REHABILITATION OF DEGRADED BAMBOO FORESTS AND *AGARBATTI* PREPARATION

A SLEM BEST PRACTICE

THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Indian Council of Forestry Research and Education has documented Rehabilitation of Degraded Bamboo Forests and Agarbatti Preparation from Degraded Bamboo Forests as best practices for sustainable land and ecosystem management (SLEM) under the World Bank funded SLEM Project.

Rehabilitation of degraded bamboo forests

Degraded land has serious adverse impacts on the environment, including soil quality degradation, local water loss and threats to biodiversity. This in turn has affected the economic and social services derived from the ecosystem by reducing the productivity of agricultural land as well. Bamboo can survive on degraded soils and steep slopes where many plants cannot grow. Being a perennial monocot plant, it has extensive capacity of stabilizing loose soil to prevent soil erosion. Bamboo is an important non-timber forest produce for forest dependent communities in India. Bamboo is one of the most productive and fast-growing plant and its unique growing capacity makes bamboo a valuable sink for carbon. Bamboo, which is an important forest produce, has high significance in socio-economic life of the rural people and people residing nearby forests. It is said to be poor man's timber and put to multifarious uses for various livelihood options. Bamboo is utilized for house construction, bamboo ply, agricultural implements, handicrafts, agarbatti sticks, brooms, food, fuel, fodder, paper pulps, medicine etc.

Madhya Pradesh State Forest Department rehabilitated an area of 14500 hectare of degraded bamboo forests in five districts of Madhya Pradesh namely Betul, Chhindwara, Umaria, Sidhi and Singrauli from 2010-2014 under UNDP supported project on "Integrated Land and Ecosystem Management to Combat Land Degradation and Deforestation''. A key intervention of the programme was to engage the community in protection of forests. This also included improving the health of existing bamboo clumps and planting new ones which came under the bamboo rehabilitation intervention. Intervention was carried out intensively for four years with each beneficiary being assigned 5 hectare of land to protect each year for four years, thus ensuring 20 hectare of conservation per beneficiary.

Steps to be adopted for rehabilitation of degraded bamboo forest Site preparation

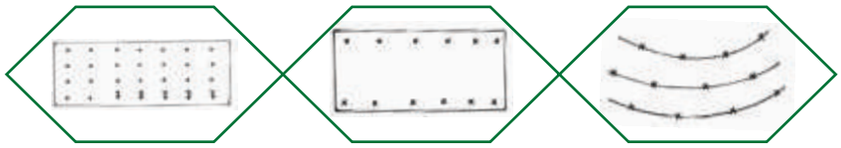
The site should be cleared properly by removing all stumps, roots, lops and tops. Discard the bamboo if available from the site for further use. This discarded bamboo will be used for agarbatti preparation, fencing, crib wall and other households uses.

Steps involved in rehabilitation of degraded bamboo forest

- Plantation of bamboo and other species (aonla, shisam, neem, karanj, khamer, mahua, teak and subabul) need to be carried out. The fodder availability can be increased due to plantation of fodder trees including Cenchrus grass. This will help in reduction of the practice of free grazing. The cutting of trees for fuel wood has to be slowed down and only the wood pruned from trees and dead wood can be collected as a fuel wood.
- Restoration of existing bamboo clumps can be carried out by turning the soil at the roots and cleaning the clumps.
- Stone bunding can be done at the base of the bamboo clumps to prevent soil erosion due to water runoff on steep slopes.
- A series of loose boulder check dams can also be constructed on the water streams in the forest. These can reduce the soil erosion. Additionally, staggered trenches can be created on degraded lands which further check the soil erosion. This watershed intervention will increase moisture and water retention downstream.
- Forest health can be improved through active participation of the local community in the conservation and protection of the degraded bamboo forests.

