

**Biodiversity conservation and sustainable livelihoods through Assisted Natural
Regeneration – An analysis of current processes and scope of Refinement¹**

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Abstract

Assisted/Aided Natural Regeneration (ANR), drawing from its evolution in South East Asia about 30 years ago, can be defined as a flexible approach to reforestation which relies on principles of secondary succession and “assists” the natural regeneration to establish faster, apart from augmenting natural regeneration (also called “accelerated natural regeneration”) through planting of additional trees when needed. As a forest management tool, it usually consists of silvicultural (tending)³ operations, soil conservation measures and seeding/planting through participation of local community and integration of local ecological knowledge. ANR now forms the major strategy under National Afforestation Plan (NAP) and externally aided forestry projects in India covering so far a few million ha of degraded forest land. In its present form, it is departmentally executed as one of the plantation models (300 trees/ha) besides assisting ‘natural regeneration’ of one or few timber species being governed by principles of timber oriented forestry. Result of an analytical evaluation study of ANR practice under NAP in the state of Maharashtra points to the scope of refining the existing approach. A paradigm shift in the existing approach to ANR seems quite imperative considering the changed focus of Indian Forestry towards people’s participation, biodiversity conservation, ecosystem services and NTFP-based livelihood promotion, apart from justifying its nomenclature. Taking the status of ANR in Orissa with a special focus on externally aided Orissa Forestry Sector Development Project

¹ Paper presented at the National Workshop on ‘**Biodiversity Conservation through Stakeholder Participation**’ organized by the **Full Bright Indo-American Environment Leadership Program** of **United States-India Educational Foundation (USIEF)** at Cochi, Kerala during October 6-9, 2009.

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as a case study, this paper tries to analyze the existing practices, processes and suggests necessary refinement in approach to accommodate the changing paradigms in Indian forestry. The refinement advocated blends top-bottom approach of GIS based mapping with bottom-up approach of local level micro planning and promotes multi-stakeholder forest management through participation of VSS (Vana Samrakhyana Samiti), NGO and Forest Department to augment elements of biodiversity conservation and livelihoods promotion. Different innovations like use of grid-based planning and integrated treatments, leveraging on local ecological knowledge (LEK), shifting focus from what-to-cut to what-not-to-cut, augmenting enrichment seeding/wildling, promoting regeneration of forest-foods like tubers, herbs etc. have become part of this approach through interactive demonstrations and stakeholders-feedbacks. The rationale and process of evolving of the refined ANR approach is discussed and then step-by-step process along with the challenges in its adoption is indicated.

Key Words: NTFP, Local Ecological Knowledge, Stakeholder participation, JFM,

1. Introduction

Degradation of forests continues to cause serious problems world-wide and deforestation now forms the second largest anthropogenic source of GHG emissions (IGES, 2009). A variety of measures have been tried to address these problems at different levels, with varying degrees of success, the more recent being the options around REDD (Reduced Deforestation and Degradation). Communities around the world have also shown their ingenuity in manipulating the forest and ecological successions to reverse the process of deforestation, evidences of which galore from 'Slash & Char' (Biochar/ Tera preta) system by pre-Columbian Amazonian community to recent community forestry movements in Orissa, India (Singh et al., 2005). Assisted or Aided Natural regeneration (ANR), based on

principles of secondary succession and complimented with traditional knowledge and involvement of the local community is an important option employed in India and South East Asia to rehabilitate the degraded tropical forests through augmenting natural regeneration and enrichment plantations.

ANR is being adopted in South East Asia for more than 30 years now and it would worthwhile to have a brief review of its concept and practice in this region before analyzing the situation in India.

2. ANR: Concept, Philosophy and Practices

2.1 Scenario in South East Asia

ANR is regarded as a flexible approach to reforestation in South East Asia that uses natural regeneration of forest trees (“wildlings” or natural seedlings, and sprouts), “assists” natural regeneration, and helps trees grow faster. It is sometimes also called “accelerated natural regeneration” wherein additional trees are planted when needed or wanted (enrichment planting). (Ganz & Durst, 2003) In the Philippines, this technology, which is based on the ecological principles of secondary forest succession, utilizes natural processes and promotes regeneration of indigenous species, has been well-developed for degraded forests covered by *Imperata cylindrica* grass. (Dugan et al 2002). The key elements of ANR in the Philippines are quite basic: control fire, restrict grazing, suppress *Imperata* growth and involve local people. The benefits of ANR are equally fundamental. The cost of reforestation through ANR is far less than traditional plantation development. The technologies are simple and easy to implement. The resulting forest is highly diverse biologically and there are substantial benefits for local people (Ganz & Durst, 2003). Other examples of implementation of such principles of secondary successions to degraded forests include the approaches of forest restoration in Thailand, and imitating nature in Brazil. Sajise (1989) has summarized advantages of ANR or similar strategies as follows:

- faster and cheaper (it may not be necessary to establish a nursery);
- promotes and conserves biodiversity;
- maintains the original vegetation stand and corresponding ecosystem functions;
- maintains the integrity of the soil and involves minimum soil disturbance;
- labour intensive and provides employment for the local community and promotes use of indigenous knowledge (IK);
- promotes empowerment if IK and traditional institutions are used and valued; and
- promotes hydrologic integrity and biotic functions

As per Sajise (2003) the *ANR technologies* usually comprise site selection, site assessment, site-species matching, site modification such as shade opening, supplemental or enrichment planting of appropriate species, protection and maintenance and monitoring.

