

*Government of India  
Ministry of Environment  
& Forests  
New Delhi*

*National Working Plan Code  
Draft 2012*

*Open for suggestion and  
comment*



## Index

Chapters	Subject	Page No.
	Preamble	
<b>I</b>	General	
<b>II</b>	Other Important Matters	
<b>III</b>	Organisational Structure	
<b>IV</b>	Necessary Inputs to WPO	
<b>V</b>	Consultative Committee and preparation of the plan	
<b>VI</b>	Survey And Assessment of Natural Resources	
<b>VII</b>	Writing Up the Plan	
<b>VIII</b>	Preparation of Maps	
<b>IX</b>	Compartment History	
<b>X</b>	The Control and Records	
	<b>Annexure</b>	
<b>I</b>	Preparation of Micro Plans and Eco-development Plans	
<b>II</b>	Plot Approach Form	
<b>III</b>	Plot Description Form	
<b>IV</b>	Plot Enumeration Form	

## Preamble

The first planned working of forests in the country was crafted by one Mr. Munro for Travancore forest. In 1937, Munro, the then Superintendent of Forest in Travancore, estimated on the basis of his personal observation and long experience of working in the woods that about 100,000 trees of teak were fit to be felled. The idea of fixing and forecasting the annual yield on the basis of some form of computation of the contents of the forest combined with the rate of growth of the trees was, indeed, new in the country that time. Fraternity of Indian forestry rightly assumed that, "the credit of having been the first to introduce a simple form of forest working plan in India must be ascribed to Mr. Munro".

First Working Plan in India was prepared under the direct control of Inspector General of Forests Sir Wilhelm Schilich in 1884, a remarkable event as it resulted in unified approach for the whole country. A special working plan division was created for the first time in the country in the year 1884 by United Provinces. The experience so gained in the past led W.E.D. 'Arcy to bring out his treatise "Preparation of Forest Working-Plans in India (1898)", providing guidelines for systematic working plan preparation. Based on regional requirements and federal governance, Provincial Working Plan Code was adopted in different states of the country.

In 2004, Ministry of Environment and Forests, Govt. of India adopted National Working Plan Code for the management of forests under the prescriptions of a working plan/scheme prepared on the basis of principles of sustained management of forests and recognized silvicultural practices.

In recent years there has been paradigm shift in the policy and approach to the forestry sector both nationally and internationally. The focus has shifted from timber harvesting to environmental stability, biodiversity monitoring and management, restoration of ecological balance of the disturbed areas, protective function of the forest resource and other socio-economic benefits based on Non Wood Forest Products (NWFP). It is also recognized that climate change phenomenon seriously affects and alters the distribution, type, composition, quality and mitigation potential of forests of the country especially in realm of non-climatic anthropogenic stressors. Involvement of forest fringe communities living close to forests in protection and management of forest resources and sharing of usufructs through micro-plan and eco-development plan has become imperative and must find linkage to the working plan. Working plan preparation should also capitalise on the gains of new space based technological advancements like remote sensing, GIS, GPS, computational & analytical systems at hand for real time monitoring of forests dynamics.

Consequent to the directions of Hon'ble Supreme court of India with regard to ensuring of restocking /regeneration of any forest area before taking it up for any kind of felling as per the valid working plan duly approved by the designated authority, it has thus become necessary to review and revise the National Working Plan Code 2004.

## CHAPTER I

### GENERAL

1. All forests are to be managed under the prescriptions of a working plan/scheme which are prepared on the basis of principles of sustainable management of forests; conservation and development of biodiversity; maintenance and enhancement of ecosystem services including carbon sequestration; and the participation of local people in planning and management of forest resources.

2. Working Plan is a written document describing the forests, results of the past management practices and proposal for the future forest management interventions for a forest or forest area. Over the years it has evolved from an extensive simplicity to that of an intensive complexity to meet the National and International goals along with sustainable management of forests and adequate safe guards for the local people. Working plan is prepared for large areas such as forest division, where as working schemes are prepared for smaller areas for a specific purpose or for forest areas under the control/ ownership of such bodies as private, village, municipal, cantonment, autonomous district council (especially in North Eastern States) etc.

3. It is the duty of the manager or owner of the forest area to ensure the preparation of the working plan / scheme. The authority as designated by the Ministry of Environment & Forests, Government of India, will approve the working plan and ensure the implementation thereof. Even working schemes have all major elements of working plan; and these schemes also need the sanction of competent authority designated by the Ministry of Environment & Forests.

4. For involvement and benefit of local stakeholders, micro plans are to be prepared within the ambit of working plan prescriptions for JFM areas and eco development plans are to be prepared for eco-sensitive forests adjoining the notified protected area. Micro-plan of jointly managed forests is to be prepared by the members of the JFMC through PRA with the technical assistance of forest staff of territorial division as per MOU for sharing the responsibilities of implementation and equitable sharing of the usufructs among the stakeholders within the broad prescriptions of working plan. Micro plan will be approved by the Working Plan Officer (WPO) concerned, unless otherwise notified by any particular state government for this purpose. Proper implementation of the micro plan by each JFMC may be reviewed **at least** once in two years by the Forest Development Agency (FDA).

## CHAPTER II

### OTHER IMPORTANT MATTERS

#### FORESTS AND CLIMATE CHANGE

5. Forests are linked to climate change in three ways; i) Forests are source of greenhouse gas (GHG) emissions, ii) Forests offer mitigation opportunities to stabilize GHG concentration and iii) Forests and their ecosystem goods and services are impacted by climate change. Impacts of Climate Change on forest ecosystem are getting manifested as species range shifts, changing biodiversity, phenological changes in plant life cycles, forest growth pattern of species, changing boundaries of ecosystem, and other biotic and a-biotic responses. But forest ecosystems operate on large time scale. Therefore long observational periods are necessary in order to identify the key changes. Working plan must provide for studies which cover the characteristic time scale where these effects are expressed. Persistent effects of past forest management events are maintained as legacies that can only be resolved by such studies.

#### CARBON SEQUESTRATION AND MITIGATION

6. Forests and wood products can effectively reduce the process of climate change in several ways. Growing trees absorb carbon dioxide from the atmosphere and store the carbon so efficiently that about half the dry weight of a tree is carbon. This carbon remains locked up in the wood and wood products. The production of wood products uses less energy (usually sourced from finite fossil fuels) compared to other products. Sustainably grown and harvested wood (and other biomass) also provides a renewable alternative to fossil fuels. Enhanced Carbon Sequestration practices through appropriate silvicultural techniques, eco-restoration of degraded/mined out forestlands, improved biomass productivity, etc shall result in better forest health which are under increasing threats of forest degradation on account of recurrent fire, unregulated grazing and lopping, invasive species and uncontrolled felling. Due regards for biodiversity conservation and uses of local people should also be explored and prescribed for sustainable management of forests.

#### REDD+

7. REDD+ stands for Reducing Emissions from Deforestation and forest Degradation including forest conservation, sustainable management of forests and enhancement of carbon stocks, and has been adopted by the UNFCCC (United Nations Framework Convention on Climate Change) as a tool for climate change mitigation. Deforestation happens when forests on forested-land are cleared and such land is put to other-than-forest land-use. Forest degradation implies gradual depletion of forests driven by demand for biomass, and disturbances like fire and soil erosion, which, result in dwindling carbon density and ultimately complete loss of forests (deforestation). Implementation of REDD+ therefore would result in lowering in emission of carbon dioxide and other GHGs from forests on one hand, and enhancement in sequestration of carbon in forests on the other.

## **BIODIVERSITY CONSERVATION AND DEVELOPMENT**

8. The natural biological diversity should be maintained and developed through sustainable management and use practices. Vegetative data should be quantitatively analyzed for different biodiversity indices and based on the biodiversity assessment, suitable management strategy should be prescribed. Impacts of climate change and other stressors (including existing forest management or other practices) may also be adequately highlighted so as to take suitable adaptive and corrective measures for conservation and development of biodiversity. Other biodiversity related to algae, fungi, lichens, epiphytes, parasites etc should be taken into consideration. The use of components of biological diversity in such manner and at such rate that does not lead to the long term decline of the biological diversity thereby maintaining its potential to meet the needs and aspirations of present and future generations, fair and equitable sharing of the benefits arising out of use of biological resources, knowledge and for matters connected therewith as provided in Biological Diversity Act 2002 should be ensured.

## **APPLICATION OF MODERN TECHNOLOGIES**

9. Forest resources assessment and mapping are the most important requisites for the preparation of the *working plan*. Use of Remote Sensing (RS) has become an important tool in the Forest Resource assessment and management. Geographic Information System (GIS) and Global Positioning system (GPS) have further enhanced these capabilities. The WPO should use them if necessary with the help of Forest Survey of India (FSI). From satellite data the minimum map-able size is of the order of 2-3 hectares. Maps thus prepared have high degree of planimetric fidelity and are compatible to computer data handling. GIS is the tool for collecting, storing, retrieving, transferring, and displaying geographically referenced spatial data with its corresponding attribute information to meet a specific requirement. Various data can be stored in the digital maps in the form of layers. These layers can be overlaid and manipulated to generate new information. Various layers found useful for *working plan* map on 1:50,000 scale are given below:

Forest density, Forest type, Site Quality, Contours, Soil map, Road network, Encroachments, Volume data, Wild life sighting, Villages, Boundaries, Research plots, Fire affected area, Plantations, Other layers

10. The remote sensing results need to be verified for accuracy on the ground. This can be achieved through GPS. This instrument will help the WPO to precisely locate the points on the ground and compare the remote sensing results on random basis. Differential Global Positioning System (DGPS) is useful for boundary survey and later on transferring the boundaries for updating the maps prepared using remote sensing data & GIS.

## **FOREST COVER AND CHANGE ANALYSIS**

11. Multi-dated satellite images may be used for Change Matrix Analysis. Change Matrix describes the change in forest cover for the division over the period of last plan or such other period of two or more assessments by showing the extent of areas changing from one class of land cover to another between the different periods.

## **FOREST INVENTORY AND VEGETATION MAPPING**

12. Information on growing stock & its growth is necessary for efficient planning and management of the Forests. The Forest Inventory provides this important input. Inventory includes mapping, sampling and analysis. The present inventory will make use of a combination of Geomatics and field inventory data for assessment of growing stock and condition of the forests. For the first time in the Country, inventory and mapping of the entire vegetation including herbs, shrubs and climbers along with Trees, has been brought in the ambit of the forest resource assessment. This will also include inventory of the Non-Timber Forest Produce trees & medicinal plants which will ultimately help us to prepare the livelihood plans for the local communities in a more effective manner through sustainable management of the forests.

