DEPLETION OF COMMON PROPERTY RESOURCES AND ENVIRONMENTAL DEGRADATION: A MICRO STUDY IN NORTH-EAST INDIA

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Abstract

Forest resources act as life supporting resources in North-Eastern part of India. It influences the life and lore of the people with rich culture, traditions, ethos and indigenous knowledge systems for conservation and its sustainable use. However, with the increasing population growth , unhindered immigration, expansion of agriculture, clearance of forests for various purposes, urbanization and other biotic pressures such as grazing by cattle and goat, cutting of timber and fuel wood, collection of rare and ornamental plants for trade, collection of medicinal plants, cane bamboos and other minor forest produces, resource-base of the region have gradually been depleted and threatened the existences of large number of plant species in the region. Based on a large scale primary survey covering 19 villages and 447 households of two districts of Arunachal Pradesh , a State in North East India, this paper attempts to make an in depth analysis of the role of common property forest resources in the lives of autochthons . The study also attempts to quantify the extent of depletion of common property resources and its impact on ecological sustainability of the region. The determinants of common property forest depletion enable to suggest for an environmentally sustainable management of common property forest resources which would not only help to prevent the resources degradation and rural poverty but will also conserve the commons from over-exploitation.

Key words: Common property forest resources, environmental degradation, ecological sustainability, rural poverty.

1. INTRODUCTION

The exclusion of members is difficult under common property regime while joint use involves subtractibility (Berkes, 1989, Fenny et al., 1990). Common property resources are thus considered to be public good with finite or subtractive benefits. This means that if someone uses more less remains for others and so, common property resources are potentially subject to congestion, depletion and degradation (Ostrom, 1990, Randal, 1983). Such problems of common property-depletion, degradation, over-exploitation-results from the tension in the structure of joint use rights adopted by a particular village or group (Runge, 1986). Due to the failure to enforce rights and duties, members enjoy exclusive use rights in many common property regimes where resource is limited and many users are present and so excess demand for resource eventually lead to its over-exploitation. In fact, the depletion of common property resources mainly occurs when its use exceeds the limits of sustainable yield. Under the circumstances, individual members enjoy the benefit of common property regimes but the community or the group pays the full cost of individual behaviour. This phenomenon was labeled as the tragedy of commons by Hardin (1968). The consequences of forest degradation are reductions in wildlife numbers supported, land degradation and soil erosion, reduced water availability, more travel time to collect firewood and minor forest products, and reduced ability to support grazing livestock.

Arunachal Pradesh, a State in North- Eastern part of India, is rich in forest resources. The State covers only .011 per cent of population while its geographical area constitutes 2.5 per cent of total area of the country. As high as 61.55 per cent of the total geographical area of the State is under forest cover as against 22.08 per cent of the country as a whole. The forest cover of the State is 51540 sq. km., which is 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). According to legal status, there are seven fold

classifications of forests in Arunachal Pradesh. For scientific management and sustainable use of forest produce, around 19 per cent of the forest cover of the State has been brought under the category of reserve forests. The unclassed State forest constitutes the highest 60.08 per cent of the total forest area of the State.

Only 0.64 per cent of the forest cover is under Anchal Reserve Forest. National park and wild life Sanctuary together constitutes 18.49 percent of the total forest cover of the State. In the absence of cadastral survey of land other resources; there is a dispute (community vs. State) regarding the ownership of the forest resources.

In general, village forest and unclassed State forests are claimed to be the community (common) forest in the State of Arunachal Pradesh. Thus, as high as 60.66 per cent of total recorded forest is considered as common forest in the State. The per capita availability of forest is significantly higher in Arunachal Pradesh (6.31 hectare) compared to the national average of only 0.12 hectares. However, with the increasing population growth , unhindered immigration, expansion of agriculture, clearance of forests for various purposes, urbanization and other biotic pressures such as grazing by cattle and goat, cutting of timber and fuel wood, collection of rare and ornamental plants for trade, collection of medicinal plants, cane bamboos and other minor forest produces, resource-base of the region have gradually been depleted and threatened the existences of large number of plant species in the region. Based on a large scale primary survey covering 19 villages and 447 households of two districts of Arunachal Pradesh namely Papumpare and Upper Siang, this paper attempts to make an in depth analysis of the role of common property forest resources in the lives of autochthons . The study also attempts to quantify the extent of depletion of common property resources and its impact on ecological sustainability of the region. The determinants of common property forest depletion enable to suggest for an environmentally sustainable management of common property forest resources which would not only help to prevent the resources degradation and rural poverty but will also conserve the commons from over

Cprs are the life supporting resources in Arunachal Pradesh. Arunachal Pradesh is the home to a wide range of minor forest produce or non-timber forest products (NTFPs). NTFPs comprise a wide range of products such as cane, bamboo thatch, grass, resins, a host of medicinal herbs, spices, aromatic plants, tendu leaves, dhuna, pipli and trees with oil-bearing seeds.
The tribal population of the state mainly for their sustenance uses these NTFPs. Some of these products are extracted for selling in the market. Bamboo has innumerable uses for the tribal people of Arunachal Pradesh, such as construction of houses, fencing of agricultural fields and garden plots, carrying water, as storing vessels and even for cooking rice. Bamboo plays a significant role in tribal celebrations and rituals.

