ECONOMIC INCENTIVE AND ENVIRONMENTAL MANAGEMENT
A STUDY OF FORESTRY IN NORTH-EAST INDIA

Utpal Kumar De

Introduction

Management of environmental resources has become a challenging issue in the past few decades. The problem of imminent resource scarcity (especially the exhaustible resources) and the degradation of environmental quality were dealt in several writings on environmental implications of materialistic economic growth (Boulding, 1966; Ayres and Kneese, 1969; Maler, 1974 and others). Many of the resource economists (Meadows *et al.*, 1972; Cole *et al.*, 1973) felt that the world economic growth would not sustain for long because of the exhaustibility of critical environmental resources. Therefore, they pointed out the need for proper management of natural resources, especially of non-renewable resources and predicted the halt in growth process unless the environmental management is taken into consideration in the states' policy. In contrast to it, after long debate some economists in the late 1970s came to the conclusion that growth process may sustain for an unlimited period of time and scarcity of natural resource would not pose any threat to the development (Pirages, 1977; Coomer, 1979; etc.) They opined on the basis

of past experience that market would take care of the problems of resource crunch and substitution possibilities (price mechanism would force the substitution of scarce resources with newly generated relatively cheaper ones) would make required materials available and keep the economies on the path of sustainable development. After a few years the same debate resurfaced again with the observation of growing pollution level and the large-scale depletion of environmental resources across different countries and it has been realised that the markets are not playing its catalytic role in the resource allocation problem. These are conceived to be due to the externality of major environmental effects to the market and involvement of public good at local and global levels. Many of them have argued that economic development itself will induce an improvement in environmental quality (through the inverted-U proposition) and thus provide an alternative solution (Shafik and Bandyopadhyay, 1992; Grossman and Krueger, 1995 and Seldon and Song, 1994) that has been challenged again by several recent researchers.

The management of natural resources both renewable and non-renewable has still remained an important issue at the policy level and needs continuous attention.

Objective

The present paper tries to throw some light on the management of natural-forest resource and efficacy of the policy of incentive and environmental protection in the light of some personal experiences gained in Northeast India.

Development and Environmental Degradation

Needless to say that since the beginning of civilisation human beings have been exploiting nature for the maintenance and improvement of quality of life. In return of material, energy, consumption and recreation items, nature receives dirty wastes and pollution and until recently

the task of purifying these has been left with the environment. Human activities have always been destructive to nature. The advancement of economics and unbridled population growth have been associated with increasing demand for resources and degradation of natural resources in quantitative and qualitative terms. Whereas a balanced natural resource base is always essential for leading a good and healthy life not only by the present generation but also by the generations to come and hence the question of intergenerational equity of distribution of natural resources arise (Becker, 1982). However the rate of regeneration of resources has never been matched with the rate of exploitation and destruction of natural resources. Moreover, the gap widened at an alarming rate, especially with the process of so-called economic development. The dumping of wastes in the soil and water, releasing of pollutants in the air and increasing energy use have been done at higher rate than the assimilating capacity of the nature. The problem has been aggravated further with the destruction of forest, which adversely affected the biodiversity, ecological balance, that appeared as a great threat to the existence of human life on earth, and thus became a great concern to all of us. The rapid development (industrial and agricultural) in some countries not only affected the resource bases of those countries but also caused encroachment in other environmentally resourceful (but underdeveloped) regions through the advancing commercial system.

One of the major causes of overexploitation of natural resources is the commonness of the resources. If a depletable resource is open to access by more than one individual, incentives for overutilisation emerge (Parisi *et al.*, 2000). As the number of individuals that enjoy free access grows large relative to the capacity of the common resource, overutilisation would eventually lead to the complete destruction (like deforestation and desertification) of the common resource. In other words, when multiple individuals are endowed with the privilege to use a given resource without any cost effective way to monitor

and constrain each other's use, the resource is vulnerable to overuse; a problem known as the "Tragedy of the Commons" (Hardin, 1968).

