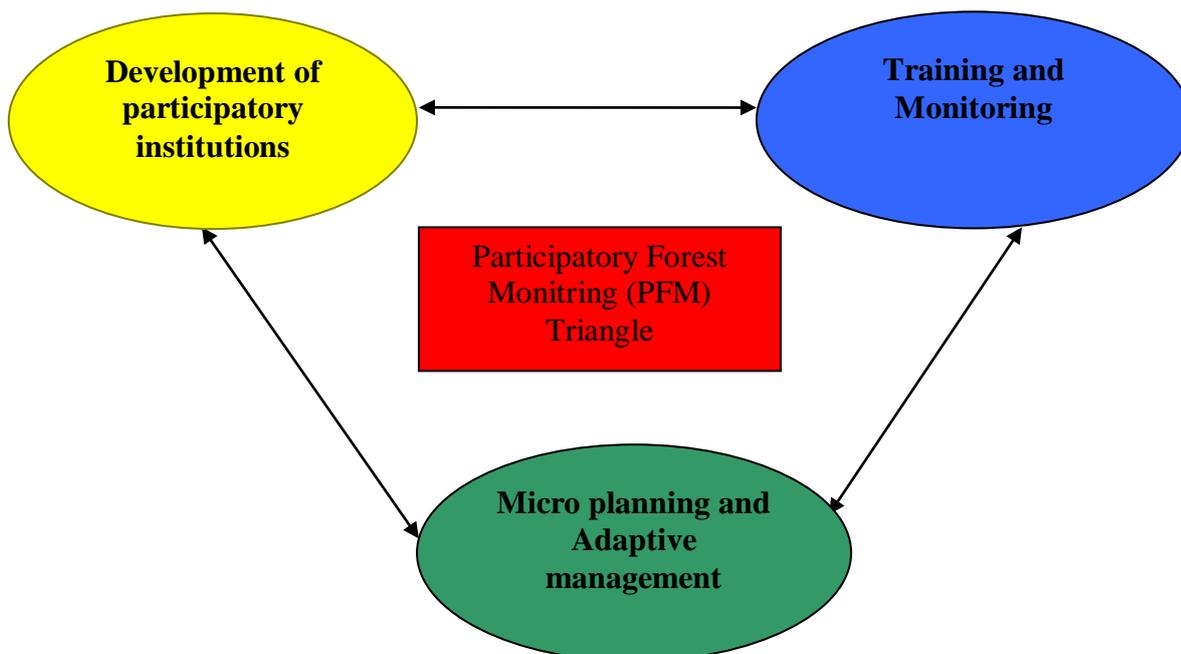




PARTICIPATORY FOREST MONITORING (PFM)

FIELD MANUAL FOR PLANNING AND MANAGEMENT OF FOREST RESOURCES BY LOCAL STAKEHOLDERS



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Foreword

Continuous deforestation and the degradation of forests in India lead to a decline in forest cover, which was a cause of concern leading to emergence of forest policies to conserve the forests and regenerate and manage the degraded forests. The backlash of earlier forest policies and their failures largely due to non-involvement of local community led to the emergence of a new institution and rationale for the origin of Joint Forest Management (JFM) under the National Forest Policy, 1988 that envisages people's involvement in the development and protection of forests. Thus the main goal of JFM is involvement of community in protection and regeneration of forests by working in collaboration with the state forest department.

As a result participatory management of natural resources in general and forest resources in particular with willing and active participation of local community become the best strategy. In this context several efforts have been made through out world and particularly in tropical countries to design and develop participatory methods and tools to involve multi stakeholders in planning and management of resources.

This manual aims at addressing vegetation monitoring involving the local communities and the local forest department. Based on the experience gained in conduct of participatory vegetation monitoring under the Rufford Small Grants, this manual has been prepared.

Acknowledgements

- Village Forest Committees
- Forest Department: The PCCF, DCF, RFO and his staff
- NGOs involved in the process
- Experts:
- Rufford Small Grants
- Asian Nature Conservation Foundation

Glossary

JFM: Joint Forest Management
VFC: Village Forest Committee
GB: General Body
EC/MC: Executive/Management Committee
NTFPs: Non timber Forest Products
PFM: Participatory Forest Management
NGO: Non-governmental Organization
VDF: Village Development Fund
VFDF: Village Forest Development of Fund
SHG: Self help group

General Introduction

Participatory Forest Monitoring (PFM) for Joint Forest Planning and Management in particular and Community Forest Management in general is one of the manuals developed to support Village Forest Committees (VFCs), in planning and managing their forests. The concept of PFM came into existence as a result of participation of various stakeholders from village level to global in management of forest resources. The project on PFM was planned to develop participatory monitoring of forest resources at local community level, it envisaged to involve local institutions and different stakeholder groups in identification of resources, planning for utilization and regeneration of resources, and adaptive management of forests. The basic objectives of PFM is to develop a people-centric monitoring system, in which local people should have a better understanding of resources around, followed by assessing the status and planning for sustainable use of them.

This field manual describes the PFM approach to planning of joint forest management in a village. It explains the rationale for PFM, the process involved in it and the various factors that contribute towards design and development of PFM for local community under JFPM programme in India.

The significant step in developing this manual is the result of implementation of such methodology at 20 Village Forest Committees under JFPM in two forest divisions in Karnataka, India. It describes in detail how to plan and implement steps in conducting PFM to reach adaptive management plan for forest resources, what tools and techniques are needed.

The overall expected outcome of the filed manual on PFM is to enable local community to understand resource status in the village and have adaptive management plan for sustainable use to generate income and employment at village level

Box I: Assumption for the Filed Manual

Local community, front line of Forest Department and local NGOs to involve in assessing the forest resources at VFC jurisdiction; As mandated in the national forest policy of 1988 to evolve Participatory management of forest resources through Joint Planning and Joint Management, the PFM is to provide an enabling environment for different stakeholders to develop user-friendly mechanisms to account changes in resource status and planning for regeneration of such resources

Providing a resource management system on a scientific framework, it is to establish a baseline of the resource status in the village with current patterns of extraction of resources. It is assumed that the process of PFM should allow local people to project available resources under three contexts viz., Ecology: Density and diversity, Economic: demand and supply of resources, and Socio and cultural: institutional mechanism, ethnic diversity and resource use.

Who is this Field Manual for?

Local community (Village Forest Committee members, GB and MC members)

- SHG members
- Local traditional healers
- Local NTFP collectors

Front line staff of Forest Department and other line departments

- Range Forest Officer
- Section forester
- Forest guards and forest watchers
- Revenue officer/ village accountant
- Agricultural assistant

Local NGOs

- Village level functions
- Management functionaries

Village level associates

- Scholl teachers/ students
- Social motivators

What is in this Field Manual?

- The need for PFM under Joint Forest Planning and Management
- The PFM process – Major stages and critical steps
- The PFM strategy
- A demonstration of how to plan and organize PFM at VFC level
- Examples of activities, methods, techniques and tools

In what ways participatory monitoring is different from assessment and evaluation?

The sheer magnitude of implementation of Joint Forest Management programme in India has created a shortfall of studies that monitor the spread, performance and impact of JFM. The regional diversities, socio-economic status, site-specific details in forest type, history and culture have profound impact on extraction practices of products and their management.

The pragmatic solution to this problem would be to enable the Village Communities monitor the status of vegetation through continued periods. This requires the capacity building of communities that would render them independent to develop techniques and adopt practices. Continual evaluation of these practices and modifications as the case may be would evolve site specific and local sustainable management practices.

Thus participatory monitoring as a tool to monitor JFM through village communities is an enduring tool that will be a path breaking effort towards sustainable management of forests involving local communities. Eventually institutionalizing this process will be one of the most cost-effective methods to monitoring of JFM in India.

Assessment and Evaluation V/s Monitoring

Monitoring is periodic observation of events to understand the performance of a project or programme. It is continuous and periodic study of a project or programme to assess the process, activities, performance/effectiveness and impacts.

Evaluation is an overall assessment of a project and its achievements relative to project's objectives. It indicates the extent of success from the perspective of different stakeholders. It is a systematic process to assess as objectively as possible, the relevance, effectiveness and impacts of a project in the context of its objectives.

Box II: JFM Monitoring

The concept of JFM is to willingly involve many stakeholders with innovative institutional and vegetation management interventions. For effective, sustainable and participatory forest management there is a need for learning on social, institutional, economic, ecological, silvicultural, legal and policy aspects. This enables effective decision-making at the policy as well as JFMC level for evolving adaptive management strategies.

Thus the aim of Monitoring and Evaluation of JFM is to learn lessons on various aspects of participatory forest management and provide a suitable framework for its effective implementation. However, the challenge is development of methodology for M&E with regard to time, scale, and issues to be monitored. Further, it is essential to follow scientific sampling procedures and address issues keeping the interest of various stakeholders in mind and derive outputs that could be conveyed to the village community and forest functionaries.

How is the information in the Filed Manual organized?

The Filed Manual on PFM is divided into three parts:

Part one explains the rationale and processes for Participatory Forest Monitoring (PFM), need for PFM, its planning and implementation at VFC level. It provides basis for participation of local people in monitoring and management of resources

Part two describes PEM strategy, which is based on the various factors contributes towards participation of local people in management of forest resources

Part three provides how the critical steps are planned and implemented. Each step includes description of what action to take, way, when, and how. It identifies what resources need to monitor, and what the expected outputs are as well as who will be responsible for the action. The experience of implementation of PFM at few VFCs in India also helps to understand the process in much practical manner as possible.

Part I: Rationale and process for Participatory Forest Monitoring (PFM)

The Design and development of PFM process, provides rationale for participation of local people in resource management and building capacity among them. This section provides concepts and operations of participatory monitoring, leading to development of strategy, activities and action required from the different stakeholders at various levels from village to international arena.

Participatory Monitoring for what?

Before embarking on monitoring, it is important to identify the key issues, which will provide the basis implementation of JFM. The following goals can be the basis for Monitoring.

- **Sustainable forest development:** Forest development needs to be aimed at conservation to meet the needs of the present and also plan for the future needs and aspirations of the community. Forests provide sustenance needs such as fuelwood, fodder, NTFPs, small timber and also non-tangible environmental benefits.

Box III: Factors contribute for PFM under of JFM

JFM is implemented in complex situations in different parts of the country. The issues that make JFM successful are different from JFMC to JFMC, which is governed by socio-economic variables, ecological diversity and occupational patterns in the village. Thus one of the issues for M&E is to identify the variables that make JFM a success, so that the same model can be replicated to other JFMCs with the same features governing them. Also it is essential to identify the prerequisites to make JFM a success.

Thus Monitoring of JFM should incorporate criteria associated with the health of the forests, people's perception and participation, environmental indicators and economic viability.

- Sustained and effective participation of local community: The goal of any Participatory Monitoring should include assessment of extent and effectiveness of participation and development of strategies to promote sustained participation of the community in JFM.

The JFMCs need to be monitored for conduct of JFMC activities and its effectiveness, and its impact on institutional performance, ecological status and financial flow. Thus Monitoring should constitute the 3 essential components of institutional, ecological and economic assessments.

In this context Participatory Monitoring should lead to address the above-mentioned issues based on which goal setting, objective setting from different stakeholder's perspectives can be decided.

PFM process to evolve, in concurrence of merging both scientific knowledge and local people knowledge. The strategy should be eco-friendly and user friendly.

Approach for PFM

PFM is a tool for adaptive forest management. It is seen that VFCs can take up PFM as an important activity in JFM. Many programmes have become part of JFM in villages and PFM could be added to the list of activities. Thus it may be made mandatory that monitoring is done every year or two depending on the type of forest and the human resources available. Monitoring could be done at two levels, at the village community level, with minimal observations, and the other by Forest Department with more emphasis on size class distribution, change in species number, regenerative capacity etc.

