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Eucalyptus – a disastrous tree for India

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There has been considerable and acrimonious debate on issues related to social forestry as a strategy for providing the people with their requirements of fodder, timber, firewood and green manure, while arresting the deepening ecological crisis in the country. The debate is not about the unquestionable need for increasing tree cover. It is primarily a debate on the criteria for the choice of species and land for afforestation and appropriate social organisations to ensure the achievement of the socio-economic goals of the social forestry programmes.

The social forestry programme of Indian states has included a number of components like road-side plantations, canal, tank, and river-bank plantations, common land plantation, a number of local species of trees being used. Moreover, success has been relatively good in the spread of tree cover both in terms of number of seedlings distributed and in new area under plantation in private farmlands. But for various reasons, the species most used has been Eucalyptus, with the result that expansion of Eucalyptus hybrid monoculture onto food growing land has become one of the focal points of debate. The core of the debate is whether such an expansion of Eucalyptus monoculture is desirable from the point of view of satisfaction of the basic needs and of ecological stability of the rural ecosystem, which is needed for the longterm sustenance of not

only the rural but also the urban human settlements.

From the content of articles published in the press criticising the extension of Eucalyptus monoculture onto farmland and the official response through the recent press releases by the Chief Conservator of Forests of Karnataka (CCF), it appears that the two debating sides differ in their perceptions of the problem. So that a higher level of understanding can be reached on both sides with the establishment of some communication, it is necessary to identify the nature of the present incompatibility. Analysis of the debate so far suggests that the differences in the perception of the problem beyond the initial arguments on the need for more forests, needs to be understood. The analysis in summary form is given in Table 1. It is evident from Table 1 that the official planning of social

forestry has been seriously lacking in an holistic or ecosystemic perspective.

We are not only facing shortage of wood but also food. For the last three consecutive years we have become dependent on food imports. The estimate of the food grain shortfall for the current year is about 13.5 million tons. Under such conditions land use planning should be a balanced combination of silviculture and agriculture. What should be done under such conditions can be ascertained in standard text books of plant sciences, indeed eminent foresters of the past in India had already laid down the methodology for land use for a genuine social forestry. The press release of the CCF and the policies pursued in social forestry by many Forest Departments appear to ignore such well argued observations. Maximisation of the use of our limited land res-

Table 1: Summary of the different perceptions on Social Forestry

Forest experts perception of the problem	Official steps for solution	Counter-expert's perception	Non-official steps for solution
Shortage of wood, especially firewood (Economic)	Maximisation of wood production through extension of forests into new areas, especially farmlands. With the help of quick timber producing species like Eucalyptus	Shortage of land for the satisfaction of all basic needs including food, fodder, firewood, green manure etc.	Maximisation of land use without displacing food crop and introducing deeprooted multi-purpose tree species in farmland for multi-layer landuse
Lack of tree cover (Ecological)	Growth of plantations of tree species that survive without any effort. Hence choice of Eucalyptus	Lack of ecological stability and destruction of genetic diversity. Deterioration in the water and soil systems	Growth of tree cover with diverse tree species having soil-improving and water-conserving capacities. Improvement in genetic diversity
Lack of motivation of the people for tree planting (social)	Motivate individual farmers by providing free seedlings of species ensuring quick economic returns and no dependence on social organisation. Hence choice of Eucalyptus	Collapse of traditional community management of common resources like village forests and grazing lands. Lack of social mechanism to motivate plantation on the common	Ensuring social organisation to protect the villages wood lots for long term social interest and provide equal access to common resources

ources can be achieved only by mixed cropping of multi-purpose species. Such a strategy is not new to Indian people and has even been recommended by foresters of the highest rank.

The first Indian national to be appointed as the Inspector General of Forests of India, M.D. Chaturvedi as early as 1946 worked out a model of agroforestry that would increase fuel and fodder availability without harming food production. Recommending the planting of Babul as an agroforestry species in the agricultural land of the gangetic plains Chaturvedi (*Land Management*, UP Government Press, 1946 Allahabad) showed that it was possible to create farm forests equivalent to two million acres of pure Babul plantations, twice the area of the reserved forests in the region without any reduction in food production. "Being a deep rooted species it (Babul) does not compete for nutrition in the upper layers of soil which support agricultural crops. It provides excellent fodder, fuel, tannin bark and timber. Above all its attenuated leaf surface and the nature of its crown do not shade crops sufficiently to affect production". The stress on Eucalyptus as a dominant species in social forestry despite the existence of alternative workable models prepared by the highest forest officials of the country amounts to misuse of precious resources, both economically and ecologically.

Well known plant scientists Hall, Barnard and Moss in their famous book *Biomass for Energy in the*

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Developing Countries (Pergamon, Oxford, 1932, p.49) take the stand that:

"In cases where land is scarce, *Agroforestry* systems have much to offer. Agroforestry involves the intercropping of trees with field crops, a practice which can allow food and fuel to be produced from the same land. The crops must be chosen carefully so that they complement rather than compete with each other. *Eucalyptus*, for example, is not a good agroforestry species due to its high moisture demand and its tendency to produce toxic substances".

In all types of land use, productivity in a sustained form can be achieved only through the maintenance or improvement of the natural mechanisms which keep the landform stable and the soil in place, maintain its fertility status and its water potential. Eucalyptus hybrid monoculture over large areas undermines those objectives of soil and water conservation. The Central Soil and Water Conservation Research Institute has just completed long term field experiments establishing that loss of groundwater system is greatly increased by Eucalyptus. Further, Eucalyptus does not contribute to the soil fertility. S.K. Seth, retired Inspector General of Forests of India has cautioned about the ecological unsuitability of such trends.