## **GRID BASED SAMPLING DESIGN**

13. The existing survey and assessment of natural resources for the working plan is carried out on the basis of random sampling having the aim of collecting information mostly on forest timber production and very limited information on forest biodiversity. In the present changing scenario of natural resource management at the global level, with regard to biodiversity, climate change and carbon emission/sequestration it is necessary to have monitoring and assessment of forest resources on the basis of grid based systematic sampling, where in the distribution of the sample plots within the surveyed population is homogeneous. The purpose is to provide new qualitative and quantitative information at divisional level which may be integrated and up scaled to state and national level. Further, standardization and processing of the data at the national level may be taken by FSI or any other agency as designated by MoEF. The assessment covers a wide range of parameters which will provide a holistic view of land use and its impact for the country as a whole. This information can be used to plan, design and implement national and international policies and strategies for sustainable use and conservation of natural ecosystems.

14. Grid based systematic sampling design offers best opportunity to revisit the area for change detection and its attribution to climate change. Grid based Data can be used even for Species Distribution Models and offer opportunity to validate dynamic vegetation models. Some of suitable sampling plots can be used for growth and carbon sequestration studies.

## **GROWTH DATA AND CARBON SEQUESTRATION**

15. A network of grid based permanent sample plots should be identified and established in different strata of the forests to provide necessary growth data. These permanent sample plots are necessary to assess the role of forests as source or sink for green house gases on long term basis and to study carbon sequestration and storage in above ground biomass, below-ground biomass, deadwood, litter, soil and harvested wood products for different forest types of India with an emphasis on different management regimes



## LINKAGE WITH NATIONAL FOREST INVENTORY

16. There shall be backward and forward linkage between forest inventory under Forest Resource Assessment for working plan and National Forest Inventory. National Forest Inventory is carried out by FSI in 60 randomly selected districts (distributed all over the physiographic zones in proportion to their size) spread over the entire country in a cycle of two years. For forest inventory in selected districts plots are systematically laid out in forest area. Survey of India (SOI) toposheets of 1:50,000 scale (size 15' X 15' i.e. 15 minutes latitude and 15 minute longitude) is divided into 36 grids of 2 ½' × 2 ½' which is further divided into sub-grids of 1 ¼' × 1 ¼' forming basic sampling frame. Two of these sub-grids are then randomly selected to lay out the sample plots. Other forested sub-grids in the districts are selected systematically taking first two sub-grids as random start. A sample plot of 0-1 ha area is laid out on ground to record the measurements. To carryout Forest Resource Assessment for Working Plan, each of these 1 ¼' × 1 ¼' grids are further sub-divided into 9 sub-grids for forming the basic sampling frame of 25" × 25" and a sample plot of 0.1 ha is laid at the centres of these sub-grids following the same methodology as provided for National Forest Inventory so as to make use of information collected during field inventory in the past for biodiversity change matrix analysis. Out of 36 sample plots laid at the centres of sub-grids 25" × 25" within the grid of 2½'×2½' laid for Forest Resource Assessment of working plan, two sample plots are common to the national forest inventory.

17. For forward linkage to national forest inventory, forest resource data based on systematic sampling can be standardized following the procedure(including the coding) provided in the manual for national forest inventory since same methodology for collection of data has been provided in this code. The provision of staggering working plan preparation can even take care of physiographic stratification adopted for national inventory. A robust and dynamic national carbon MRV (measuring, reporting and verification of carbon stocks) based on forest resource assessment of working plan can also be realised for REDD+ provided sufficient resources are made available to the states for estimating carbon from different pools of forests.

## JOINT FOREST MANAGEMENT

18. Joint Forest Management is sharing of responsibilities, authority, and usufructs between the Village Community or the Forest User Group and the Forest Department on the basis of an agreement between the two. The management of the jointly managed forest is done through the provision of a micro-plan prepared as per (**Annexure-I**) by the Community on PRA basis and with the technical help of the officials of the Forest Department. Since the micro-plan is prepared with the technical guidance of Foresters, there are little chances of any conflict between the working plan and micro-plan prescriptions. One thing which has to be ensured is that the micro-plan prescriptions do not violate the silvicultural prescriptions of the working plan especially those related to sustainable management of forests and regulation of yield of major forest products. Approval of JFM micro-plan from Ministry of Environment & Forests is not necessary as they are covered by the macro level prescriptions of working plan of the forest division. Any deviation from the macro level prescriptions will require prior approval of the Regional CCF (MoEF).

## **COMMUNITY FOREST MANAGEMENT**

19. Forest community rights related to community forest resources, minor forest produce, grazing grounds, water bodies etc recognized under the provision of the Forest Rights Act 2005 can be exercised within the frame of sustainable use. Therefore proper guidelines for sustainable use of community forests; extraction, processing, market and trade of minor forest produce, etc. may be provided under a separate working circle. Details of existing rights are to be provided so as to assess their sustainability, reasoning for their continuity and enhancement of productivity.

## **FRINGE FOREST MANAGEMENT**

20. In general the forest fringe area is conspicuously different from the inner forest due to close contact with local communities. Although the dependence of forest fringe villages and their interaction with forest is almost same, but the kind of interaction and its severity may vary from one type of forest fringe to another. The communities living in the forest fringe depend heavily on the forest for their fuelwood and fodder needs. In rural household, fuel wood is used for cooking as well as for water and household heating particularly in the hilly regions. The villagers' dependence is more because the commercial sources of energy is beyond the reach of the common man due to varied of reasons. Non-Wood forest products, (referred to in the system of national income accounts as minor forest products) are sources of livelihood and food security for a large number of rural communities living in and around forests. NWFPs are important to rural households in terms of their contribution to health, food, energy, and other aspects of rural welfare. Although forests are repository of the biodiversity but this bio-diversity is very sensitive to interventions and interferences. Since the communities residing in the forest fringe areas visit forest frequently for several purposes, they have a strong influence on the bio-diversity status of forest fringe areas. The forests are also source of major water resources both surface, sub-surface and ground water in the country due to beneficial hydrological functions of forests including interception of rainfall and regulating the stream flows, soil erosion and conserving the soil moisture. Forests supply organic matter and nutrients to agriculture ecosystems. Therefore special provisions may be made in the working plan to sustain food security and livelihood issues of the people in fringe forest areas based on socio-economic survey and assessment for sustainable management of forests.

## **TREES OUTSIDE FOREST (TOF)**

21. Trees Outside Forests (TOF) are located on land other than forests, including agricultural land (e.g. agro-forestry systems, hedgerows, woodlots), built-up areas such as settlements and infrastructure (e.g. street trees, parks and other urban tree systems), and bare land (e.g. dunes, former mining areas). They contribute nearly one fourth of the total stock of the country and provide for revitalization of rural economy. So there is a need to describe and comprehend the dynamics of trees and shrubs on rural and urban land, and their interaction with forest dynamics. This will lead to a better understanding of off-forest tree management and towards integrated and sustainable management of natural resources on forest, farm, pastoral and urban land. Based on plot description and enumeration for areas outside forests, assessment will be done with respect to present scenario and their potential for sustainable land use management within the forest division. This requires

intersectoral synergy and convergence. WPO may therefore prepare a separate strategy as New Chapter, not being part of general prescription of Working Plan.

## Chapter III

### ORGANIZATIONAL STRUCTURE

22. At the National level, the organization includes Director General of Forests & Special Secretary to the Government of India, Additional Director General of Forests, Inspector General of Forests, Deputy Inspector General of Forests, and Assistant Inspector General of Forests in the Ministry of Environment & Forests, New Delhi; and it is supported by Regional Offices headed by Additional Principal Chief Conservator of Forests/ Chief Conservator of Forests. There should be adequate number of chief conservator/conservator of forests for every state in the Regional Offices so that there is efficient monitoring of the whole process of working plan preparation and adherence to the prescriptions of working plan in all workings of forests.

23. In the States, there is no uniformity in the constitution of the working Plan organization. At present Working Plan Unit at the field level is generally headed by a Working Plan Officer (WPO) of the rank of Conservator of Forests. For smaller states, deviation may be approved by DG(Forests) & Special Secretary, MoEF. There are various levels of supervision and direction of which Principal Chief Conservator of Forests, Additional Principal Chief Conservator of Forests and Chief Conservator of Forests are the key functionaries. Overall situation is as under:

**Head** (Policy level) - PCCF/APCCF

**Field Supervisory unit** – APCCF/ CCF (Working Plan)

**Field Functional unit** – Working Plan Officer is assisted by minimum of two Asst. Conservator of Forests (ACF), four Range Forest Officers (RFO), twelve Foresters and one subject matter expert in each of the specialized fields such as Remote sensing and GIS, Biodiversity assessment, socio-economic analysis, statistics, taxonomy, ecological dynamics, soil science etc.

24. Considering the important nature and specialization of the work, PCCF should ensure that the adequate core staff of the Working Plan Unit are created and provided. In case adequate regular staff is not provided, the WPO should be empowered to engage, subject matter specialists for field work and ministerial staff for maintenance of record and budget on contract basis.

25. Generally working plan is to be revised every 10 years and for the preparation of the working plan of a territorial division, normally two years time is required, which may vary depending upon the volume of work and technical facilities available. The number of working plan units in the state depends upon the workload, i.e., number of territorial divisions for which working plans are to be prepared/ revised for the cycle of 10 years. Generally, one working plan unit may undertake the work of preparation of working plan for four or five forest divisions in a cycle of 10 years, whereas supervision of working plan preparation may be limited to 4-5 working plan units per field supervisory unit to be headed by one APCCF/CCF (WP).

26. The working plan/working scheme of forests other than those under the control of Forest Department such as municipal, cantonment, private, village, etc. may be prepared by Working Plan Officer on the request of the owner themselves or through outside consultants preferably qualified foresters.

## **IDENTIFICATION OF AREA**

27. It is the responsibility of the PCCF (Head of Forest Force, HoFF) to ensure proper planning for the preparation of working plan for all Forest Divisions so that the process of working plan preparation for the entire state gets staggered over the period of 10 years and the revision of working plans does not get accumulated. As a mid-course correction, plan period of few working plans may be extended or reduced for the purpose of staggering working plan preparation in the state. However PCCF (HoFF) should also ensure that all forest workings are done as per approved working plan prescriptions.

## **TENURE OF WPO AND OTHER SUPPORTING STAFF**

28. The officers and the critical staff of working plan unit should not be transferred during the preparation of working plan.

## **HEADQUARTER**

29. Headquarter of territorial circle may be the head quarter of working plan unit. It facilitates proper coordination and smooth flow of information/records.

## **STATUS AND ALLOWANCES**

30. For all practical purposes, the Working Plan Unit is treated as a functional charge, and the WPO has the status and power, unless otherwise stated in any particular respect, of a Conservator of Forests. A WPO and other supporting officer/ staff of the Working Plan unit should be entitled to special pay equivalent to the best option of such allowance permissible under the relevant rules (e.g. 30% of the basic pay as admissible to training faculty of training institutes like IGNFA, WII).