Features of PFM

The PFM should have a framework to address various issues of participatory forestry and some of the basic steps essential to design an ideal PFM strategy are as given below.

Goal setting: Goal setting is to decide the aim of conducting the M&E. The output should be able to provide answers to the goals set for the M&E. The goals of M&E will depend on which stakeholders' perspectives are being

Box IV: PFM - meeting national agenda

To feed to progressive policy advocacy: JFM policies are continuously being evolved. Monitoring should aim to feed to the policy advocacy at the state and central level. Issues such as structure and constitution of JFMC committee, microplan preparation and its execution, benefit-sharing process, legal status of JFMCs, linkages to other rural development activities, etc. need to be monitored regularly to feed to policy changes

addressed. For example, the donor agency goal could be to assess the improvement of livelihood due to JFM; the Forest Department's may also be to understand the improvement in vegetation status; while the community perspective may be to sustain the flow of benefits. Based on the goals of M&E, the issues to be addressed have to be identified.

PFM: Institutional, Social, Ecological and Economic context

There are several specific aspects that need to be monitored under JFM area. The PFM describes following issues with Institutional, Social, Ecological and Economic context.

Institutional issues: Institutional issues for PFM include i) structure and functioning JFMC, forest division, state and national level institutions, ii) Membership of various institutions, particularly JFMC, iii) Effectiveness of participation of local communities and Forest Department, iv) Factors contributing to participation of communities, v) role of Forest Department, NGOs and other institutions iv) capacity and institutional building activities and impacts.

Social issues: Social issues for Monitoring could include; i) participation of women and other disadvantaged groups in JFM activities, ii) impacts of JFM on different social groups in the village, iii) factors contributing to the effective participation of women, landless and artisans, iv) leadership development and awareness on JFM, v) sharing of costs (of protection) and benefits among different social groups and vi) impact on quality of life.

Ecological and Silvicultural issues to be addressed in Monitoring studies could include; i) forest regeneration model or approach adopted, ii) biodiversity status, iii) species of community, species actually planted, iv) silvicultural practices adopted, v) rate of growth and biomass production, vii) NTFP species regeneration, viii) sustainability of regeneration, ix) grazing and harvesting practices adopted and impacts on sustained production, x) species choice and silvicultural practices to be adopted for sustaining flow of forest products, xi) impacts on soil and water resources of the village

Economic issues to be addressed include; i) investment and operational costs, ii) opportunity cost to communities for participation in JFM, iii) economic values of different products (grass, fuelwood, NTFP, timber), iv) cost-benefit analysis, v) economic indicators to promote community participation, vi) cost-effectiveness of afforestation through JFM.

Major steps: PFM elements

PFM is about working together with established VFCs to help them to monitor resources status and involve them in planning and managing resources for future use. PFM is developed based on participatory elements, which have interaction with in each other to form triangle.

Major elements are

- Development of participatory institutions
- Training (capacity building) and monitoring
- Microplanning and adaptive management

Development of community institutions

Establishment of institutional mechanism for PFM at village enables

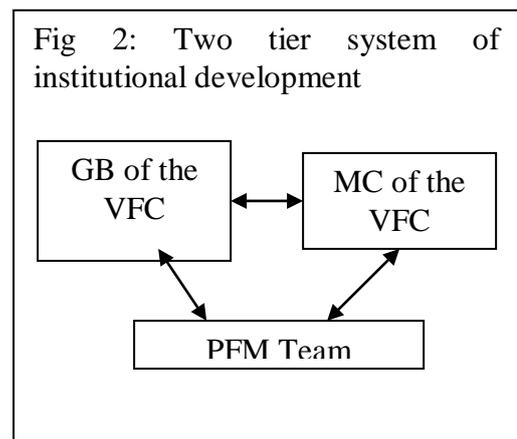
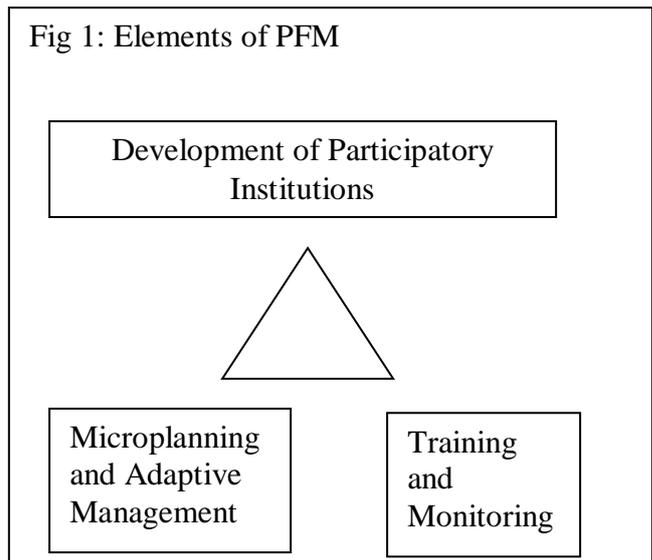
local community to monitor the resources status over a period of time. As monitoring is dynamic and continuous process. The ideal institutions are Village Forest Committees initiated under JFPM. It is suggested to create PFM team under VFCs to look after PFM, and involve VFC for planning and management of resources based on the PFM process. The two tier institutional system need to create for better performance of PFM and enable the decision making process at VFC based on the out puts of the PFM and linked to periodic monitoring.

How to constitute PFM team

Looking at potential of local people and technical requirements of PFM, a small PFM team should be constituted under VFC. Members selected for PFM team should be approved under General body meeting of the VFC and there should be opportunity to re-constitute PFM committee by adding and replacing the members based their interest and convenient to work in the team. The team constituted for PFM with approval of GB should closely work with Management committee of the VFC.

Special committee for PFM at VFC level is to tap the skills of few individual at VFC to involve in period resources monitoring, followed by feed the results of PFM in to Management plans, they also expected to motivate the VFC members towards better understanding of PFM process.

Box I: Steps in formation of PFM and its responsibility



A new participatory institution is established at village level by ensuring gender and equity and multi stakeholder participation in the Village Forest Committees.

The basic steps in the formation of PFM team are listed below;

- Calling general body meeting of village forest committee/ village: ensure representation of stakeholders such as NTFP collectors, healers, traders, SHG members etc.
- Facilitate identification of representatives for task team from each stakeholder group based on knowledge and skills of individual person
- Discuss and deliberate with members of all the stakeholder groups
- With mutual consultation co-opt the stakeholder representatives for the task team
- Seek acceptance from the general body to select those representatives for PFM team
- Obtain concurrence of the chosen individuals to participate in the activities of the PFM team.
- Develop resolution about formation of PFM team and its responsibility

The responsibility of the PFM team is to carry out the PFM process such as planning and implementation of PFM activities;

- Discuss among team members about resources potential and conditions in the village
- Develop and understand data collection methodology and formats
- Document of baseline information on ecology, social and economic issues related to forest management.
- Understand and evaluate collection methodology in terms of its effect on stock, yield and regeneration
- Identify sites for sampling plots for monitoring of vegetation and ecological conditions.
- Measure and compare the growth, yield and regeneration by laying out sample plots at above sites

Generate and disseminate the results to VFC and educate other VFCs for the PFM process.

Resource monitoring: participatory approach

PFM is not just monitoring of forest status, but is a process by which the community is inducted to decision making process through scientific methods of analyzing ground information. A lot of preparation has to go towards sensitizing the community for the need of PFM and educate them about the importance of it. This can be designed as follows: The village communities have their own

criteria to indicate the health of the forests. This needs to be combined with scientific methods of monitoring vegetation status.

The process of “Participatory Forest Monitoring” requires sensitizing the community of its necessity particularly if they are to be the decision makers in forest management. Thus PFM involves development and adoption of simple and scientific method of vegetation assessment and analysis that can be adopted by the village community for periodic monitoring so that effective management related decision can be taken. The following table describes methods and periodicity of monitoring for various issues at VFC level.

Table 1: Participatory Forest Monitoring: Methods and Periodicity

Parameters	Method	Periodicity of monitoring
Intuitional		
Membership patterns (male and female) GB and MC meetings Representation given to women and social groups Representation of Ex-officio members Participation of members in GB and MC	VFC records Meeting register VFC Bylaws VFC Bylaws Meeting register	Half yearly Quarterly Yearly Yearly Yearly
Ecological		
Area under different forest and other land Area under wasteland and other village common lands Area covered under JFPM Area under plantations and species planted Protection and management of natural and plantation Regulations with respect to grazing, extraction of resources Regeneration in natural forest and performance of plantation	Field monitoring	Yearly Incase of regeneration after rainy season
Social and Personal		
Conflict resolution Facilities extended in terms of Community Hall, drinking water etc. Training programs attended Social mobilization and leadership development Relationship with FD and other departments Rural development and women development	Developing social index and generation of baseline scenario VFC records	Yearly Half yearly
Economic		
Cost of the Plantations and natural protection Entry point activities Benefit sharing mechanism Details of VFDF, VDF Expenses incurred at VFC level Flow of products, fuel wood, fodder, NTFP Income generation Employment generation	Developing economic Index and generation of baseline scenario VFC records and forest department records	Yearly Half yearly

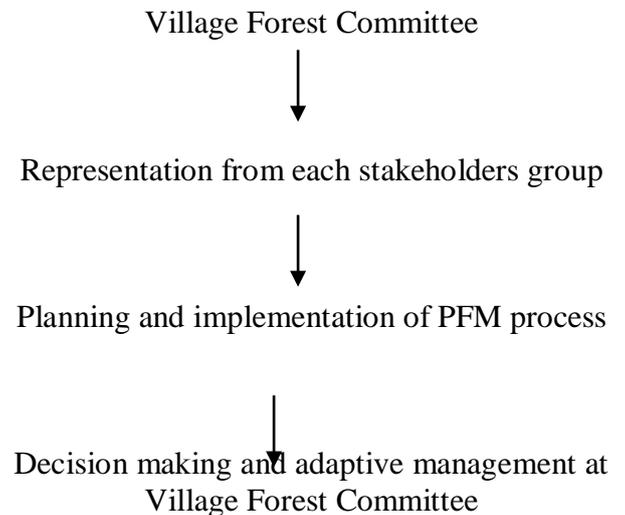
Stakeholder participation in PFM process

Apart from identification of relevant stakeholder groups in the village for constitution of PFM team, it essential to ensure participation of each stakeholder group in PFM activities and benefit each other from the process

How to ensure stakeholders participation?

- Identify stakeholder group and their needs and interest in forest management
- Ensure each stake holder group have been represented in the PFM team
- Voice of each representatives of different stakeholder groups have been equally heard and provided under decisions making process
- Roles and responsibilities of PFM activities have been shared among all team members
- Respective representative from stakeholder group should educate his members and motivate towards better forest management

Box VI: Reciprocal decision making process with involvement of stakeholders groups



The reciprocal decision making process at village forest committee is key issue of stakeholder participation under PFM process, as it describes that VFC is responsible for initiation of PFM activities through stakeholder participation. The team constitute for PFM process is approved by the VFC is involved in Planning and implementation of PFM process, however finally VFC have lead role in decision making and preparation of adaptive management based on the inputs provided by PFM team .

Critical stages of the PFM process at VFC level under JFPM

Sensitization of the village community: The NGO with active involvement of local staff of the Forest Department can brief the community about the importance of PFM. The aim of PFM, the methodology to be adopted and the results of analysis of data needs to be explained to the community with examples for better understanding. If already initiated in another VFC, the VFC members can also be used as resource persons.

Training: The VFCs require training on techniques used in Forest Monitoring. Simple parameters have to be selected for the purpose. Normally, villagers are knowledgeable in identifying almost all trees, shrubs and herbs by their local names in their forests. They are also knowledgeable about economic importance of species, their usefulness etc. However, they require minimal training and demonstration in recording these parameters and simple analysis. A team of at least 10 members represented from different stakeholder group and approved from VFC can be trained for intensive PFM process.