"Today there is a trend induced

by much faster recycling in the whole economic field. That trend puts a premium on production and utilization of renewable resources over shorter and shorter periods. Thus, tree species which are fast growing and can be harvested in a few years (eg. Eucalyptus) are preferred to those which take longer to mature. . . .

In the short term such processes may appear not to injure the inherent capabilities of the resources base, but since most of the processes which are responsible for maintaining the health and regeneration of complex systems, such as soil, are neither adequately understood nor are they amenable to continual or uninterrupted manipulation, it is debatable whether such strategies will not ultimately lead to irreversible degradation."

(Source: DST Seminar on Resources, Development and Environment, New Delhi, 1973).

The fears about the long term ecological impact of the fast growing species, as expressed by Seth have also been shared by a number of ecologists as well as farmers. The policy pursued in Karnataka is in contradiction to those views. In a press release the CCF stated that:

"Eucalyptus is described by some as an ecological monster. This is because of pooling of the negative qualities of all the 650 species of eucalyptus. In general three species of eucalyptus have been used for draining marshes, but

the species most used in India do not have that quality. The fast rate of growth of our eucalyptus is mistakenly ascribed to its requiring a large quantity of water. The rate of growth mainly depends on the ratio of water required to produce dry mass. According to the findings of the Forest Research Institute, the water required for producing dry mass in the eucalyptus hybrid is less than the requirement of rosewood, one of our own slow growing species."

It is however not correct that the Eucalyptus species being used in India do not have a high water requirement. As reported by the leading plant scientist R.K. Gupta (*Plants for Environmental Conservation*, Bishen Singh Publishers, Dehradun 1979) Eucalyptus is being extensively utilised for reclamation of waterlogged areas in Punjab and Haryana. Similarly Eucalyptus has dried up burrow pits common on roadsides. On that point Gupta states that "in low rainfall areas, its (Eucalyptus) roots form a network just below the soil surface to extract every bit of moisture. This results in poor undergrowth". The existence or otherwise of undergrowth in Eucalyptus plantations is, thus, a function of the water availability in the soil and the demand made by Eucalyptus. In arid regions where the use of water must be optimised against diverse requirements the critical factor is the absolute demand made by a species on the water regime and not the specific water consumption for dry matter production. The study made by the Forest Research Institute (FRI) is misleading and insensitive to the realities of drought-prone areas where water is a limiting factor. While the FRI study shows that the consumption of water per unit dry matter is less for Eucalyptus it is however much higher (Table 2) when total consumption is considered.

Eucalyptus does not affect water resources merely by its demand on them. The interception loss in Eucalyptus is strikingly low thus allowing the rain water to erode the soil by direct impingement. In a study by the Soil and Water Conservation Research Institute in

Table 2: Specific and total water demand for Eucalyptus and pine in mm rainfall equivalent

Species	Water Consumption	
	per gm of dry matter	Annual*
Eucalyptus	1.41 mm	1200 mm
Pine	8.87 mm	760 mm

*Source: Stafelt's Plant Ecology (Longmans, London 1972)

Ooty, the interception loss in native shola forests was found to be 33.8 per cent, for Acacia 21.5 per cent and for Eucalyptus it was only 2.9 per cent (P. Samraj et.al. National Symposium on Soil Conservation and Water Management in the 1980's, Dehradun, March 1980). As a result of that low interception the runoff and soil loss increases with Eucalyptus. This fact has been well established in recent studies at the Ooty Institute. Further, Eucalyptus has a poor leaf litter that does not contribute to humus formation and infiltration of water into underground cavities. In this respect Eucalyptus is inappropriate as a species for ecological rebuilding. The lack of humus also affects its contribution to soil fertility. Moreover, the drastic transformation of soil chemistry in the process of leaching alkaloids prevents the germination of other species, especially in poor rainfall areas. In such arid zones Eucalyptus plantations are thus found to violate all ecological principles of maintaining life support systems and genetic diversity.

In view of such ecological problems afforestation policies predominantly based on Eucalyptus in the pursuit of short-term economic gains must be reviewed. Nor must we forget that such a purely commercial approach has already succeeded in degrading vast reserved forests throughout the country. Why did it happen? The sympathisers of Eucalyptus now argue that this 'quick growing' species is the miracle solution to the problems of the rural people, and "farmers want it". The true reality is that farmers want it only because pulp based mills throughout the country have pushed up the price of Eucalyptus and are paying handsome advance payments to the farmers. It is wishful thinking that

without a strong social organisation, market forces on their own will benefit the common man, especially the poorer half of the population who have no purchasing power to create a demand on the market. Nor have markets alone ever been able to contribute to an ecological balance anywhere in the world. And to ensure social control over the utilization of natural resources, social forestry programmes need to be recast without linkages of justification with the market economy. That then is the task of forest officials as much as of rural social organisations. Without the realisation of this truth 'social' forestry will never be of any use to the majority of the people. Forest Management in India has to stop providing one-dimensional solutions based on one-dimensional understanding of problems and evolve to a higher level of systems analysis and understanding. The problem of species choice will automatically fall into place when the market forces will be screened out. *Success in the social forestry programme can be achieved not by making Eucalyptus the Kalpavriksh but by organising social controls on the utilization of common natural resources and by expanding agroforestry with the help of deep-rooted multi-purpose tree-species.*

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