



Preserving Natural Resources Through Watershed Management In Hill Areas

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Introduction:

We are aware that the natural resources like the forests and agricultural lands have gradually been devastated and degraded to a great extent which is responsible for the cause of a number of problems. Vast areas have been depleted of the fertile top soil due to the siltation and salinization mainly attributed to floods. Crops yield have been much reduced. Besides we have come across the various effects caused due to the fast removal of the vegetational cover and massive deforestation in all almost regions of the world The consequences are well known to all of us. Besides depletion in forest production, a number of ecological changes such as reduction in the quantity of water in the Groundwater (Aquifer) as well as drastic changes in the environmental quality and climate are concomitant. The reason which is quite obvious of the reduction in the production of the crops and tress is the degradation and destruction of the sc s The erosion and depletion of the fertile top layer of the soil are caused by a number of factors such as unscientific agricultural practices, construction of large dams, massive deforestation and number of man's actrvtoes concerned with over cultivation, urbanization and industrialization etc. All these activities denude the land of its protective green cover, hastening the process of soil erosion, degradation water logging and salinity. This affects both the cultivated and \. uncultivated lands. When these problems are not checked in time by taking proper remedial measures, there is every likelihood that the soil might lost its fertility forever turning the same into a barren land and desert.

Desertification has been progressing in many states of India, which reduces the crops, and tree yields to a great extent. Generally such lands, which do not give economic, return or in the other word, which is useless, are termed as 'wasteland'. Such lands are ecologically degraded and unstable as the topmost fertile layer of the soil (rich in organic matter 'and1 humus) has nearly or completely lost.

In India, the National Land Use and Wasteland Development Council (NLWDC) and the national Wasteland Development Board (NWDB) which are under the Ministry of Environment and Forests respectively have undertaken the tasks of preparing programs for conserving and protecting the lands from turning into wastelands.

A Technical Task Group was formed by the planning Commission and NWDB. This group has defined the wasteland as 'the land which is degraded and is presently lying unutilized except as current fallows due to different constraints' (CSIR 1990). Depending upon the casual factors, the wastelands may be grouped under (i) Water-erosion, (ii) Wind-erosion and (iii) Salinity and Alkalinity. The wastelands comprise of three groups of land of viz. (i) cultivated land affected by soil-erosion, (ii) degraded forest land (iii) degraded land with special problems or problem soils. Depending upon the extent of degradation, the wastelands have been categorized by NWDB into (i) Cultural wastelands which are not being used currently due to different constraints but have the potential for the development of vegetative cover after appropriate treat-

ments and (ii) Unculturable wastelands which are not being used currently and cannot be developed for vegetative cover under any circumstances. The culturable wastelands comprise many land areas such as gullied and ravinous lands, water logged lands and marches, salt-affected lands.. Areas under shifting cultivation (j humming cultivation), degraded forest lands, degraded pasture and grazing lands, degraded non forest plantation land, striplands, sandy areas, mining/ industrial wastelands. The uncultural wastelands include barren rocky/ stony waste areas, steep-sloping areas and snow covered areas.

Deforestation which is one of the potent factors for turning fertile lands into wastelands require immediate attention. India loses its forests at the rate of 1.5 mil.ha per year while the total rate of deforestation for the world accounts for 17 mil. ha per year. Based on the satellite imagery data Forest Survey of India reports that the total forests area of India stands at 637,293 sq.km by 1999 which constitutes only 19.4% of the geographical area though the New Forest policy of India states that 33% of the geographical area of India should necessarily be forest area (The Hindu, 2001). The present demand of fuel-wood in India is about 235 million cum whereas our forests can supply only 40 million cum per annum. As India would require about 350 million cu.m. of fuel-wood by 2010 A.D. there would occur a deficit of 305 million cum of fuel-wood per year by then (Sagreiya, 2000).

Besides, the rate of annual afforestation is very meager as the Afforestation: Deforestation stands at 1:14 as against the world ratio of 1:10 (Newman, 1990; Sharma, 2001). Besides causing a number of ecological factors which are known to us, the removal of trees from our forests at a massive scale remove 60-75% of organic matter and other important nutrients thus rendering the soil nutrient-depleted. Hence there is need to enhance massive planting of trees to overcome the various problems discussed herewith. In India, Rajasthan has largest area of wastelands (37 mil.ha) constituting 21.1 % of the total wastelands of India. The percentages of wastelands in the North East constitute 16-25% of their respective geographical areas. Wastelands hisLet us assess the extent of wastelands in the state and analyze in what way the same can be improved. According to the reports of the Ministry of Agriculture, Govt, of India and CSIR (1990) the area of wasteland in the state is estimated at 7,340 sq.km out of the total geographical area of 22,366 sq.km. This constitutes 30.4% of the geographical area of the state and 0.42% of the wastelands of India. The area in the state stands at the 4th position of the largest wasteland areas in India. The high percentage of wastelands in the state clearly justifies why the crop and forests yields become reduced significantly.

The growth rate of rice in the N.E. region including /Manipur' was reduced from 5.6% in 1980's to 2.1% during t9\$1-95 while the growth rate for rice for India was reduced from 3.7% in 1980 to 3.28% in *#90 and t99T Subsbrespectively (The Hindu J*PoTTT The fuel-wood production from our forests has significantly reduced 1980-1990.