Planning for new plantation of bamboo, energy plantation and fodder

- Site and species selection for plantation based on geographical condition.
- Plantations can be raised as a block plantation, if large area is available.
- After clearing the land and before digging of pits, pit sites should be identified by using a measuring tape to ensure the desired spacing and then marked with wooden or bamboo sticks that will be the centre of the pit.
- Pits of size 30x30x45 cm depth should be dug to ensure that the roots of the plants do not curl up once the planting material is placed in it.
- The soil dug from the pits should be dumped close to the pit.
- While digging stones, roots of trees, grass or shrubs, if any, should be separated so that while filling the dug-up earth back in the pits these are not mixed with the soil.
- The spacing of pits varies according to the planting scheme for different areas. Generally, the spacing between pit to pit along the contour line is 2 m and the distance between lines (Contour) is 3 m.

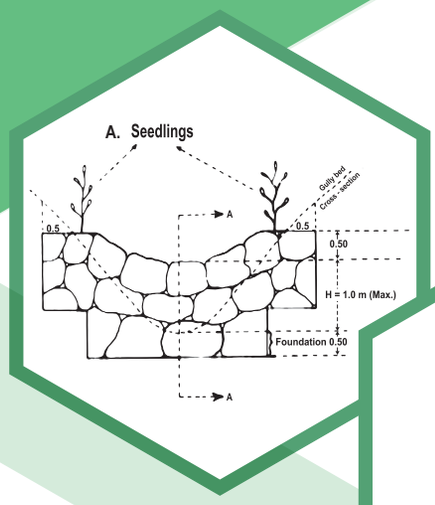


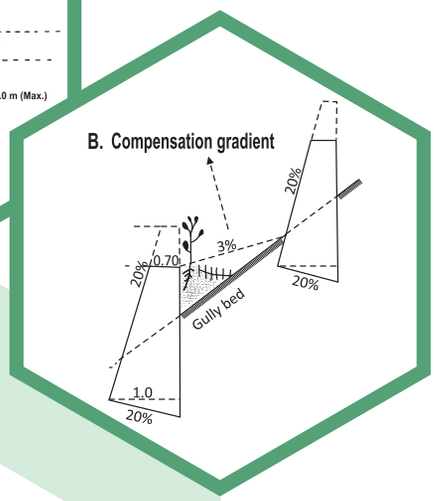
Block Plantation | Boundary Plantation | Bund Plantation

For soil and water conservation following measures could be followed:

Gully Plugging and Nala Control

- In control of gullies and nalas, the erosive velocities are reduced by flattening out the steep gradient of the gully.
- Construction of series of checks which transform the longitudinal gradient into a series of steps with low riser and long flat treads.
- This involves construction of check dams (vegetative, stone and crate wire or wire mesh check dams).
- Mechanical measures (check dams) are supplemented by planting in gullies behind check dams.
- All gully or nala control work should start from the top of gully/nala and this activity must cover both non-arable and arable land.
- Mechanical measures have to be adopted to prevent washing away of vegetative measures by large volume of run off.
- Vegetation once established is able to take care of gully.