In Indonesia, TPTI (Indonesian silvicultural system utilizing selective cutting and natural regeneration) as a form of ANR has laid out optimal conditions for success in terms of number of trees of different age group⁵ that are to be retained. Enrichment planting is implemented on sites that do not have a sufficient number of poles, saplings, seedlings and where there are many open spaces (i.e. open canopy). Tending is carried out on areas of enrichment planting to replace seedlings that have died. (Soegiri & Pramono, 2003)

While continuing to embody the ecological principles involved in the technological interventions Sajise (2003) felt that ANR approaches should also be socially acceptable and institutionally supported. Walpole (2003) was of the opinion that the whole discourse on ANR could focus on traditional systems and knowledge, yet the challenges facing ANR development include broad ranging impacts from competition with plantations, insecure tenure and extraction rights, over regulation of communities, poverty and marginalization.

Citing example of *Ifugao muyong system*, Butic and Ngidlo (2003) have shown that ANR

Number of nuclei trees - >25 per hectare; Number of pole-size trees - >200 per hectare; Number of saplings - >1 600 per hectare; Number of seedlings – 20 000 per hectare; Nuclei trees, pole-size trees, saplings and seedlings should be evenly distributed

can be used effectively to transform woodlots into multiple-use centres without disturbing the ecological functions of the natural forest and have emphasized that it can be used to link indigenous approaches with learned forestry interventions and forests can be diversified to meet both the micro and macro levels of their integrated restoration work.

As the communities are the primary cause of land-use changes and the use of ANR approaches is inherent to their daily lives, they have to play a significant role in ANR. Considered an integral part of ANR in the Philippines, communities have demonstrated actions towards protection of forests for their own benefit as well as for the benefit of broader society, mostly in remote locations where government approaches have not been very effective. ANR could be promoted as a strategy within community-based natural resource management, to restore native plant communities and ecosystems. There is also a need to experiment with new approaches of user-centred ANR technologies and to develop workable approaches compatible with local conditions. It is essential that constructive partnerships be formed among NGOs, Governments, Private sector and Communities to design effective ANR approaches, for mutual long-term gains for the all stakeholders (Ganz & Durst, 2003)

2.2 Present Scenario in India: Practice and Limitations

ANR forms an important component of National Afforestation Plan (NAP)⁶, the flagship afforestation program of Govt of India, which has covered a total area of 1.58 million

⁶ NAP aims to sustainably develop the forest resources of the country with people's participation, with focus on improvement in livelihoods of the forest-fringe communities, especially the poor. NAP Scheme aims to support and accelerate the ongoing process of devolving forest protection, management and development functions to decentralized institutions of Joint Forest Management Committee (JFMC) at the village level, and Forest Development Agency (FDA) at the forest division level. GOI formulated NAP in the 10th plan, by merger of four centrally sponsored schemes operative in the 9th plan period viz. (i) Integrated Afforestation and Eco-Development Projects Scheme; (ii) Area Oriented Fuel-wood and Fodder Projects Scheme; (iii) Conservation and Development of Non-Timber Forest Produce including Medicinal Plants Scheme and (iv) Association of Scheduled Tribes and Rural Poor in Regeneration of Degraded Forests. Samanvit Gram Vanikaran Samriddhi Yojana (SGVSY) came into existence and was implemented through a new decentralized set up of FDAs during the last two years of the 9th plan period. Considering the success of the pilot phase in the 9th plan, GOI approved NAP during the 10th plan period, to be implemented by involving

hectare till March 31st, 2009 through 795 Forest Development Agencies (FDA) since the launching of this mechanism in 2000-01, at a cost of Rs.2675.26 crores (GOI, 2009a). ANR also forms the major strategy for rehabilitation of forest land under externally aided projects⁷ being operated in 11 states of India at an investment of Rs 5577 Crores. (GOI, 2009b) Considering the area coverage and amount of investment going into ANR and the envisaged processes and goal, it is imperative to have a look at the present practice and analyze its effectiveness.