Field methods: Standard ecological methods, social and economic index method can be adopted for studying various ecological, social-personal and economic parameters. For example, in case of ecological monitoring measurements of tree girth, height, regeneration status etc. can be recorded. The number of quadrats and replicates can be based on the type of vegetation sampled.

Relevance of data and analysis: Objectives of JFM are clear and also quite ambitious especially with regard to meeting the basic biomass needs of local people and overall socio-economic development of village. Success and performance of natural protection and plantations are important in this context. Various factors influence the performance such as protection, grazing and fire. These changes have to be recorded in terms of number of species, density etc., to understand the growth and development of the plantations. The information on these aspects could help in adopting suitable management strategies keeping in view the local needs and environment. Incase of socio-economic data generation of baseline data will indicate performance/progress of social and economic development among VFC members and village as whole by referring socio-economic index

Cost incurred for the PFM process: it is estimated from the some of trails conducted at 20 VFCs in Karnataka. Required cost and human power the cost per VFC will be about Rs. 1,825 per year, it includes training of PFM team, monitoring of ecological social, personal and economic parameters of PFM process for one time. Apart from this, the community in terms of labour and record keeping incurs a cost of about Rs. 500 per year. A total of Rs. 2,325 per VFC is required to keep the PFM in place.

Box VII: Human resource needs of the PFM process

Human resource requirement to carry out PFM is minimal and depends on the extent of area to be sampled, number of replicates, type of forest or plantation, terrain, size of village, number of programmes etc. A team is essential, as it is not possible to carry out this kind of work by an individual or whole VFC. At least 10 persons should constitute the team and represented from different stakeholder groups. Even more persons could be trained to compensate the absence of any individuals at the time of monitoring. In all, 10 persons have to work for 3 days for recording one time data. Then, all VFC members could analyze the data generated to draw up conclusions and adopt for implementation.

Fig: PFM process under Joint Forest Management

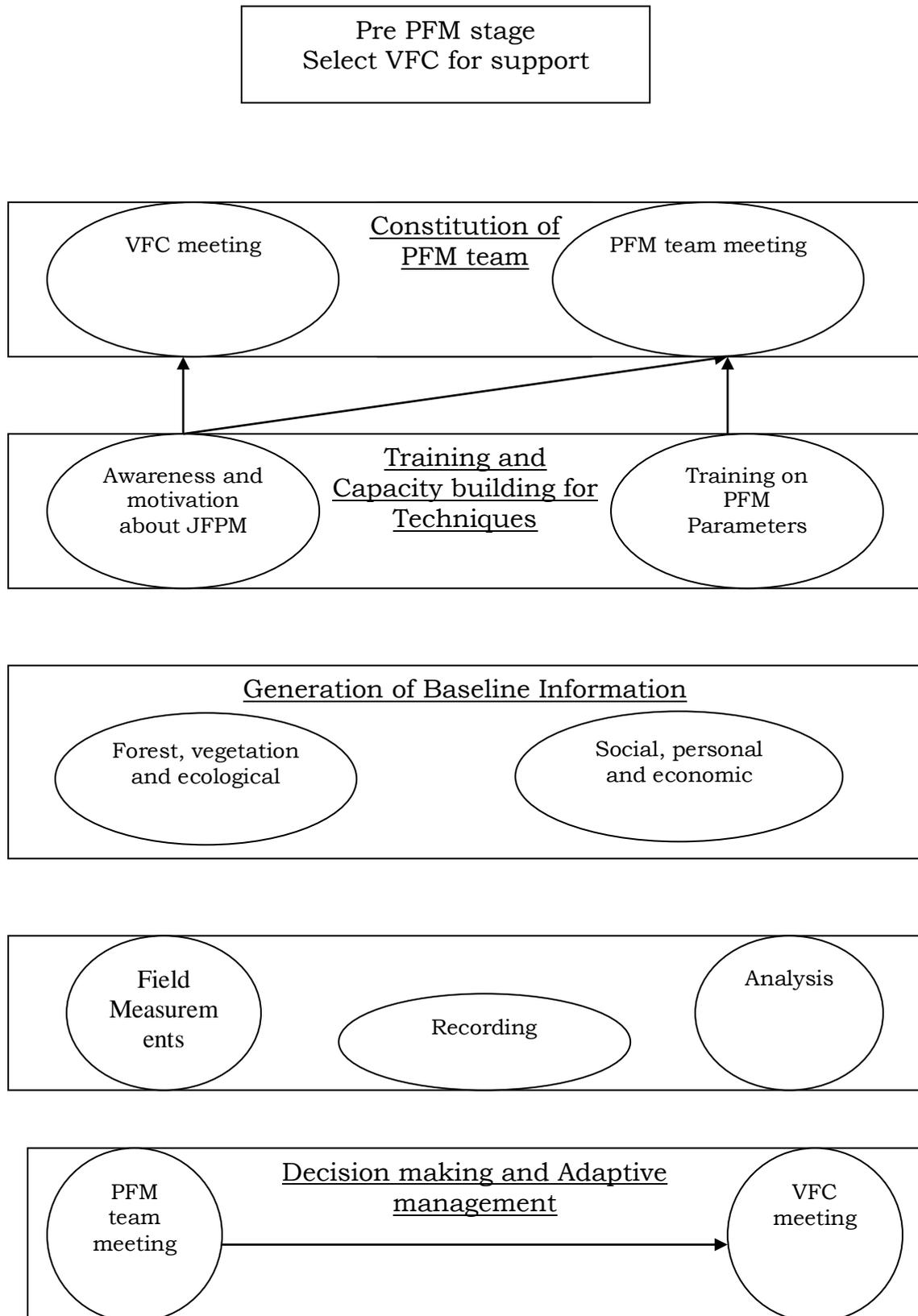


Table: Different steps of PFM process at VFC level under JFPM

Stage	Step	Objective/output	By who
Pre PFM stage	Select VFC	A Selected VFC for monitoring	Local NGO and Forest Department
Stage I: Constitution of PFM team	VFC meeting	To explain the purpose and process of PFM at VFC level To prepare adaptive management plan based on PFM process	Local NGO with Forest Department
	Stakeholder group meeting	To select representatives for the PFM team	VFC and Forest Department
	PFM team meeting	To train for PFM process To monitor, document and analyze PFM	Local NGO and PFM team
Stage II: generation of Baseline data/information	Forest, vegetation and ecological related	To understand vegetation status To prepare forest management plan	PFM team and VFC
	Social personal and economic related	To understand the status of village and VFC members To prepare village development plan	PFM team and VFC
Stage III: Monitoring of PFM parameters	Field measurements	To arrive quantity and quality of data	PFM team
	Recording	To use for preset and future reference	PFM team and VFC
	Analysis	To arrive data in from of interpretation	PFM team and VFC
Stage IV: Decision making process and adaptive management	PFM meeting	To prepare inputs for decision making process	PFM team
	VFC meeting	To discuss and consider inputs for adaptive management of forest	PFM team, VFC, Forest department and Local NGO

Part II: The PFM Strategy for Joint Forest Planning and Management

This section describes the PFM strategy at VFC level, for this experience of filed implementation of the PFM trails at 20 VFCs in Karnataka have been taken in to account.

Objectives of Participatory Forest Management

The Primary objective of is to promote scientific management of forest by local community at VFC level under JFPM, followed by sustainable utilization of forest resources to generate livelihood and resource security

- ❖ To enable the local community to monitor the forest, vegetation, ecological, social, personal and economic issues of forest management at VFC level
- ❖ To build institutional structure with in VFC and capacity among the local community to equip scientific monitoring
- ❖ To facilitate adaptive management based on the PFM process for better biodiversity and flow of forest benefits to motivate and sustain the interest of the local the community

Identification of village resources followed by its status by the local community is the key issue of the PFM. Under JFPM local communities have opportunity to regenerate nature resources especially forest resources. The local management as they protect and regenerate the resources is eligible to share benefits along with Forest Department. The PFM process aims to bring them in scientific understanding for resources, its protection and regeneration by using JFPM funds. Further benefits generated in terms of products, income and employment is to promote social, personal and economic development of VFC members to achieve overall village development.

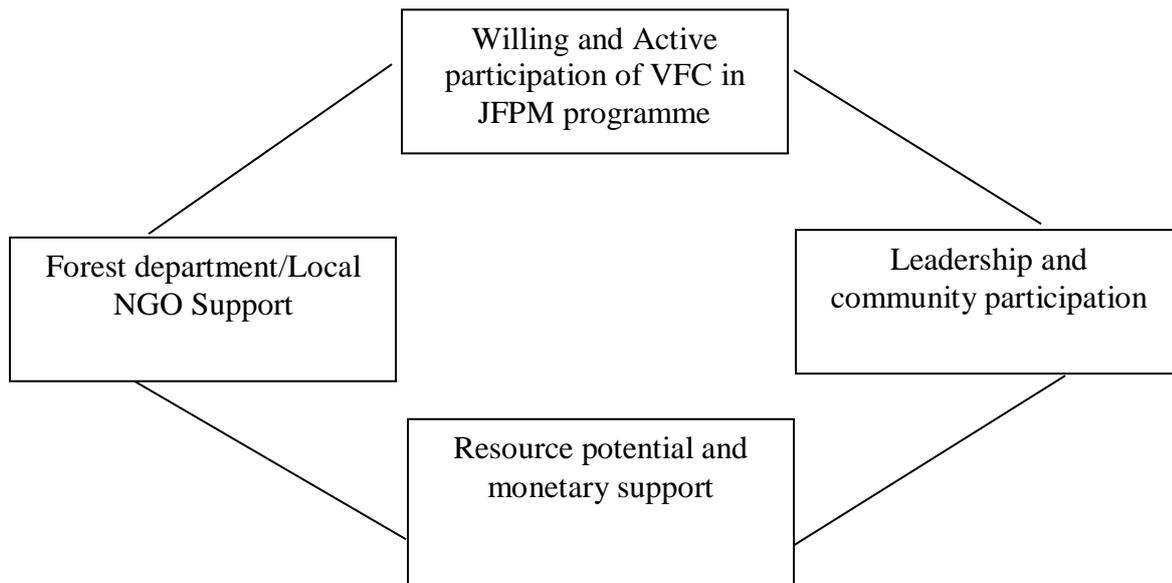
Factors influencing Participatory Forest Management

The Objectives of PFM process are influenced by four critical factors, Willing and Active Participation of VFC in JFPM programme, leadership and community participation with in VFC, Forest Department/local NGO support and resource potential and monetary support

The four factors influence the overall PFM process the village, all four factors are interlined and further affected by several sub factors. The willing and active participation of VFC under JFPM provide favoring satiation for initiation of PFM activities at VFC, the sub factors influence this major factors are awareness and motivation provided by Forest Department and local NGOs especially on local participation in forest management and benefit sharing.

The leadership quality in the village can promote good community participation. This is the ability of the person to lead the team for PFM process. However this was strongly linked by the opportunity for local leader to emerge at VFC under JFPM programme.

Fig: Factors influence the PFM process under JFPM



Support of Forest Department and Local NGOs are critical for any VFC to become active, this provide for protection and management of resources by promoting good community participation. This is to develop communication and extension methods to reach community effectively

All the above factors are definite influenced by the resources available in the village and funds provided under JFPM for its protection and regeneration. Apart from this mobilization of funds at village level through income and employment generation activities.

The PFM strategy

The rationale for developing a design for PFM through participatory means active involvement of local institution and community for proper management of forest. The process is expected to facilitate by Forest Department and local NGO. Under this pretext a design development of PFM has been taken up in India. The filed implantation of PFM was under taken in 20 Village Forest Committee in two forest divisions in India. The field manual was designed with due consideration of field experiences.

