APPROPRIATE SILVICULTURAL MODELS UNDER THE JOINT FOREST MANAGEMENT - GUJARAT STATE

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Introduction

Sustainable forest management as practiced during last hundred years has proved to be a myth which is apparent from the extent of open and degraded forests. Almost 38.0 million ha of the total forest area of 76.5 million ha is in category of open and degraded forests leaving only 38.5 million as dense forest with crown density more than 40% (Anon., 1995). Inspite of efforts by the Government, the trend of degradation and desertification continues in western part of India. A comparison of 1995 assessment with that of 1993 reveals that there has been a decrease of 507 km^2 in the extent of actual forest cover of the country indicating continuance in trend of degradation (Anon., 1995). In this background, there should be clarity in planning that, when the trend of degradation could not be reversed in the past, how the new Forest Policy would achieve the objective of forest restoration and ecological stability along with meeting the increasing need of the society?

Sustainability of Forest Productivity - Myth and Reality

Adverse influences of grazing, burning, removal of forest produce and silvicultural practices have altered majority of forests in western part of the country to a more or less marked retrogression stage which is now xerophytic in nature. Export of minerals and nutrients from forests in mountains is uni-directional which has increased tremendously in degraded forests. The factors like water run-off, fire, grazing, cutting of trees and removal of biomass cause export of nutrients and minerals from forests to rivers and plains continuously. It is difficult to mention a single factor here which reverses the transportation from low lands to forests. The basic question remains to be answered is - How can the biomass production be sustained in absence of mineral cycling and negative nutrient budget which decide the productivity of the land? Organic residue is not returned to soil for mineral replenishing which causes continuous depletion of sites. Balance of nutrient budget is already disturbed, specially in degraded forests bringing negative impact on the productivity. This has proved beyond doubt that sustained productivity of wood in degraded forests under the Joint Forest Management (JFM) is a myth rather than reality and raises a fundamental question about the sustainability of forest management.

Due to the degradation and spread of desert conditions, xerophytes are also expanding their coverage which have been recorded as the biological indicators to prove the process of desert spread in Banaskantha, Sabarkantha, Mehsana, Kutch, Panchamahal and Saurashtra region.

Denuded forests under the JFM in the

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State of Gujarat are not capable to produce enough biomass on sustained basis to meet the growing needs of the society. Local communities have to understand the fact that sustained wood production from these areas is out of question and degraded hills need to be rehabilitated primarily for ecological and environmental interest for sustenance of agriculture.

Sustainability of the JFM

Understanding among local communities about natural processes, inter-relationship and roles of hill forests for sustaining agriculture are key factors for the success of the JFM. People have realised the impact of forest degradation on agriculture and they also know that local wisdom in the form of community decision plays an important role for restraining people from using hill resources. Rehabilitation of forest through the JFM is a new management approach which is evolving slowly as an appropriate management strategy. This has been proved in some areas of Gujarat where people have realised that environment, water, grasses and non-wood products are major produce from the forest which in turn sustain agricultural system.

The Notifications of the State Government issued in 1991 and 1994 for the JFM focus on timber production and procedure for final felling and distribution of produces. Poor people have interest in fodder, and Non Timber Forest Products (NTFP) like Timru (*Zanthoxylum alatum*) leaves, Mahua (*Madhuca longifolia*) flower and fruits, gums, medicinal plants etc. Thus implementation of programmes related to production of NTFPs as per choice of village community will attract the majority of tribal community. Forest regeneration primarily for wood production may bring elements of commercialisation ignoring primary objective of the management which not only alienate majority of people due to socio-economic conditions prevailing in the villages but also raises a question about the sustenance of the JFM. Environmental benefits, water regeneration and non-wood produce from rehabilitating forest keep the interest of majority community intact by sustaining benefits and enhancing people's participation which in turn sustains the JFM.

System of forest management prescribed in the Government's Notification for the JFM seems to be unsuitable for many areas and they are required to be modified in favour of improvement of the ecosystem. Continuous improvement of sites should be the main objective of the programme by making provision of adequate forest cover after cutting of trees. Sustainable forest management in degraded forests, specially in arid and semiarid zones should not prescribe for removal of wood above an ecological limit aiming at environmental stability and ecological security for improving and sustaining the rural economy.

Silvicultural System under the JFM

Silvicultural system under the JFM should be evolved and prescribed as per local condition, existing physical and biological resources and requirement of the village community. In a degraded forest area in hills of Gujarat State, silvicultural system should focus on minimum biomass removal from forests with maximum benefits to local community. It was felt in Gujarat State Level Working Group on JFM to prepare a need based silvicultural model with the in-built provision of flexibility. In

the background of this fact, the degraded forests proposed or likely to be proposed in the JFM in Gujarat State are classified as under for purpose of prescriptions of silvicultural system.