The causes of the conversion of fertile lands into wastelands in the state are multifarious. The degradation of the soils finally converting them into sterile soils without the top-soil has been noticed both in the plains and hilly areas alike. These are primarily attributed to Man's activities. Some of the important causes are highlighted below:

- (i) The rapid rate of deforestation in the state has been the most potent factor for converting the land into wastelands. About 4,937 sq.km constituting 22.1% of the total area of Manipur represent only the dense or 'true forest as per the reports of the concerned department. But the area of the dense forest has been estimated at about 719.3 sq km in 1990's based on the satellite imagery data given by the National Remote Sensing Agency (NRSA) and this constitutes only 3.2% of the total area of Manipur. The heavy depletion of forest in state due to wide practice of 'shifting cultivation' (Jhumming or 'pamlou' in Manipur) as about 83,526 families in hilly areas have been practicing this system of cultivation. The total area cleared due to jhumming has been estimated as 4,905 sq km in 1990's. Senapati and Ukhrul districts have the largest areas forests (25-28%) under the jhum practice. Of many consequences of 'burning' during jhum practice, the most important effect is degradation of the fertile soil due to removal of the organic matter 'layer of the soil which depletes the important nutrient in the soil. The fuel-wood production has decreased from 70,264 cu m in 1986 to 29,078 cu m by 1998. The per capita availability of fuel-wood has been reduced from 0.03 in 1981 to 0.015 cu m in 1998. The average rate of annual tree plantation in the state is very less the annual ratio of afforestation: deforestation is found to be 1:13.5 (Sharma, 2001) which far exceeds the ratio of 1:10 for the forests of the world as given by Newman (1990). Besides degrading the soils, one of the serious effects is the threatening to extinction of over 65 plants species comprising of shrubs, bamboos, canes, orchids, aromatic, and medicinal plants from our forests (Table).
- (ii) Removal of vegetational cover in the catchment areas of important rivers and lakes are responsible for the fast rate of siltation.
- (iii) Lack of road side plantations especially in those areas facing the hill -slopes. Even if such plantations are there, the right or appropriate plant species have not been used.
- (iv) Heavy removal of brown earth from hill slopes for earth work which thereby exposes the hill slopes to wind and water erosion.
- (v) Over use and misuse of inorganic chemicals, fertilizer as well insecticides to the fields without organic manure which thereby leads to the sterility and destruction of the soils.
- (vi) Non-practice of crop -rotation in many fields keeping the soil as fallow areas exposes the field to wind and water erosion which finally leads to gully erosion. Suggestion for Improvement It may be noted that out of the total area of wastelands in the state, about 880 sq. km has been treated and reclaimed by the government and this constitutes only 12% of the wasteland in the states and hence the major areas are yet to be reclaimed. Besides the efforts taken up by the Government a joint co-operative effort from the public, NGO's and organizations and

remedial measures is called for some suggestions may be helpful towards implanting measures for reclamation of the wastelands in the states.

- (i) Measures for the effective massive planting of trees in the forest areas with the right and appropriate selection of tree species.
 - (ii) Planting of sand-binge species of sedges shrubs etc. on the naked hill slopes which are exposed to wind direction. Some species like Pennisetum, Chrysopogon, Heteropogon, Themeda Arundenella as well as Vitex and Sida species may be useful.
 - (iii) Planting of appropriate medium size trees in the fields and foothills of hills towards the leeward side to protect the areas from wind and storm erosion.
 - (iv) Discouraging planting if Eucalyptus and Acacia confusa species around the fields, roadsides and hill slopes etc and substitution by appropriate species.
 - (i) Use of crop rotations in the fields as far as practicable using
 - (vi) crop (paddy)-legume-paddy alternation for restoring natural fertility in the fields.
 - (vii) reduction of burning in the steep areas of hills stoppage of the burning phase during shifting cultivation and substitution of shifting cultivation by the terrace cultivation etc. Mulching should be done in the fields as soon as the crop season is over.
 - (viii) This can be done by covering the fields using paddy stalks, cornstalks, paddy husks, saw dust etc. so that the soil is not exposed to wind and at the same time the soil gets enriched in organic matter. Checking of flooding and water-logging in the fields
 - (ix) Minimizing the use of inorganic chemicals and insecticides in the fields. Use of such chemicals be made upon advice from experts. Inorganic chemicals should always be used 'along with' compost, FYM and any other organic manure.
 - (x) Watershed should be managed properly in the foothills.
- 1, Geographical area of I³p5? 22,366 sq.km
 - 2, Area of wastelands: 7,40 sq.km percentage of geographical Area: 30.4%. Percentage of wastelands of India: 0.42%
 - 3, Category of wasteland in the state: Culturable.
 - 4, Area so far reclaimed till 1990's: 880 sq.km Percentage of treated areas: .12% Percentage area remaining untreated: 6460 sq.km (88%)
 - 5, Area degraded due to practice of shifting cultivation: 4,905.2 sq.km
 - 6, Annual Afforestation: Deforestation ratio 1:13.5
 - 7, Forest Loss Index of the state (After Sharma, 2001) 0.04
 - 8, No. of threatened plant species in the forests: 65 sp. (After Sharma, 1997 & 2001)

Conclusion

Phoebe hainisiana, Junglans regia, Rhus hookeri, Ghrewia elastica, Flacourtia cataphracta, Butea frondosa, Aphanomixi polystachys, Magnolia griffithii, Cycas pectinata, Podocarpus wallichii Cymbidium giganteum, Arundina- graminifolia, Ascocentrum ampellicum, Dendrobium arachnites, Dendrobium densiflorum, Dendrobium nobile, Kalimpongia narajitii, Paphiopedilum insigne, Paphiopedilum villosum, Spiranthes sp., Vanda cuerulea, Aquilaria agallocha Dioscorea deltoidea, Rauwolfia serpentina.