## **BUDGET AND ACCOUNTS**

31. This is regulated by the rules and regulations of the Central/State/UT Government. It is ensured that adequate budget provision is made in time. The proposed estimate is prepared by the APCCF/ CCF (Working Plan) a year before the working plan revision is due to commence and copies sent to the PCCF and the concern Territorial Circle. The WPO or his subordinate is delegated the power of drawing and disbursing officer. The Office management and maintenance of records, reporting of progress of work, and expenditure are according to the procedures laid down by the Central/State/UT Government concerned.

## **CO-OPERATION OF TERRITORIAL STAFF AND ASSISTANCE FROM SPECIALISED INSTITUTIONS**

32. It shall be mandatory for the in-charge of territorial division and as well as circle to extend full cooperation and assistance to the WPO for fieldwork and provide logistical support, access to official records and other information so that the WPO can prepare good quality working plan expeditiously.

33. The WPO may take assistance from specialized institutions like ICFRE Institutes, FSI, WII, IIFM, Universities etc. for preparation of working plans as and when required.

### **OFFICE AND RESIDENCES**

34. Every State and UT Government should provide necessary office and residential accommodation to all officials of Working Plan Organization both at head quarter and field levels as per rules and norms in force applicable to their rank and status.

### **EQUIPMENT AND FURNITURE**

35. The working plan unit should be equipped with necessary equipment and furniture as per requirement including tents, boxes, folding chairs and tables, cots, wedge prism, diameter tapes, axes, prismatic compass, Abney's level, planimeter, acre square, drawing board, drawing instruments, GPS, computers and its accessories along with necessary software e.g. GIS software etc.

### **TRANSPORTATION AND COMMUNICATION**

36. The WPO should be allowed the same scale of transport and communication facilities as per his rank. However ACF, RFO and their staff should also be adequately provided with field vehicle, if necessary hired, for carrying out forest inventory and ground-truthing etc. as per requirement in the field without regard to their rank and entitlement.

### **STATIONERY AND BOOKS**

37. Adequate stock of stationary and forms is provided to the WPO. The procedure (type, quantity, and rules for procurement and record keeping) is laid down by the respective State Governments. Following books are generally required by the WPO:

Forest Manual of the State, Financial Hand Books, Practical Forest Management, Forest Pocket Book, Forest Policy of the State and the Centre, Forest Laws, JFM Guidelines of the Centre and the State, Eco-development Guidelines, Working Plan Code, working plan under revision and older working plans, State Forestry Action Plan, FSI reports on forest cover, annual forest statistics of the State, technical books and forestry journal etc. A permanent library along with internet connection and other communication facilities; and digital store house of all relevant working plans and maps along with necessary database should also be established and maintained.

## CHAPTER IV

### NECESSARY INPUTS TO WPO

#### MAPS AND REMOTE SENSING SATELLITE IMAGERY

38. When the WPO joins the division, Territorial DFO traditionally supplies him two sets of 1:25,000 and six sets (two cut and mounted and rest four uncut and un-mounted) of 1:50,000 scale maps. The use of these maps is done in following manner:

The WPO uses two cut and mounted sets of 1:50,000 scale maps in office and field.

He sends one set each of stock maps on 1:50,000 scale to the CCF Working Plan and the DFO.

He sends one set each of management maps on 1:50,000 scale to the CCF Working Plan and the DFO.

He sends one set each of working plan maps on 1:25,000 scale to the CCF working plan and the DFO.

Additional copies of management and working plan maps may be made by the DFO as per the requirement.

39. The use of modern technologies and tools which includes satellite remote sensing, geographic information systems (GIS) and global positioning system (GPS) have become inevitable in preparation of working plans of forest divisions. The digitized toposheet of 1:50,000 scale having boundaries of forest area including range, beat, sub-beat, village, block, compartment and sub-compartment for the forest division should, therefore, be provided to WPO *along with Geomatic Support System (hardware – workstation, DGPS/GPS; software - Digital Image Processing (DIP), Geographic Information System (GIS) etc.)*. Multi-dated forest cover and forest type maps (FSI) in digital and hard copy form on 1: 50,000 scales will be useful for change matrix analysis. IRS P6 RS2 LISS IV image (having 5.8m resolution) or equivalent satellite imagery of recent version, in digital form for the whole division may be procured or provided by FSI on behalf of central government. This will help in maintaining a record of synoptic coverage (of satellite image) of entire forest area under the division on a fairly large scale and also be useful in working plan preparations in several ways.

#### COMPARTMENT HISTORIES, CONTROL FORMS AND DEVIATION STATEMENTS

40. The WPO is supplied with up-to-date Compartment / village/ management unit histories, deviation form, control forms and any other base line data required for working plan along with the list of JFM areas and work done by the territorial DFO.

#### PRELIMINARY WORKING PLAN REPORT (PWPR)

41. PWPR is of considerable importance as it forms the basis of the WPO's intensive fieldwork. Therefore, the WPOs should be provided with PWPR with necessary details of the working plan area, review of management practices adopted during the working plan period including the extent of harvesting, proposed maps to be prepared or revised, information to be collected and sources of information, list and type of field work to be done, and time schedule for various works to be done by the WPO.

42. Specific comments are made on Part I of the working plan regarding such sections which are required to be updated. Necessary information and database must be made available to WPO in this regard. The PWPR also indicates the work that the WPO has to do during first year's field work; makes clear what information he has to collect and what information is already available, what maps he has to prepare and what maps are available to him, the kind of vegetation and other survey he has to undertake and the kind of studies already done for the area, the type and intensity of enumerations he has to do in each working Circle, and so on.

43. Part II requires detailed comments and close analysis of the results of the past management for each Working Circle separately. Success or failure and reasons, if known, are taken note of; the impact of the past working plan and the extent of harvesting are reviewed. While writing Chapter on "Past Systems of Management" critical analysis should be done about deviations /failures in fully achieving the past prescriptions. As far as possible, attempt should be made to quantify the achievements of past prescriptions.

44. Preliminary Working Plan Report shall aim at ensuring sustainable management of forests through existing or suitable innovative silvicultural systems for maintaining and enhancing supply of Medicinal and Aromatic Plants (MAPs), NWFPs, along with other forests goods and ecosystem services for the benefits of local people.

#### **PREPARATION OF PWPR**

45. During the following working season, i.e., in the working season immediately preceding that, in which the working plan revision is due to commence (at least three years before the expiry of current working plan period), the concerned DFO territorial shall be directed by Head of the Territorial Forest Circle to initiate preparation of the preliminary working plan notes. These notes briefly review the results of management during the past years, and point out whether the general system of management is satisfactory or not, and suggest any necessary change for improvement. He must complete the notes within two months time and submit the note to Head of the Territorial Forest Circle. Territorial Circle In-Charge inspects the forests concerned, and writes the Preliminary Working Plan Report (PWPR) during or soon after his tour within two months time and submits the draft to concerned CCF/APCCF/PCCF for consideration of the Standing consultative committee. A check list of necessary information and inputs to be provided to WPO should be annexed along with PWPR for the scrutiny of and guidance from the committee.

#### **CONSULTATIONS WITH LOCAL STAKE HOLDERS**

46. The Territorial Circle in-Charge during his PWPR preparation will hold consultation with indigenous people forum, **JFM committees, Village Panchayats and Forest Development Agency** about the expectations of forest dependent people and try to accommodate the same as far as possible to the extent that they are compatible with the technical feasibility of sustainable management of forests.



## **CHAPTER V**

### **STANDING CONSULTATIVE COMMITTEE AND PREPARATION OF WORKING PLANS**

#### **STANDING CONSULTATIVE COMMITTEE**

47. There shall be a Standing Consultative Committee of the state under the chairmanship of PCCF (HoFF) having the representation of experts from the state (including Chief Wildlife Warden), FSI, ICFRE institutes and Regional CCF/APCCF of MoEF for preparation of working plans in the state.

#### **FINALIZATION OF PWPR**

48. The draft PWPR is deliberated upon in the Standing Consultative Committee meeting chaired by the PCCF (HoFF), which then finalizes the report with changes as deemed necessary.

49. The approval of Preliminary Working Plan Report by PCCF (HoFF) should be granted at least two and half years prior to the expiry of the current working plan, so that the preparation of working plan by the Working plan officer, approval by the designated authority and delivery of approved working plan to the DFO concerned for implementation can be completed prior to expiry of the current plan.

#### **DRAFT WORKING PLAN**

50. It is advisable for the WPO to submit first draft of his plan within one and a half year (one year for data collection and six months for writing) as per the approved PWPR and time frame. By this time the WPO has completed collection of forest resource inventory data, growth and yield statistics, and completed stock mapping. Part I of the working plan provides the information generated from various sources including Forest Inventory and Assessment. The Chapter on "Past Systems of Management" and on "Statistics of growth and yield" should be written as comprehensively as possible and should be completed soon after the data has been compiled and analyzed. Part II will be written chapter by chapter, and using more or less standardized paragraph headings in their proper order. The write up of Part II shall be based on information provided in Part I.

51. The draft working plan is completely self-contained so that it is not necessary to refer to any other document to understand it. This should be accompanied by a short explanatory note stressing upon any point of importance and drawing the attention of the CCF/APCCF (Working Plan) to any deviation from the PWPR or subsequent instructions. The complete plan along with required maps is first vetted by the CCF Working Plan. He then sends sufficient copies to the PCCF for circulating amongst the members of standing consultative committee especially the RCCF (MoEF). The members especially RCCF (MoEF) should get the copies for examinations and comments at least 45 days prior to the final meeting of the Standing Consultative Committee. This should be deliberated in the meeting and commonly acceptable suggestions/alterations/modifications may be incorporated in the final draft working plan for submission to RCCF (MoEF). In case of any serious and irreconcilable difference of opinion between the State Forest Department and

RCCF (MoEF), the matter may be referred by the PCCF (HoFF) to DGF&SS (MoEF) for final decision in the matter.

### **SUBMISSION OF THE PLAN**

52. Draft WP as deliberated in the Standing Consultative Committee and as revised after incorporating the suggestions of the committee, is sent to the Regional CCF (MoEF) by the PCCF (HoFF) through the State Govt for approval under intimation to MoEF.

### **SANCTION OF THE PLAN**

53. After examining the plan, RCCF (MOEF) accords the approval on behalf of the Government of India as such or with necessary suggestions, directions and modifications within 3 months.