ANR, notwithstanding its nomenclature suggested to aid/assist natural regeneration is primarily seen as a plantation model⁸ under NAP wherein plantation of 200 plants per ha is also prescribed along with cost provisions for soil moisture conservation works, micro planning, awareness raising and Entry Point Activities (EPA)⁹.

Considering the importance and coverage of ANR interventions, GoI understands the need of getting feedbacks from field to gauge effectiveness and explore further refinement. There have been several evaluation/research studies commissioned by GoI to look at ANR models from different angles with respect to 'implementation and impact'. A summary of one such study carried out in Maharashtra is presented here to focus an analytical understanding of the scope of such studies, as well as their results vis-à-vis the implementation process and recommendations for refinement.

two tier set up namely the Forest Development Agencies (FDAs) and Joint Forest Management Committees (JFMCs).

⁷ These funds have been utilized and proposed to be utilized in future for rehabilitation of forest land, to improve the quality of life of the villagers adjoining forests, ensure people's participation, strengthening joint forest management institutions, to augment availability of fuel wood and fodder, promote farm forestry, agro forestry, water and soil conservation measures, encourage tree growing on private land and greening of the urban areas in accordance to the objectives envisaged in various projects under implementation.

⁸ Models are as per number of plants to be planted per ha; other models being Artificial Regeneration – 1100 plants/ha; Silvi-pasture Developments – 400 plants/ha; Bamboo Plantation – 625 plants/ha; and Mixed Plantations of trees having MFP and medicinal values – 1100 plants/ha.

⁹ As per Ministry of Environment and Forests' Operational Guidelines for Implementation of NAP (circulated to various State Governments vide DO No. 25.1.1/99-B-II, dt. 31-05-2002)

3.1 A Case Study of Maharashtra

In Maharashtra, under NAP, ANR model was proposed to be implemented in 39 of 45 operative FDAs, over an area of 21,495 ha, where the canopy density is more than 40%. During 2003-06, an area of 12,269.50 ha was covered under ANR in 32 forest divisions out of which 65% of areas fall under 4 agro-climatic zones namely zone II-Pune, VII-Nagpur, VIII-North Chandrapur and IX-South Chandrapur.

A study was carried out by SEVAK (2008)¹⁰ to gauge the effectiveness of biological intervention of ANR in restoring forests with cost effectiveness while fulfilling community needs. This study covered a sample of 30 villages (2 each from 15 FDAs from these 4 agro climatic zones) and included 13 tribal and 17 non-tribal villages covering 795 ha of ANR area (7% of total ANR intervention area).

The study revealed that the people's participation was adequate (>60%) in 9 (30%) villages in micro planning; in 18 (60%) villages in implementation and in 22 (70%) villages in protection activities. With reference to choice of species, in 19 villages, it was as per micro plan, in 24 Villages as per Villagers' requirement and in 27 Villages as per technical suitability. Teak, Bamboo, Karanj, Aonla, Ain, Apta, Bor, Babul, Khair, Neem, Shivan, Sissoo, species were used on large scale, in plantations. Survival % was 65% on average (> 80% in 14 villages and <40% in 8 villages). Average number of woody stems (> 30 cm GBH- Girth at Breast Height) per ha was 442 out of which 275 were existing trees. Average availability of non-woody plants per 5m X 5m quadrat was 203 plants excluding grasses. Soil and Moisture Conservation Works (SMC] were not taken up in most of the

¹⁰ GOI, Ministry of Environment and Forests, through its Regional Centre, Mumbai of NAEB had engaged SEVAK, Pune, an NGO for carrying out ANR Impact Assessment study of Maharashtra State implemented through FDAs / JFMCs, *vide* its letter No. AFC/RC: NAEB: VVR/06/1679 dt. 25-09-06, on discussions of the Concept Paper prepared by SEVAK during the meeting held on 7th Sept. 2006 at Mumbai.

villages. Only in 7 villages SMC like CCT (Continuous Contour Trench), gully plugging and nala bunding were carried out.

Out of the 30 investigated villages, working plans were operative in 19 villages with different working circles¹¹. In the remaining 11 villages working plans were not operative, however in the past working plans, these areas were treated under some working circle¹².

The area identified for treatment in 3 villages was suitable for treatment of Artificial Regeneration because it was devoid of 0.4 density forests and had no sufficient root stock for treating under ANR. Area of other 27 villages was suitable for ANR treatment. Silvicultural practices prescribed in the working plans in many villages did not match treatment under ANR. Ongoing Silvicultural systems had not given boost to natural regeneration but had helped in conservation of forests. The silvicultural operations like Subsidiary Cultural Operations, Cut Back Operations had not been carried out and this was the main reason, the study felt, why desired natural regeneration had not established.