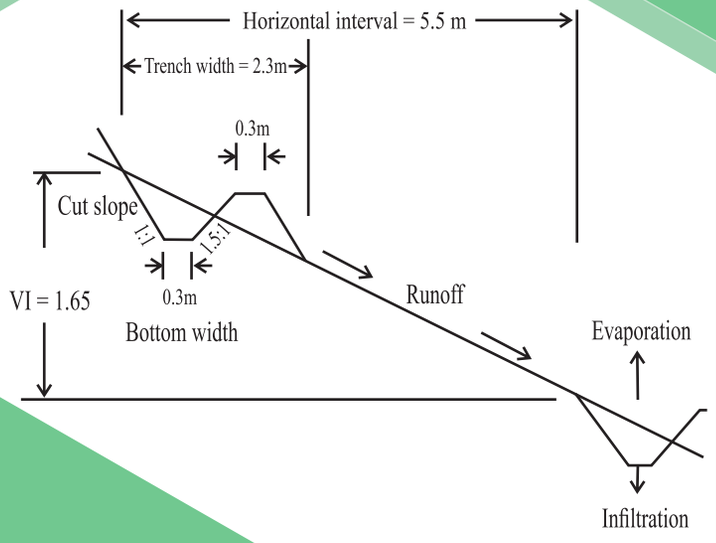


Stone check dams

- For constructing stone check dams, the site where it is to be constructed is cleared and the sides are sloped 1:1.
- The bed of gully is excavated for foundation to a uniform depth of 0.45-0.60 m and dry stones are packed from that level.
- Over the foundation, stone masonry super structure of check dam can be constructed.
- The stones are dressed and properly set in with wedges and chips.
- The width of check dam at the base should be approximately equal to maximum height and successive courses are narrower so the section is roughly a trapezium.
- In the centre of the dam portion sufficient waterway is allowed to discharge the maximum run off.
- The stone work should go up to 0.30-0.60 m in the stable portion of the gully side to prevent end-cutting.
- Sufficient apron should be provided to prevent scouring of the structure.
- The thickness of the apron packing should be about 0.45 m and gully sides above the apron have to be protected with packing to a height of at least 0.30 m above the anticipated maximum water level to prevent side scour being formed by the falling water.

Loose boulder check dam

Loose boulder check dams in series



Contour Trenching

- Contour trenches are widely used for moisture conservation in plantation areas.
- It is a practice of excavating trenches along a uniform level across the slope of land
- Bunds are formed along the trenches on the downstream side with material taken out of them.
- Contour trench break the velocity of run off and store whole or part of runoff.
- If contour trenches are constructed on the slope at the interval, just before runoff water attains erosive velocity, their life will be much more

Staggered trenches

These are generally made in high rain fall areas as there is a danger of overflow and breach in case of continuous trenches in such areas. In staggered trenching, the trenches are located directly below one another in alternate rows and in a staggered fashion. These may be 2-3 m long and the spacing between the rows may vary from 3-5 m.

Apart from rehabilitation of bamboo forests and poverty reduction in poor tribal families, there are number of other advantages:

- Increase in socio-economic conditions of the poor tribal families
- Availability of raw material for local handicraft and cottage industries
- Control in degraded bamboo forests
- Control in land degradation
- Improvement in bio-diversity
- Ecological revival associated with immediate and long-term livelihood opportunities
- Overall improvement in environment

Agarbatti preparation from bamboo

Agarbatti making is a profitable business that can be initiated at a small scale with small capital, machine and equipment. Agarbatti manufacturing can be undertaken through self-help groups or on cooperative basis as this enterprise is capable of creating livelihood opportunities especially for women in rural India where raw material used in its manufacture are easily available. It also forms a significant share in the country's exports. Agarbatti are used by all communities in India, Sri Lanka, Myanmar and by Indians residing abroad. It is exported to 90 countries. Agarbatti Industry is one of the labour intensive cottage types of traditional industries in India and Karnataka leads in this industry.

Incense sticks or agarbatti preparation requires simple technologies, locally available raw materials and low capital investments. The principal raw materials for agarbatti, consist of a bamboo stick, powder mixture of charcoal and gigatu/ jigat powder and incense paste (Masala). Bamboo is the base material for this practice. Forests of Madhya Pradesh are always rich in bamboo resources. This practice will revive the age-old tradition of utilizing bamboo for livelihood by rural artisans especially women in the states of Madhya Pradesh and Chhattisgarh.

Ingredients required for manufacture of Agarbatti

A typical composition for masala agarbatti is as under:

- White chips - 40%
- Gigatu/ Jigat - 20% (composition can be modified)
- Charcoal - 20% (according to the requirements)
- Aromatic chemical/ essential - 20%
- Oil and other ingredients

Manufacturing process

All the ingredients in powder form are mixed well in the proper proportion with water to a semi solid paste. This paste is applied to bamboo sticks and rolled on wooden-planks with hands uniformly. The raw sticks are then dried for 6-8 hours and packed in suitable bundles. For perfumed agarbatti the concentrated perfume (rose, jasmine, mogra etc.) is diluted first with white oil or diethyl phthalate (generally 1:3) and raw agarbattiare dipped suitably in dipping trays. The perfumed agarbatti are packed immediately in butter paper bags or polypropylene bags and finally in printed cartons.