I. Degraded forests with adequate root stock of teak (above 2000 root-stock/ ha).

II. Degraded forests with sparse root stock of teak, timru, etc.

III. Open forests with sparse trees and root stock.

IV. Degraded forests/blanks with poor or no root stock.

V. Grasslands (Vidis).

JFM in Gujarat State has been implemented initially in first category of forests where dense teak coppice has shown promising result at initial stage due to protection provided after plantation or closure of area by local people. But it has been observed in some areas that coppice growth stagnate after a few years and such type of the crop should be replaced by high forest.

Grass and NTFP are mainly produced from other four categories of forests managed under the JFM. This sustains continuous flow of benefits to local community when area is provided with some tree cover to check site from deterioration. After careful consideration of the requirements of sites and need of local community, following silvicultural systems may be adopted which can be modified as per local conditions.

(a) *Silvicultural System for Managing Coppice Forests of Teak* : In general, root stocks of teak in degraded forests under the JFM are very weak because they were regularly damaged by local community. Such stocks are capable to produce small poles or firewood. Density of coppice trees in such area is very high which provide thick coverage to sites. Coppice crops available on sites are not capable to produce high quality forest and hence it is necessary to transform such forests into superior one by taking up continuous improvement programme.

Final felling as prescribed in the State Government Notification of the JFM may reverse the process of restoration and also bring negative impact on the site. Thus selection-cum-improvement felling in such type of forest would meet the ecological need of the site as well as would maintain sustained supply of wood to the village community. Felling rules in this system should be inconsistent with the continuous improvement in the forest ecosystem. The following may be prescribed in the working scheme while implementing selection-cum-improvement silvicultural system in the area :

1. Thinning should be done for teak coppice trees favouring healthy coppice trees, sapling from seed origin, fruit trees and other NTFP species.

2. Adequate tree cover (about 40% canopy density) should be maintained after thinning or selection felling in interest of protection of site.

3. Selection felling should be done at certain interval (say 10 years). Mature, dead, diseased and defective trees should be removed to provide the opportunity for

growth and development of middle aged, young trees, specially from seedling origin.

4. Felling should not be done along nalas and rocky hills.

5. Gaps should be planted by seedlings (200 to 400) of teak, mahuda, bamboo, amla, bili, baheda, sadad, kher and other important species. Attempt should be made to change coppice forests by forests from the seed origin. To change the composition of forest in favour of ecologically superior forests, NTFP and fruit species should be planted in gaps along with SMC works and bamboo should be planted along nala and foot hills.

6. Adequate number of plus trees should be retained for sustained supply of seeds for natural regeneration of forests.

7. Silvicultural system should always attempt for minimum removal of wood from the area to maintain mineral cycling for improving the productivity of site as well as maintaining ecological stability.

(b) *Silvicultural System for Managing Non-Timber Producing Forest*: Degraded forests rehabilitated by regenerating trees and shrubs, etc. which produce NTFP, mainly fodder and medicinal are best suited for sustenance of the JFM. This kind of forest management has advantages over timber producing forests.

Mixed forest producing NTFP and medicine is considered to be ecologically superior because it conserves bio-diversity of area as well as provides sustained ecological security to rural economy including agriculture. Management of such type of forest results in maximum benefit to rural community, specially poor sections of the society, with minimum removal of biomass. Mineral transportation from non-timber forest is less compared to forest managed for wood production. Regeneration of forest under this system would maintain nutrient and mineral cycling which, in turn, would improve site condition of the area.

Mixed forest managed primarily for NTFP protects the interest of poor people who constitute majority in the village. Thus, such type of management enhances people's participation because they get regular employment for collection of NFTP like timru, mahua flower and fruit, fodder, medicine and edible fruit, etc. from the forests. Management of teak forest under the JFM may result into commercialisation of produce alienating poorer sections of the society which may prove to be counter-productive for sustenance of the JFM whereas non-timber producing forest sustains the interest of majority of local community and their participation making the JFM sustainable. Intangible benefits derived by the village from non-timber forest may be higher than pure teak forest.

Following may be prescribed for regenerating and managing such forests in II, III and IV categories of land.

1. Existing biological resource (root stock etc.) should be used for regenerating area and gaps should be planted by species like mahua, bamboo, timru, amla, kadaya, gunda, bor, bili, sitafal, karmada, etc. along with SMC works. Species which provide maximum benefit to people should constitute major composition in a block for facilitating collection of produce economically.

2. Bamboo should be planted along nalas and streams. Some area of foot hills and plains should be planted by timber producing

species (teak, eucalypts, sissoo, baval), mahua and bamboo.

3. Some patches with sparse trees surrounded by regenerated forest should be left blank for grass production.

4. Cultural operations like pollarding etc. should be carried out for timru and other species for maximising NTFP production.

5. Thinning should not be carried out in such areas.

6. Bamboo harvesting should be done after six years of the plantation and should be removed scientifically from each clump at an interval of three years.

7. People should be allowed to collect dead wood leaving enough leaf-litter for maintaining mineral cycling and health of the site.