Some of the critical observations made include lack of consultation of the working plan prescriptions i.e. working circle and/or silvicultural systems in selection of sites, absence of technical formalities of selection of sites and getting treatment maps and site specific estimates approved by the competent authorities, undertaking of ANR works mechanically without consideration of variations with respect to local situations and lack of innovative approach and flexibility within the approved package.

This study made the following recommendations for effective ANR

- *Suitability*: ANR model is to be implemented in the forest area having minimum root stock of coppicing plants and/or 300 numbers standing trees (>30 cm GBH) per

¹¹ Babul-van afforestation working circle, selection cum improvement working circle, pasture working circle, afforestation working circle, teak plantation working circle, improvement working circle and plantation management working circle.

¹² Selection cum improvement working circle, coppice with reserve working circle, afforestation working circle, pasture development working circle

hectare. Forest area having crown density of 40% and above are ideal for ANR treatment. Completely degraded and scrub / open forest lands should be excluded for treatment.

- *Treatment Map*: Small blocks of 0.5 ha are to be laid on ground with serially numbered and boundary fixed through laying dressed stone or cement block. The treatment map should be prepared by Forester, verified by the Range Forest Officer and approved by the Assistant Conservator of Forest. The treatment map should show gully, nala which need soil moisture conservation treatment; the blocks for seed sowing in bushes and the place for live hedge fencing.
- *Alignment of pits*: No planting be done in blocks having 150 or more standing trees over 30 cm GBH. Alignment of pits are to be done at 7X7 m for blocks having 100-149 standing trees over 30 cm GBH and alignment of pits at 5 X 5 m for blocks having less than 100 standing trees having GBH above 30 cm.
- *Timing of Operation* : Cleaning of brush wood and its collection in small heaps, dressing of old stools, coppicing of root stock, flush to the ground and singling of NR shoots and alignment for planting are be done, preferably in January – February
- *Seed sowing*: In the 0.5 ha blocks where standing trees are less than 30, seed sowing in bushes are to be adopted. Chandan, Neem, Jatropha, Khair, Sissoo, Bor, Seetaphal, Mango are some of the ideal seeds for bush sowing. Ideal period is last week of May, when the visibility is clear and sufficient soil temperature is available for seed germination, on start of monsoon.

Based upon the learning and limitation of the Maharashtra study, we tried to analyze the practices of ANR in Orissa and attempt to suggest strategies and processes for field refinement. Our initiative draws heavily from our field visits and interactions with various stakeholders including Forest Department, NGOs and Communities. Having been able to

understand their roles, perceptions towards the existing processes from close quarters, we have tried to weave in their involvement in the proposed refined strategy based on their strength and weakness.

3.2 A Case Study of Orissa with focus on Orissa Forestry Sector Development Project

In Orissa, use of ANR approach through involvement of village level institutions¹³ can be traced to the period of implementation of SIDA (Swedish International Development Agency) assisted Social Forestry project during early nineties, where under the RDF (Rehabilitation of Degraded Forest Scheme) through ANR practices had been carried out. Besides, in the Working Plans, Rehabilitation Working Circles, prescribes ANR like operations under subsidiary silvicultural operations. ANR is usually undertaken for rehabilitation of degraded forests through JFM mode and is aimed at augmenting productivity of fuel wood, fodder, small poles, NTFP, medicinal plants etc .

Presently, ANR (or RDF) is an important afforestation strategy of Orissa Forest Department covering about 75,000 ha under different ongoing schemes¹⁴ (during 2007-09) viz. Economic plantation/RDF (6,100 ha), 12th Finance Commission grant (27, 800 ha), KBK Plantation (4,000 ha), NAP (31,958 ha), Compensatory afforestation (2,333 ha), NREGS (2,806 ha). ANR also forms the major forest treatment intervention under JICA (Japan International Cooperation Agency) assisted Orissa Forestry Sector Development Project (OFSDP), being implemented in 14 forest divisions with an investment of Rs 660 Crores during 2007-13 (www.ofsdp.org). Under OFSDP 1.76 lakh ha. of restoration of degraded forests around more than 2000 forest-fringe villages is to be undertaken through JFM approach, out of which ANR strategy is going to be adopted in about 80% of the area. The other afforestation options being Artificial Regeneration models like Economic

¹³ Village Forest Committee were constituted during implementation of Social Forestry Project in Orissa through enactment of The Orissa Village Forest Rule, 1985

¹⁴ <http://orissagov.nic.in/forest&environment/index.htm> (accessed on 5th Sep 2009)

Plantation, NTFP Plantation, Fuel & Fodder Plantations and Bamboo plantations, which are all block plantations.

During planning of OFSDP, OFD had suggested assisted natural regeneration (ANR) treatment for indigenous species-oriented, NTFP-oriented, and medicinal plant-oriented models. OFSDP envisages adoption of ANR to facilitate natural regeneration on degraded forests where rootstocks are still available through singling of coppice shoots, removal of high stumps and climbers, and tree planting in blank areas. In order to augment incentives to the VSS members concerned, species that will provide economic benefits in the early years (NTFP and medicinal plants) are suggested, so far as the site conditions allow.

