rural People in Context of Its Sustainability in Arunachal Pradesh

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Forest Cover in Arunachal Pradesh

The State is ranked second among States and UTs in terms of area under forest cover. Forest cover (recorded and reserved), district-wise forest cover, land use classification, legal forest status of the forest, forest type and species diversity of plant and animal, forest type and species diversity of plant and animal, plant groups, families, genera and species and dominant families of angiosperms of Arunachal Pradesh, India and world are shown in Table-1, 2, 3 and 4.

Arunachal Pradesh contains only 0.11 percent of population of the country while its geographical area constitutes 2.5 per cent of total area of the country. The State, which is the extension of Eastern Himalayas, is very rich in forest-wealth mainly due to non interference of the forest by mankind. Due to botanical richness, it has attracted many plant explorers in the past. From 1956, the Botanical Survey of India has been actively exploring different parts of the State. As per the State forest report-1999, published by the Forest Survey of India, forest cover of Arunachal Pradesh is 68951 sq. km. accounting for 82.21% of its total geographical area. The recorded forest area of the state is 51540 sq. kms., which is about 61.5% of its total geographical area and the largest among the States of North-East India and second highest among the states of India only next to Madhya Pradesh (Forest Statistics, 2000- 2001). Thus, the

State is fortunate to have such high percentage of its area under valuable forests cover against the national percentage of 20.5 as per 2001 assessment.

This paper seeks to an in-depth study to identify the contributions of forest and how to make it more beneficial to the people of the State.

Contribution of the Forest

Flora and Fauna: It is well known fact that more than 80 per cent of the world's medicinal flora is found in the Himalayan ranges of India. Arunachal Pradesh is lying within the Himalayan belt has almost of all medicinal plants. Since the state has remained a generally inaccessible area with scarce means of communication and transport, very little written record is available about medicinal flora. Mostly the knowledge and information were passed from generation to generation by word of mouth and through folklores. However, under Monasteries of Monpa (Buddhist), there were monks who had expertise and who trained some selected persons in the area of identification, collection and processing, and use of various active parts of the herbs. It is a common knowledge that only certain plants and certain parts of plants like flower, leaf, bark, root are of medicinal use.

Arunachal Pradesh offers an ideal agro climate with vast potentials for growing varieties of orchids round the year. Out of about 1150 species of

orchids known in India, about 550 species occur only in Arunachal Pradesh. These species occur in varying climatic and habitat conditions in varying concentration from the warm foot-hills to the cool temperate hills in Arunachal Pradesh. Such a diverse climatic situation has favoured the occurrence of about 550 species of orchids in the state which is a highest number for any state in India thus making it an "Orchid Paradise" of our country. There are over 500 Herbs recorded from Arunachal Pradesh of which 250 are used in various Ayurvedic formulations.

Vast climate variations in Arunachal Pradesh have resulted in existence of almost all types of Herbs and timber wealth ranging from tropical teak in foothills jungles to coniferous and alpine of high mountains. The state is very rich flora. It has about 4500 species of flowering plants, 400 species of pteridophytes, 23 species of coniferous, 35 species of bamboos, 20 species of canes, 25 Rhododendron species. Overall, Arunachal Pradesh is, as if, a natural garden of more than 20,000 identified species of medicinal plants and so many still remain unidentified. About 300 plant species out of native flora in North-Eastern India are used for edible purpose. Of these, over 25 provide tubers/rhizomes etc., which are eaten raw or boiled. Over 50 are consumed as green with their leaves/tender shoots cooked as vegetable; about 170 ripe fruits, which are pulpy and sweet/sub-sweet are eaten raw and many of these are used for pickles/vegetables when unripe; about 15 have edible seeds which are eaten raw or roasted.