Any design for use of biological elements must incorporate the fact that such a system needs to be sustainable in several senses- biologically, ecologically, economically, and in terms of social appropriateness. The basic idea behind PFM is that forest resources should be managed well and utilized sustainably. Sustainable use has been defined as the use of components of diversity in a way and at a rate that does not lead to the long term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations

The uniqueness of PFM process is focus on scientific management of forests by developing participatory steps, for this local knowledge and understandings of resource management has been considered for establishing a participatory adaptive management, through participatory action. This section present strategies for PFM process by keeping subsistence use of the forest from the local community, the forest products under special focus are NTFPs, Medicinal Plants, Fodder, Fuelwood. Further, communities will be empowered to manage their resources in a more sustainable manner, which will stabilise community resource dependence and economy.

The practice of PFM at local level requires participatory planning and capacity building among local stakeholders for development and implementation of adaptive management. It calls for active participation of all the stakeholders so that knowledge and skills of the all individuals are taken in to account. Some of the participatory steps essential in for designing and developing PFM strategies are;

- Documentation and application of scientific knowledge of PFM and transfer in to local community for regular management.
- Design and implement of PFM an experimental basis and develop common filed manual for general practice.
- Devise mechanisms for preparation of participatory approach of PFM to develop a feasible adaptive management forests.
- Monitor and decision making under PFM

The participatory approach of developing the PFM needs constrictive design, which should include different stage of programme planning and implementation. Basic ides of the PFM is to seek local people participation, enable them to implement various activities by building capacity.

The overall design of such a process is intended to deliver community oriented monitoring mechanism, so that the local people have ability to prepare comprehensive adaptive management plans for conservation and regeneration of forests. The significant feature of such efforts is to seek active and willing participation of local community, and build confidence in PFM for its wider applicability to all natural resources. The design should cater to

- Increased awareness of the Village Forest Committee (VFC) and the Forest Department local staff
- Strengthening of monitoring, management, feedback system with co-ordination among all the stakeholders
- Security of future stock and yield
- Increase in cash income of the gatherers for good quality produce and timely harvest and also help generate savings for health and livelihood security
- Methods evaluated by relevant stakeholders and recommendations made for management plans.

- Internalisation of the method in to management systems such as Micro plans and Working Plans

Based on the four factors, which influence the PFM process there are eight PFM strategies have been identified and described here

Strategy I: Development of community institutions

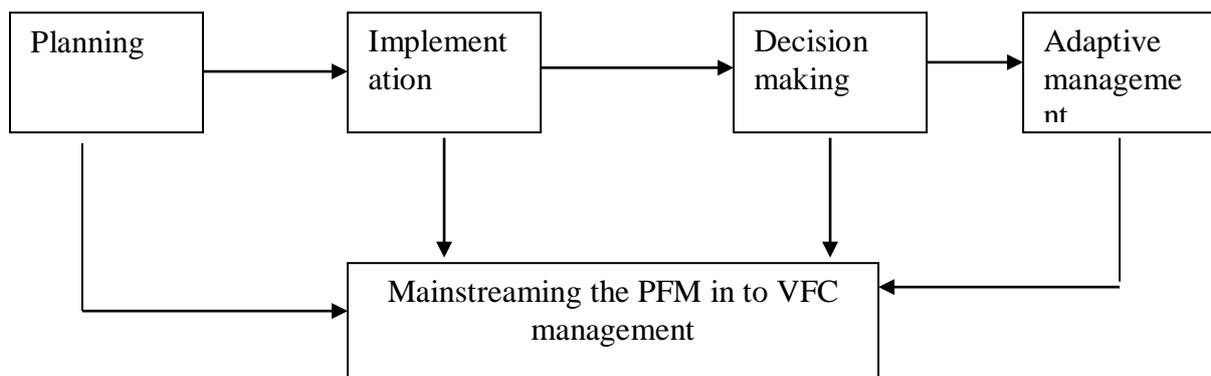
Enable the PFM process at VFC, development of proper institutions are become importance. This is to cater the needs of the PFM planning and implementation, ensure participation of local community participation and sustain the forest management activities. This step is curial and critical to all other steps in the PFM process. Some of the key issues to be considered during building of proper community institutions at village level not only for PFM process, also for conservation and sustainable utilization of natural resources generated under JFPM.

Consider the existing institutional mechanism created under JFPM, the VFCs are legal bodies formed under JFPM byelaws of respective state government in India. These have been identified by Deputy Conservator of Forest, signed MoU for their involvement in protection and management of forests and sharing of benefits. Every VFC is expected to prepare Micro plan for five years for management of forests.

The PFM process should cater the opportunity of such institutions to provides awareness and motivate the VFC to involve in proper monitoring for scientific management of forests.

It is to strengthen the existing microplanning activities at VFC level in to more scientific manner as possible, the plan should be based on need assessment and resources available. So PFM strategy is to work under umbrella of VFC to meet five major factors such as **planning, implementation, decision making and adaptive management.**

Fig: Institutionalization of PFM process at VFC level



The philosophy of the PFM process under JFPM programme is to enable VFC to monitor the resources and prepare plan based on this, for this PFM team will be constituted to assist the VFC.

Strategy II: Stakeholder participation

The second strategy of PFM process is to establish stakeholder participation at VFC. The key activities under this are identification of stakeholders groups in the village and having concern over their problems to achieve full community support for management of forest resources in the village.

The listing of stakeholders and eliciting their participation is crucial for setting up an efficient PFM Team. The second step is to establish a common goal for the team that will bind them together for the task ahead. . The common goal for different stakeholders is that they all need to be interested in conservation of fortes and sustainable utilization of the forest products

Identification of stakeholder groups in the village needs to understand the various interest and working objectives of local communities in the forests. Their historical and cultural relationship with forests and forest resources, social and economic dependence on forest and most importantly their **intra and inter dependence** on the forests.

Extent and degree of dependence of local community groups provides their need for forest protection, conservation, regeneration and sustainable utilization of forest resources.

Based on the inter and intra relationship of local communities on forest, key stakeholders at village have been grouped in to primary stakeholder groups (mostly NTFP and fuelwood collectors, Livestock holders, farmers/cultivators, artisans), secondary stakeholders (Self help group members, local traders and folk healers) and tertiary stakeholder group (government employees, servants and politicians)

Table: Key stakeholders of PFM process and their roles

Key stakeholders	Roles
PFM Team	Enumerate the plots, keep records, field analysis, local dissemination
Village Forest Committee (VFC)	Approval of PFM, constitution of PFM team, seeking cooperation from Forest department, local NGO and other departments.
Forest Department	Facilitate the PFM, request local NGO for capacity building and dissemination. Helping for assimilation of PFM in to management plans
Self Help Groups	Participate in PFM activities, promote PFM in to other villages.
Local NGO	Guide PFM team for data collection and disseminate process, help VFC to understand the PFM process and preparation of adaptive management plan for forest based on it

Strategy III: Resources Monitoring: participatory approach

The strategy of design and development of participatory monitoring of forests and forests resources describes creation of ownership among the local community by understanding the resource conditions and exhibiting the roles and responsibility for management of resources in a longer period.

The strategy also tries for efficient use of provision of JFPM resolution in the state. The overall out come of this effort is to contribute towards better ecology and meeting social-economic needs of the local people to provide resources and livelihood securities.

Participation is the process that brings together the stakeholders and enables them to share, contribute and act with mutual responsibilities to promote mutually beneficial set of interests. Participatory approach involves collaboration between the external institutions with the local stakeholders. This approach is an improvement over the erstwhile strategy where external researchers or the Government agency planned development for the local people. This improved approach has been effectively used in Joint Forest Planning and Management programme (JFPM) in India, through the State Forest Departments, under the National and State Government resolutions. However, there are certain social factors that need to be kept in purview while planning to involve local people for PFM.

The basic principle in devising such participatory design is that it should be more “inclusive”, non-discriminatory, equitable and gender sensitive. One caution one needs to exercise is that any inclusion should not be compulsory and obligatory. That is to say only those interested stakeholders who wish to be part of the PFM process should be included initially and motivate others later on.

Strategy IV: Capacity building and training of local community

PFM focuses on developing “self sustainable community institutions” by empowering local people. Various capacity building and training programmes have been designed and implemented for different stakeholders involved in the implementation of PFM. The rationale behind designing the capacity building programmes for local community is to reach people of different socio-economic and educational background. The capacity building for PFM attempt to up date participatory knowledge through innovative extension education programmes. It is expected to train local community to implement the participatory experimentation under varied biological management factors within the current socio-economic context and develop methods by which multiple forest users can monitor the impact of such variations in management.

The building capacity among local people such as VFC members, frontline staff of Forest Department and local NGOs is essential for implementation of PFM at VFC level. This calls for design and development of communication

system adoptable to local conditions, training mechanism and technique of applying PFM system in to general forest management.

Strategy V: Generation of baseline information planning and monitoring of forest resources

The prerequisite for monitoring of resources for longer period is generation of baseline data/information. The data collected on various parameters of ecological, social, personal and economic for first years can be considered as baseline information, on which monitoring data of subsequent years will be used to understand the changes in improvement.

It is vital to compare the changes always to original conditions, the purpose of generation of baseline under PFM is to provide direction for change anticipated in adaptive management of forests.

It requires special skill among the local NGO to convince local community about baseline, however on long duration they will realize that such information is useful in checking the progress.

Some of issues keep in mind while establishment of baseline scenario is that, Local NGO can take lead in collection of such information with help of local community. It is essential to record data from the proper documents through field investigation. Collect all possible information either it have current and future implications. Documentation and sharing of such information with VFC and Forest department is essential for its validity and future application.

Strategy VI: Participatory mapping and monitoring of forest resources

Development of participatory resource mapping enables VFC to project PFM strategy in a meaningful way. At village level training for local people to prepare participatory mapping involves local knowledge about resources. In this context also local NGO along with Forest Department should take lead in preparation of maps.

Participatory resource mapping refers a sequences of illustration that clearly depicts the activities to be involved under PFM process. The process starts and ends with the user groups and its is essential that they are part in the identification and clarification of information to sketch put various maps on political, social, ecological and economic related issues.

Key features

- ❖ Involves the end users in its development (local community are part of participatory mapping)

- ❖ Introduces a new participatory tool that promotes effective communication between local community and field staff (NGO and FD) and helps to ensure the task being carried out is appropriate
- ❖ The maps are useful for semi or non-literate user groups

Strategy VII: Community Analysis, reporting and Decision making process

The process of decision-making in participatory experimentation receives focal attention, as person/group involved in decision-making should have ability to implement such decisions and avail the benefits derived out it. More often, it is observed that, in most of the participatory approaches decision-making is limited to completion of designated target and thus will not be effective due to lack of commitment.

The decision making process is essential for each and every stage of programme planning and implementation, so that knowledge and skills required for capacity building can be clearly understood. The different stages for which decision making is required are planning, implementation, adaptation, action and monitoring.

Strategy VIII: Communication and Adaptive management of forest resources

Assimilation of PFM in to local management (through microplans) is depends on the effective spread of PFM ideas in to whole VFC, the daunting task of the PFM team along with local NGO and FD is to community each staged and out puts of PFM in to VFC at regular interval. The rationale of planning the dissemination programme is to inform the VFC about the PFM, progress and achievements, more importantly to seek their suggestion to up date the process.

There are two ways of reaching the local community effectively and efficiently. The interpersonal communication and group/mass communication, they are unique in building the community awareness and motivate them to participate in conservation and sustainable management of natural resources.

The programmes developed for interpersonal communication intended to provide the specific and in-depth information for stakeholders directly involved in the PFM. This is to generate awareness among the local people residing in the study area about the nature of PFM process, progress and practice of wise ideas derived out of such participatory efforts.

Group and Mass communication helps in reaching VFC at large and preparing them for action.. This mandates for development of group communication interventions for spreading the participatory approach across the VFC area.

