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Restoration of denuded lands in the north eastern India through rubber plantations

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North Eastern region of India comprising of seven states presents a fragile eco system. This is an outcome of indiscriminate destruction of forests, mainly by the tribals who follow traditional system of shifting cultivation, locally called as *"jhumming"*. With the increasing population pressure, the cycle of shifting cultivation became more frequent. Shortening of the time lag between successive "jhum" cycles, did not permit reestablishment of natural vegetation, thus degrading the land further. Moreover, as the shifting cultivation involves slash and burn, it leads to destruction of soil organic matter and reduces moisture intake capacity of the soil.

Slash and burn cultivation and indiscriminate felling of trees led to land degradation with *lalang* grass, a nutrient depleting monocot, infesting the hillocks. Vast stretches of denuded hillocks, a large chunk of which is owned by the tribals, are generally unutilized or underutilized. Successful cropping in these lands requires heavy investment. A large section of population fall into a very low-income group and the potential for generation of higher income through land management has been difficult.

Various projects have been implemented by the State Governments to rehabilitate shifting cultivators on settled agriculture right from 1950s. Since most of the activities were with annual crops or animal husbandry /poultry without people's participation, the attempts were not successful. The tribals could not eke out a living out of such rehabilitation programmes.

New project initiative

Marshum tribes live in Lakshmandepha, a remote village in Tripura, located about 50 kms from Agartala, the state capital. They follow a matrilineal system and the society is highly inward looking, shy, confining themselves to shifting cultivation and collection of forest produce. As yield from shifting cultivation was dwindling and with practically no economic produce to be collected and sold, the monthly income of a family was just about Rs.200/- to Rs.300/-, not even sufficient to provide one square meal a day. Malnutrition, illiteracy and unemployment has had its deplorable effect on this group. The villagers had about 200 acres of the hillock, generally devoid of any vegetation. Rubber being a rain fed crop and also sturdy, was found to be an appropriate crop for the region. The Rubber Board, thus, initiated rubber based rehabilitation projects during 1991-92 in Tripura as a part of its economic rehabilitation projects for tribals.

Besides rubber plantation, a variety of need based activities were also included through participatory approaches. Activities like special nutrition programme for children, health and hygiene camps, adult literacy, special programmes for women, additional income generation during the immature phase of rubber etc. were introduced.

Programme impact

Ecological impact

The cultural practices adopted for rubber plantations are highly eco friendly. After the planting operations i.e., taking pits and forming contour bund if the land is slopy, no further interference of the soil was done. By growing a leguminous cover crop (generally *Pureaia phaseoloides*) from the first year itself, the ground cover improved and organic matter to the tune of about 6-8 tonnes of litter every year got added. By the use of leguminous cover crop, application of fertilizers for rubber, particularly, nitrogen, was reduced drastically in later years.

A study conducted in the NE region has revealed that the organic carbon content showed an increase in the plantation compared to areas subjected to shifting cultivation in a relatively short span of time. Enrichment of organic carbon in a plantation of 10 years was as high as 65% vis-à-vis fields subjected to shifting cultivation. (Krishna Kumar *et al* 1991) Similarly the moisture retention characteristics and the Available Water Storage Capacity (AWSC) have also been significantly high. Influence of rubber plantation on moisture retention was noticed even up to a depth of 120 cms. Soils under rubber plantation have registered higher rate of infiltration. Studies on under-storey vegetation indicated that more than 12 species of

A tribal girl tapping rubber

Leaf mulch in a mature rubber plantation

plants could be seen growing under rubber. The floor accumulation in rubber compares very well with the figures for subtropical natural forests. In terms of influence on soil physical properties and species diversity, rubber could be considered as a desirable candidate for eco-restoration (Krishna Kumar *et al* 1990). Rubber tree utilizes much less water than many other forest species for a comparable biomass production.

The biomass removal from rubber plantations during its economic life span is very limited. Rubber tree is often referred to as an efficient solar energy harvesting enterprise. Carbon sequestration in rubber plantation is quite significant (Wan, 1994). Rubber crop also helps to cleanse the atmosphere.

Socio-economic impact

The plantation started yielding its economic product, latex, from 1999-2000 onwards. In 2003, the monthly income of each family reached Rs.3000/- to Rs.4000/-. This would further increase as the peak yielding stage is reached after 3-4 years' of tapping latex. A Rubber Producers' Society (RPS) was formed with an elected leader and Board of Directors from among the participants, to strengthen the bargaining power of the tribals. A community processing center for processing latex into sheets in an environment friendly manner is established in each plantation centre where even the rubber effluent is used to generate bio-gas which in turn reduces the use of firewood to dry rubber sheets. Such plantations have been initiated in about 30 centres and more are coming up.

There are other economic benefits that could be obtained from the rubber tree. Firstly, the timber, which itself is a good source for commercial exploitation. After using the main trunks for value addition, the branchs can be used as fuel wood. Similarly, the tree is also an excellent source of extra floral honey. Rubber seed is a source of oil, finding its use in soap and paint industry. Plantation during its early stages offers opportunity for intercropping with a variety of annual crops in the inter row spaces. With appropriate spacing adjustment, even tree crops and perennial crops such as teak can be interplanted adopting the concept of agro forestry.

Socio-economic development in this colony has been remarkably high as evidenced by standard of health, education and overall outlook of the community towards development. A good number of children have reached high school stage. Indebtedness of the tribals to money lenders has reduced. Many of them have bought cattle which generates income and more than 70% of the members have opened Savings Account in banks.

Conclusion

The single most contributing factor for the success of the programme has been the involvement and commitment of the tribals, particularly women, and the dedicated support provided by the Board. Rubber is a technical crop and it is a classic example where tribals have proved that they can take up any technology demanding activity, if supported properly. The most important factor is that the denuded hillocks has now been transferred to rubber forests providing livelihood for about 10,000 tribal families in the NE region.

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the local demand, perennial water source and more efficient utilization of environmental resource. This serves as a better cover to the soil and aids in regeneration of soil.

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References:

1. Agarwal, A. and Narain S. 1990. Village Ecosystem Planning, Centre for Science and Environment, International Institute for Environment and Development, Dryland Network Programme.

2. Forest Research Institute, 1988. Wasteland Development for Fuelwood and Fodder Production. FRI Press, New Delhi.

3. Khan, I. 1987. Wasteland Afforestation (Techniques and Systems), Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.

4. Mazzucato, M. and Niemeijer, D, 2001. Over estimating land degradation, underestimating in the Sahel, International Institute for Environment and Development, Dryland Network Programme.

5. Roy, A. K. and Verma S. K. 2001. Wasteland Management and Environment, Scientific Publishers, Jodhpur, India.

6. Toulmin, C. 1993. Combating desertification: setting agenda for a global convention, International Institute for Environment and Development, Dryland Network Programme.

7. http://ces.iisc.ernet.in/energy/Welcome.html

8. Toulmin, C. 1995. The convention to combat desertification: guideline for NGOs activity, International Institute for Environment and Development, Dryland Network Programme.

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