Like flora, the deeply wooded terrains of Arunachal Pradesh are also rich in fauna. There are believed to be more than 100 species of mammals in its forests. These include four major cats (tiger, leopard, snow leopard and clouded leopard), three antelopes (serow, goral and takin) and the highly endangered

hispid hare. The State is home to 8 out of 16 species of primates found in India. Bison or Gaur and Mithun are two important mammals found in the state. Additionally, at least six species of squirrels, mongoose, civet cat are some of the smaller mammals found in the wild. There are four types of deer: Sambar, hog deer, barking deer, and musk deer. Red panda, binturong, black bear, sun bear, sloth bear, wolf, wild boar, wild goat and wild pig, monkey, elephant are the other animal species found in the State. There are about 650 species of birds, including three species of hornbills and the endangered white winged duck and rare pheasants. In addition, there are 105 species of fishes, 42 species of amphibians, besides a large numbers of reptiles, butterflies and other terrestrial mammals.

Natural Environment and Ecological Balance:

There is a great need today to create a comprehensive awareness to have adequate safeguards against the destruction of the natural environment. The concern for preservation of environment is multi-dimensional and it relates itself to many disciplines and facets of the administration. The protection of environment and ecological balance are the concern of the people all over the globe. The Northeastern region of the country, which forms major part of the Eastern Himalayas, is not only rich in forest and related natural resources, but also very much rich in bio-diversity. It has myriad of complex problems with distinct constitutional and legal features.

It is clear that there is a need for conservation of forest in the region. As there are many people maintaining their livelihood from forest, we should chalk out proper afforestation programme which will ultimately satisfy the growing demand for products. The principle behind bio-diversity is to encourage the conservation of a wide range of flora and fauna in a given area to ensure an ideal nutrient

cycle, as well as, food chain which are important aspects of ecological balance. Preservation of plants and animals are necessary, because our present knowledge about them is confined to a small number of species and the benefits of the remaining millions of plants and animal species are not known to us today. Nevertheless they play an important role in maintaining the ecological balance.

Ecotourism: Arunachal Pradesh is the largest in area among North- Eastern states and is the second largest forest covered state next to Madhya Pradesh in the country. The state is already in the tourist map of India because of its unique, diverse culture, beautiful river valleys, snowcapped mountains, archaeology and mythology of ancient culture and religion. Ecotourism is a visible means for communities and individual to earn their livelihoods because of:

- Increasing the awareness and value of natural wild life on both local and international levels.
- Contributing to the socio-economic incentives to preserve the natural wildlife population and habitats. This may contribute to the influx of foreign currency much needed for capital investment.
- Creating socio-political pressure on the local and international level in order to preserve the biological resources for current and future generations.

Ecotourism is a form of tourism that is inspired primarily by the natural history and the environment of an area. Profits that may originate from this programme are used for sustainable economic development and to fund local conservation projects for the preservation of the

environment. Tourism is one of the faster growing industries in the world today. It creates employment especially for guides, restaurants, hoteliers, local shopkeepers, merchants etc. and brings in foreign currency to economically marginal areas. And also it plays an important role in the social culture and economic development of the nations, and has the potential to preserve the heritages.

Hydro Power Potential: Arunachal Pradesh, having untapped estimated hydro power potential of 49,000 MW, may emerge as power house of India when this potential is fully harnessed (Source: Deptt. of Power, Govt. of Arunachal Pradesh). Even if a part of the available hydro potential is harnessed, the state will not only be self sufficient in meeting its own power requirement but at the same time it can earn revenue by supplying power to the other neighbouring states of the country. During 2002-03, 35 numbers of micro/mini hydel projects with an installed capacity of 32.48 M.W. and diesel sets with an installed capacity of 27.12 M.W are the main sources of power supply in the state though the actual power requirement is 95 M.W. So the state is highly deficient in power generation.