The field survey data reveals that around 16.71 per cent of the household income is coming from the cpr based activities, poor households enjoy around 23.56 per cent of total household income while for the non-poor this percentage is 14.33; on the other hand, around 24.56 per cent of the total consumption expenditure of the household is supported by the cprs in the study villages, the poor and non-poor households enjoy 24.18 per cent and 24.89 per cent respectively. The classification of sample households into poor and non-poor category show that 21.25 percent of the households live below the poverty line. The extent of poverty increases sharply to 37.14 per cent in the absence of access to cprs. This signifies that with the access to common property resources the poverty level reduced by 15.89 percentage points in the study villages. The derivation of income from common property resources has serious implications to rural inequalities and social justice. CPRs contribute significantly to reduce rural economic inequalities and income poverty. However, increasing participations by the non-poor in recent years in CPR based activities have changed the distributional dynamics of CPRs in the rural economy of the State. Contrary to the reduction, CPR based activities have led to increase the economic differentiations in the study villages. In other words, the extraction of CPRs specifically by the non-poor is found to be inequality enhancing in the study area. This is causing concerns for the survival of the masses and social justice. CPRs provide 88.20 per cent of total energy expenditure (88.21 per cent and 88.19 per cent respectively for non-poor and poor households); non-poor and poor households enjoy common forests almost equally for the extraction of fuel wood. CPRs are an important source of employment. An average household in the study villages could generate around 150 man-days of employment per annum from CPR based activities. Around 18.33 per cent of the working populations of the villages are engaged in cpr-based activities. Animals graze mainly in the common forests. The non-poor households with greater ownership of livestock created larger animal grazing days than the poor households. The percentage of animal unit grazing days provided through CPRs for non-poor households (81.82 per cent) is found to be higher than the poor households (69.54 per cent). The extraction of products from CPRs, by the households, depends on a host of factors relating to households and village characteristics. The existence of private property, the level of education, size of the households, the proportion of women and child to total family size, the distance between dwelling place and the common forest field, market distance etc are some of the socio-economic, demographic and geographical factors which influence the extraction of products from CPRs (Kuri, 2005).

3. THE EXTENT OF FOREST DEPLETION

Among 19 surveyed villages severe deforestation was found in 5 villages under Kimin block i.e. in 26.32 per cent of the cases, medium deforestation was found in 5 villages under Sagalee block i.e. in 26.32 per cent of the cases. Therefore forests had declined compared to earlier in 52.64 per cent of the total cases. Interestingly, in 9 villages under Marrying block (Damro hemlet) i.e. in 47.36 per cent of the cases, no noticeable deforestation was observed. The low extent of deforestation in Marrying block was mainly observed to be responsible for geographical inaccessibility, remoteness and non-penetration of the market. The traditional customary rights and obligations were well defined and individuals followed the access rules in greater vigor and sincerity. On the other hand, large-scale deforestation in Kimin block is mainly

responsible for the easy access to market. Free riding behaviour of the individuals for commercial exploitation of common property resources frequently led to the violation of access rules set by the community. The block wise compiled data as regards the depletion of common property land forest resources are presented in the following table.

Table1: Extent of Depletion of Common Property Resource (during 1980-2003)

Sl. No.	Items	Percentage decline			
		Sagalee	Kimin	Damro	Total
1.	Common forest area (in sq.km)	12.50	18.75	5.00	12.00
2.	Common Village land (in sp.km)	9.75	12.00	2.00	8.00
3.	Common grazing land (in sq.km)	5.00	8.00	0.00	4.33

Source: Village Survey 2003-2004.

The common forest area declined around 12 per cent in the study area during 1980-

of timber. Some illicit felling are also reported in the forest adjacent to the tributaries of the Brahamaputra river and the logs are thrown into the river which are collected in the downstream of Assam plains for sale to saw and veneer mills in different parts of the country(Mitra,2002).

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. Some of the villagers reported that the forest officials are also becoming a partner of such illegal felling of trees for timber extraction.