OFSDP facilitates an elaborate planning approach which blends top-bottom with bottom-up planning and use of latest technology with participatory processes for treatment of forest area of VSS. Three sets of GIS maps on 1:5000 scale are developed for each VSS site through interpretation of satellite imagery, DGPS (Digital Geographic Position System) survey and joint (by Forest Department and GIS Vendor) ground verification to provide detailed analytical information about the area (base map), land use (agriculture, forest, orchard, rocky outcrops etc.) and forest maps (canopy density, forest type, major species and stage of crop, etc). The Forest map also provides information about topography including slope, drainage lines and divides the area into grids that are approximately four ha in extent (200m X 200m). These maps are to be utilized for a comprehensive participatory micro planning process with involvement of stakeholders like Forest Department, NGO and VSS members through forest-PRA (Forest time line, Forest historical transact, NTFP flow map, NTFP seasonality, present forest resource map and proposed forest treatment map) to accommodate concerns of livelihoods, biodiversity conservation as well as the availability of LEK. These inputs were provisioned to help

development of an ecologically sensitive, livelihoods-promoting, sustainable forest treatment plan through multi-stakeholders participation.

However, re-visiting of the micro plans carried out during initial two years of project implementation and a mid-term analysis of the field practice of ANR carried out by the project revealed the following:

- *Limited appreciation of Paradigm shift in Forestry at cutting edge level* : The changed wind blowing in forestry sector post-1988 (participatory, livelihood oriented forestry) and post-Rio (biodiversity conservation focus) seem to have not been appreciated adequately by the cutting edge staff, with their mindset towards revenue oriented, industrial forestry through departmental intervention still continuing.
- *Continued focus on timber-based forest management*: The focus is on weeding out non-timber species (including trees, climbers, shrubs and herbs) to promote regeneration and growth of timber species like Sal (*Shorea robusta*) and some associates. While all non-timber species are removed through cleaning and climber-cutting operations, Natural Regeneration (coppice-route) of timber species mostly that of Sal, are promoted through singling (of coppice shoots) and stool cleaning operations. This purposive operation results in dominance of Sal. While such a result serves the cause of national interest of restoration of degraded forests with green cover and revenue generation, it seems to compromise the livelihoods needs of communities living in and around the forests, and thus endangers sustainability.
- *Creation of even-aged single-storeyed pure crops*: ANR operations lead to creation of even-aged single- storeyed pure crop, which from ecological perspectives, as well as in terms of flow of ecosystem services, considered inferior to mixed uneven

aged multi-storeyed forest. At many places in Orissa¹⁵ congested stands of such even-aged pure sal crop could be seen as a result of past RDF operation and in the absence of further provisions of thinning.

- *Limited focus on diagnosis and planning:* Availability of options like GIS maps and forest-PRA tools, have not been adequately tapped, making less than holistic diagnosis of the forest area. Quite often the treatments have been planned independent of these inputs.
- *Plantation & treatment in patches/blocks:* Instead of promotion of diffused treatment of the site through NR, supporting tending operations, enrichment planting/seeding and soil moisture conservation (SMC), there have been a block plantation approach. Quite often, the plantation option of 300 plants per ha, have been found to be clubbed together to raise a block plantation of an area equivalent to (ANR area in ha X 300/1600) ha in open gaps, where ideally AR plantation models would have been tried. Similarly tending operations and SMC measures have been found to be taken up sporadically in different patches. While tending operations have been restricted to cleaning, high stump cutting & climber cutting, but not thinnings in congested crop. SMC measures were around mostly loose boulder check dams (LBCD) as gully control structures.
- *Changed economic sense in present context:* With the changing economic scenario, NTFP has become more valuable than timber, however the understanding and attitude of cutting edge forest staff still seem to favour timber-trees especially sal and teak to be most viable commercial option.
- *Participation:* In its present form, ANR operations are planned and implemented by forest department with the participation of local communities mostly as wage labourers.

¹⁵ In one site of RDF areas in Phulbani treated through SIDA fund in early nineties, no of sal stems were found to be 1300-2900/ha during 2009 with upper storey completely dominated by Sal (as per data collected laying 25m X 25m quadrat)

Acceptance of participatory micro planning in treatment of VSS-allotted areas and inclusion of such plans in the working plan under JFM provides space for promoting people's forestry, which has yet to be adequately tapped into.