On the other hand, when multiple owners have the right to exclude others from using any resource and no one exercises an effective privilege of use, there is every possibility of underutilisation of that resource. This problem is popularly known as the tragedy of the anticommons (Buchanan and Yoon, 2000). Therefore, the principle of anticommons (may be through privatisation) would be an effective way of preserving the critical environmental resources. It may happen if the resource is owned by a single person or a group of individuals and each of them enjoys the exclusion right. But that may lead to the undesirable consequence like deadweight loss and therefore the nonfulfilment of social welfare maximising condition as explained by Heller and Eisenberg (1998).

Rapid population growth and poverty have also been identified as other important cause of the overexploitation of natural resources (Rao, 1994). On the one hand, havoc population growth has led to the extensive and intensive use of land for cultivation and housing along with the extension of urban areas over the surrounding forest areas and excessive pressure on the water and mineral resources—the prime factors of life. On the other hand, population growth along with rapid industrial progress has contributed significantly to the heavy growth of pollution level in 20th Century and caused rapid degradation of productive resources, changes in biodiversity and ecological balance.

Level of poverty also has an important connection with the depletion of resources, especially of local common resources. Majority of the poorest people live in rural areas and depend highly on the natural resources mainly on forest for their sustenance. They used to collect fuel-wood, leaves, fodder, fruits, timber for daily consumption, making dwelling cottages, grazing their cattle and collecting other means of livelihood in exchange of timber and

other materials collected from the forest. Similarly, the common fisheries have also been used by those common people. Though a large portion of forest is owned by the Government and the forest department is responsible for protection, preservation, maintenance, development and harvesting of the forest; in most cases they cannot evacuate the forest areas because of morale and welfare implications as well as strategic and political reasons. Therefore, the common distressed people exploit the public forest as if it is their natural right. Thus, poverty alleviation has been identified as the one important remedy of environmental destruction (World Bank, 1987 and 1988).

Contrary to it, in many cases it was also found that the poor people are not responsible for all types of environmental degradation and in some cases they can even invest in environmental improvement due to their indigenous knowledge. It is rather the non-poor who, in many cases, have better access to natural resource and overexploit it (for their commercial and other purposes) and are responsible for much damage to the environment (DFID & UNDP, 2002). Thus even if there is no poverty, the people will have the incentive to overexploit the common resources as their rational subjectivity lies in maximising their own return without paying any interest to its external impact on others in the society (Olson, 1965; Hirshman, 1970). City dwellers in many developing countries are also found to follow the principle of non-cooperation as the optimum strategy for the excludability and rivalry in consumption and hence prefer the private action as against collective action for resource management. The former pays more to individuals at least in the short run and hence causes rapid depletion of resources and deterioration of environmental quality (Anand, 2000). Though these analyses were based upon the management of urban pollution and hazard the same is also applicable in case of exploitation of natural resources in rural areas.

Several policies have been adopted at the local, regional and global levels for the conservation of still unexplored environmental resources and repair the damage to the environment caused by earlier policies, as far as possible. Pricing, taxation, subsidy and other administrative actions have been followed to control the management and sustainable use of resources. However, many of the environmental regulations fail to contain the over-exploitation and depletion of resources (like common fisheries, forest, grazing land, etc). Though some of them are successful, albeit in limited cases, problems are still there in the deployment of such methods and heavy transaction costs involved in them. Hardins (1968) had asserted the need of collective action in case of managing open-access-common resources for reaching a socially desirable solution. Ostrom (1990), Jodha (1990) and Noronha (1997) and several others have analysed the problem of rural common property resource institutions and the problem of co-operation. They indicated that the reality is often different from the one-shot prisoners' dilemma game model and people seem to violate the modern definition of rationality to cooperate (Anand, 2000). Method of encouragement through economic incentive to those who are closely associated with the particular resource would be one easier way to successfully manage the resources at lower social cost, at least for the renewable resources like forest.