The PFM should get general acceptance and applied to all natural resources. This can happen only through assimilation of PFM into management plans. The adaptive management of forest is happening through two levels; micro and macro level. At micro level VFC prepare microplans for five years of forest management under JFPM. Further at macro level working plans of forest department can address PFM strategy and also amendments in JFM policies. It is ideal to utilize enabling intuitions and management systems to assimilate the study ideas.

Under Joint Forest Management programme, village community institutions initiated micro plans have been prepared for management of forest under their control. Micro plans are village management plans prepared for five years, which describe resources in the village and plans for sustainable management of resources through community participation. The PFM process and outputs there under can become part of the micro plans and the methods so developed may guide the sustainable utilization of resources.

Forest departments prepare working plans for management of forests at division level, these are prepared for duration of ten years and assess the resource potential and provide guidelines for resource management.. The PFM has adopted strategies for reaching the forest officers at various levels to incorporate processes in the preparation of working plans.

Part III: Planning and using the critical steps

The part III of PFM field manual described the practical aspects of PFM process. The section provide how to materialize the steps and strategies identified for PFM process, it illustrate the specific methods, expected outputs and its application into general understanding.

Use the steps in sequence

The PFM team needs to be aware of the steps from the start of the PFM process, so that they know what to expect, why, when and where, and who will do what. For effective PFM process at VFC level some of the critical steps are followed in sequence as follows;

- ❖ Conduct VFC meeting for approval of PFM process and at different stages of PFM planning and implementation. The decision making power on PFM process and its application into Adaptive management is rest with VFC.
- ❖ Intensive training of PFM team for various tools and techniques helps in effective implementation of PFM process it is important to provide proper awareness and motivation about PFM use in general forest management to both PFM team and VFC.

- ❖ Involve local FD and NGO staff in all stages of the PFM process. Provide proper time for local community to think about the process and adoption of such process in to management plans.

Plan the individual steps

For effective planning and carrying out PFM process, one has to plan individual steps of each PFM activities. Steps to be followed while implementing PFM process are give below;

Activity: Specify what action to take for the PFM activity

Objective: explain what the active will achieve

Expected outputs: ensure what is expected at end of each PFM activity

Responsible institutions: indicate clearly institutions responsible for organizing PFM activity

Methods: describe how particular PFM activity should be achieved

Points to be consider: positive and negative aspects to be take care during performance of each PFM activities

Skills required: mention about specific skill required and updating of such skills

Materials required: suggest minimum material required for performance of PFM activity

Time frame: duration required for conduct of each PFM activity

Pre PFM stage

Selection of VFC for PFM process

Activity	Selection of VFC for PFM
Objectives	To decide on willing and active VFC under JFPM programme to take up PFM
Expected outputs	Selection of VFC for PFM
Responsible institution/s	Division and Range forest office of Forest department, Local NGO
Method	<ul style="list-style-type: none"> ❖ To review the activities of each VFC in the division/range ❖ Discuss with local NGO about community interests and participation in forest management ❖ Develop filed visit programme
Point to consider	Discuss with field implementation staff and contact all possible sources
Skills required	Ability to extract and analyse information from various sources
Material/s needed	VFC registers, microplans, review reports, field notes, paper and pen
Time frame	2 days

PFM step I: meeting with Forest Department and NGOs

Activity	Organize meeting with Forest Department and NGO
Objectives	<ul style="list-style-type: none"> ❖ To inform the FD and NGO to involve in PFM process ❖ To seek their help in selection of VFCs ❖ To facilitate PFM process at VFC level and its assimilation at range, division and state level
Expected outputs	<p>Proper understanding and necessity of implementation of PFM at VFC level</p> <p>Agreement on extent of involvement in the process and enable VFC to implement PFM</p>
Responsible institution/s	Top FD management and Nodal NGOs
Method/s	<ul style="list-style-type: none"> • Contact division and range offices and explain about having meeting for PFM implementation • Fix common venue and date for the meeting • Early correspondence about meeting and get acceptance in advance • Remind the about meeting previous day of the meeting • Identify the local NGOs to be invited for meeting • Prepare meeting presentations • Conduct meeting in team and allow for greater discussion to have proper understanding about concept and application of PFM at VFC • Select VFC for action • Get approval for involvement of FD and NGO staff
Point to consider	<p>Ensure participation of FD field staff</p> <p>Clarify all doubts and allow for suggestions and comments</p>
Skills required	Proper agenda, communication skills and facilitating meeting
Material/s needed	Agenda, minute recording book, attendance sheet, pen, pencil, books and presentation tools (LCD and compute, overhead projector)
Time frame	One day, half day for presentation and discussion, half day for selection of VFCs

PFM step II: meeting with Village Forest Committee

Activity	Organize meeting with selected VFC/s for PFM
Objectives	<ul style="list-style-type: none"> • To inform the VFC about PFM and seeking approval • To bring VFC about planning and implementation of PFM • To constitute PFM team
Expected outputs	Agreement over implementation of PFM, constitute PFM team and preparation of schedule of PFM activities
Responsible institution/s	Local NGO, Forest department and VFC
Method	<ul style="list-style-type: none"> • Visit VFC to fix the meeting • Decide on venue and date most convenient to local communities • Inform the Forest Department, other NGOs, agriculture department, revenue department about programme and ensure their attendance in the meeting • Reach place of meeting at least one hour before • In the VFC meeting, explain the purpose of this • Explain the PFM process, role of VFC, purpose of PFM team, and most importantly to inform them about rationale for selection this VFC for PFM implementation • Explain the role and involvement of Forest Department and

	<p>Local NGOs</p> <ul style="list-style-type: none"> • Allow for discussion and clarification from VFC members and Mc members • Seek general approval for planning and implementation of PFM through PFM team • Finalize the schedule of time for implementation • Schedule follow up visits
Point to consider	<ul style="list-style-type: none"> • Need to emphasize on why PFM process required at VFC • Ensure participation of all stakeholder group in the meeting, participation of forest department officials, revenue officials • Select PFM team having representation from each stakeholder group • Allow for all sort of clarification from VFC members
Skills required	Good presentation of meeting, agenda, have good speakers (community communication skills)
Material/s needed	Meeting facilities available at VFC, record book, pen, paper, Banner (food in case it is planned to supply during meeting)
Time frame	2 days: one visit before conduct of meeting and one day for meeting

PFM step III: Baseline for forests, village and community

Activity	Build baseline information on ecological, social, personal and economic related issues
Objectives	<p>To generate baseline data for VFC</p> <p>To monitor the similar information in subsequent years</p> <p>To generate change pattern to baseline data</p>
Expected outputs	Baseline database, aware and motivate local community about creation of baseline information
Responsible institution/s	Local NGO, Frontline staff of forest department, PFM team
Method /s	<ul style="list-style-type: none"> • Design formats required to generate baseline information • Translate formats in to vernacular • Conduct briefing programme to field staff • Fix the schedule for baseline data collection • Inform VFC, Forest Department and other department of their cooperation and supply of relevant information they have • Collect information from various sources • Document and share information with VFC and FD • Generate tables for future reference
Point to consider	Clarity in formats about various parameters, its units and source of collection. Orient team about purpose of collection of such information and its importance in the future
Skills required	Ability to design simple formats, orient field staff, conduct survey and preparation of final tables
Material/s needed	Survey formats, pens, pad and drawing sheets
Time frame	3 days: half day for orientation and preparation for field survey, one two days for collection of data and half day for generation of final tables

PFM and planning Step IV: meeting with VFC for PFM and PFM team

Activity	Orient PFM team and VFC for planning and implementation of PFM activities at village
Objectives	<p>To inform the VFC about PFM activities</p> <p>To seek VFC support for planning and implementation of PFM</p>

Expected outputs	Get ready PFM team to conduct PFM activities
Responsible institution/s	Local NGO, Forest Department and PFM team
Method /s	<ul style="list-style-type: none"> • Inform the VFC and PFM team about meeting • Fix date and venue convenient to local community • Aware and motivate PFM team for training programme • Fix the schedule for the PFM activities and get approval from VFC and PFM team • Inform the local forest department about schedule
Point to consider	Ensure participation of MC members, SHG members and local healers in the meeting to share their ideas and cooperation for PFM team, provide enough time for discussion among VFC and PFM team to fix schedule
Skills required	Ability to interfere in the meeting to bring consensus to arrive decision making, communication skills and friendly with local community
Material/s needed	Banner of the programme, minute book, pen and paper
Time frame	One days

Planning Step V: meeting and training PFM team

Activity	Conduct training programme for PFM team
Objectives	To train the PFM team to organize PFM process
Expected outputs	Get ready PFM team to conduct PFM activities
Responsible institution/s	Local NGO, Forest Department and PFM team
Method /s	<ul style="list-style-type: none"> • Inform the PFM team about training programme in advance • Fix date and venue convenient to PFM team • Assess the individual members for their acquire of knowledge and skills of the training • Conduct training programme for PFM team • Collect feed back on training • Assess the extent of preparedness among the PFM team
Point to consider	Keep enough time to train the PFM team, consider their skills while orienting PFM activities
Skills required	Ability to train the PFM team, use of extension methods
Material/s needed	Training module, drawing sheet, sketch pens, pens, pencil and papers
Time frame	Two days: half day for assessing knowledge and skills of forest management, one and half day for training of PFM team

PFM and planning Step VI: tools and preparations

Activity	Tools and techniques for PFM activities at VFC level
Objectives	To Prepare tools, techniques and material required for PFM planning and implementation
Expected outputs	Get PFM kit ready, supply PFM kit to PFM team
Responsible institution/s	Local NGO, PFM team and nodal NGO
Method /s	<ul style="list-style-type: none"> • List out the tools and material required for PFM • Tools required for Forest Vegetation monitoring are ropes, toiler taps, colour chalks, writing registers • Tools required for social, personal and economic monitoring, data sheet and documentation registers • Prepare PFM kit with all tools required for PFM implementation • Prepare schedule for various activities

	<ul style="list-style-type: none"> • Prepare sequence of activities • Assign PFM team members for particular work based on the their knowledge, skills and ability work in the team
Point to consider	Provide right material at right time, assess the capabilities of the PFM team members and assign work
Skills required	Skills of the PFM, acutance with PFM tools
Material/s needed	Plastic Ropes, measurement tapes, colour chawks, hats, drawing sheets, data formats, pens, pencil and paper
Time frame	One day

Constitution of PFM team step VII: participatory forest monitoring

Activity	Conduct PFM at VFC by PFM team
Objectives	To implement PFM activities at VFC To collect monitoring data
Expected outputs	Get PFM data on various parameters such as ecological, social, personal and economic related issues
Responsible institution/s	PFM team, local NGO and frontline forest department
Method /s	<ul style="list-style-type: none"> • Have small discussion before PFM team leave for Monitoring • Assess the preparedness among PFM team • Start forest vegetation monitoring, followed by social-economic monitoring • Conduct forest walk to assess the landscape and resources potential • List out different vegetation pattern and decide on number of sampling plots • lay sample plots of 25 * 25 meter square plots • count number of tree and its local name • measure and document girth and height of each tree in the 25 meter quadrate • list and count shrubs, climbers and seedling in 10 meter quadrate • conduct participatory rural appraisal and discussion on data format to collect information on availability of forest resources, its use, village and VFC profile, economic dependence on forest • document socio-personal and economic parameters from different surces • draw social and participatory map to locate resources and plan for adaptive management
Point to consider	Follow sequential steps of PFM, work with full confidence to motivate PFM to do right job
Skills required	Leading team work, communication skills and anticipating team work is better work
Material/s needed	PFM kit, drawing sheet, sketch pens, colour powders, pen, pencil and paper (back up lunch)
Time frame	Two day: half day for forest walk, one day for vegetation monitoring and half day for socio-economic monitoring