- *Biodiversity & Local Ecological Knowledge (LEK)*: Ongoing ANR practices have not been able to appreciate the potential of LEK and concerns of biodiversity.. Biodiversity rich forests meet better the various cultural and livelihoods needs of the communities.. Through their intimate and symbiotic relationship with forests, the forest-fringe communities have demonstrated a deeper understanding of the forest ecosystems as well as appreciation of the uses, and niches of different species¹⁶. There is also an increasing realization of and agreement on the involvement of traditional communities worldwide in protecting, maintaining and using biodiversity sustainably for their livelihoods. This forms the foundation of JFM approach and needs to be appreciated. Acceptance of participatory micro planning as a process for restoration and management of forest area under JFM and inclusion of such treatments into the Forest working plans has now provided space for promoting people's forestry.
- *Livelihoods Perspectives*: Goal of OFSDP is to promote 'healthier forests and wealthier communities'. Therefore, it is required to lend livelihood perspectives into ANR operations through promotion of appropriate species. However, the peer pressure for higher survival and growth has lead to mostly retaining of sal and enrichment planting of non-browsable, fire hardy, fast growing species. The role of local community, given their ability, skill and willingness, vis-à-vis forest treatment for livelihood promotion and sustainable forest management, has not yet been fully accepted.

¹⁶ During the ANR demonstration at different places in OFSDP area, village women could enlist more than 200 species of trees, climbers, shrubs, herbs and tubers etc. as per their uses and were able to tell their niche and specific requirements

4 Evolving ANR Refinement

Considering the above feedbacks, project deliberated upon developing a refined approach to ANR and developing an-user friendly strategy to facilitate following up of the same in the field by the implementing stakeholders. This was followed by a series of demonstrations of the refined approach during February-March, 2009, and consultations at the project level among senior officials as per the field-feedbacks. This lead to development of protocol for a refined ANR implementation, through multistakeholders' participation for augmenting forest-based livelihoods and promotion of biodiversity conservation. The proposed refinement approach envisages comprehensive diagnosis of the forest area to be treated through use of grid-based GIS map and multi-stakeholder grid transects with focus on appreciation of local ecological knowledge. It is followed up by a collaborative design through matrix-based logical prioritization of species, species-site matching and grid-based prescriptions for species augmentation (through retention, planting and seeding), tending operations and soil moisture conservation measures. This approach envisages a combination of restrain (not to fell) and enrichment (planting/seeding) to conserve biodiversity and enhance livelihoods potential. This step-by-step approach is designed to adequately appreciate local ecological interactions, species-associations and the traditional knowledge systems about the use and management of forest resources.

4.1 The Stakeholders and the Processes

The micro planning working group comprising of 8 numbers of the VSS (Van Samrakshyana Samiti) is to carry out this task assisted by NGO team members and Member Secretary (Forester) as per the roles and responsibility specified for them. Financial provision has been made to meet the wages and other contingencies. NGO team

members and VSS Member Secretaries have been trained to facilitate this process through practical field demonstration cum trainings. These ten members get divided into two teams to carry out the task in a forest area of about 80 ha divided into 20 four ha grids.in about 2-days.

The materials required for undertaking this refined ANR, includes GIS (Land use and Forest) maps of the site (with grids), Forest-PRA outputs of the Micro plan of the VSS, 30 meter tape and/or Günter Chain and a Simple Compass.

4.2 The Step By Step Approach

In the first (Diagnosis) step₂ the team takes up transect walk along the marked grid lines¹⁷ (Figure 1) and analytically understand and characterize each grid (Format 1) in terms of their present ecological status, livelihoods-linkages and potential treatments required. During this grid walk, the team members collect information about Canopy Density, level of dependence/disturbance, important species indifferent storeys. This is carried out to decide the silvicultural tending operations, soil moisture conservation measures and species to be augmented. The grid information is analyzed to club grids with similar ecological and livelihoods status and plan appropriate treatments for these eco-livelihoods units.

The next step involves deciding about species (*Trees, Liana, Shrub, Herbs, Climbers, Tubers*) to be promoted in different eco-livelihoods units as per rational community choice (weighted scoring matrix), local ecological knowledge and species silviculture. The species matrix (Format 2) along with their description of selected species in terms of their livelihoods-uses, regeneration potential and the local ecological knowledge (Format 3) are collected in this step. Listing of candidate species helps the working group to plan in advance their seed collection and silvicultural information about them, if required

¹⁷ Grids are drawn (200m X 200m)on the GIS map with an area of 4 ha each

In the fourth and last step, treatment plan (Format 4) for all eco-livelihood units (group of similar grids) are finalized as per species retention/augmentation (through