Forest in North-East India

In India around 76 million hectares of land is under recorded forest cover, which accounts less than a quarter of its total geographical area. During last few decades there has been a severe destruction and degradation of forests. Estimates show that only during the decade of nineties (1989 to 1999) half of the recorded forest area in the country (38 million hectares) has been degraded. The Northeast India is not an exception in this regard. Forest in the Northeast India, which accounts for more than a quarter (around 26 per cent) of India's total forest cover is also

subjected to rampant exploitation. It has a great importance not only for its market value and other uses but also because of the existence of rich biodiversity. For its great biological diversity the region has been identified as one of the eighteen hotspots in the World.

Management of Indian forest is mainly guided by the Indian Forest Act, 1927, Forest Conservation Act, 1980 and forest policy of 1952 and 1988 as well as some other forest management rules promulgated at the state (*e.g.*, Assam Forest Regulation 1891 that follows the forest rules of other north-eastern states) or local (*e.g.*, Garo Hills District Forest Act of 1958, Mikir Hills District Forest Act of 1957 etc.) level from time to time. According to the Indian Forest Act, 1927, there are following three major distinctions of forests.

Reserved Forest

The forest areas which have been reserved by the government for its extensive use where all rights and privileges of the local communities are not permissible unless it is recorded at the time when the process of reservation had taken place. The most important and valuable timber and biodiversity rich forests are kept in this category. An estimated fifty per cent of India's forests belong to this category.

Protected Forest

Those forest areas which have not been explicitly reserved by the state and the local rights and privileges are admissible unless explicitly stated otherwise. During the colonial period many protected forests were converted into reserved forest category and currently protected forests are generally restricted to the comparatively more degraded remnants of many older forest patches and now cover around one-fifth (20%) of India's forest area.

Unclassified State Forest

Forest areas not yet brought under the classification of aforesaid two categories. It might be due to the fact that these forests were too inaccessible or too degraded and having very little timber value. While these areas are supposedly owned by the state, in reality these are mostly, controlled by the local communities. This category of forest covers the smallest area at the all India level but it covers a substantial area in the north-eastern region of India. Infact, excludinmg Assam, in all the north-eastern states area belonging to this category of forest varies from 35 per cent to over 50 per cent.

Another important category of forest is there, called *village forest* (under Indian Forest Act, 1927, Section 28) but was not given much emphasis. However, it covers a large part of forest area in north-eastern India, where ownership lies mainly with the community. The harvesting and maintenance are controlled by the local communities.

According to National Forest Policy 1988, 33 per cent of total area of the country should be under considerable forest cover for the maintenance of a better ecological balance. Whereas only less than a quarter of the country's land is under forest department, 19 per cent of land area has forest cover, of which, only one-eighth (around 12.5 per cent) has dense forest (of crown cover more than 40 per cent by definition). According to that policy the hilly districts should have more than 60 per cent good forest cover for restricting soil erosion, water conservation and containing deforestation. So far the North-eastern states are concerned, the standard norm is maintained in many cases, at least on record. But if the exact tree cover and the rate of deforestation of the last few years are considered then it is not very difficult to understand, what situation would be, unless serious attempts are made to contain the rampant exploitation.

Table 1 shows that during 1989–1999 the percentage of geographical area under forest has decreased in almost all

the northeastern states except Mizoram and Tripura, though the figures are still higher than the national average. Whereas the percentage of forest cover under dense forest has increased in all northeastern states except Mizoram. However, if the area under open forest and area with less than 10 per cent crown density is considered, we observe considerable degradation of forest land during the same period in all northeastern states except Assam and Mizoram.

