

Management of Forest Resources and Sustainable Development in a Less Developed State of India: Issues and Challenges

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Abstract: The concept of economic development has been changing over a period of time. In the early 1980s a new concept of economic development emerged as a reaction to negative experiences of development which is known as 'sustainable development'. Sustainable development is processes in which the economic and social welfare of the people can be maximized with minimize damage to natural resources and environment. Thus the conservation of forest resources and sustainable development are closely interlinked such that one cannot be achieved at the expense of the other. Arunachal Pradesh, one of the less develop State in India, is a micro hotspot within the larger Eastern Himalayas. Based on satellite imagery, the forest area in this State constitutes around 80.39% of the total area, which is one of the highest among the States of India. Can the rich forest resources of the State continue to be protected as development comes? Already, a price has been paid, the forest cover as well as diversity in its highly rich flora and fauna has declined. The conflict between development process and protecting forest resources and biodiversity of the State is becoming increasingly more apparent. Hence, the present paper deals with the issues and challenges of management of forest resources and sustainable development in the context of Arunachal Pradesh.

Key words: Environment • Natural resources • Sustainable development • Bio diversity • Flora and fauna

INTRODUCTION

Environmental conservation and sustainable development are closely inter-linked such that one cannot be achieved at the expense of other. The preservation of natural resources is one of the most important components of environmental conservation in the hilly areas. Forests are the most important natural resources in the hilly area and they play an important role in the economic life of the indigenous people of the hilly areas. At the same time forest represent a complex economic resource. In addition to their timber value, they are a valuable source of biodiversity, as a carbon store and in reducing the severity of floods. At the same time forest may be regarded as capital stocks of such a nature that they yield two distinct flows of goods fundamentally different in nature-flow of private good such as timber, fuel wood, other minor forest produce and a flow of public

goods like maintenance of environment, causation of rainfall, prevention of soil erosion, etc. However, there is a conflict between these two types of goods which the forests yield. Hence, a compromise has to be brought between the demand for private goods and that for public goods from forest for achieving sustainable development in Arunachal Pradesh and here lays the importance of management of forest resources in a hill less developed state like Arunachal Pradesh.

Status and Ownership of Forests in North Eastern Region of India:

There are some unique features of forests situated in Arunachal Pradesh. Around 80.39 percent of the total geographical area is covered under forest which is second highest among the eight States of North East India. As per the estimates of the Forest Survey of India in 2013 based on satellite imagery out of total forest cover of the State 77.60 percent consists of dense forest

Table 1: Forest coverage in North Eastern States in 2013 (Area in km²)

State	Geographical Area	Dense Forest*	Open Forest*	Total Forest**	Change in Forest Area from 2011- 2013 (<i>Per Cent</i>)
Arunachal Pradesh	83,743	52239 (77.60)	15079 (22.40)	67321 (80.39)	-0.11
Assam	78,438	12789 (46.22)	14882 (53.78)	27671 (35.28)	0.00
Manipur	22,327	6822 (40.15)	10168 (59.85)	16990 (76.10)	-0.45
Meghalaya	22,429	10138 (58.64)	7150 (41.36)	17288 (77.08)	0.06
Mizoram	21,081	6038 (31.69)	13016 (68.31)	19054 (90.38)	-0.30
Nagaland	16,579	6034 (46.26)	7010 (53.74)	13044 (78.68)	-1.65
Sikkim	7,096	2661 (79.24)	697 (20.76)	3358 (47.32)	-0.01
Tripura	10,486	4750 (60.39)	3116 (39.61)	7866 (75.01)	-1.06

Note: *Figures in the bracket represents the percent of total forest coverage

**Figures in the bracket represent the percent of total geographical area

Source: India State of Forest Report (2013) [10].

(crown density above 40 percent) and 22.40% consist of open forest (crown density 10 percent to 40 percent). An analysis reveals that in around 2.5 percent of India's land mass, the State of Arunachal Pradesh contains nearly 16 percent of total timber growing stock of the country (the highest among the individual States) and more than 30 percent of India's fauna diversity [1].