Constitution of PFM team step VIII: documentation and participatory analysis

Activity	Recording of data/information and understating
Objectives	To document data/information during PFM implementation To apply possible analysis to understand data/information collected

	To prepare inputs for decision making process
Expected outputs	PFM records, generation of PFM outputs and provide these as inputs to decision making process
Responsible institution/s	PFM team, Local NGO, Frontline staff of Forest Department
Method /s	<ul style="list-style-type: none"> • Follow each step of monitoring • Train the few PFM team member for documentation of data/information during PFM implementation • Ensure PFM team document data/information at every stage during PFM process • Ensure data/information documented in formats provided for the purpose • Gather all recorded documents • Provide simple analysis approach for data/information • Encourage PFM team to understand data • Generate final tables for VFC meetings • Plan for follow up monitoring
Point to consider	Keep the confidence of Team members to do some new job, look for educated youth for documentation, avoid confusions among PFM team member. Provide sufficient time for analysis
Skills required	Community understanding, better communication to teach analysis of data, work for difficult task
Material/s needed	Data entry formats, drawing sheet, colour pencils, pens and paper, scale and pencil
Time frame	one day: half day for editing of documents and half day for analysis of data and generation of final table

Adaptive management step IX: PFM team meeting

Activity	Conduct post PFM meeting for PFM team
Objectives	To discuss on final tables to be provided for VFC for further action To plan for follow up activities for long term monitoring
Expected outputs	Generation of final tables, preparation of follow up action
Responsible institution/s	PFM team, Local NGO, Frontline staff of Forest Department
Method /s	<ul style="list-style-type: none"> • Fix meeting with PFM team • Ensure participation of all filed staff participated in PFM • Help them to generate final output tables • Explain them tables and allow discussion among the PFM team • Provides necessary clarification to each quires in understanding final tables • Highlight importance of data collected and analysis done • Prepare fallow activities in consensus with PFM team
Point to consider	Provide learning environment , be critical while explaining importance of data collection and analysis
Skills required	Ability to facilitate community decision, analyzing and interpretation capacity
Material/s needed	Display board, pointer, final tables, pen, pencil and paper
Time frame	One day

Adaptive management step X: VFC meeting

Activity	Conduct post PFM meeting at VFC level
Objectives	To discuss on final tables prepared by PFM team To arrive at participatory decision making on findings of PFM process

	To approve follow up activities for PFM
Expected outputs	Decision making on final tables, finalization of follow up activities for PFM team
Responsible institution/s	VFC, PFM team, Local NGO, Frontline staff of Forest Department and Nodal NGO
Method /s	<ul style="list-style-type: none"> • Fix meeting with VFC • Ensure participation of all VFC members, PFM team, Local NGO and Forest department • Allow PFM team to conduct meeting • PFM team to share their experiences PFM planning and implementation • PFM team to share positive and negative challenges they faced during PFM implementation • PFM team to present final tables to VFC members • Allow discussions among PFM team and VFC members to bring clarity in final outs • Highlight importance of data collected and analysis done • Facilitate for participatory decision making process • Approve follow activities for PFM team
Point to consider	This is very crucial meeting, Allow PFM team to perform the meeting, facilitate discussions when ever it is required
Skills required	Develop good communication skills among PFM team, be as good observer and facilitator of discussion
Material/s needed	Display board, pointer, final tables, pen, pencil and paper
Time frame	One day

Adaptive management step XI: review management plan and inclusion of findings

Activity	Microplan revision and provision for adoption of PFM process and findings
Objectives	To study the microplans at VFC To prepare synthesis PFM process and its finding for incorporation in to microplan To consider Forest Department views on this To prepare Adaptive management plans
Expected outputs	Provision of microplans to adopt PFM process, preparation of PFM synthesis,
Responsible institution/s	VFC, PFM team, Local NGO, range level functionaries of staff of Forest Department and Nodal NGO
Method /s	<ul style="list-style-type: none"> • Conduct meeting of different stakeholders • Critical review of microplans • Identification of provision for adoption of PFM process and its findings • Prepare PFM synthesis in consensus with VFC and other stakeholder groups • Ensure participation of Range forest officer in the meeting • Explain the PFM process and its findings • Explain importance of PFM in management of forests • Arrive decision to incorporate PFM in to microplans of VFC • Develop adaptive management plans based on the discussion
Point to consider	Prepare good PFM synthesis, allow VFC to explain the PFM process to RFO and other stakeholder groups
Skills required	Facilitating meeting, community communication, convincing various stakeholder groups and officials
Material/s needed	Display board, pointer, final tables, pen, pencil and paper

Time frame	One day
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Adaptive management step XII: Range and division meetings

Activity	Conduct post PFM meetings at Range and divisions
Objectives	To spread the PFM ideas at Range and Division level To facilitate PFM process across VFCs To influence the PFM in to macro level management plans
Expected outputs	Incorporation of PFM process in to macro level management plans and policy changes
Responsible institution/s	VFC, PFM team, Local NGO, Forest Department and Nodal NGO
Method /s	<ul style="list-style-type: none"> • Fix meeting with Range Forest Officer and Deputy Conservator of Forest • Ensure participation of all different stakeholder groups at range and division level and filed implementation team form VFC/s carried out PFM process • Ensure participation of NGOs and other VFCs in the range and division • Allow PFM team to conduct meeting • PFM team to share their experiences PFM planning and implementation • PFM team to share positive and negative challenges they faced during PFM implementation • PFM team to present implementation experiment, time required to complete PFM process • Allow discussions on importance PFM in regular management of forest under JFPM • Get reflection from FD officials and other stakeholders on PFM process and its spread in to other VFCs • Facilitate for participatory decision making process for provision of incorporation of PFM process in to macro level management plans • Prepare inputs for policy and forward these to state and national level
Point to consider	Allow VFCs implemented PFM to share their experiences, facilitate discussions when ever it is required
Skills required	Develop good communication skills among VFC to present PFM process, be as good observer and facilitator of discussion
Material/s needed	Display board, pointer, final tables, pen, pencil and paper
Time frame	One day

Part IV: Methods, Data formats and output tables of PFM

This part of the field manual gives methods for PFM planning and implementation, various methods developed and executed at field during implementation of PFM programme at 20VFCs in India has been described. Data sheets developed to generate information at VFC level provides supportive material. Formats of out put tables are given to have details understating of finding of PFM process and its assimilation into adaptive management of forests and forest resources.

Format I: Meetings

Several meetings have been planned at VFC, PFM team, Range and division level, the purpose of the meeting is to generate interaction among various stakeholder groups to facilitate the PFM programme at VFC level and derive benefits into adaptive management of forest across VFC, at range and division level.

Method/s

Orientation cum participatory discussion on the agenda of the meeting

Data format 1: Meeting notice

Title of meeting	Village Forest committee meeting for constitution of PFM team
Date	
Place	
Time	
Agenda of the meeting	
Expected participants	
Signature of the participant	

Data format II: Recording of minutes of meetings

Issues raised	By whom	Clarification/justification
Issue1		
Issue2		
Issue3		
Issue4		
Conclusions		

Data format III: attendance list of the participants

Name of the person	Institutional participation	Signature

Format II: Baseline data/information

Establishment of baseline data on various parameters is one of the key activities under the PFM process

Method/s: organizing PRA, questionnaire survey and focus group meeting

Data formats for socio-personal and economic related information

1: Socio-Economic Structure of the Village

1.1 The population statistics of the village is as below

Class	Population	Literates	Literacy %
Male			
Female			
Children			
Total			

1.2 Ethnic composition

Class	No. of Families	Population
SC		
ST		
Others		

1.3 Details of landholding

Class	BF	SF	MF	LL	Total
SC					
ST					
Others					
Total					

Note: BF: Big Framers, SF: Small Farmers, MF: Marginal Framers, LL: Landless labour

1.4 Livestock details: The livestock detail of the village is as under:

Livestock	Number
Cows	
Ox	
Buffaloes	
Sheep	
Goat	
Poultry birds	

1.5 Land use pattern

Land use pattern	Area under Acres
Cultivation Dry land	
Cultivation Irrigated	
Cultivated Garden	
Forest	
Area under plantation	

Gomal or grazing land	
Village common lands (gram thana, burial grounds School flied, avenues and canal and tank area)	
Waste land	

1.6 Climate

Parameters	Observations
Agro climatic zone	
Soil type	
Forest type and classification	
Temperature	
Rainfall and frequency of rainfall, no of rainy days	

1.7 Cropping pattern

Kharif		Rabi/Summer	
Crop	Area (ha)	Crop	Area (ha)
Paddy		Ragi	
Ragi		Sunflower	
Sunflower		Groundnut	
Groundnut		Coconut	
Pulses		Arecanut	
Coconut		Mulberry	
Arecanut			
Mulberry			

1.8 Forest Types

Forest Class	Area (ha)	Year of planting
Natural forest (Govt. waste land)		
Reserve forest (Munnajangal)		
Badavanahalli Social forest		
Area under JFPM		
Area under FDA		

2. Pre JFPM activities in the village

Activities	Date
Information given to Villagers on JFPM	
Further discussions on JFPM activities	
Problem identification and acceptance to form VFC by villagers	
Registration of VFC in presence of DCF (As per R.No. 14)	

Selection and approval of VFC members in presence of RI	
Pre PRA activities	
PRA	
Microplan preparation	
MoU signed and the Project approval	

3. VFC Details

Sl No	Name	Designation	Age	Gender	Caste	LH

4. Summary of micro plan activities under JFPM

Name of VFC:

Duration of Microplan

Dare month and Year (starting and closing):

Approved on:

Sl. No.	Year	Amount(Rs.)	Activities
1			
2			
3			
4			
5			
Total			

5. Afforestation under different lands

Scheme and model of the plantation	Year	Area	Species
Enrichment plantation			
Natural protection			
Fuelwood plantation			
NTFP plantation			
Multipurpose plantation			

6. Self help groups in the village

Details	Observation
Number and name of SHG/s	
Membership (SHG wise)	
Capital raised (in Rs.)	
JFPM activities initiated	
Capacity invites and source	
Benefits derived	

7. Forest Resource Management and utilization

7.1 Farmers dependence on forest resources

Classification	No. of families	Nature of dependency
Big farmers		
Small farmers		
Marginal farmers		
Land less		

7.2 Collection of Forest Resources in the village

Resource/stakeholder group	No. of families collecting	Quantity gathered (per family)	Frequency	Season of collection
Fuelwood - LF - SF - LL				
NTFPS - LF - SF - LL				
Medicinal Plants - LF - SF - LL				
Grazing - LF - SF - LL				

7.3 Resource needs met from (% collection to meet the village needs)

Fuelwood	Forests	Agricultural lands	Plantations	Buy from market

NTFPS				
1.				
2.				
3.				
4.				
5.				
Medicinal Plants				
1.				
2.				
3.				
4.				
5.				
Fodder				

7.3: Resource base

	Area	Dominant Species
Natural forest (area)		
Plantation I (Area)		
Plantation II (Area)		
Plantation III (Area)		

7.4: Status of resources (Natural Forests and Plantations)

Density of forest	Area	Dominant species	Species extracted			
			Fuelwood	NTFPS	Medicinal Plants	Grazing
Natural Forest						
Dense forest						
Moderately Dense						
Open forest						
Degraded forest						
Plantations						
P1						
P2						
P3						
P4						

7.5 Are the resources in the village sufficient?

Fuelwood	NTFPs	Medicinal Plants	Fodder

--	--	--	--

25%, 25-50%, 50-75%, 75-100%

8. Incidence of Forest fire

- 8.1 Nature incidents
- 8.2 Extent of incidents (area in Acre)
- 8.3 Prevention and control mechanism
- 8.4 Funds provided
- 8.5 role of VFC in fire prevention

9. Protection of JFPM area by VFC

- 9.1 Protection arrangements,
- 9.2 Involvement of VFC members
- 9.3 Conflict resolution (inter and intra)

Format III: Monitoring: Ecological, Institutional, Social-personal and Economic

1. Organizing Participatory Rural Appraisal

After having three to four visits sensitization regarding project was made to VFC members and villagers. The date was fixed to conduct PRA by looking into the villager's suitability. Two days PRA includes on first day the orientation regarding the study was made to VFC members, Villagers and Forest department staffs.