### **PRINTING OF THE PLAN**

54. Sufficient copies of the plan as approved by the Government of India may be printed and soft copies (SC) uploaded on the website. The minimum requirement will be as under:

- Regional Offices, MoEF, GOI-1 copy
- All offices of Forest Department, Home State-1 copy each
- Territorial Circle concerned – 3 copies
- Territorial DFO concerned – 20 copies (office, ACFs, FROs,BOs etc)
- State Forest Library and training centres-10 copies each
- ICFRE Institutes and centres-1 copy each
- National Forestry Library and Information centre, FRI-2 copies
- Wildlife Institute of India,Dehradun-1 copy
- Forest Survey of India, Dehradun and its centre-1 copy each

### **AMENDMENTS**

55. Any amendment in a plan involving points of technical importance or leading to deviations from the prescriptions, which is proposed by a Territorial Conservator, should be sent with the necessary draft amendment through the CCF, working plan and the PCCF to the Regional CCF, government of India through state govt, for approval. Similarly, amendments proposed by the CCF, Working Plan should be sent to the Regional CCF through the PCCF and state govt. When the Regional CCF has approved an amendment, the CCF, Working Plan arranges for sufficient copies of it to be printed and issued to all persons who have copies of the working plan. Amendments are serially numbered; the number and date of sanctioning letter is also given.

56. The territorial DFO should update the digitized maps and data at the time of preparation of annual report indicating fire damage, encroachment and landslide, plantation raised with latitude and longitude etc and submit the same to PCCF through territorial CF with a copy to CCF, working plan.

## MONITORING BY CENTRAL GOVERNMENT

57. The National Working Plan Code has to be followed by each State Government and Union Territory for all categories of forests as defined by the Supreme Court in its judgement dated 12.12.1996.

58. The Regional CCF of Ministry of Environment and Forests will especially monitor following points:

- 58.1 Process of working plan preparation for the entire state is staggered over the period of 10 years and the revision of working plan does not get accumulated;
- 58.2 Preparation of the *working plan* is according to prescribed procedure, i.e., Consultations, Field visit, PWPR, Writing of *working plan*, Preparation/updating of maps, Writing/Editing of Compartment Histories, and Prescribing of Control Forms;
- 58.3 The *working plan* prescriptions are being followed and the system of annual updating of Compartment Histories and Control Forms is in place;
- 58.4 Harvesting is not exceeding the natural regeneration. This can be monitored through field visits, reports, and money provided in the budget for plantations and silvicultural operations.

59. There will be flexibility in following matters and the State Government can also take decision at its level

- a) Organizational matters
- b) Administrative matters
- c) Intensity of sampling
- d) Carbon Pool Stock Estimation
- e) Soil survey and assessment
- f) Plot Approach Form
- g) Plot Description Form
- h) Plot Enumeration Form
- i) Formats of Compartment Histories
- j) Formats of control forms
- k) Additional chapters/ information in the *working plan* (Deletions are not allowed)
- l) Matters related to prescriptions under NWFP (inclusive of medicinal and aromatic plants) and Bamboos/rattans Working Circles
- m) Trees Outside Forests
- n) Scale of maps (they have to be SOI maps in any case) and Colour schemes of relevant maps
- o) Registers and records

60. In case of any ambiguity the matter may be referred to the DG Forest & SS to the Government of India, whose decision will be final.

## CHAPTER VI

### SURVEY AND ASSESSMENT OF NATURAL RESOURCES

#### EXAMINATION OF TERRITORIAL UNITS

61. The first duty of the WPO in the field is to inspect and examine his forest area (including range, beat, sub-beat), village, block, compartment and sub-compartment and see that they are demarcated on the ground by GPS and using digitised version of map of scale 1:50000 for the purpose of new plan. For further demarcating forest boundaries, use of differential GPS may be done. Latitude and longitude of the boundary pillars may also be taken with the differential GPS with sub-meter accuracy. Changes in the boundary of blocks and compartment are not made by the WPO as the rights and concessions of villagers are associated with these. However, changes in the boundaries of the sub-compartments may be made for management purpose, with the consent of CCF working plan.

#### FOREST RESOURCE ASSESSMENT

62. Assessment of natural resources is an essential and integral component of *working plan* exercise. On the basis of this assessment, past performance is evaluated and future management finalized. In forest crops one has to identify multi-dimensional populations with various parameters and attributes. Forest data to be collected by WPO shall cover:

- **Growing stock Inventory** - It includes, Individual tree species stand or forest type; Form and composition of tree crop-according to age, quality, extent, etc. and its distribution; Statistics of growth and yield through stump and stem analysis as well as from other available records; Biomass carbon stocks; Status of plantations etc.
- **Vegetation survey** - It includes enumeration of species composition such as dominant and co-dominant tree species, bamboos, rattans, shrubs, herbs, climbers, lichens, algae, fungi, epiphytes and parasites for their density, frequency, dominance and abundance values. This survey is necessary for study of phyto-sociological interactions, status of regeneration, geographic distribution and environmental relationships of plant communities, assessment of medicinal and aromatic plants; and other NWFP species (excluding bamboo and rattans.)
- Assessment of flagship faunal species and their special habitats.
- Survey of forest soils and assessing soil organic carbon stock.
- Socio-economic survey to assess the dependence on forests for livelihood needs

#### LAYING OUT GRIDS ON THE TOPOSHEET AND SAMPLE UNIT

63. For forest resource assessment of working plan, the sample plots are systematically laid out in the forest area which is indicated on the Survey of India toposheet on the scale of at least 1:50,000. The grids are laid out by dividing the toposheets of 1:50,000 scale (size 15' X 15' i.e. 15 minute latitude and 15 minute

longitude) falling within the division/district boundary into 144 grids of  $1\frac{1}{4}' \times 1\frac{1}{4}'$ . To carryout Forest Resource Assessment for Working Plan, each of these  $1\frac{1}{4}' \times 1\frac{1}{4}'$  grids are further sub-divided into 9 sub-grids for forming the basic sampling frame of  $25'' \times 25''$  (sub-grid of twenty five seconds latitude and twenty five seconds longitude representing approximately 60 ha on the ground). All the sub-grids of  $25'' \times 25''$  are to be surveyed. The intersection of diagonals of sub grid is marked as centre of sub-grid on the map. The latitude and longitudes of the intersection of diagonals of sub grid will be identified as the centre of the sub-grid. These latitude and longitudes will be used for reaching the centre of the sub-grid by using GPS. The grids of  $1\frac{1}{4}' \times 1\frac{1}{4}'$  and sub-grids of  $25'' \times 25''$  are conveniently serial numbered by WPO. A sample unit with a radius of 80 m covering an area of 2 hectare is taken at the centre of the sub-grid without actually laying out the plot.

64. IRS P6 RS2 LISS IV image (having 5.8m resolution) or equivalent satellite imagery of recent version in digital form for the whole division may be used to determine the possible accessibility and location of sample unit and its land use. The land use may be classified into closed forest, dense forest, open forest, scrub, bamboo brakes, shifting cultivation, young plantations of forest species, tree in line (Avenue plantation), forest roads, grass lands, barren lands, agricultural land without trees in surround, agricultural land with trees in surround, non forestry plantations, habitation, water bodies etc. as per the description given in *Manual for National Forest Inventory of India (FSI, 2010)*

#### **DESCRIPTIVE WORK WHILE REACHING THE SAMPLE UNIT AND SAMPLE PLOTS**

65. After deciding the grid and sub-grid numbers to be surveyed, the team leader i.e. forester in charge should find a nearest convenient route so that they reach the sample unit i.e. centre of the subgrid from minimum traverse by vehicle or foot. After reaching at a nearby location of the plot, the next job would be to search a reference point, which can be identified on the map as well as can be located on the ground. The sub-grid centre is reached after covering desired distance and bearing from the reference point. The reference point selected on a map should not be a temporary structure. The possible reference points may be Village tri-junction points, Bridges and culverts, Temples, mosques and churches; Crossing of rail, road, rivers, streams; Ponds and wells; Mile stones or kilometre stone or prominent trees etc. The location of reference points and its correct description recorded in the form is very important to re-visit the sample unit in future.

#### **STOCK MAPPING**

66. While approaching the sample unit, stock assessment and mapping (earmarking the stocked area on the map) should be done ocularly traversing the forests (compartment/village /any other management unit); so as to cover the entire area making observational assessment of site quality, tree species composition, its health (including injury to the tree crop), density and crop age, etc.; All locations where any of the parameters change should be described in PLOT APPROACH FORM (**Annexure II**) and depicted/delineated on the map. Presence of special features within the compartment/village/other management unit, namely grassy patches, scattered trees, plantations raised, etc., should also be described in PLOT APPROACH FORM (**Annexure II**) and depicted on the stock map. Regeneration status of main species should also be observed.

67. PLOT APPROACH FORM also contains general observational information on undergrowth – climbers, important herbs, shrubs, medicinal and aromatic plants (MAPs); bamboo and rattans; NWFP yielding species; intensity of invasive species; flagship faunal species and their traces, special wildlife habitats and their interface with humans, biotic factors, and any other thing or special treatment required should find a mention here. For accurate identification of herbs, shrubs, creepers, grasses, epiphytes, lichens, etc.; services of taxonomist/experts may be hired.

68. Drivers of forest degradation; forest resource utilization; dependence of local people on forest; and their social, cultural and spiritual aspects; may be explored. The notes prepared by the WPO and his team during the field visit are very important as they form the basis of the description of compartment/village/other management unit, which again form the basis of future management. Notes are taken under the headings mentioned in the PLOT APPROACH FORM (**Annexure II**).

69. An effort should be made by the WPO and his team to use GPS tract facility to make the above observational information, spatial, as far as possible, and develop fully functional GIS based maps as an integral part of working plan exercise, and train the staff to use the same in the collection of data and preparation of reports.

#### **LAYOUT OF SAMPLE PLOTS IN THE FIELD**

70. After reaching the sampling unit i.e. the centre of the sub-grid, a square plot of 0.1 ha (Central plot) will be laid out by measuring 22.36 m horizontal distance i.e. half of the diagonal in all the four directions at 45° in North-East, at 135° in South-East, at 225° in South-West, and at 315° in North-West corners of the plot from the true north. Check the dimensions of the plot, i.e. all sides should measure 31.62 m horizontal distance. Care should be taken for laying out the proper dimensions of the plot. Each sampling unit may contain 5 sample plots of 0.1 ha (31.62m X 31.62m) each for tree inventory. Four side plots (namely North Plot, East Plot, South Plot and West Plot) of 0.1 ha (31.62m X 31.62m) will be laid at a distance of 50m from the centre of the central plot to their centre in all the four directions i.e. north, east, south and west. Nested quadrates of size 3m × 3m and 1m × 1m will be laid out at a distance of 30 metres from the centre of the central plot in all four directions along diagonals in non-hilly area and along trails in hilly areas for the enumeration of shrubs (including regeneration status) and herbs respectively. The provision of side plots in each sampling unit for enumeration of trees may be systematically reduced by the state government subject to local conditions and objectives of the management.