An attempt is now made to examine the position of Arunachal Pradesh in terms of total forest coverage among the North Eastern States of India on the basis of latest satellite date. The details are furnished in Table 1.

Table 1 shows that out of eight North Eastern States, Mizoram has the highest forest coverage (90.38 percent) followed by Arunachal Pradesh (80.39%). However if we look into the composition of forests, Arunachal Pradesh has the highest dense forests in the region (77.60 percent of total forest cover) where as the Mizoram has the lowest dense forest (31.69%). Table 1 also shows that all the North Eastern States lost the forest coverage in between 2011 to 2013. In fact, during this period North Eastern Region lost the forest area of 627 sq. km.

In Arunachal Pradesh, the ownership of land as well as the forest land and the individual right to use it are governed by local traditions and custom of the tribes. Under the prevailing land tenure system, there are three types of land ownership namely (a) community land (b) clan land and (c) individual land. Regarding the forest land, almost all the tribes have the community forest which is controlled by the village council. In some areas, clan ownership is recognized in the forest areas falling within the village jurisdiction. That is why if we look at the data on the basis of legal status of forest in the State, it is found that around 60.11% of total forest is under community ownership which is reported as Unclassified

Table 2: Classification of forest in Arunachal Pradesh, 2008 (*Legal Status*)

Legal Classification	Percentage of Forest Area
Reserved Forests	19.54
Protected Forests	0.02
Anchal Reserve Forests	0.63
Village Reserve Forests	0.58
National Parks	4.44
Wild Life Sanctuary	14.50
Orchid Sanctuary	0.19
Unclassified State Forests	60.11
Total	100.00

Source: Arunachal Pradesh Forest Statistics (2008) [11].

State Forest (USF) (Table 2). However, at present there is a growing tendency of individual ownership of forest which is a recent phenomenon in the State. For example, in the *Apatani* plateau of Lower Subansiri district in few areas of other district of the State, the forest has become increasingly privatized.

The reserve forest, National Parks and Wild Life Sanctuary constitutes of 19.54, 4.44 and 14.50% of the total forest area respectively of the State. However, there is a steady increase in reserve forest in the State. On the other hand *Anchal* Reserve Forest covered only 0.63 % of the total forest area. Such forests are managed by the forest department with the provision for sharing the net revenue in the ratio of 50:50 (share of village: share of Government). However the unclassified State forests remained the highest (60.11%) where there is community ownership. A much-referred to problem with common property resources is the 'tragedy of commons' [2]. Whenever any of the set of rules and regulation is violated, individual choices prevailed over the social choices. This is exactly what happened in Arunachal

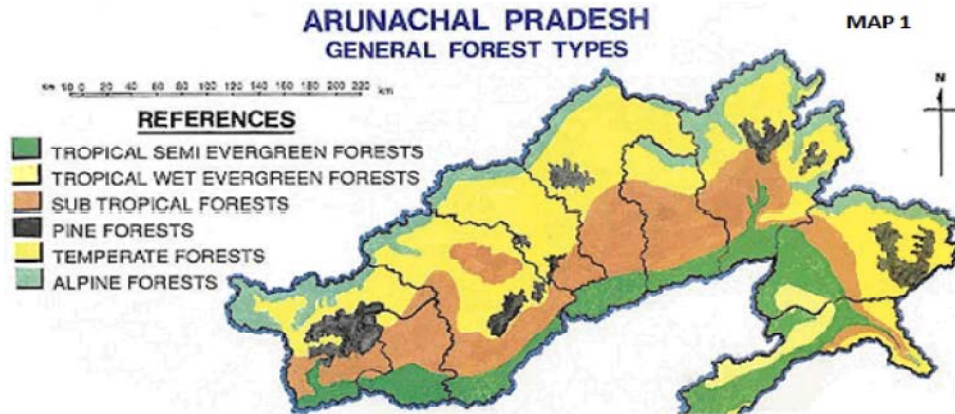


Fig. 1: Map showing the Arunachal Pradesh general forest types.