Therefore, there is an urgent need to protect the rich forest resources of the state by firmly dealing with such organized gangs indulging in illicit tree felling and also by controlling the indiscriminate destruction of forest in unclassified Sate Forest.

4. DETERMINANTS OF FOREST DEGRADATION: AN ECONOMETRIC ANALYSIS

For the purpose of regression analysis, a composite measure called Forest Degradation Index (FDI) was constructed as the sum of forest damage (FD), forest condition relative to earlier (FC), and the depth of forest use penetration (FP).

Therefore, FDI = FD + FC + FP

Where FDI = Forest degradation index

FD = Forest Damage

FC = Forest condition (quality)

FP = Forest use penetration

All three variables (FD, FC, FP) are coded (using four points scale) so that increasing values show higher levels of forest degradation, they are comparable in magnitude so that each component has a substantive impact on the index, and they are positively correlated. The major advantage of the Forest Degradation Index as a measure of environmental outcomes is that it captures the quality of the vegetative cover, and not just its area, based on field visit; the disadvantage is that the index relies on subjective judgment.

4.1.THE REGRESSION MODEL

Dependent Variable (Y): Log of forest degradation index

Independent Variables:

(1) Management active (whether exists or not is measured by introducing the dummy variable);
(2) Distance of the village from common/state reserve forest (measured by actual distance in k.m;
(3) Distance of the village from nearest market (measured by actual distance in k.m from the village schedule);
(4) Log of population size of the village (measured by actual numbers from the household survey);
(5) Log of live stock units (measured by actual numbers in cow units from the household survey); and
(6) Ratio of population to common forest/land area of the villages(from village survey data).
(7) Village poverty index (measured from household survey data)
(8)

In the study we considered 19 sample villages. Apart from household survey, we collected information from each village and filled-in a village schedule (either from a gaon bura or from a teacher) about the above socio-economic variables and the extent of degradation of the forest area. Because of the proximity of the measurements of land and forests and other socio economic variables, when we found some inconsistency in quantitative observations we cross checked it from the other village elders. Accordingly, we filled in 19 schedules from 19 villages. The regression results are shown in the following table.

Table: 2: Determinants of forest degradation

Dependent Variable: log of forest degradation index (Y)				
	Coefficient	t-ratio	Mean of X	S.D of X
Constant	2.592	3.602	-	-
Management active	-1.485	-5.828	0.4737	0.5060
Distance to common/State forest	-0.011	-1.830	1.8947	0.9902
Distance to market	-0.018	-1.402	6.5211	5.2729
Log population size	0.017	1.425	5.7269	0.1343
Log livestock units	0.180	1.720	6.3286	0.3903
Population/(forest + commons)	0.074	2.038	3.0295	0.5305
Poverty Ratio	0.004	0.766	39.9279	12.9867
Model F-test Sample Size	4.854 19			

Source: Household and Village Survey 2003-2004
Note: Mean of Y= 1.6156; S.D = 0.8874

Management active is a dummy variable taking the value 1 in nine villages with active (formal and informal) conservation rules and 0 otherwise. Management active has the expected negative sign i.e. this variable is associated with a smaller extent of forest degradation; it is significant at 1 per cent level. This result demonstrates that local management institutions, although no panacea for halting forest degradation, may have a positive role to play in improved management. Distance from village to the common/state forest reserve has negative parameter, significant at 5 per cent level, meaning that villages close to the forest reserve cause more severe forest degradation everything else being equal. Similarly, the distance of nearest market from the village is found to be negatively associated with the degradation of forest resources i.e. market close to the village cause more severe forest degradation. In other words, market plays the promotion role of degrading forest resources. The log of village population has a significantly positive parameter. This shows that more users mean greater degradation of resources. However, the parameters for population increases in magnitude if we exclude live stock population because of close correlation between human and livestock population across villages. Hence, at this level of analysis it is difficult to distinguish whether it is the people or their livestock that is causing the damage. The logarithm of livestock population has a significantly positive. This is consistent with a detrimental ecological impact from animal grazing. The population relative to forest and commons is included as a measure of resource scarcity. This variable is found positive and significant implying that scarcity of commons in relation to population leading to its degradation. Poverty index is found to be positive but insignificant. This implies that poverty does not necessarily lead to the degradation of forest. Therefore, it can be asserted that the size of human and livestock population, scarcity of resources relating to the size of the population, lack of property rights, market penetration, commercial exploitation of the resources (emergence of neo-rich class with commercial interests), distance of the reserve area from the residential area and the quality of the management etc. are some of the important factors that determine the extent of degradation in the study villages.