71. Three nested quadrates of size 5m × 5m, 3m × 3m and 1m × 1m may be laid at the centre of the central plot for the estimation of carbon stock on the availability of own resources or fund obtained from other agency. In 5m × 5m, all the dead wood above 5cm diameter would be collected, weighted and recorded. In 3m × 3m, all the woody litter, that is all branches below 5cm diameter, would be collected, weighted and recorded. All shrubs (including all the trees below 10cm dbh) and climbers in 3m × 3m plots would be up-rooted, weighted and recorded. For trees, allocation of carbon in root, stem, branch, twigs and leaves may be obtained separately. In 1m × 1m, all the herbs including leaf litter would be collected, weighted and recorded. Dry biomass would be converted into carbon stock. For collecting data on humus and soil carbon, forest floor of 1m × 1m plot would be

swept and materials thus collected, would be weighed and a portion of the same would be kept for the carbon analysis. After that, a pit of 30cm × 30cm × 30cm would be dug at the centre of the 1m × 1m plot and a composite sample of soil weighing 200gm would be kept for organic carbon analysis.

### **GENERAL PLOT VARIABLES TO BE RECORDED**

72. General information related to land use, physiographical features like altitude, aspect, slope, soil and water resources; crop composition, regeneration status, injury to the crop, fire incidence, grazing incidence, presence of weeds, presences of grasses, occurrence of bamboo, plantation status, distance from water course, drivers of degradation, etc. should be recorded for every sampling unit of 2 (two) hectare area in the PLOT DESCRIPTION FORM (**Annexure III**). This information along with the general observations made in PLOT APPROACH FORM (**Annexure II**) will be used for writing the compartment description. General definition and description of terms not specifically mentioned here may be taken from the manual for national forest inventory of India (FSI, 2010).

### **PLOT ENUMERATION**

73. For the Sample Plot, which cannot be laid out due to steep slopes or other conditions, may be left out of enumeration and its inaccessibility conditions need to be mentioned in Plot Enumeration Form (**Annexure IV**). All trees having diameter 10 cm and above will be enumerated, species and diameter class wise, from all the identified sample plots of 0.1 ha and recorded in the PLOT ENUMERATION FORM (**Annexure IV**). Trees, the stems of which touch the north and west border lines of the plot (called border line trees) will be enumerated. However, trees, the stems of which touch the east and south border lines of the plot will be treated as "out trees" and will not be enumerated. In and out bamboo would be similarly decided and treated. Trees below 10 cm diameter at breast height over bark will not to be enumerated. Enumeration of trees/bamboo will start from the NE corner of the plot and will proceed in clockwise direction. The same procedure should be followed for all the sample plots. For bamboo, average diameter of the clump will be measured and number of green culms of different age class (up to 1 year, 1-2 years and above 2 years) and dry & damaged culms in the given clump will be recorded. Also the height of the trees, at least from the central plot should be measured and recorded for ascertaining the site quality.

74. The data of shrubs, climbers and regeneration status from all 4 quadrates of 3m X 3m laid at the centre of the plots is to be collected and recorded in the PLOT ENUMERATION FORM. The data of herbs from all nested quadrates of 1m X 1m laid within each quadrate of 3m X 3m at the centre is to be collected and recorded in the PLOT ENUMERATION FORM.

### **GROWING STOCK ESTIMATION**

75. From the enumeration/field data, species wise distribution of trees in each diameter class will be generated for compartment/village/any other management unit. Ratio method of estimation will be used for estimating the growing stock of important trees species using local volume table developed by FRI/FSI or under previous plan. Adding the growing stock of all compartment, the growing stock of

the block will be estimated, which will be again integrated up to range level and further at divisional level. Stratification developed by FSI based on forest type, density, land use using GIS can be used for increasing the precision of the estimates. Any gap in research results with respect to estimation of growing stock must be brought out clearly.

## CARBON STOCK ESTIMATION

76. The total carbon stocked in the forest is divided into different pools and the changes in carbon stocks in these carbon pools are estimated as per Good Practices Guidance (GPC) developed by Inter-governmental Panel on Climate Change (IPCC). Changes in Carbon stock based on inventory data may be measured using Stock-Difference method based on tier 2 and tier 3 approach of IPCC guideline. Gaps in the information collected from state and national research organizations and further research needs should be explicitly highlighted.

## BIODIVERSITY ASSESSMENT

77. The data collected during enumeration such as, the number of individuals of each species and the dbh of each tree, are utilized to derive secondary attributes like basal area (BA, m<sup>2</sup>/ha), density (D, trees per ha) and frequency (F, number of quadrats where trees occur). Relative values will be calculated. The Importance Value Index (IVI) is calculated by adding up relative frequency (RF), relative density (RD) and relative dominance (RBA). However, in the case of shrubs, herbs, saplings and for regeneration, the IVI is calculated based only on relative values, i.e., relative frequency and relative density. It is assumed that the dominance of a species increases with an increasing importance value, and that the species with lowest importance value is the least dominant one. The maximum IVI value is 300. Basal area and density of the tree species should be converted to a hectare basis. To estimate the regeneration structure, all tree species should be grouped under different dbh classes. The total number of individuals belonging to each dbh class should be calculated for each species for each site.

$$D_s = \frac{\text{total number of individuals of species } s}{\text{total area of quadrats studied}}$$

$$F_s (\%) = \frac{\text{number of quadrats in which species } s \text{ occurs}}{\text{total number of quadrats studied}} \times 100$$

$$RD_s = \frac{\text{Density } (D_s) \text{ of species } s}{\text{Total density of all species}} \times 100$$

$$RF_s = \frac{\text{Frequency } (F_s) \text{ of species } s}{\text{Sum of frequencies of all species}} \times 100$$

$$RBA_s = \frac{\text{total basal area of species } s}{\text{total basal area of all species}} \times 100$$

$$IVI_s = RD_s + RF_s + RBA_s$$

78. Species diversity is an expression of community structure and is a characteristic unique to the community level of organization. The number of species in a community is referred to as species richness. The relative abundance of rare and common species is called evenness. Species diversity includes both species richness and evenness. A community demonstrates a high species diversity if many equally



or nearly equally abundant species are present. Communities with a large number of species that are evenly distributed are the most diverse and communities with few species that are dominated by one species are the least diverse. If a community is composed of only a few species, or if only a few species are abundant, then the species diversity is low. Species diversity indices like Shannon-Wiener Index ( $H'$ ) and Simpson's Index ( $\lambda$ ) are calculated as:

Shannon-Wiener Index of species s: 
$$H'_s = -\sum_{s=1}^S p_s \cdot \ln(p_s)$$

Simpson's index for species s: 
$$\lambda_s = \sum_{s=1}^S p_s^2$$

where,  $p_s$  is the number of individuals of species  $s$  ( $n_s$ ) divided by the total number of individuals ( $N$ ) observed ( $n_s/N$ ) and  $S$  is total number of species. The Shannon–Wiener index combines the number of species within a site with the relative abundance of each species. The number of species (species richness) in the community and their evenness in abundance (or equitability) are the two parameters that define  $H'$ . This index is a measure of the average degree of uncertainty in predicting to what species individuals chosen at random from a collection of 'S' species and 'N' individual will belong. When all species in the dataset of interest are equally common, all  $p_s$  values equal  $1/S$ , and the Shannon index takes the value  $\ln(S)$ . The more unequal the abundances of the individual species, the greater is the weighted geometric mean of the  $p_s$  values, and the smaller is the corresponding Shannon entropy. If all abundance is concentrated to one type, and the other types are very rare in relative terms (even if there are many of them in absolute terms), the Shannon entropy approaches zero. When there is only one species in the dataset, the Shannon entropy equals zero exactly.

Similarity index (community coefficient) is calculated for determining the number of species which are shared among the sites to assess the extent of variation in the species composition. This is known as the  $\beta$ -diversity (Jaccard, 1908) or index of biotic similarity (Sorenson, 1948).

$$C_j = \frac{J}{a + b - J}$$

where  $J$  is the number of species common to both sites, 'a' is the number of species in site A and 'b' is the number of species in site B. A value of  $C_j$  closer to 1 indicates greater dissimilarity or greater beta diversity and a value closer to 0 indicates greater similarity of species.

## **PLANTATION SURVEY AND ASSESSMENT**

79. Valuable forest resource has been created throughout the country under various schemes of afforestation, social forestry, externally aided projects, etc. An up-to-date and reliable knowledge of these man-made forest plantations is necessary in respect of species planted, crop harvested and corrective measures taken as

required for the plantation. The assessment of growing stock of old plantations, which attains a minimum size of 10 cm DBH can be done based on plot enumeration data for such plantation areas for sustainable management of plantations and their contributions in enhancing timber production and carbon sequestration. But there is a need for assessing the status of young plantations having less than 10 cm DBH for maintenance of biodiversity; soil and moisture conservation and other socio-cultural benefits which should be assessed and recorded. Plantation Journals offer the best options for assessing such young plantations. Plantation Journal should have provision for suitable sampling strategy for the survey. Results of such survey are to be recorded in the Plantation Journals which are made available to WPO for assessment of young plantation.

### **SOIL SURVEY AND ASSESSMENT**

80. The proper examination of soil profile leads to understanding the genesis of soil. The analysis of soil reveals the fertility of soil, constraints if any, the required soil management strategies and the suitability of species. The soil properties along with site features like slope, aspect, erosion, climate etc. brings out information about the land capability class, land suitability, land irritability etc. However, the detailed soil survey is not required during the revision of working plan. WPO may take help from the secondary sources for the assessment of the forest soil. For survey, soil samples may be collected from different horizons between soil surface and 2m depth. The soil samples may also be collected from pre-determined depths like 0-15cm, 16-30cm, 30-60cm, 60-100cm etc. The sampling may be carried out by excavating a soil profile or by auger method. The soil samples are collected, labelled and carried to laboratory for the analysis of Physical properties (such as Texture, Bulk density, Moisture, Water holding capacity, Field capacity, Depth and Colour) and Chemical properties (such as pH, organic matter and nutrients. The nutrients mainly include nitrogen, phosphorus, potassium, calcium, magnesium). In case of soils suffering from salinity/ sodicity, the estimation of attributes like Exchangeable sodium percentage, Sodium absorption ratio and electrical conductivity may also be needed.

### **SOCIO-ECONOMIC SURVEY AND ASSESSMENT**

81. It is necessary to assess the dependence of villagers on the forests for their livelihood needs. It is also important in the context of preparation of micro-plans for Joint Forest Management and forest fringe management. Information on socio-economic status of the people living in forest fringe villages should be collected and assessed to bring forth the role of forest products and ecosystem services in their lifestyle. This is necessary to formulate suitable management strategies to improve their socio-economic status particularly that of tribal and economically backward communities living in fringe villages and partially or wholly dependent on forests for their livelihood. Socio economic survey shall include dependency on timber, fuel wood, fodder, grazing, other NWFPs and livelihood aspects. Since this is also a very important aspect of forestry, it has to be done with all seriousness; and help of Sociologist/Economists/Socio-economists /Recognized Institutes may be taken. The detailed survey is not required to be undertaken by WPO during the revision of working plan. The data on socio-economic survey from the secondary sources such as published/grey literature and observations made/ recorded under PRA of that area may be used.