Table 3: Dense and Open Forest cover in Arunachal Pradesh from 1987 to 2013 (Area in km²)

Year	Dense forest	Open Forest
1987	51096 (84.46)	9404 (15.54)
1989	54272 (78.93)	14491 (21.07)
1991	54542 (79.33)	14215 (20.67)
1993	54510 (79.39)	14151 (20.61)
1995	54176 (78.95)	14445 (21.05)
1997	54155 (78.94)	14447 (21.06)
1999	57756 (83.89)	11091 (16.11)
2001	53932 (79.26)	14113 (20.74)
2003	53511 (78.67)	14508 (21.33)
2005	52388 (77.29)	15389 (22.71)
2007	52414 (77.82)	14939 (22.18)
2011	52387 (77.71)	15023 (22.29)
2013	52239 (77.60)	15079 (22.40)

Note: Figures in the bracket indicates percent of total forest area

Source: India State of Forest Report (1987-2013) [10].

Pradesh. This is clear when we look into the table 3 which shows that there is steady reduction of dense forests in Arunachal Pradesh from 1987 to 2013.

In spite of less of dense forest cover, Arunachal Pradesh still has all the vegetative type i.e., tropical, sub-tropical, temperate and alpine. The details are given in Map 1 (Fig. 1).

A great diversity is associated with tropical and sub-tropical vegetation types. All the useful plant species ranging from medicinal to timber plants are closely linked with the economic life of the people. The State is endorsed with about a third (5000 seed plants) of the 15000 seeds plants found in the India along with thousands of non-flowering plants and around 500 exotic Orchids [3].

Assessment of Forestry Planning During Various Plan

Periods: Regarding forestry planning in Arunachal Pradesh, we find that the State Government had not formulated a forest policy of its own and therefore the forestry planning in Arunachal Pradesh slowly evolved out of the forestry planning enunciated at the national level [4]. For example, when the National Council of Applied Economic Research was requested in 1964 to conduct a techno-economic survey, it recommended three suggestions regarding development afforest namely- (i) a massive programme of industrialization based on forest resources: (ii) emphasis on the immediate development of interior areas: and (iii) strengthening of the machinery implementation i.e., the Forest Department [5]. On the basis of recommendations therein, we find the introduction of *Anchal* Forests in 1975-76, the establishment of Arunachal Pradesh Forest Corporation in 1978-79, encouragement for the mushroom growth of saw mills and as a result the forest-based industries were steadily initiated in this State. At the same time, the forest resources based industrialization in the State has largely been synonymous with the massive supply of forest based raw materials and semi finished products to the other parts of the country. For example, according to the official estimate, Arunachal Pradesh contributes nearly 50% of timber supply made from the North Eastern Region of India to other parts of India, [6].

With this background, it will be quite interesting to study the detail of the financial outlay for forestry development during the planning period which is given in Table 4 which shows that there was no doubt steady increase in plan allocations in the forestry sector from INR 23.15 lakhs in the First Five Year Plan to around INR 7700 lakhs during the Eleventh Five Year Plan. But there was a drastic reduction in Percentage allocation to total

Table 4: Allocation under forestry sector and revenue from forest during five year plan periods (in INR. Lakh)

Plan Period	Allocation to Forestry	Revenue from Forests
1 st Plan	23.15 (7.71)	37.00
2 nd Plan	32.20 (6.32)	101.57
3 rd Plan	51.00 (7.13)	236.67
4 th Plan	158.00 (8.78)	707.05
5 th Plan	348.00 (5.50)	1368.70
6 th Plan	1397.24 (6.26)	3487.82
7 th Plan	2741.80 (4.99)	7004.55
8 th Plan	4710.00 (4.07)	17729.09
9 th Plan	6018.12 (2.42)	7364.82
10 th Plan	7022.40 (1.81)	5850.20
11 th Plan	7700.00 (1.98)	NA

Note: The figures in the bracket indicate the percentage of allocation to forestry sector to total allocation.

Sources: (1) Report of Planning Commission, Government of India, New Delhi.

(2) Arunachal Pradesh Forest Statistics, (2008) [11].

allocation from 7.71% in First Five Year Plan to only 1.98% in Eleventh Five Year Plan. However, the planned allocation to the forestry sector is not in keeping with the revenue generated. The figures show that the amount allocated for the forestry sector was inadequate and it was due to inadequate budget allocation the plantations and development programmes of the forest department suffered a major setback [7]. Hence, fund allocations should be increased substantially so that more investment in the forestry sector could be made to increase the productivity of forest.