Table 1: Proportion of area under forest cover, dense forest and open forest in north-eastern states during 1989–99 (in percentage)

State/Year	1989			1999		
	FA	DF	OF	FA	DF	OF
Arunachal Pradesh	82.27	78.93	21.07	82.21	83.89	16.11
Assam	33.19	60.20	35.96	30.20	61.28	38.72
Manipur	79.99	28.29	71.71	77.86	34.15	65.85
Meghalaya	69.76	21.84	78.16	69.70	37.90	62.10
Mizoram	86.19	21.36	78.64	86.99	20.65	79.35
Nagaland	86.85	32.27	67.73	85.43	36.27	63.73
Tripura	50.81	22.80	77.20	54.79	38.78	61.22
All India	19.47	58.97	40.21	19.38	59.22	40.02

Note: FA means percentage of total geographical area under forest; DF means percentage of dense forest area to total forest area (having >40 per cent crown density); OF means percentage of open forest area to total forest area (having 10–40 percent crown density).

Source: Forest Survey of India, Ministry of Environment and Forest, Government of India, New Delhi.

The highest annual compound rate of degradation –8.57 per cent was observed in Arunachal Pradesh (Table 2) and the lowest in Manipur (–0.90 per cent). It increased by 0.08 and 0.75 per cent respectively in Mizoram and Assam. Comparing with the other states the degradation was found to be on the higher rate in the north-eastern states, which may be due to the practice of traditional *jhum* (shifting) cultivation (Reddy *et al.*, 2001).

Rao (1994) has also identified population growth as another cause of forest degradation in this region as population has been increasing at significantly higher rates as

Table 2: Extent of degraded forest in north-eastern states during 1989–99

State/Year	Compound Growth Rate per annum (percentage)
Arunachal Pradesh	–8.57
Assam	0.75
Manipur	–0.90
Meghalaya	–3.48
Mizoram	0.08
Nagaland	–1.33
Tripura	–2.18
All India	0.20

Source: Government of India, Ministry of Environment and Forests, Forest Survey of India, New Delhi.

compared to the forest cover and hence the per capita forest cover decreased and the pressure on forest is mounting. It is compounded with the higher incidence of poverty which was around 45 per cent of population in 1993–94 in the region (as estimated by the modified expert group) in contrast to around 37 per cent of national average and only below the state of Bihar and Orissa.

Joint Forest Management

It has already been stated that a major part of forest resources in the northeast India is under community ownership and management. Though forest is renewable resource, it is subjected to overexploitation and thus deterioration for its commonness as well as poverty, increasing population pressure and lack of sustainable management mechanism. However, it is not wise to deny access to the poor who earn almost forty per cent of their livelihood directly from the natural resources mainly common forest and have very limited alternative sources of income. One cannot stop the use of natural resources to arrest the development but is necessary to stop the misuse and degradation of resources for sustainable progress, development and greater benefit of mankind. Joint Forest Management

(JFM) has raised a hope in this respect to protect the forest resources following the other successful projects of such kind in other regions of the country.

It is a system of co-management or called participatory forest management where the local people or community who are the major users are involved in the management of resources along with the state machinery. In a number of countries this type of institutional changes have been taking place for the management of local commons. In India it came as an alternative to community forestry and government management system of forestry. The earlier experience of community forestry programme was far from satisfactory but there were a number of innovative local efforts directed at the management and regeneration of degraded forest lands during 1990s (Poffenberger, Mc Gean and Khare, 1996). JFM is described as a process where the "government assign group rights to a specific territory, provide technical guidance on resource management practices and help create a more positive economic environment for cooperation" (Lawry, 1990, p. 420). Co-management is seen as a pragmatic way to "institutionalise collaboration between administration and resource users and end those unproductive situations where they pitted against one another in the process of resource regulation" (Baland and Platteau, 1996, p. 347). Even if the local communities are given much scope there always remain mistrust between state agencies (like forest department) and user groups. The major task of this system is to break this mistrust so that local knowledge of the resource and the existing social structures can be used to effective management of resources.