Issues to be discussed during first day of PRA

- Participatory monitoring of JFPM by involving village community
- Sensitization on impact of protection, management and extraction practices to undertake adoptive forest management activities.
- Resources available in the forest
- Value of medicinal plants
- Quantification of total resource available in the forest
- Plan of action for second day PRA (Transact walk, social/resource mapping, venn diagram, quadrant sampling technique, Focus group discussion)

2. Constitution of PFM team (extraction of one the VFC is given with format)

Name of the member	Age	Occupation/Subsidiary occupation	Gender	Relationship to VFC

3. PFM Activities in sequence

3.1 Transact walk

Along with PFM team, Forest Department staff and villagers, the transact walk was made in forest area to know the present status of the forest. In the transact walk the different plant species, water storage structures, paths, plantations made, cultural properties etc., were identified. The important plant species identified were as follows.

Issues for monitoring	Observations in the filed
Landscape and land use pattern	
Forest patches and vegetation status	
List of Trees	
List of shrubs and herbs	
Animals and birds	
Water bodies, tanks and rivers	
Water shed area, check dams and area under development	

3.2 Social mapping:

After the transact walk, the map was drawn on the floor by the villagers using different colours. In social mapping which depict the village features viz, roads, temples, houses, schools, community building, water tanks, forest path, location, boundary, plantations, species, ponds and ravines in forest, etc.,

3.3 Trend analysis

The trend analysis was done to know the changes occurred in the forest species from fast 25 years. The major species present at 25 years back and 10 years back was compared to the present condition. The details regarding the trend analysis is given below.

3.4 Trend analysis map (Forest species present in earlier year and now)

Assess the condition of forest in the village by having trend data

Name of the forest Patch:

Approximate area:

Local name of the patch:

History and current condition

25 years back	10 years back	Now

3.5 Focus group meetings

The information collected through seasonality and focus group discussion regarding forest dependency of villagers, frequency of visit to forest, cropping pattern, forest resource management and utilization etc., were discussed earlier.

3.6 Quadrant sample technique

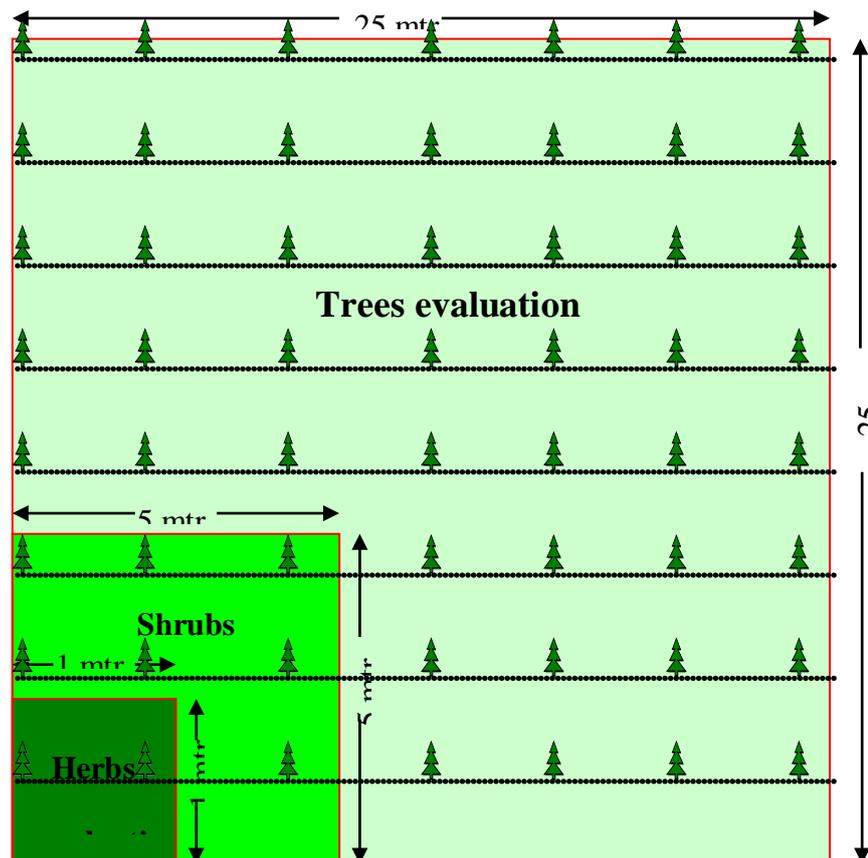
While at the time of transact walk, the quadrant sampling technique was conducted to quantify the species present. The details of observations made were given below.

Technique of sampling: Random - By throwing stone

Technique: quadrant technique

Area: 25
mtr. X 25 mtr. -
Trees
5
mtr. X 5 mtr. -
Shrubs
1
mtr. X 1 mtr. -
Herbs

Fig: Model of
Quadrant
Sampling
Technique



3.7 Enumeration of tree species

Measure height and girth of each tree, which has girth class of more than 10 cm

Sl. No.	Name of Species (common name)	Height (m.)	Girth (cm.)	Remarks
1.				
2.				
3.				
4.				
5.				

3.8 Enumeration of shrubs and herbs

Sl. No.	Name of Species (common name)	Number in each quadrate	Remarks
1			
2			
3			
4			
5			

3.9 Regeneration species in forest area

Sl. No.	Name of Species (common name)	Number in each quadrate	Remarks
1			
2			
3			
4			
5			

Format IV: Quantification of data

1. Quantification: Major tree species

Sl. No.	Name of Species	Height (m.)			Girth (cm.)		
		Max.	Min.	Avg.	Max.	Min.	Avg.
1							
2							
3							
4							
5							

2. Quantification: diversity of shrubs

Sl.No.	Name of Species	Number
--------	-----------------	--------

1		
2		
3		

3. Quantification: diversity of Herbs

Sl.No.	Name of Species	Number
1		
2		
3		

Format IV: community decision making and adaptive management strategy

1. Preparation of PFM team perspective

Team should prepare their perspective on following issues

- Species diversity and density
- Species survival and growth rate
- Current use of resource and its economic value
- Demand and supply status of forest resources with future projects
- Regeneration status

Preparation of Diversity status across forest patches and plantations, classify these in to various habits

- Tress of timber related
- Tree of NTFP related
- Climbers
- Shrubs
- Herbs
- Medicinal plants
- Animals
- Birds
- Any other habit/s

2. Community awareness and education

Present PFM information for Community is awareness and education with respect to

- Role of PFM and data/information collected
- Participatory monitoring of JFPM by involving village community
- Impact of protection, management and extraction practices to undertake adoptive forest management activities.
- Resources available in the forest

- Effective resource utilization
- Value of medicinal plants

3. Understanding the VFC view towards PFM

In consultation with VFC prepare final table of PFM, this should enable VFC to incorporate these issues into microplans and prepare adaptive management of strategy

- Protection of natural forest
- Management of Plantations
- Management of village common land
- Management of water bodies

4. Community decision making process and adaptive management

- Decided to conduct Participatory vegetation monitoring twice in a year
- Last week's of January and July is scheduled for to carry out the programme
- Resource estimation in the programme
- Decisions on the requirements of plantations, species in the required area
- Environment protection through forest protection
- Standardizing the sampling technique by themselves for their own benefit
- Encouraging the growth of medicinal plants
- Appointing a permanent watcher through VFC
- Setting up of detailed protection measures in gramasabha
- Punishing for all forest destruction activities as decided in gramasabha
- Prohibition of illegal entry into the forest without the VFC permission

4.1 Ecological concerns and aspirations of village level institutions

- Extent of forest and tree cover
- Conservation of forest and Maintenance of bio-diversity
- Maintenance of ecosystem
- Improvement of agro-ecology

4.1.1 Area Brought under Joint Planning and Forest Management

- Area and type of forests brought under community management
- Area of degraded land brought under community management

4.1.2 Conservation and Maintenance of bio-diversity

- Growth of trees, flowers, medicinal plants and fruits (t/ha)
- Growth of grasses (t/ha)

- Change in canopy cover
- Improved species richness and density
- Improved harvest methods
- No of rare , endangered threatened and endemic species including animal species
- Protection from grazing and fire
- Improved NTFP species

4.1 3: Maintenance of ecosystem

- Natural regeneration status
- Status of soil erosion
- Status of soil moisture and soil compaction
- Nutrient status of soil
- Run-off
- Level of water table
- Rainfall
- Extent of weed , pest, diseases, grazing, fire etc
- Availability of food to animals and birds
- Diversion of forest to non forest uses

4.1.4 Improvement of Agro-ecology

- Change in no of trees planted on private lands
- Community composting
- Watershed development
- Increased interest in agriculture due to improved ecosystem

4.2 Economic aspects

- Improvement of family economic conditions and quality of life
- Continuous availability of forest produces
- Increased employment opportunities
- Management of VFC fund and village assets

4.2.1 Improvement of family economic conditions and quality of life

- Enhanced income levels for village households through marketing or enhanced availability of forest products
- Saving potential
- Economic development through savings in community fund
- Family credit available from VFCs
- Profits from forest produce
- Additional sources of income available to people in the village
- Change in agricultural produce
- Increased food stock
- Decreased dependency on forest

- Break away from money lender

4.2.2 Continuous Availability of forest produce

- Increase in availability of NTFP for sustenance and sale
- Increase in availability of fodder, fruit, fuelwood, bamboo, and wood for agriculture implements and poles for use by the communities

4.2.3 Increased employment opportunities

- Employment through protection activities
- Status of migration

4.2.4 Management of VFC fund and village assets

- Development of village fund
- Contribution by the villagers to the village fund
- Extent of rights over collection and marketing
- Maintenance of money in a bank account
- Improvement of village assets

4.3 Social Aspects

- Collective decision making
- Gender equity and social justice to weaker sections
- Feeling of communities ownership and responsibility
- Unity and co-operation among VFCs and families
- Protection by the villagers
- Change in behaviour to protect forest
- Village problem solving and development

4.3.1 Collective decision making

- Obey of rules (set by the VFCs) by the communities
- Planting of trees on degraded and harvested lands by the VFCs according to decisions of the villagers
- Regulation of VFCs by the villagers themselves

4.3.2 Gender equity and social justice to weaker sections

- Women's involvement in forest protection
- Decreased drudgery of women in NTFP collection
- Access to education for poor families through VFCs
- Decrease in exploitation by powerful people in the village

4.3.3 Feeling of community ownership and responsibility

- Change in focus from selfish motives to community benefits

- Sense of commitment and discipline
- People's co-operation and their commitment towards preservation of forests
- Feeling of ownership of the forest
- Protection of village resources

4.3.4 Unity and co-operation among VFC and families

- Motivation for protection due to benefit sharing
- Unity among women members
- Decrease in internal village conflicts
- VFCs' assistance to individual families in the time of trouble

4.3.5 Protection of forest by the villagers

- Regularity of patrolling by the villagers
- Stopping of unauthorized felling of trees
- Stopping encroachment
- Prevention of forest fire
- Stopping illegal grazing

4.3.6 Change in behaviour to protect forests

- Reduction in indiscriminate lopping
- Stoppage of cutting trees for fuelwood and using dry wood as fuel
- Sustainable extraction of fuelwood
- Sustainable grazing through rotational grazing
- Reduction in fuelwood wastage
- Reduction in misuse of forest

4.3.7 Village problem solving and development

- Village development works undertaken through VFC
- Village cleanliness and improved health
- Increase of education
- Income from NTFP leading to village development
- Peaceful environment in the village