Forest Revenue: Forest has several uses and functions. Forest is scarce and is becoming increasingly scarce due to pressure on it. It can be attributed to increase in population and demand for forest resource. The forest resources of Arunachal Pradesh are under tremendous pressure due to increasing demand for human and livestock. Too much of extraction has led to forest degradation and disaster in ecological balance in recent time in this region and this led to famous Supreme Court verdict on 12/12/96 banning exploitation of forest resources specially industrial wood in Arunachal Pradesh and other State. If we refer to the table-3

shown above we find that the forest of Arunachal Pradesh was at higher side except during 1989 when the forest cover was 69,002 sq. km. only 0.22% of forest cover reduction during 1999 compared to 1989. If we accept state first report, then there was not much depletion of forest cover in the State. Forest revenue plays an important role in Forest economy of any state. The table-5 below shows the forest revenue of Arunachal Pradesh during last few years.

It may be seen from the above table-4 that the forest revenue of Arunachal Pradesh has decreased substantially specially after the Supreme Court verdict during 1996-97. The forest revenue during 1992-93 was Rs. 28.48 crores approximately while during 1993-94, it was Rs. 39.65 crores and Rs. 34.89 crores during 1994-95. It was Rs. 49.04 crores during 1995-96 and fell down to Rs. 25.24 crores during 1996-97 and further to Rs. 7.53 crores during 1997 -98. There is some improvement in recent years while it was Rs. 15.61 crores during 2002-03 and Rs. 9.63 crores during 2003-04.

Some suggestions to make the forests more beneficial

In order to maximize the monetary gains and maintenance of ecological balance, there is an urgent need for quick growing species to supply wood for fuel. Again, systematic plantation of suitable types on waste and semi waste land would be the right answer. Reserved forests are maintained by the State not only for ecological reasons, but also for economic benefit.

1. The first step in planting trees is the selection of species that will thrive on a given site. This has to be done on the basis of local observation, experience and ecological understanding. The purpose of planting should be to establish a

protective cover that would help to conserve and increase soil fertility to achieve rapid progress. The government must directly take step with its full authority, acquire all forests and waste lands, plant them with selected species of quick-growing trees and protect, control and manage them in the initial stages. All this can be done by the State forestry department which needs to be suitably strengthened for the purpose. After reaching the harvesting stage, the actual operation can be contracted out to qualified tribal people.

For planned forest management, quick-growing species should be planted. Wastelands should be brought under the scheme of Haryali through forestation and so on. There may be scheme for bamboo used in industry and also plant different species of bamboo compared to the neighboring countries like China, Myanmar etc. In fact 61 species out of 127 species of bamboo are available in India and most of them are indigenous to the NER. If a proper planning is made, all of them would be very useful in the industries of the State.

2. The Poor tribal people need to be rehabilitated in their own natural setting by enabling them to develop their skill and potential for production of forestry. What is required for this? It is sympathetic understanding of their needs and facilitating fuller use of their man power by making them active partner in social forestry. Actually the team spirit to do challenging tasks which the tribal have can be institutionalized through multipurpose service co-operatives. In this way the intermediaries will also get wiped out.

3. Forest based industries such as paper pulp, paper mills, match, wood factory, fibre board factory, plywood and hard-wood manufacturing, timber treatment and seasoning, resin, turpentine manufacturing industry should be economically

feasible. The finished goods can be marketed through co-operatives and Forest Corporation. The government can help by providing all infra-structural facilities to the local entrepreneurs to set up a net work of wood based small scale industries. The tribal people will then no longer remain mere collecting agents of minor forest produce but the skill, experience and capability generated in them would open out their entrepreneurial abilities. This will enhance their capacity to take up new jobs and help them to learn new skills so as to enable them to earn.

4. The unemployed youth can find employment in the rubber plantations as well as in the rubber-based industries. Rubber-based industries can also lead to the economic development of the state. Apart from the economic aspects, rubber plantations can play a vital role in the ecological and climatic conditions prevailing in the region. Rubber plantations have an important role to play in soil conservation. The vast stretches of fallow land of the region can be made productive and being man-made forests. As a whole, the cultivation of rubber and the growth of rubber-based industries will improve the status of the economy of the eight states of the north-eastern region and will contribute much to the prosperity of the region as well as of our country. On the other hand, rubber plantations will help to control the climate of the region to a great extent.