82. Socio-economic survey shall entail collecting information on socio-economic status of the people living in and around the forest and their dependence on the forests for their livelihood needs. The villages lying within the limit of 3Km from the forest will be considered as forest fringe villages for the assessment. Stratified multistage random sampling will be employed for the socio-economic survey. The first stage sampling units will be the fringe villages and the second stage sampling units will be the households. The first stage sampling units i.e. fringe villages within the division will be stratified based on the population of the villages, their distance from the road and market, range, block etc. Representative fringe villages will be randomly selected from each stratum of the division. In the selected fringe villages, the households will be categorized in three groups based on their economic status viz. 'affluent', 'less affluent' and 'others' as defined by National Sample Survey Organization (NSSO). A household is classified as "Affluent" if the household owns any of the items like motorcar/jeep, tractor, truck/van/bus, large business, spacious pucca house in good condition or any two of the items like colour TV, cell phone, Dish TV, washing machine, refrigerator, microwave oven, two wheeler (automobile) or owns land/livestock in excess of certain limits (7.0 ha. cultivable land /3.5 ha. irrigated land or at least 10 heads of cattle and buffaloes or at least 30 sheep/goats.). A household is classified as "Less-Affluent" if the household does not own above items and owns land/livestock less than the above mentioned limits and more than 0.4 ha. land area or at least 2 heads of cattle and buffaloes or 5 sheep/goats. A household is classified as "others" if the household does not own any items mentioned above and the land area less than 0.4 ha. or less than 2 cattle and buffaloes or less than five sheep/goats. Thereafter twelve households in each selected fringe village will be selected randomly for the survey (Two, five and five households from 'affluent', 'less-affluent' and 'other' class respectively). Total number of households should be twelve, the shortfall in the first category i.e. affluent will be compensated from less-affluent class failing which 'other' class will be considered and the shortfall in less-affluent class will be compensated from affluent failing which from 'other' class. Others class will be compensated from affluent class failing which from 'less-affluent' class. The data will be collected by visiting the selected houses in each selected fringe villages. These data will be collected at household level through the detailed questionnaire. The questionnaire shall generally contain information on fuel wood, fodder (includes grazing, stall feeding kg per day or week etc.), NWFP (including MAPs, bamboo and rattans) etc.

### **ASSESSMENT OF NON-WOOD FOREST PRODUCTS (INCLUDING MEDICINAL AND AROMATIC PLANTS)**

83. The WPO does the assessment of available potential NWFP through old records, local enquiry, and plot enumeration data. Data collected under different studies and/or maintained in the JFM areas may be used. Summarized estimated quantities may be recorded for every compartment /village/any other management unit in terms of their scientific name, local name, type of plants, their part and its utility, area (ha), quantity per hectare, estimated harvest/hectare etc for species of trees, shrubs, climbers, grasses, herbs, lichens, fungi etc. A separate estimation may be done for medicinal and aromatic plants (MAPs).

84. For estimating the production of fruits, flowers and seeds of tree origin, total harvest of the desirable part(s) should be enacted (for two consecutive seasons from same trees) from at least three trees of different diameter class. The fresh and

dry weight of each should be recorded. The drying of the harvested parts may be carried at 105°C using a laboratory oven or sun drying if possible. The yield of products (wet or dry) obtained should be multiplied by the number of trees of a particular species enumerated for the compartment/village/any other management unit at different diameter class level. For estimating the production of shrubs, the useful part should be harvested from at least five plants and the fresh and dry weight of the same would be recorded. The yield of the products would be calculated as described above. For estimating the production of herbs, at least 10 to 20 numbers of each species should be harvested and fresh and dry biomass of the useful parts should be determined as described above.

### **ASSESSMENT OF BAMBOO/RATTAN**

85. Data from plot enumeration will be used to estimate the number of clumps per management unit (compartment, village or any other unit) and classify them as:
- (i) Luxuriant – All healthy, un-congested, undamaged and in good condition
  - (ii) Degraded – Not capable of being rehabilitated and of attaining normal productivity
  - (iii) Culturable – Not included in (i) or (ii)

### **ASSESSMENT OF WILD HABITATS AND SPECIES**

86. The WPO is not required to undertake an estimation of faunal populations. Advantage should be taken of ongoing efforts such as estimation of predators, co predators and prey in India carried out by the National Tiger Conservation Authority (NTCA) in collaboration with the Wildlife Institute of India and the State Forest Department. The WPO should identify flagship species including mammals, birds, reptiles, amphibians, plants etc. which may be significant for the area. The WPO should identify suitable habitats and micro habitats for such key wildlife species and appropriate measures needed to conserve and improve the same. Special attention should be given to forest areas in proximity to Protected Areas which also serve as extended habitats for many rare and endangered species. The maintenance and restoration of wildlife corridors must be identified as a priority. Threats, such as due to habitat loss and/or fragmentation; illegal trade; road and rail networks; etc. should be identified and appropriate corrective measures suggested for implementation. Similarly, areas of man animal conflict deserve special attention for amelioration.

### **ASSESSMENT OF TREES OUTSIDE FOREST (TOF)**

87. For assessing Trees outside forests, FSI will provide geometrically rectified IRS P-6 LISS IV (5.8m) images on 1:50,000 scale. Forest area of the division is masked out from them and classified map is generated having different strata namely, block plantation, linear trees, scattered trees, area with no trees, cropland etc. Stratified random sampling may be undertaken to assess the growing stock and the potential area for extension of forestry outside forests and sustainable land use management within the forest division. This requires inter-sectoral synergy and convergence. WPO may therefore prepare a separate strategy as New Chapter, not being part of general prescription of Working Circle for forests.

## CHAPTER VII

### WRITING UP THE PLAN

#### CONTENTS OF THE PLAN (To be written by WPO)

88. The standard working plan headings are reproduced in the table given below:

Chapters	TITLE / SUB-TITLE	EXPLANATION
i.	INTRODUCTION	
ii.	GLOSSARY OF TERMS	
iii.	List of Flora (indicating RET and unique species)	Local names of trees, shrubs herbs and climbers (including epiphytes, parasites etc.) with English names, if any, in alphabetical order, followed by their botanical names. Make it as exhaustive as possible. Help of subject matter experts may be taken for updating the list.
iv.	List of Fauna	Local names with English name, if any, in alphabetical order, followed by their scientific names. List may be made as exhaustive as possible with the help of subject matter experts.
v.	Others	List of lichens, algae, fungi etc.
<b>PART- I</b>		
Summary of facts on which proposals are made		
1	The Tract Dealt with	Title
1.1	Name and situation	Name of the division and its geographical location, demographic and administrative details. (Details regarding, ranges, beats, their headquarters and area; list of rest houses, other forest building, forest roads, fire lines etc. are to be provided in the <b>appendix</b> . To be provided by concerned DFO to the WPO)
1.2	Configuration of the ground	It may be categorized as flat, gently rolling, hilly, very hilly, undulating foothills including description of slope, aspect etc.
1.3	Geology, rock and soil	Describe the geological and rock formation, soil types in particular along with Geological Survey of India (GSI) references. As far as possible, GIS maps may be provided.
1.4	Climatic Parameters	Data on rainfall and temperature: yearly and month-wise maximum, minimum, and average temperature for a few representative stations is given. This information can be obtained from Meteorological Department. Relevant GIS maps along with historical data may be provided.

<b>Chapters</b>	<b>TITLE / SUB-TITLE</b>	<b>EXPLANATION</b>
1.5	Soil and water conservation	Title
1.5.1	Water resources	Duration of water flow in the selected seasonal rivers, streams, nallas; wetlands in forest areas; water level in the wells and ponds in the vicinity, (up to 5 km) of forest area along with maps:
1.5.2	Soil erosion	Soil erosion status in the division
1.5.3	Conservation measures	Area treated under soil and water conservation measures
1.6	Land use, Land use change and Forestry (LULUCF)	Title
1.6.1	Land use and land cover,	Range wise land use for the division may be categorized as closed forests, dense forest, open forests, scrub, bamboo brakes, shifting cultivation, young plantations of forestry species, tree in line, forest roads, grass lands, barren, agricultural land without trees in surround, agricultural land with trees in surround, non forestry plantations, habitation, water bodies etc along GIS based maps.
1.6.2	Forest Distribution and its area	Details of range wise area of RF, PF, Un-classed Forest, other types of areas; distribution of different forest types along with GIS map.
1.6.3	Land use change	Details will come in divisional area statement, including list of area (range wise / beat wise) diverted, under FCA, FRA, Non forest Land/ Degraded Forest given for compensatory afforestation under FCA, encroachments and with special mention of change in area of forest cover with respect to base year should be given along with map using modern tools of GIS and remote sensing. Summary of changes occurred during last plan period may be given.
1.7	Status of forest boundaries	This refers to state of forest boundaries, a general note on the state of existing boundaries and boundary pillars, noting specially on the status of demarcation and need to have demarcation may be described. Locations of the boundary pillars should be shown on the map with latitude/longitude with the help of most appropriate methods on village map or such other map of convenient scale. The analysis may be made of fresh encroachments

<b>Chapters</b>	<b>TITLE / SUB-TITLE</b>	<b>EXPLANATION</b>
		since Dec, 2005 onwards in forest area by GIS based change analysis.
1.8	Legal position	Area of the forest under different legal classes (Reserve Forest, Protected Forest, Un-classed Forest, village forest etc.,) along with number and date of notification for creation of reserve and/or protected forest is given; and mention is made of various forest settlements. Pending forest settlement work is also quantified.
1.9	Rights and Concessions	A brief account of the rights and concessions, their extent, nature, etc., which are to be regulated or met under working plan prescriptions should be given. (details are to be given in the appendix)Rights granted under JFM/PESA/STOFDRA(FRA) etc. should also be included
2	Flora and Fauna	Title
2.1	Forest Flora	Title
2.1.1	Forest Composition and Distribution	Based on the vegetation survey & forest inventory and compartment descriptions, a summary of important trees and other species occurring in the area with their floristic composition and condition (age class, health, and quality of the trees) is given. The effect of geology and soil; and climatic parameters (rainfall and temperature) on the distribution of forest types, specific composition (sub types), ecological relations; distribution of species; unique and specific vegetation etc. may be explored and described. Help of experts on Species Distribution Models may be taken.
2.1.2	Biodiversity Assessment	Biodiversity assessment in terms of density, frequency, total basal cover, dominance, IVI etc. should be given. Efforts should be made to make a base year documented species diversity status for future reference using GIS tools. As far as possible status of the species prone to over exploitation and destructive harvesting should be given.
2.1.3	Status of invasive species	Details to be given of forest areas infested by different invasive species.