5. SUSTAINABLE MANAGEMENT OF FOREST RESOURCES : PARTICIPATORY APPROACH

The scale of use of forest resources increased markedly after independence when the government of India launched the development programme in the state to create infrastructural facilities such as road, hospitals, educational institution, etc. The government expenditure tended to monetize the different communal economies and integrate these economies with the national market economy**.** The outcome of the process of monetization was the emergence of individual property rights in cultivable land all over Arunachal Pradesh (Roy & Kuri, 1997a). Along with the spread of institution of individual ownership of cultivable land, there was gradual expansion of government ownership of forest, and in the process communal ownership got squeezed**.**

It is the reduction of communal ownership which lies at the root of some of the problems of the

declared as reserve forest, there was no contention. Much of these forests were in areas which were inaccessible and hence were not under the use of an quisition expanded beyond inaccessible forests and tended to engulf forests hitherto used by people, contention began to emerge (Roy and Kuri, 2001). . To date the legal status of unclassified state forest, which constituted 62.17 per cent of total forest, area remains largely undefined. People claim the ownership of unclassified state forest as an exercise of their traditional rights as recognized in customary laws. In Arunachal Pradesh the importance of the continuation of the customary laws has been recognized since the 1950.

again. Even the government of Arunachal Pradesh passed a bill protecting the customary laws of different tribes of Arunachal Pradesh (the bill passed in 1994 awaits presidential approval). In spite of this, the government does not seem to give any weight to the customary laws while acquiring forests and organizing its management.

In fact, genesis of the problem of deforestation can be traced to the facile legal doctrine on which the tion policy has been based. When the government took over any forest, the people dependent on it felt a sense of being expropriated from their communal land. Consequently, they developed apathy towards the
took advantage of public apathy and weak forest protection force by felling trees, often illegally. In course of time the rate of deforestation increased so much that it invited intervention restricting felling of trees for sale and suspending operation of saw mills. The outcome of the Supreme intervention has been painful for the state economy; many people have lost the means of their livelihood.
In order to frame an outline of a viable forest management we should take into account the fundamental facts that have been analyzed above. These are: the inability of the government to manage forest efficiently in the presence of public apathy, the effectiveness of customary laws and practices in controlling the behavior of the village people and the rule of motivation or incentive. In order to remove apathy of the people towards the health of forest, the customary rights of the people should be legally recognized .The recognition of customary rights would turn communal land or village land into the joint property of the village people. A typical Arunachal village has a number of characteristics which can add sufficient strength to the village level organization formed to manage natural resources. These characteristics are:

(i) The size of the village is small.
(ii) The people of a village belong to the same tribe, speak the same language and have the same culture and values.

(iii) They know each other and class rigidity has not yet taken shape; communication among them is easy and rapid.

(iv) They are well acquainted with the customary laws and practices and apply laws fruitfully. village councils can settle interpersonal disputes rapidly and satisfactorily .

These characteristics of typical village are basic strengths which can solve the problems arising out of free-ridership, opportunism, lack of information

responsible for non-performance of contract and failure of organization. Endowed with these basic strengths if a village community forms an organization with all villagers as its members to manage the resources in which they all have property rights, there will be sufficient incentive for them to achieve a high efficiency. Given the low cost of monitoring each behaviors, the overall cost of protecting and managing the forest in the neighborhood of the village will be low and the amount of benefit each person will get after the maturing of trees and their harvest will be high. Apart from direct economic benefits, the villagers will derive a number of others benefits from the forest of their neighborhood. These benefits are conservation of soil, watershed etc. which will act as added incentives to the local people to protect forests.

6. CONCLUSION

Sustainable management of forest resources is the pre-condition for sustainable livelihood of the autochthonous of the State. Currently, the management aspect of common forest resources is directionless and thus CPRs have become a free playground for the autochthonous.

encouraging the strategy of Joint Forest Management did not find any appreciable success. In Arunachal Pradesh, the problem of deforestation is mainly due to the apathy of the people towards forests being managed by the government. The source of this apathy is the expropriation, or possible expropriation of their communal land by the government causing an atmosphere of uncertainty. To crate motivation for the people it is necessary that the age-old traditional rules of the people in afforestation and protection of the forest should be recognized. Legalization of customary rights over communal land can remove the atmosphere of uncertainty over its property rights .Then the formation of village level organization to protect, regenerate and manage forest on such land is expected to solve the problems of deforestation in the State. Moreover, any attempt to encroach upon the CPR land and forest need to be monitored and curtailed. Initiatives should be made to generate more awareness among the locals for the protection; regeneration and the development aspect of forest resources.

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