Forest planning and policy should be framed in such a way so as to provide maximum employment and income to the tribal people. In this case, the cultivation of rubber can hold out a big promise due to its shorter gestation period and also its foreign exchange saving role if it is made stronger in view of the sufficient availability of tilla lands in the state. Again, the future strategy of industrial development in the state hinges upon the

development of small scale and cottage industries rather than upon large industries, it has a direct linkage with the development of forest resources in the State.

5. Forest Corporations will also help to market the various forest products including medicinal plants collected by the local people so that the exploitation by middlemen and contractors can be eliminated. So the development of forestry in the state means the upliftment and economic development of the tribal population in this region. In the development of village forests in the North Eastern Region, the main problem is one of eliminating shifting cultivation (known as Jhum cultivation in this region) which has been going on from generations to generations. The local people of this region have been practicing shifting cultivation for the past several centuries. If the positive rate of growth is to be achieved, the practice of shifting cultivation has to be controlled and regulated. It is also to be noted that not only are the Jhumias facing serious economic problem but society as a whole is also having to pay price for deforestation in the region in the form of soil erosion, flood and drought.

For conserving and managing natural vegetation the jhum cultivation and illegal felling of trees, which are the root cause of deforestation, must be stopped immediately but not without rehabilitation of the jhumias. If the government is successful to protect the natural vegetation, the state will be the richest in having the Herbs which can be sold in national and international markets. Hence, it is necessary first to develop the market for herbs within the state where the local cultivators will be benefited economically. It will give an incentive to the local people to protect the valuable herbs from extinction. Shifting cultivation and illegal felling of trees are the main cause of disappearance of flora

and fauna in Arunachal Pradesh. The Central Government as well as the State Government should give top priority to protect the herbs of economic value in the State which are endowed more than 50% of herbs of the country. Days are not far when the Governments can generate employment as well as earn foreign currency from the export of the State's herbs if they try to take kin interest to protect the existing herbs from disappearance.

6. Forest Management: Though the North Eastern Region is no doubt one of the forests richest regions of India but still a large portion of forest area remains unutilized and unexploited due to its difficult terrain, heavy rainfall and transport bottleneck. The Government is no doubt trying to develop the forest resources in the North Eastern Region. But the finance and outlay for the forestry sector during the Five Year Plans are not sufficient. Forest management should be so oriented as to serve the best interests of the region.

Preservation of forest is a heavy task to the State. The interests of people depending on the forests products for their livelihood would have to be protected by providing training and employment opportunities in alternative occupations. The population increased and modernization are realities of the day when we plan for the future, new ideological statements are not enough, but one should have proper action plan. It is necessary that systematic forestation and plantation programmes are to be undertaken to increase the forest cover. All barren lands to be brought under forest cover by private sector.

7. Convention on International Trade in Endangered Species of Fauna and Flora (CITES): In the present Export Policy all wild animals and products are prohibited to export. All

items of plants of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and Wild Orchids are banned as per the current Export/Import policy. This policy further includes 29 species of plants obtained from wild and their portions derivatives and extracts which are not allowed for export. The remaining items other than these are permitted for export subject to no-objection from the Regional Deputy Director (Wildlife Preservation) of Government of India and legal procurement certificate/cultivation origin certificate from Divisional Forest Officer of the state government. For CITES species, specific permits are issued by the Regional Deputy Directors (Wildlife Preservation) designated as Assistant Management Authorities under the CITES depending on the placement of the items. Import restrictions are equally rigid. Import of Ivory and species found in India and its products is prohibited. Other species are allowed against an Import license and recommendation of Chief Wildlife Warden of the state. All export and imports of wildlife and its products are examined by officials of Regional Deputy Director (Wildlife Resurrection) before granting customs clearance.