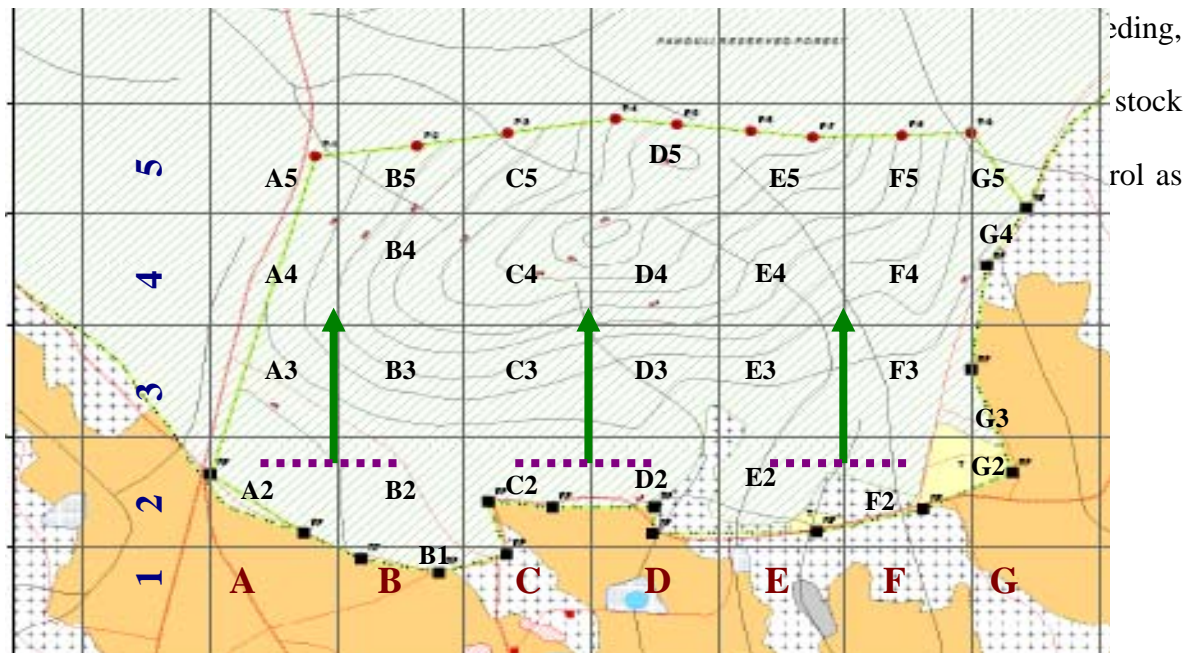


Fig 1 Marking the grids and taking transact along grids

4.3 The Challenges

Given the present capacity and continuing approach towards timber-based and departmental approach of forest management among the cutting edge stakeholders bringing about change will be difficult. Considering the paradigm shifts in the approach, its implementation may be quite challenging and painstakingly slow, However, since VSS areas have to be treated on a participatory approach with prime objective of livelihoods augmentation and biodiversity conservation, percolation of the change process through demonstration, piloting and frequent monitoring of actual adoption at VSS level will be absolutely essential.

5 Conclusion

ANR holds great potential in the present global context to reverse the process of deforestation. The refined approach suggested to the ongoing ANR practice in India holds a lot of promise in augmenting local livelihoods and biodiversity conservation through a

multi-stakeholder platform. By providing strategic space to local communities (VSS) and civil societies (NGO) in the planning and decision making of forestry interventions, such an approach also incentivizes and reinforces the concept of Joint Forest Management. Moreover, it also paves the way towards formal interaction of the stakeholders in manipulation of forest structure and composition. Comparing and contrasting the resulting forests evolved through such co-management approaches vis-à-vis the forests resulting from management by separately by Forest Department and Community (CFM) in terms of ecological and socio-economic impacts will provide immense learning opportunities in the direction of future forest management in India.

Blending such stakeholders perspectives into forest management process can be further boosted with involvement of women self help groups. OFSDP is contemplating to pilot a process of allocating a patch of forest area (few grids of 4 ha each) to a SHG of forest dependent, poor tribal women in some VSS to experiment forest management by them. Considering the immediate and intense interaction of these women with forest and their role in influencing forest structure and composition through their selective removal of various forest products, such an attempt deserve serious attention. Such treatment plans can be prepared and implemented by the SHG as per their intended use to meet their livelihood and cultural needs with facilitations by NGO and FD. Their manipulation of forest canopy, selective removal/augmentation of species will develop of a forest which may have distinctive conservation, livelihoods and cultural values apart from 'educational' value towards future forest management through ANR approach in India.

Acknowledgement:

The authors are thankful to the field staff, NGO partners and more importantly to the communities whose feedbacks were critical in developing and refining the concept. JICA's support to OFSDP and feedbacks from project official is also duly acknowledged.