8. Area should be closed to grazing and adequate protection should be provided against fire.

(c) *Silvicultural System for Managing Medicinal Forests* : Some areas are known for production of medicinal produce and people collect parts of vegetation traditionally for local use as well as for supply in the market. Such area should be regenerated again by taking up plantation of species like amla, arjun, baheda, bili, aritha, gugal, harde, karanj, kachnar, ratanjot, safed musli, chanothi, arudosi, surpgandha, aswagandha, satawadi, nagod, etc. Existing vegetation should be allowed to grow along with plantation of medicinal species, which should be carried out after identifying the need of people as well as marketing opportunity available nearby. This system of forest regeneration and management would be of immense use for sustaining the JFM when linkages between village community (Forest Protection Society) and market are properly established in favour of maximum benefit to the people involved in collection of medicinal produce.

This system of forest management has advantage over timber producing forest as discussed in Silvicultural System for Managing Non-Timber Producing Forest. The management would help in continuous improvement of forest along with sustenance of employment and perpetual benefit to local community.

Most of medicinal shrubs, herbs, grasses and climbers are shade bearing species and they can be grown in mixed forests. Thus, medicinal forest can be regenerated without disturbing the existing regenerated forests as discussed in the second type of silvicultural system under the JFM. Planting several species at one site may be good for bio-diversity conservation but collection of produce from only one or two species may not be economical. Thus, it is desirable that species producing medicinal parts for local community for marketing should form major composition of the crop facilitating easy collection of he produce.

(d) *Silvicultural Model for Managing Silvi-pastoral Forests* : After protection of degraded forest, area starts producing grasses after one or two years resulting into immediate benefit to the village community. Fodder is a basic need of the people which they get every year from the area under the JFM. Transformation of entire area into wooded forests may hamper the interest of people and it is necessary to manage part of forest land for sustained grass production. A silvi-pastoral model has to be designed for

maximum production of qualitative grasses along with adequate vegetation cover for protection of site. The following activities and silvicultural system may be prescribed by managing such type of area under the JFM belonging to II, III, IV and V categories of land :

1. A canopy density of about 0.1 to 0.2 is considered to be ideal for maximum sustained grass production in semi-arid zone like Aravali, Saurashtra and Panchamahal. Thus, some trees should be allowed to grow to provide some cover and to moderate micro-climate favouring grass development.

2. Good quality of grass should be regenerated in the area. Blank areas should be planted with about 200 to 400 seedlings/ ha along with seed sowing of palatable grass species and SMC works.

3. Bamboo should be planted along nala and streams. Rocky up-hills should be regenerated by hardy tree and shrub species. Forests in top hill and in foot hills should surround the silvi-pastoral block for protection of site and maintenance of micro-climatic stability.

4. Thinning of tree should be done in silvi-pasture block when canopy density exceeds 0.2.

5. People should be allowed to collect dead wood and NTFP from the area.

6. Area should be closed from grazing and adequate protection should be provided against fire.

7. Harvesting of grass by villagers should be allowed after ripening of the seeds of grasses.

(e) *Management of Vidis (Grasslands) under the JFM* : Vidis or grasslands, mainly located in Saurashtra and Kutch are managed primarily for grass production. Reserve vidis are relatively in good health whereas non-reserved vidis are degrading fast due to excess grazing. Some of the reserved vidis in Jamnagar have been transferred to tree land reducing the level of grass production. Grass produced from the reserved vidis is supplied to the Revenue Department to meet the scarcity situation. Some of the reserved vidis or part of them and most of the non-reserved vidis can be managed under the JFM by making suitable arrangement for protection, harvesting and distribution of produce. The following activities may be taken in such areas :

1. Most of the vidis are located in arid and semi-arid zone. Boundary plantation should be carried out after demarcation to raise shelterwood against hot wind.

2. Unwanted growth like *Lantana* and *Prosopis juliflora* should be uprooted.

3. SMC works should be carried out to enhance moisture level.

4. Sparse vegetation of trees and shrubs should be raised by planting 200 to 400 seedlings in blank areas. Seeds or seed-palets of palatable grasses should be sown to improve grassland for maximising productivity.

5. Grass harvesting should be done after ripening of grass seeds.

6. Area should be protected completely from grazing and fire.

Silvicultural system and operations prescribed in this paper should be modified as per requirement of the site and need of

the management. Sometimes, it becomes extremely difficult to regenerate and manage forest on ecological principle and a compromised management under the JFM should be evolved by safeguarding immediate need of people as well as allowing continuous ecological improvement of the ecosystem. Understanding about the silvicultural system and nature would help people and forest community to prescribe appropriate silvicultural system meeting all requirement for sustenance of the JFM.

SUMMARY

The appropriate silviculture system and operations meeting all requirement for sustenance of the Joint Forest Management have been described in detail.

संयुक्त वन प्रबन्ध के समुपयुक्त वन संवर्धन प्रतिरूप - गुजरात राज्य

एच०एस० सिंह

सारांश

समुपयुक्त वन संवर्धन प्रणालियाँ और कार्य जो संयुक्त वन प्रबन्ध को निरन्तर बनाए रखने की सभी आवश्यकताएँ पूरी करते हैं, यहाँ विस्तारपूर्वक बताए गए हैं।

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