India became a signatory to CITES in 1976. In nutshell CITES is a systems of permits and certificates to regulate International wildlife trade. The species are divided into three appendices depending upon their status in wildlife and volume of trade. In case any species is smuggled out of a country, the importing country co-operates by insisting on CITES documents. Presently the convention is signed by 144 countries. CITES has become an instrument to control the activities of elements, who tried to meet the demand of wildlife products by illegal means. Wildlife products from North-East States enter the illegal wildlife trade in live, raw or semi-finished forms only. A very large and diverse group of species are involved in such

trade. The endangered species of plants and animals are greatly threatened owing to illegal trade in this region. CITES should be strictly followed in India in General and also in North-East States in particular.

8. Plantation of Reserved Forest: The measure involves the policy of restocking the degraded reserved forest areas with high quality species of trees. The strategy is to plant the trees at close spacing commensurate with the silvicultural need and bearing capacity. The restocking measure is expected to restore the quality and quantity of flora in the reserved forest. The schemes adopted under this measure are: (a) Teakwood Plantation Scheme ;(b) Plywood Plantation Scheme; (c) Matchwood Plantation Scheme;(d) Regeneration of Degraded Forest Scheme ;(e) Quick Growing Industrial Species Plantation Scheme;(f) Minor Forest Product and Medicinal Plantation Scheme.

Social Forestry: Social forestry refers to the plantation outside the area of reserved forest. It broadly means taking forestry to the people. It was first started by the central government during the Sixth Five Year Plan. Assam also along with other states launched this project during the same plan period. The social forestry scheme was originally designed to plant up all the vacant and community land and also to afforest the land where encroachment had already begun. To this end, extensive plantation programmes had been taken up on government waste lands, roadside lands, railways track side lands, canal embankments, village grazing reserves and institutional lands. In course of time, the social forestry scheme has been diversified to include planting in fallow private lands and block planting or single planting on homesteads, bunds and boundaries of the fields by persuading people to agree to this type of plantation for their own benefit and for the benefit of healthy

environment. For this purpose, the necessary seedling raised in departmental nurseries is supplied to the people free of cost. Later on, plantation of avenues in the towns and cities, ancient tanks and other historical places, along with the creation of recreational parks have also been taken up under the extended scheme of social forestry to improve the bio aesthetic impact. The implementation of the social forestry scheme, although vigorously pursued by the government has achieved only partial success because of several constraints afflicting the project.

Farm Forestry: Farm forestry is another important measure to increase the forest cover of the state. Farm based forestry under non government organization in the form of private or public limited company or corporation with investment from members of the public is being practiced with good amount of success in many states. Farm forestry is generally devoted towards developing Agro-forestry, social forestry and also plantation of commercially valuable trees.

Forest protection and regeneration programme, particularly social forestry schemes to be a success, involvement of people should be ensured. Participation of people can be expected only when they are made partners not only in formulating and implementing the various schemes of plantation based on local needs, potentials and availability of inputs, but also in sharing the benefits of these programmes to meet the basic needs of the people in respect of fuel wood, fodder, minor forest produce and small timber.

Everybody should realize that forest represent the proverbial goose that lays golden eggs. If man decides to kill the goose to grab all the forest wealth at one time, the future would be bleak.

Conclusion

We find that the forest economy had a great impact on the State Economy especially during last decade. Again, we are satisfied with the intervention of the Supreme Court on preserving ecology and environment in North-East States in general and Arunachal Pradesh in particular. But this had a great impact on the economy of the state. The forestry-logging sector and manufacturing sector were affected very badly and as a result the revenue of the State decreased sharply. The socio-economic effect is badly affected more specially in the eastern part of the state where forest based industries were largely concentrated. Now the need is for alternative ways and means to compensate the state revenue. The State should try for enhancing the entrepreneurship among the indigenous people based on other alternative resources like mining, bamboo, etc. For the State, alternative resource has to be mobilized for higher matching of state share to central aids and grants. There must be ways and means to reduce dependency on Central Government and central fund for self-sufficiency of the State. Given such multi-facet dimension of complexity, conservation and management of forest resources, including eco-development of the region continue to remain a special challenge. For the betterment of lives, urbanization, transportation, industrialization are necessary but we can try to minimize the deforestation.