<b>Chapters</b>	<b>TITLE / SUB-TITLE</b>	<b>EXPLANATION</b>
2.1.4.1	General description of the growing stock and forest resource productivity	Growing stock of wood with respect to base year; growing stock of bamboo indicating the number of clump and clump size with respect to base year; increment in volume of identified species of wood in terms of MAI with respect to base year and enhancement of forest productivity through quality plantation activities and eco-restoration of forests land.
2.1.4.2	Carbon stock	Details of biomass carbon stock assessment may be given based on the forest types and land use.
2.1.5	Status of natural regeneration	This should be described in detail for all principal plant species including trees, shrubs, bamboos, canes, medicinal plants, other NWFPs (and RET species) based on regeneration survey.
2.1.6	Status of plantations	Details to be given based on survey and assessment of areas under the plantation.
2.1.7	Injuries to the crop	Practically necessary details of different kind of injuries such as Area affected by forest fire; area damaged by natural calamities (flood, frost, drought, erosion, etc.); area protected from grazing; and incidences of pest and diseases are provided. Scientific information with regard to attack of fungus and other insect pests should be mentioned, where it is of practical significance such as Gynoderma or Sal borer etc.
2.1.8	Forest degradation and its drivers	Details of drivers of forest degradation like fires, unregulated removals, encroachment, over grazing, mining, shifting cultivation, etc along with the area description under different levels of degradation.
2.2	Forest Fauna	Title
2.2.1	Fauna and their habitats	Give description of flagship wild species including mammals, birds, reptiles, amphibians, etc. along with their suitable habitats and micro habitats. This chapter may be vetted by State CWLW.



<b>Chapters</b>	<b>TITLE / SUB-TITLE</b>	<b>EXPLANATION</b>
2.2.2	Threats and Challenges to wildlife	Give details regarding habitat fragmentation/loss, illegal trade, road & rail networks, extended habitats in proximity to protected areas for rare and endangered species; man animal conflict.
2.2.3	Protection and Management of fauna	Details of measures taken
<b>3</b>	<b>FOREST RESOURCE UTILIZATION</b>	<b>Title</b>
3.1	Demand and supply of Wood and wood products	Description of recorded removal for agricultural customs, local needs, market and marketable product including that of Forest Development Corporation and other agency may be given. Consumption of wood by wood based industries and other end users may also be given.
3.2	Removal of fuel wood	Information based on socio-economic survey and assessment will be provided here. Assessing and evolving mechanism for quantified data on recorded removals and sharing with the community may also be ensured.
3.3	Assessing demand and supply of bamboo and rattans.	Assessment of bamboo/rattans and quantified data on their removal and sharing with the community will be mentioned.
3.4	Assessing removal and production of NWFP.	Assessment of demand and supply, sustainability and potentiality, Import and Export of NWFPs; A separate assessment may be made with respect to medicinal and aromatic plants (MAPs).
3.5.1	Removal of fodder	Description of cattle rearing community of forest dwellers with regard to removal of fodder
3.5.2	Assessment of grazing in forest	Number of livestock grazing in the forest, availability of palatable species and pasture land etc. to assess the grazing pressure and potential based on socio-economic survey and assessment and vegetation survey.
3.6	Valuation of forest products	Including past and current prices of different forest products with price trend.
3.7	Other Dependency of local people on forests	Other dependency which is not mentioned above.
<b>4</b>	<b>Social, cultural, traditional and spiritual aspects</b>	
4.1	Constitution of JFM committees and area(s) protected by them	Details have to be given along with the map
4.2	Status of empowerment of	Aspects related to regular meetings at the

<b>Chapters</b>	<b>TITLE / SUB-TITLE</b>	<b>EXPLANATION</b>
	JFMCs	community level and representation and participation of members belonging to different categories in JFMCs and their role in functioning of the Forest Development Agency may be given to indicate the status of empowerment.
4.3	Labour welfare	Details of Welfare measures along with direct employment in forestry activities
4.4	Status of compliance of Forest Rights Act (FRA)	Status of registration of all the claims and settlement of the genuine claims along with list of individuals and communities to whom forest area is allotted, enlistment of those locations whom physical possession has been handed over on ground and its position on the forest map with lat/long, status of forest management of areas given to allottee
4.5	Respect for traditional knowledge	Documentation of the Indigenous Traditional Knowledge and incorporation of the same in the micro-plans and other prescriptions of the plan
4.6	Extent of cultural/ sacred groves	Details of cultural and sacred groves and interventions to conserve them.
4.7	Social customs	Prevalent social customs relevant to forests.
4.8	Other aspects	Other aspects which are not mentioned above.
5	Five Year Plans	WPO has to describe the activities taken up under preceding Five-year plan, (plan wise and scheme wise) and make summary suggestions for future based on details prescriptions provided in the various chapters of the plan.
6	Staff and labour supply	The details of sanctioned, permanent, temporary, and seasonal posts are given. It should also include number of filled and vacant posts on a particular date when the working plan is under revision. The requirement of daily wage/contractual man power may also be mentioned in this chapter. The usual rates of wages, past and present, are also mentioned.
7	Past system of management	Title
7.1	General history of the forests	The historical back ground of the management of forests is given as early period as possible with mention of sources of information. Compartment history can be an important source of such information.

<b>Chapters</b>	<b>TITLE / SUB-TITLE</b>	<b>EXPLANATION</b>
7.2	Past system of management and their results	The system of management which has been followed in the past will be briefly discussed, with a view to prevent repetition of such mistakes as might have been made, and also to understand and appreciate the present condition of the crop. In general the account given in the expiring plan will be adopted and updated unless there are definite reasons of revising it. Further, there should be specific mention of status of Joint Forest Management, Community involvement and functioning of the Forest Development Agencies in the division along with the change matrix analysis
7.3	Special works of improvement taken	A brief summary and results of works such as fire-protection, improvement in communication, interface activities, amenities to staff, etc. will be given.
7.4	Past yield, revenue, and expenditure	This is given year-wise in a tabular form. The average during past working plans and details for each year during the plan under revision are generally given along with critical analysis.
8.1	Statistics of growth and yield	WPO has to assess the availability, of volume/ yield tables for the main timber species, which have been prescribed for felling in the various working circle for calculation of yield. If such tables are not available, then the possibility of stem and stump analysis for such species may be examined and implemented if possible for preparation of local volume table. In case, this is also not feasible, then standard volume tables / regression equations developed by FRI/FSI or other institutes may be recorded and used. Research gap with respect to availability of data must be brought out clearly.
8.2	Statistics of forest carbon stock	Default values used with respect to estimating forest carbon stock must be brought clearly so that specific values can be developed through experimentation and research.
<b>PART II</b>		
9	Basis of proposals	Title
9.1	Objectives of management	It should include short and long term objectives of sustainable management of forest as enshrined in National Forest Policy (1988), encompassing the ecological, economic and social dimensions in a division and provide broad strategy for attaining the objectives. The strategy may include reducing forest degradation, conservation of forest and its

Chapters	TITLE / SUB-TITLE	EXPLANATION
		biodiversity, maintenance of ecosystem services and products, enhancement of productivity and establishment of regeneration to secure it in perpetuity; ecological and silvicultural requirement of species; progressively increasing the growing stock and yield of timber and other forest produce until the maximum sustainable yield and carbon sequestration potential is attained; prevention of erosion and stabilization of the terrain; improvement and regulation of hydrological regime; maintenance of bio-diversity and wildlife; fulfilling socio-economic needs of the people; peoples involvement in planning and management of forests. Performance indicators may be identified for different objectives of management.
9.2	Method of treatment to be adopted	A brief account is given of the ecological and silvicultural requirements for sustainable management of different identified forests or crops keeping in view the stakeholder's requirement, biotic factors aspects.
9.3	Constitution of Working Circles	Mapping and Listing of different Working Circles (including overlapping ones), their area, and distribution recording justification for their constitution amongst various options for sustainable management of forests.
9.4	Period of working plan and necessity for intermediate revision	Generally the period of working plan will be for 10 years. A midterm review of WP should be undertaken for mid-course correction by the consultative committee under the Chairmanship of PCCF (HoFF) with representation from RCCF (Central). Similarly, based on the performance of the WP prescriptions the plan period may be extended up to 5 years beyond the stipulated plan period by designated authority on the recommendation of a standing consultative committee authorized for this purpose.
10	CHAPTER 2 to last CHAPTER viz., Z	Title
10.1	(Name of) Working Circle (Clearly marked on GIS based maps(1: 50,000)	There will be a separate chapter for each Working Circle including the overlapping ones. Last chapter identified with a Working Circle is presumed as Z (last in row) which has a numerical value like X, XI, XII, etc.
10.2	General Constitution of Working Circle	Mapping and Summarization of working Circle area statement by ranges, blocks, and compartments included in the Circle indicating

<b>Chapters</b>	<b>TITLE / SUB-TITLE</b>	<b>EXPLANATION</b>
		gross area and showing forest type and density classes (as adopted by FSI).
10.3	General character of vegetation	Concentrate on aspects of vegetation pertinent to management objectives outlined for the Working circle, e.g., composition, age class, distribution, density, growing stock, status of regeneration, special problems like menace of weeds and invasive species growth etc.
10.4	Felling Series; cutting sections and JFM areas;	Name them and give the reasons for their constitution. JFM areas may be described as per existing village level JFM committees/micro-plans.
10.5	Blocks, compartments and JFM area;(marked on GIS based maps)	In a tabular form Felling Series, Cutting Section, Range, Block, Compartment, Quality, and Area in hectares. JFM areas may be described as per existing village level JFM committees.
10.6	Special objectives of management	These are enlisted in order of priority.
10.6.1	Analysis of the crop (where volume table of main tree species is not available the regression equation developed by FRI/FSI may be used)	Stock maps, range and mean of quality and age class distribution, selection of sample units, type of enumeration, assessment of NWFP bearing species, status of regeneration, comparison with previous data, and special features, if any, are to be described.
10.6.2	Silvicultural system	Define the system and give reasons for its adoption
10.6.3	Rotation Period	The growth and other data on which the rotation is based are discussed. Full reasons are also given for adopting a particular period. If there is a change from the previous plan, then its possible effect on age class distribution is analyzed. The yield calculation formula adopted for sustainable harvesting should be indicated.
10.6.4	Harvestable diameters	These are prescribed and also justified for different species from crop potential and future perspective.
10.6.5	Reducing Factors and reduced Areas	In general, reducing factors are used for quality and density for species for which yield tables are available. When enumerations have been done, the basal area is used for density reduction.
10.6.6	Felling Cycle	Wherever applicable, it is fixed and reasons given. In the diffused systems it generally corresponds to the period of the plan, i.e., 10 years.
10.6.7	Division into Periods and allotment to Periodic	This is done for the shelter wood systems. It is also necessary to monitor the progress of