4.4 Institutional Aspects

- Sustainability and strength of VFC
- Collective decision making and members' active participation
- Gender equality
- Unity and conflict management
- Involvement of FD staff and other institutions
- Equitable sharing of work and produce
- Sustained funding

- Capacity building
- Transparency

4.4.1 Empowerment of VFC

- Tenurial rights
- Level of dependence on FD for convening meetings, writing minutes and taking decisions
- Tie up with other institutions such as NGOs and Panchayati Raj Institutions
- Participation of women and marginal class
- Powers of VFCs
 - To admit new members
 - To cancel membership
 - To apprehend offender

4.4.2 Collective decision making and members' active participation

- People's initiatives to serve the VFC
- Regularity of meetings
- Members' response to attend meetings
- Process of decision making

4.4.3 Gender Equality

- Participation of women in managing committee as well as executive committee
- Co-operation between male and female members
- Unity among women members

4.4.4 Unity and conflict management

- Opponents into the VFC
- Reduction of inter-village conflicts
- Type of leadership (in traditional leadership conflict resolution becomes easier)

4.4.5 Involvement of FD Staff and other institutions

- Appointment of forest guard
- Monthly general meeting with forest department
- Linkages with other departments
- Tie up with Panchayati Raj Institutions

4.5.6 Equitable sharing of work and produce

- Right over ownership over NTFP
- Benefit sharing mechanism

- Demarcation of land for each village

4.5.7 Sustained Funding

- Mode of funding
- Period of funding
- Awareness of members regarding fund

4.5.8 Capacity Building

- Training for community members
- Source of fund for training
- Frequency of training

4.5.9 Transparency

- Maintenance of proceedings of VFC meetings
- Maintenance of accounts and records of VFC money and other assets

Annexure: Notes on methodological approach for PFM

Annexure I: Notes on methods for Institutional, Socio-personal and Economic monitoring

Economic monitoring is challenging, as it requires collecting various kind data/information. The major methods used are survey method, PRA and case study methods. Either one or combined methods can be used based on the nature of data to be collected and cost. In case of survey method by using open or closed end questionnaires, information can be gathered. However, case studies can be developed to get in depth information. Participatory Rural Appraisal (PRA) is the best way of collecting data if monitoring is take up at VFC level. PRA methods are useful for gaining a preliminary understanding of the research or project area and communities in a relatively short period - usually between three days and three weeks. PRA approach is used for planning, institution development, information gathering and other studies in forestry, agriculture and rural development projects. PRA is based on interdisciplinary, exploratory studies relying on use of community interaction and indigenous knowledge. PRA can help generate information on the socioeconomic and ecological conditions prevailing in the research site. In contrast to conventional surveys, PRA methods can produce approximately the same types of data with equal levels of accuracy but considerably faster, while providing a better understanding of the human-ecological context in which the study occurs. Some of the PRA tools relevant to forestry sector are as follows:

Semi-structured interviews: This technique involves obtaining valuable information through simply talking to individual community members or small groups. It is used for better understanding of the community's relationship and dependency on the forest resources, the management issues, and the available resources in addition to a whole range of additional information.

Venn diagram: Venn diagrams consist of circles drawn to indicate different forest user groups and illustrating the relationship and reliance each group has with the forest and each other.

Seasonal calendar: the seasonal calendar documents the flow of forest products over time and how product collection changes over the season. This information can contribute to an estimation of yields.

Flow diagram: This diagram technique is one of a range of tools that can be used to develop an economic assessment of the production system. This along with other economic techniques to estimate yields, labor and capital costs draw on information obtained from PRA tools along with additional research and ecological data aids in economic analysis.

Historical transect: This technique helps to identify successful and unsuccessful management systems so that a new management system can avoid the same mistakes and promote the positive aspects endorsed by the community.

Trend lines: Creating a graph that diagrams changes in the population, rainfall, and volume flow of important forest products over time helps to draw patterns of forest disturbance and regeneration over time.

List making: This collaborative process allows to identify the forest products and classify forest products into commercial and subsistence use.

Organizational chart: This illustrates the structures and individuals within local government organizations and technical agencies. Organizational charts can also be used to reflect indigenous organizations including village chiefs, council of elders, healers, water management organizations and leadership positions, etc.

Time line: Time lines help identify important past events, for example, drought, forest felling, forest fires, etc., that assists the PRA team in being better informed about the area and the potential risks posed to the natural resources.

Ranking: This process indicates the order of importance among the forest products that are identified by the community that includes all commercial species and products.

Scoring: This process helps identify the relative importance of each forest product for the household economy.

Community sketch mapping: Participatory mapping technique involves facilitating community members in developing spatial representations of their areas by creating maps on the ground or on a large piece of paper, reflecting the locations of villages, forests, agricultural land, water resources, as well as management issues, which could also be digitized.

Annexure II: Notes on methods for Forest, Vegetation and Ecological monitoring

Ecological data collection of PFM is basically to understand the change in vegetation status due to protection and management of the forests by the community. The various parameters that can be addressed are standing biomass, biomass growth rates, harvestable timber volume, species diversity, species density, regeneration status of herb, shrub and tree species, and level of disturbance by way of illegal felling, pest and diseases and survival rates.

The approach to study these parameters involve selecting the size and number of plots based on the variability of vegetation and areas of the

sampling strata using standard sample size depending on the heterogeneity of vegetation. The sample size also needs to be fixed separately for trees, shrubs, herb layer and litter and soil. Some of the suggested sample sizes are shown in Table. To estimate the baseline situation, control plots in degraded areas of the village need to be laid. The plots to be laid for control plots are given in Table.

Trees: Trees or stems above 5 cm DBH are included in the tree plots. Greater the heterogeneity of vegetation, larger the size and more the number of sample plots. As a thumb rule, one ha could be the total area sampled, for forests and mixed species plantations and 0.5 ha for homogenous plantations. The dimension of plots could be determined by the investigator depending on the observed heterogeneity of vegetation, soil, topography, etc. Dead and standing trees within the selected plots should be measured along with the living trees.

The parameters to be measured and recorded include; DBH, height, mode of regeneration, damage to tree, if dead and standing, etc. DBH is measured by marking 1.3 meter above ground on tree trunk as a circle. If a tree has multiple shoots GBH for all shoots needs to be measured. Measurement of tree height is difficult, unlike DBH, especially, in a dense forest or plantation, with dense tree stems and overlapping tree crowns. Height data is an indicator of biomass and growth rate. Height can be measured by using height measuring instrument for accurate estimate or based on height classes, which gives an approximate estimate of height. Trees are observed and categorized into height classes such as < 5 m to 10 m, 10 m to 15 m, 15 m to 20 m, 20 m to 30 m and >30 m. Field investigators with little practice and experience can accurately estimate height class of a tree.

Shrubs: Shrub plots include trees below 5 cm DBH and perennial shrub species but with height above 1.5 m. Shrub plots are normally smaller in size than tree plots, but the number could be at least double that of tree plots to account for the likely heterogeneity of shrubs and younger trees. Shrub plots are located inside the tree plots, at the rate of two per tree plot. Shrub plot number can be two per tree quadrat and the size can be 5 m X 5 m. In the shrub plot, shrubs and young trees or saplings of height >1.5 m and a DBH of <5 cm are included. DBH is measured as described for tree plots. Height of shrub and young trees could be measured using a graduated pole of 5 m length.

Herbs and grass: Annual herbs especially of medicinal property and grass biomass production can be estimated by laying quadrats. The size of the sample that could be adopted is given in Table 1. Normally, herb layer plots will be of size 1 X 1 m and the number is at least double that of shrub plots. Parameters to be recorded include; species name, number of plants and fresh weight of standing herb biomass. The herbs and grass can be harvested in the sample plots, unless there is a ban on clipping the above ground parts. Peak biomass or grass growth month need to be selected, often a couple of months after the peak rainy month, for harvesting the herb

layer biomass. The harvested herb layer biomass should be weighed in the field for fresh weight in each plot. A sample of say about 1 kg of fresh biomass should be taken for estimating dry biomass in the laboratory. Estimate dry weight of herb biomass per ha using fresh herb layer biomass, dry weight and size of plots. Harvesting saplings of valuable tree species need to be avoided.

Table 1: Example of size and number of plots for different vegetation types

Forest types	Trees		Shrub		Herb/Grass	
	Size of plot (m)	Number of plots	Size of plot (m)	Number of plots	Size of plot (m)	Number of plots
Natural forest or Heterogeneous vegetation	50 X 40	5	5 X 5	10	1 X 1	20
	50 X 50	4	5 X 5	10	1 X 1	20
Plantations with homogenous vegetation or Uniform species distribution and density	50 X 20 or 40 X 25	5	5 X 5	8	1 X 1	16
Baseline or control plots	50 x 50	1	5 X 5	2	1 X 1	4

Silvicultural issues: Other than ecological issues, silvicultural issues need to be monitoring.

There are short- and long-term implications of different silvicultural interventions for biodiversity, flow of products, and fuelwood productivity.

The microplans have to take them into account and interventions have to be at VFC level, keeping in mind the needs of the local communities. It is essential to understand the microclimate of the vegetation before silvicultural interventions are carried out. The knowledge of local communities has to be gathered, to understand the traditional silvicultural practices. These practices could also be scientifically validated, if possible.

NTFPs and Marketing: A quick survey of NTFPs has to be done to assess the production, extraction and market potential. The entire chain from collection to consumers' needs has to be understood so that value addition can be done at the VFC level. It is important to estimate the potential for value addition of NTFPs through processing and marketing. Existing institutional mechanisms have to be assessed for processing and marketing the NTFPs. The role of bamboos and the canes have to be understood and silvicultural interventions have to be developed if biodiversity has to be conserved.

Annexure II: Notes on data analysis

Species density: From the number of trees sampled in the plots, it can be extrapolated to per ha to analyze the species density. The regenerating species in the area can be assessed by observing the trees in lower DBH class and the mode of regeneration i.e. seeds or coppice.

Species diversity: Species richness is the number of species present in a given area. Tree, shrub and herb diversity can be calculated by through two widely used indices for diversity indices - Simpson's index and shannon-wiener index. These indices indicate the evenness of distribution of species. Weightage is given not only to the presence of species, but also the extent of its presence. Shannon Wiener index is calculated as follows:

$$H' = - \sum p_i \log p_i$$

$p_i = p_i$ is the proportion of the total number of individuals that occur in the species i. i.e. (n_i/N)

n_i is the number of individuals of a species of a species i, and $i = 1$ to k , where K is the total number of species

N is the total number of individuals of all species in the sample.

The diversity indices give an understanding of the biodiversity in JFM areas.

Standing biomass: Several methods are available to convert tree parameters collected to tonnes of biomass per hectare. One of the most common approaches is to use allometric regression equations or simply biomass equations (Table 2) to estimate weight of a tree or biomass of a stand (per hectare) based on DBH, height and basal area estimates.

Level of disturbance: Counting the number of cut stems and dead pits in a hectare can give a fair picture of the extent of protection of JFM area. This gives the measure of extraction levels from the JFM area. In correlation with the institutional data, it can be assessed if the extraction are illegal and thus suggests the efficacy of protection measures. Ecological survey done in non-JFM area can also give a picture of the extraction levels and the impact of JFM on non-JFM areas.

Economic analysis: Under JFM, people are given right to collect certain forest products such as fuel wood, fodder and create employment opportunities. The VFCs share the benefits from timber, NTFPs etc. Forest productivity is shows a positive trend. So JFM should be evaluated to know whether it is actually beneficial, and if beneficial, to what extent is it beneficial? In other words, economic feasibility of the JFPM needs to be tested.

Before selecting the method, setting objectives of the project is required, which could be to test the sustainability of JFPM at its current rate of performance, the economic feasibility of the JFPM and to assess the direct and indirect benefits arising as a result of JFPM.