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Table-1: The Forest Cover and Recorded Forest Area in Arunachal Pradesh

Forest Cover		Recorded Forest Area	
Very Dense Forest	13,907 km ²	Reserved Forest (RF)	10,178 km ²
Open Forest	14,508 km ²	Protected Forest (PF)	9,536 km ²
Moderately Dense Forest	39,604 km ²	Unclassed Forest (UF)	31,826 km ²
Total	68,045 km²	Total	51,540 km²
Of State's Geographic Area	81.22%	Of State's Geographic Area	61.55%
Of Country's Forest Cover	10.03%	Of Country's Forest Area	6.65%

Source: Statistical Abstract of Arunachal Pradesh, 1998

Table-2: Legal Forest Status of the Forest in Arunachal Pradesh

Sl. No.	Legal Classification	Area (Km ²)	% of Recorded Forest	% of Geographical Area
1.	Reserve Forests	9722.69	18.86	11.61
2.	Protected Forests	694.3	1.35	0.82
3.	Anchal Reserve Forest	329.38	0.64	0.39
4.	Village Reserve Forest	300.24	0.58	0.36
5.	National Parks	2468.24	4.79	2.94
6.	Wild Life Sanctuary	7059.75	13.70	8.43
7.	Unclassified State Forest	30965.39	60.08	36.90
	Total:	51540	100	61.55

Source: 'Forest Statistics (Up to Year 2000-2001) Arunachal Pradesh'

Table-3: Forest type and Species Diversity of Plant and Animal in Arunachal Pradesh

Sl. No.	Zone	Forest Type	Plant spp.	Animal
1	Tropical (Plains)	Tropical evergreen 4A/b1/1 tropical semi-evergreen 2/B/C1/1a Reverie Semi evergreen	Altingia excelsa, Diptorocarpus gracils, D.retusus,	Asian Elephant, Tiger, Leopard, Snow Leopard, Clouded leopard, Takin, Chinese Pangolin,
2	Sub Tropical (upto 900-1800 mtr).	Sub-Tropical broad leaved 3C ₃ /B _b , 3c/Is ₂	Castonopsis, Quercus, Populus, Tsuga, Acer, Abies, Cupressus, Pine.	Himalayan Black Bear, Hoolock gibbon, Capped langur, Slow loris,
3	Sub Tropical (upto 900-1800 mtr).	Sub-Tropical pine forest (1200-1800 mtrs) 11/9/DS/1	Pinus roxburghii, Pinus Wallichiana, Pinus mesksii	Assamese macaque, Stump tailed macaque,
4	Temperate (1800- 2750 mtrs).	Temperate broad leaved forests IV/II/IIB/C ₁ IV/II/IIB/C ₂ sub-ayrine and Alpine	Quercus lamsllosa, Castonopsis India Acer hookeri	Pig tailed macaque, Rhesus macaque, Black mutjac, Leaf deer, Musk deer etc.

5	Alpine	V/C ₂ , VI/ISC ₃ , VI/16/C ₁ , E ₁		
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Source: Department of Forests & Environment, Government of Arunachal Pradesh

Table-4: Dominant families of Angiosperms of Arunachal Pradesh, India and world

S.No.	Name of the family	Arunachal Pradesh		India		World	
		Genera	Species	Genera	Species	Genera	Species
	Orchidaceae	122	545	184	1229	735	15000
	Leguminoceae	67	196	191	1152	690	17600
	Asteraceae	68	186	167	950	900	1300
	Rubiaceae	52	159	115	659	500	6000
	Ericaceae	9	158	15	199	50	1350
	Poaceae	76	153	260	1200	620	10000
	Urticaceae+Moraceae	25	129	25	114	45	550
	Rosaceae	18	111	44	492	100	2000
	Cyperaceae	22	96	38	545	90	4000
	Euphorbiaceae	39	94	84	528	300	5000

Source: Department of Forests & Environment, Government of Arunachal Pradesh