At the same time, the State Government policy towards the development of forestry suffers from the conflicting choice between production-oriented approach and protection-oriented approach to forestry. The approaches seem to be mutually contradictory. The Sixth and Seventh Five Year Plan in Arunachal Pradesh paradoxically had based its strategy on this contradictory footing [4]. Thus, while it was stated, strategy during the Seventh Five Year Plan that in order to protect ecological balance, it is necessary to take up afforestation, the strategy on "creating artificial regeneration method to increase the area under economically valuable species for meeting the industrial and economic needs of the State [8] undermined the very purpose of the strategy, as emphasis was laid more on the schemes like economic plantation of industrial and commercial species (i.e., Production Sector) have got much higher priority than Forest Conservation and Development (i.e., Forest Protection Sector). The production sector got more priority during the planning

period because of a strong explicit demand backed by purchasing power. As a result the State suffers from deforestation although the government statistics claim that around 61.5 % of total area is covered under forest for the last two decades. The deforestation is felt when micro level studies are undertaken. For example, the latest remote sensing data show that State lost a forest area of around 89 sq. km. during 2011 to 2013.

Major Threats to the Arunachal Pradesh Forest Resources:

The floral and faunal diversities of the State and the dependence of the people on forest bio resources from substance resulted in a rich indigenous knowledge system (IKS). A contributing factor to this richness in the IKS is the ethnic and cultural diversity associated with the demography of the State. These systems played a pivotal role in the conservation of the unique biodiversity over the centuries. In recent years, the State's rich biodiversity has increasingly come under threat. The fast development activity in the last four decades and the improvement of communication network has meant increased access. Road building improved communication system but the blistering process involved has meant the loss of valuable habitat. The monetization of barter economics has meant increased trade in timber [3]. Some of the important threats of biodiversity are identified as follows:

Illegal Felling of Trees: It is found that accessible natural forests particularly in the foothills of Arunachal Pradesh are under great pressure to a large scale due to extraction of timber and illegal felling of trees. Although the demand for wood for local consumption is relatively low due to low population of the State but in view of the increasing demand for industrial timber within the State and other parts of the country, the forest in the State are under great pressure. As per the official estimate, the State used to contribute to nearly 50% of the timber supply made from the North Eastern region of India. The tree permit system in unclassified State forest (USF) which was introduced to enable the local people to earn their livelihood in logging and extraction of timber with a view to generate income led to the emergence of a 'neo-rich' class in the traditional tribal society in collaboration with private forest contractors. There is a growing social and political pressure to overexploit the forest and the protection of forest are becoming increasingly difficult.

Moreover, the forest located particularly along the inter-state border with Assam and Nagaland are mainly prone to illegal fellings of trees and smuggling of timber. Some illicit fellings are also reported in the forests

adjacent to the tributaries of the Brahmaputra River and the logs are thrown into the river which is collected in the downstream of Assam plains for sale to saw and veneer mills in different parts of the country. The State forest department finds itself ill equipped to fight such timber poachers and smugglers and contain this menace due to the limited resources available with it for protection of forest.

Large Scale Practice of Shifting Cultivation: Shifting cultivation (*jhum*) is one of the factors adversely affecting the forest conservation efforts in North-Eastern states in general and Arunachal Pradesh in particular. *Jhumming* is mainly practiced in the USF areas in the district of Tirap, East and West Siang, Lower and Upper Subhansiri, Papumpare and East Kameng. Population wise around 54,000 families are practising shifting cultivation in the State (North Eastern Council, 2006). Thus, the dominance of shifting cultivation in the whole economy is quite evident. At the same time, it is a well-known fact that much of the forest land in the State is lost due to shifting cultivation. For example, according to Forest Survey of India, 2013, there was a net decrease of forest area in Arunachal Pradesh by around 89 square kilometers and out of these a major portion is lost due to the shifting cultivation. Forest gets denuded when old *jhum* land is left uncared for and new land is taken for *jhum*. The danger of ecological imbalance due to deforestation looks large when the claim for such new land soars up with the growth of population.