In this regime the role and managerial responsibility of two stakeholders, the state as represented by the forest department and the communities are well defined. The two groups at the field level take collective decision and NGO a third dimension in this system acts as an intermediary and catalyst between the two. The most widely reported pilot project, which was started in the 1970s in

Arabari in Midnapore, West Bengal, was based on the involvement of communities in the protection of degraded public forest lands dominated by valuable *sal* trees. In return for protecting the forests, the forest department agreed to give villagers a share of 25 per cent of the timber revenue from final harvest. The project was extended to over 1250 villages in that area covering around 1,52,000 hectares of forest and that suggests the feasibility of JFM. After the realisation of such low cost viable mechanism of forest management, the Government of India sent a circular to the State Governments recommending the adoption of JFM, in which, resource users would be involved in the protection and regeneration of forest lands in return for rights over the use of certain forest products (MEF, 1990). At present over 20,000 villages all over India are involved in this management of around 2 million hectares of forest land.

Vira (1997) explained the policy of JFM theoretically in different dimensions. He argued that the outcome of JFM is determined by the interaction between rural communities and field bureaucrats and also the structure of the community, and therefore it is necessary to study the motivations and interests of these groups. He also suggested that homogeneous and cooperative communities have greatest potential to institute cooperative resource management regimes, even without the support of the forest department. In India JFM system is found to be most cost effective and if the people are given the alternative sources of income and employment, exclusive right to non-wood forest product along with the share of benefit from the final harvest of timber they are most likely to cooperate. Of course the success depends on the political will of the government authority and the faith among the community and the government representatives (Singh, 1994). In the next part we shall discuss the joint forest management project that has been undertaken in response to the need for conservation and regeneration of degraded forest resources in Tripura as a pilot project.

An Example of JFM in Tripura

Tripura is one of the tiny states in India but the 2nd populist in the north-eastern region has experienced the same phenomenon. Extensive areas supporting natural tree growth came under reckless exploitation. Though forest is renewable resource, wanton destruction of forests for various uses has led to the depletion of forest cover at an alarming rate. Rapid population growth (though the rate has decreased during the last Census period), felling of trees for fuel, timber, fibre and other forest produce together with shifting cultivation are causing rapid shrinkage of forest cover (Shankar, 1984; Rao, 1994). The Supreme Court order of 1997 has been yielding some positive results in reducing the destruction of forest openly, however, the same is going on through other ways due to severe poverty, lack of alternative opportunities, corruption, smuggling etc. So one JFM project was initiated to explore the possibility in the region, following the successful Arabari Project in West Bengal. For the analysis of the performance of the project, data on economic conditions of the beneficiaries, activities done so far and the prospective benefits have been collected from the area in 1997 by the author himself which are presented below.

The project was undertaken in Melaghar area of South Tripura District as a pilot project, for a degraded heterogeneous forest land (tillas and lungas) of around 100 hectares involving some distressed people in the neighbourhood, forest department of the state government and one NGO. Though the local people are not the real owner they have the access to utilise and exploit the forest for their daily use that is just like any other common resources. The local people (indigenous and distressed immigrants from neighbouring Bangladesh) are closely associated with that forest land and because of their severe poverty and lack of alternative opportunities caused severe destruction and degradation of the forest. The land became almost deserted prior to 1990. The state forest

department in 1990 tried to develop a project involving one NGO and those distressed people for the regeneration of the forest as well as for proper rehabilitation of those displaced people, called the beneficiaries of the project.

The method of regeneration was not through the plantation of new trees but by nurturing the offshoots growing from the roots of the trees. Their plan was first to not allow to degrade the forest any further and second, to properly treat the upcoming trees by close monitoring. The task of NGO was like an intermediary between forest department and the local people. Primarily they organise the community, make them aware of the role of the forest in maintaining ecological balance and encourage them by explaining the mutual benefits (economic and non-ecomomic) that they can enjoy (if the forest is maintained properly) with the forest department and also providing some authority from the forest department officials to control. The forest department is also responsible to create sufficient facilities so that the beneficiaries can survive without damaging the land. The other task of NGO was to make aware the community against the campaign by smugglers and the business persons to disintegrate the project as they are related to the business of timber and other forest produce and hence affected by the development of the project. For this the NGO people were to monitor the regular activities and bring the people in close contact with the forest department officials to remove the mistrust, if any.