Production

Production may be partly or completely by hand, or partly or completely by machine. Semi-automatic machines can be used for applying paste, for perfume-dipping, packing etc. or fully automated machines which apply paste and scent, though the bulk of production is done by hand-rolling at home. Many smaller producers are using packaging materials supplied by big manufacturers under buy back mechanism. The small producers can use the final products in two ways- for sale at local haats and markets, and further supplying to big manufacturers, who after packaging market these sticks under their own brand names.

Advantages

- Promote reclamation of degraded bamboo forests and the discarded bamboo from these degraded areas can be utilized for making sticks for agarbatti
- Readily availability of raw materials
- The marginal as well as poor tribal groups get opportunities to improve their livelihood
- The community has the opportunity to get organized and strengthened to be a part of a bigger value chain. This further helps in the main streaming of the community
- Sustainable use and management of local resources ensured with community participation
- Bridge the gap between the local communities and Forest Department by articulating the common objectives of both the stakeholders
- The local communities have developed capacities to train other communities in agarbatti making, build confidence, marketing knowledge and quality improvement

Indian Council of Forestry Research and Education (ICFRE), Dehradun as Ecosystem Services Improvement Project Implementing Unit (ESIP-PIU) is building the capacity of the local communities of ESIP project areas of Chhattisgarh and Madhya Pradesh for upscaling of Rehabilitation of Degraded Bamboo Forests and Agarbatti Preparation from Degraded Bamboo Forests: A SLEM Best Practice.

Brief About ESIP

The World Bank funded Ecosystem Services Improvement Project (ESIP) supports the goals of the Green India Mission by demonstrating models for adaptation-based mitigation through sustainable land and ecosystem management and livelihood benefits. ESIP will introduce new tools and technologies for better management of natural resources, including biodiversity and carbon stocks. Main components of the project are: strengthening capacity of government institutions in forestry and land management programs, improving forest quality, and scaling up of sustainable land and ecosystem management (SLEM) best practices. ESIP is being implemented in the states of Madhya Pradesh and Chhattisgarh by Indian Council of Forestry Research and Education, Chhattisgarh State Forest Department and Madhya Pradesh State Forest Department under the overall direction of Ministry of Environment, Forest and Climate Change, Government of India.

Brief About ICFRE

Indian Council of Forestry Research and Education (ICFRE) is an autonomous body of the Ministry of Environment, Forest and Climate Change, Government of India. It is an apex body in the national forestry research system that promotes and undertakes need based research, education and extension in the forestry sector. It has a pan India presence with its 9 research institutes (Arid Forest Research Institute, Jodhpur; Forest Research Institute, Dehradun; Himalayan Forest Research Institute, Shimla; Institute of Forest Biodiversity, Hyderabad; Institute of Forest Productivity, Ranchi; Institute of Forest Genetics and Tree Breeding, Coimbatore; Institute of Wood Science and Technology, Bengaluru; Rain Forest Research Institute, Jorhat and Tropical Forest Research Institute, Jabalpur) and 5 centers located at Agartala, Aizawl, Prayagraj, Chhindwara and Visakhapatnam. Each institute are directs and manages research, extension and education in forestry sector in the states under their jurisdiction.

Published by :

ESIP - Project Implementation Unit
Biodiversity and Climate Change Division
Indian Council of Forestry Research and Education
P.O. New Forest, Dehradun – 248 006
Web : www.icfre.gov.in

For further details please Contact :

Project Director, ESIP
Indian Council of Forestry Research and Education
P.O. New Forest, Dehradun – 248 006
Contact No. : 0135 - 2224831
Email : projectdirectoresip@gmail.com

Project Manager, ESIP
Indian Council of Forestry Research and Education
P.O. New Forest, Dehradun – 248 006
Contact No. : 0135 - 2224803, 2750296, 2224823
Email : rawatrs@icfre.org

Design & Print
Saraswati Press # 7055053333