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Format 1: Eco-livelihood Description of the Grids

SI No of the Grids (<i>Mark this sl no in the copy of the GIS map</i>)	Density (> 70%, 40-70%, 10-40%, <10%)	Ecological Status or type of forest/ plantation	Livelihoods Potential (<i>Rich, Medium, Poor, Very Poor</i>)	Present level of dependence (<i>Heavy, Moderate, Low, Very low</i>)	Important species (<i>mention at least 2 important species under each category of tree, climber, shrubs, herbs and tubers etc.</i>)	Dominant age group (<i>Young – below pole or bearing stage or Old</i>)	Suggested tending operations, including specific treatment for bamboo	Status of Soil Erosion (<i>sheet, rills, gullies, ravines etc.</i>)	SMC measures suggested (<i>trenching, gully plug etc.</i>)
1	2	3	4	5	6	7	8	9	10
A1									

Format 2: Preferential Species Matrix

Uses/ Character →	Fast growing	Food	Income	Fodder	House const	Fuel wood	Total Weighted Score	Rank
Weight (0-10 scale) →	4	10	8	4	7	7		
Species (Local names) ↓	Score (0-5 Scale; 0- no use to 5-maximum utility)							
From Major Species/ threatened species as per Format 1 and Other Species added as per community choice	Score	Score	Score	Score	Score	Score		
TREE								
Jackfruit	2	5	3	2	4	2	132	I
Tamarind	1	3	4	1	2	2	98	II
SHRUBS								
CLIMBERS								

Format 3: List of Candidate Livelihoods Species for ANR

SI No	Local name of the Species	Tree/ Climber/ Shrub/ Herb	Local uses for Livelihoods	To be regenerated through NR or AR (Seeding, Planting etc.)	Local Ecological Knowledge	
					Preferred habitat	Specific tending requirement
1	Jamun	Tree	Eaten as food,	Good	Stream bank	

Format 4: ANR Treatments for different Grids

SI No of GRID	Species to be promoted			Tending Operations	SMC Measures
	Retention	Seeding	Planting		
A1	Siali, Pita alu, Tendu	Ber, mango	Oroxylon	Stool Cleaning	Stone bunding

Annex Table 1: Deciding about Species Augmentation

Key Treatments	Applicability	Suggestive Supplementary Operations
Species Retention (not to be felled)	The species to be retained are those which <ul style="list-style-type: none"> ○ Already exist in the forest and are very important from livelihoods point of view. (Refer <u>Format 3: Candidate livelihoods species for ANR</u>) 	<ul style="list-style-type: none"> ○ Stool cleaning/singling for species with coppicing ability whose rootstock exists ○ Other pruning/thinning and cultural operations, SMC etc. to compliment growth as agreed mutually
Seeding	For the species <ul style="list-style-type: none"> ○ which are important as per the <u>Format 3</u>, and ○ Whose NR is poor (lesser young population – Format 1) ○ Whose mature (read ‘seed’) trees are available (Format 1) ○ Whose seeds are of bigger size (for trees) ○ Which are shade loving or shade bearers esp shrubs, herbs, trees of lower storeys, climbers etc. 	<ul style="list-style-type: none"> ○ Weeding/Cleaning around seeded patches ○ Catch pits/ staggered trench/ CCT on the up stream ○ Other treatments as agreed upon mutually
Planting (of nursery seedlings & wildling)	For the species <ul style="list-style-type: none"> ○ which are important as per the <u>Format 3 : Candidate livelihoods species for ANR</u>, and ○ Whose NR is poor (lesser young population – Format 1) ○ Whose mature trees are also very less in number (Format 1) ○ Whose seeds are of smaller size ○ Which are light demanders, trees of upper story 	<ul style="list-style-type: none"> ○ Weeding/Cleaning around seeded patches ○ Catch pits/ staggered trench/ CCT on the up stream ○ Other treatments as agreed upon mutually

Annexure I

Changed ANR Paradigm

Existing	To
Timber (incl Small timber & fuel) based forestry	Livelihoods & biodiversity focussed forestry
Harvest sharing on rotation	Continued return for livelihood
Developing predominant timber stands	Promoting multi-storeyed, mixed forest
Reliance on only Foresters’ knowledge	Belief in local ecological knowledge
Mostly Working Plan Recommendations	Integrating Micro plan aspirations
What to Cut (Focus – removing most)	What NOT to cut (Focus – retaining most)
Plantation, Tending & SMC in diff areas	Integrating treatments on Grid basis
Apprehension in monitoring of diffused planting lead to Separate block Plantation at the cost of appropriate ANR	Increased confidence on the joint planning and implementation in form of diffused/dispersed and understory plantations on ANR principle
Planting mostly nursery raised seedling	Augmentation with Seeding and wildling
Plantation of mostly tree species	Augmenting shrubs, climbers, herbs, tubers etc.
Community participating in FD’s Plan	FD participating in Community Plan
Overall Plan for the whole area	Grid based Planning and treatment
Difficult monitoring of Plan and treatment	Easy and in-depth monitoring of grid-based plan and treatment