There are 120 families and the beneficiaries are heterogeneous in terms of their cast, creed and religion but they were homogenous in terms of their economic conditions. Thus there were differences in attitude and objective in some cases, hence it was very difficult to convince and organise them for the manageable size and the promise by the forest department to give them fifty per cent of the timber revenue (unlike 25 per cent in case of Arabari Project). At the time of survey, that means, after 6–7 years of introduction of the programme, the most part of the

land area was found almost covered in most of the part with immature but 10–15 ft. high valuable trees. However, the local inhabitants (who are staying in the command area of the forest) always had a fear of ejectment as they had no legal ownership right and that was not extended to them till then except the agreement of share of benefit and thus a suspicion was there about the continuation of the programme. Fortunately, it is still found functioning amidst conflict in mind of the beneficiaries and forest ground staffs almost in the desired way. But for the continuation and long run prospect of the process it is essential to remove the insecurity felt by the beneficiaries or communities and a strong leadership.

Distribution of Activities and Benefits

The beneficiaries have been responsible for watching and one person from each family has been participating for that by rotation. People are employed from them in weeding and cutting of branches in order to maintain the proper growth of trees and keeping the required space between the trees.

They are paid for doing these works, and jobs are given in equal proportions to all families.

Houses have been built along the boundaries of the forest area to facilitate better monitoring and prevent smuggling of trees.

The open places are distributed among them for growing some vegetables, mushrooms etc.

They are allowed to use bamboos, canes etc. for producing ice cream sticks, agarbati sticks and some other handicraft products according to their ability and knowledge.

Co-operative is formed to purchase those products from them so that they can get the reasonable price.

Water bodies are created for meeting their water needs. Moreover, the agreement is already there of providing 50 per cent of final timber product, but that may be

harvested approximately after 15 years, and the agreement may be renewed for the maintenance of sustainable development.

Benefits Accrued

Each family receives around 20–25 kg of fuel-wood per month. Also they enjoy some plots (not measured) for shifting cultivation, on an average 50–60 mandays of employment, earn around Rs. 200 per month from craft products.

Considering the benefit from final timber product (calculated on the basis of tree cover and the nature of trees at the going market rate) after fifteen years each family is expected to get an amount whose present value is Rs. 1,11,383.81 in a year.

However one may ask whether the facilities created so far are sufficient for their sustenance. Truly those are not sufficient considering the daily requirement and more has to be done. But it is clear that they are benefited much more than if they are allowed to exploit and damage the area. Along with that the benefit would be lost that is accrued to the society for maintaining the biodiversity and that can be earned if ecotourism is developed. Of course, there is the need of continuous discussion (in friendly way) on how to improve and extend the same over other areas and how to create more subsidiary occupations.

Conclusion

If the same JFM process is also replicated in other areas of the northeast India with good political will, strong leadership and designed administrative mechanism keeping the peoples' opinion in mind, and encourage them through different opportunities it would be successful in improving environmental quality without hampering the progress and regaining the ecological balance. Policy of incentive should be advocated because of the positive externality of

the environmental changes on the society that can be achieved through this mechanism. Discussion and administrative steps should be taken in such a way that the community must not feel insecured and that also depends on the quality of leadership. Panchayats, as a local representative, can also come forward with different schemes for the generation of alternative employment and opportunities and thus can play a better role in this regard. This kind of cooperative or joint management will be effective not only for the management of local forestry but also for fishery or other kind of resources with whom community has direct connection in daily life.

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