Hydro Power Projects: The State is very rich in water resources and has enormous potential of hydropower resources. A number of hydropower projects have been commissioned and these projects are at various stages of progress. The commissioning of hydropower projects have not been taken into account the proper environmental impact assessment. As a result, these projects put pressure on State's bio resources.

In addition, there is illegal trade of non-timber forest products such as medicinal plants, orchids, animal hides, musk, gland and birds which are smuggled out of the State by poachers.

DISCUSSION

The rich biodiversity of the State presents huge opportunities and challenges. The conflict between development and protecting the biodiversity of the State is becoming increasingly more apparent. Arunachal

Pradesh has a unique opportunity to map out a development path that is sustainable and ecologically sound. However to do this, the State Government will have to take the initiative and will also have to take the people into confidence. In order to achieve sustainable development along with environmental conservation the following areas need attention:

- Resources mapping must constitute an integral part of the biodiversity conservation strategy, with a view to identify endangered species and threat to geological diversity. This can help to evolve protected area management. The involvement of local people in documenting indigenous knowledge for posturing can go a long way in creating awareness and protecting biodiversity.
- Joint Forest Management especially in the regeneration of forests on degraded land should be encouraged with sharing of benefits. This model is very suitable in a hilly State like Arunachal Pradesh where around 60 percent of total forests are mainly under the traditionally ownership of local village communities. In this direction Arunachal Forest Department has been able to achieve significant progress by establishing around 21 Forest Development Agencies (FDA) and 364 Village Forest Management Communities (VFMC). Under this scheme, an area of 21,416 hectare were covered under plantations generating 1,33,559 labour days. Efforts should be made to cover all the villages of Arunachal Pradesh under JFM system for sustainable development of forest resources for socio-economic upliftment of villages and maintenance of ecological balance [9].
- In order to reduce the pressure on forest cover, more and more areas of the State should be covered under plantation crop like Tea, Coffee and Rubber. The cash crop like ginger and spices should be encouraged on degraded forest land.
- The establishment of small scale industries based on Non Timber Forest Product (NTFP) like floriculture etc so as to ensure a regular flow of such produce is another area which can be encouraged. The setting up of these small scale industries can provide livelihood opportunities. One such area that has enormous potential is bamboo and cane.
- The State can also be developed through promotion of nature based tourism in which the State has enough potentiality, provided certain infrastructural facilities are built up. Forests used to contribute a

major source of total revenue from the local source to the State exchequer, in which around 85 percent of its total budgetary expenditure comes from the centre in the form of grants-in-aid. The situation has worsened with the royalty of forest products declining due to the Supreme Court's order regarding restricting of felling of trees since mid nineties. Hence, alternative internal resources and employment opportunities have to be created within the State itself and the promotion of nature based tourism appears to be the best way in this respect which is considered the least ecologically disturbing industry in hill regions [7]. Hence, under the present circumstances a vigorous study is required to make the people aware of how additional income and employment can be generated locally due to the existence of forest resources by promoting ecotourism which may also help to conserve the forest resources. In fact, the flow on academic thinking on forestry has always been directed towards issues like timber demand, survival of forest based industries or sustainability and biodiversity. However, very few studies have been stressed on the valuation of recreational aspects of forests in the context of India and it is urgently required, particularly in the context of Arunachal Pradesh in order to conserve the rich forest resources of the State.

CONCLUSIONS

There is ample scope for scientific management to improve the productivity and sustainable utilization of vast forest resources of the State. Various projects and programs are being implemented in the State. In the past, the State's economy was dependent on forest resources. However, economic transformation and development has led to the loss of biodiversity and deforestation. Now serious attempts are being made to encounter this by involving the local communities in Joint Forestry Management (JFM). Alternatives are explored and the forest management is reoriented towards Non Timber Forest Product (NTFP) and sustainable utilization without compromising on conservational issues. A long term perspective plan is being evolved in forestry and wildlife sectors. With these expected shifts in policies and plans, the State is poised for better forest management and sustainable development.

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