Chapters	TITLE / SUB-TITLE	EXPLANATION
	Blocks	regeneration. A tabular statement is prepared showing block, compartment, sub-compartment area in hectares; PB allotment in previous plan, year of main felling, status of regeneration, allotment to PB in current plan, reasons of allotment.
10.6.8	Calculation of the yield	It is regulated by volume. If it is by area, there must a volume check. There must be provision for adjustment of extra ordinary felling against future yields. The yield calculation method adopted for sustainable harvesting may be indicated.
10.6.9	Table of felling	Felling is tabulated year-wise by ranges, blocks, compartments, and sub-compartments for each Felling Series; village level JFMC areas.
10.6.10	Method of executing the felling	Guiding principles (general marking rules) are given. It should be simple to understand and to implement.
10.6.11	Subsidiary silvicultural operations cleaning and thinning	Good practice guide for silvicultural operations including thinning and its grades etc., should be given.
10.6.12	Assisted natural regeneration	Methods of assisted natural regeneration based on status of natural regeneration may be prescribed. Keeping in view the objective of multiproduct forestry a multi tier canopy shall be ensured while prescribing silvicultural and follow up cultural activities.
10.6.13	Other regulations	May cover control grazings, lopping schemes and regulated firewood removals; fire protection; forest protection from illicit felling, encroachment, illegal mining, jhumming, etc; soil and water conservation measures; restriction on felling along rivers, highways, hill slopes, etc., which are relevant to Working Circle

89. There may be separate Working Circles for important NWFPs like gums & resin, tendu leaves, medicinal & aromatic plants (MAPs), fruits and seeds etc. Based on the potential NWFP estimation of production and demand of market, a priority list of most important species may be identified. Management and value addition aspect may be further worked out for general prescription in the overlapping working circle for NWFP with the objective of sustainable use. The use of components of biological diversity in such manner and at such rate that does not lead to the long term decline of the biological diversity should be prescribed so as to maintain its potential to meet the needs and aspirations of present and future generations. Permanent plots of suitable sizes may be laid for development of safe harvesting protocol and the optimum limit of the harvest should be standardized for assured regeneration of the species. The following harvesting regimes may be experimented to work out safe harvesting limit:

100 % harvest of the tradable part (by removing the whole number)

- 75 % harvest of the tradable part (by leaving 25 % of the whole number)
- 50 % harvest of the tradable part (by leaving 50 % of the whole number)
- 25 % harvest of the tradable part (by leaving 75 % of the whole number)

The plots should be laid in triplicate. The plots so treated shall be visited after a gap of one year to enumerate the number of new recruits and the effect of above removal shall be calculated using standard mathematical formulae.

90. Based on the availability and assessment of bamboos/rattans, suitable prescriptions may be made in the overlapping working circle for bamboos/rattans. Even annual workings for all bamboo clumps of Thrifty category (All healthy, uncongested, undamaged and in good condition) may be followed in JFM and other village forest areas. Degraded areas may be taken up for artificial regeneration of bamboos while culturable areas will need appropriate treatment to bamboo clumps healthy.

91. There may be an exclusive or overlapping working circle namely Fringe Forest Management, Joint Forest Management and *Community Forest Management* in the working plan for sustainable management of forests.

#### **MANDATORY WORKING CIRCLES**

92. There shall be an exclusive or overlapping plantation Working circle in the working plan to cover existing plantations, blanks and under stocked not suitable for ANR, clear felled areas, road side, river side, canal side, rail side, sea side, land under CAMPA etc. which are suitable for plantation will be identified and allocated to different years of plan period along with prescription of sustainable management.

93. *It is also essential to include following overlapping working circles in the working plan*

- (i) Wild Life Management
- (ii) *Soil and Water Management*
- (iii) *Biodiversity Conservation and Development(BCD)*

94. Assuming the numerical value of BCD Working Circle is Z, as stated above; the succeeding chapters are as under:

CHAPTER (Z+1)	General Financial Forecast and financial Plan of operation	The WPO will give his assessment of expected revenue, estimated expenditure for the implementation of his working plan prescriptions, and other normal plan and non plan activities of the division. He will also indicate or identify the possible sources of funding taking cognizance of provisions in five Year Plan, Non-Plan Budget, CAMPA, Green India Mission, Finance Commission etc. This is necessary to ensure that working plan does not remain a theoretical document any more. This information should be given for the working plan period. Figures of past plan (to be provided the concern DFO) should also be given for comparison.
------------------	--	--

CHAPTER (Z+2)	Miscellaneous regulations	Title
(Z+2).1	Petty felling and extraction	Petty Felling and extraction for research and training needs should be allowed. It is necessary to emphasize the fact that experimental, preservation and sample plot; seed stand and their demarcated surrounds; etc. are excluded from all operations prescribed in the working plan. Special Grants in exceptional circumstances may be allowed which do not cause much deviation.
(Z+2).2	The Control Forms	This should be clearly described and prescribed: For details see succeeding paragraph 124 to 134, under the chapter on "Monitoring, Assessment and Reporting" Annual inspection of DFO office by CF/CCF and by DFO of Range office is mandatory with in 3 month of completion of financial years to have checks on annual statements in Control forms and Deviation Statements
(Z+2).3	Records Deviations	
(Z+2).4	Rights and Concessions	These are to be dealt in some detail: the quantity allowed, actually used, requirement of future demand, etc., are to be assessed and suitable guidelines/prescriptions given.
Chapter (Z+3)	Research	Reference should be made to all research articles/ outputs/ findings used in the preparation of the plan. All research gaps and constraints with respect to availability of the data and information required for writing of plan should be brought out clearly. However establishment, maintenance and up keep of the permanent plots must be provided in the plan.
(Z+3).1	Preservation Plots	Sufficient number of representative preservation plots should be created and maintained for preserving examples of existing forests as far as possible in their present form, or preserving such selected forest plots from all forms of injury and so permit progression towards such climax form and to study and correlate vegetation change matrix with the impact of climate change.
(Z+3).2	Sample Plot	Similarly establishment of representative sample plots of all ages, all species in different site quality along with revival of previous sample plots for growth studies; and separate sample plots for NWFP should be planned for more focused research aspects in this chapter. Even schedule for data collection should be provided so that



		sustainable management of forests can be prescribed on the basis of scientific analysis.
(Z+3).3	Other Research and Experimental Plot	It may include seed orchards, experimental plots etc.,
CHAPTER (Z+4)	Establishment and Manpower including Technical Skills	Suggestions may be made regarding increase or changes in the establishment and manpower if the current arrangements do not appear to be satisfactory based on the assessment of present and future work load. Training needs of staff at all levels should be assessed and provided here.
CHAPTER (Z+4).1	Roads, Paths, Bridges, Building	Suggestions for new roads & buildings and other infra-structural facilities with full justification have to be given.
CHAPTER (Z+5)	Summary of prescriptions	This is a brief resume of prescriptions and suggestions as per working circles.. This is useful for senior officers who cannot go through the whole working plan document.
CHAPTER (Z+6)	Trees Outside Forests	Include the present scenario and potential areas and efforts required to increase ToF so as to make forests sustainable and rural economy more revitalized

### THE SUB DIVISION OF FOREST AREAS

95. There are four distinct and recognized sub-divisions of forest area as under:

S.No	Type of Sub Division	Name of Sub Division	Denotation
1.	Legal	Reserve Forest	RF
		Protected Forest	PF
		Village Forests	-
		Private Forests	-
		Community Forests (Areas having Forest Community Rights under FRA 2006)	
		Others (As defined by Supreme Court)	-
2.	Territorial	Block/Village	Local name
		Compartment	Arabic numbers. Thus 6
		Sub-Compartment	Compartment number and a small letter. Thus 6a.
3.	Administrative	Division, Range	Name

		Beat, Sub-beat	Name or number
4.	Managem ent	Village	Local name
		Sub-compartment	Already explained above as 6a
		Cutting Section	-
		Felling Series	Mainly name sometimes even a Roman or Arabic numeral
		Working Circle	Name of Species or management system
		Periodic Block	By Roman numbers. Thus PB-I
		Coupes	By Roman numbers. Thus Coupe V

### NUMBERING AND PAGING

96. Pages are numbered from the beginning of Part I, Chapter I and form a consecutive series right through the plan.

97. There should be one continuous sequence for the chapters of *working plan* including Part I & II. The chapter numbers should be in Arabic numerals.

98. There should be separate sequence for the paragraph numbers in the individual chapters. Each paragraph of a chapter should start with the index numbers of the chapter followed by the decimal point. Thereafter the paragraph number should be given as 1, 2, 3, ..., 57, 58, 59, ..., 99, 100, 101, etc. Thus paragraphs of Chapter VIII should be numbered as 8.1, 8.2, 8.3, ..., 8.9, ..., 8.99, 8.100, etc

99. If a paragraph has sub-para, the sub-para numbers should also be as 1, 2, 3, etc. The sub-para number should come after the main para number preceded by decimal point. For instance, in para 8.99, the sub para would bear number 8.99.1, 8.99.2, 8.99.3, etc.

100. Paragraphs and page numbers should be mentioned in cross-references. Dates should be typed as January 1, 2, 3, etc., and not January 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, etc.

### WORKING PLAN FOR AREAS NOT UNDER THE MANAGEMENT OF FOREST DEPARTMENT

101. This will depend on the extent of the area for which *working plan* is to be prepared. General headings, in which the *working plan* can be written, can be as under; but there is no hard and fast rule. The local DFO, the Territorial Circle Incharge, and the Head, Working Plan Organization can use their discretion.

Area dealt with – location

Details of Forest Land – Legal, Boundaries, Area, Rights of others if any

Description of the Forest Crop

Analysis and valuation of the crop

Past management practices and changes required

## PART – II

Basis of Proposals

Working Circle wise description

Necessary measures for protection of forest

Plantation measures

Estimated revenue and expenditure

Control and records

### APPENDICES

102. All information and details, which are required for the elucidation of the plan, should be included in appendices as a separate volume. In order to make full use of the appendices, reference should invariably be indicated in the concerning paragraph of the plan. Similarly in the appendices also, the concerning paragraphs of the *working plan* should be indicated in brackets below the title of the appendix.

103. The following is the list of essential appendices. Additional may be added, if necessary, but effort should be to keep them to the minimum.

#### Appendix I – Divisional Area Statement

Block Range	Village Compt Sub-Comp Coupe	Composition by area	WC FS PB	Density	Site quality	growing stock	Area	No. of cattle units permitted	Other Details	Remarks
Order Alphabetical	Serially	Separate for impt species	WC main or Over Lapping indicate	as assessed by WPO	as assessed by WPO	as assessed by WPO	Give if	If regulated	Anything Important	Important observation
1	2	3	4	5	6	7	8	9	10	11

#### Appendix IIA – Enumeration Results

Full details in compartment histories inclusive of major NWFP and an abstract are to be given in this appendix. The figures are detailed by Working Circles, Felling Series, Blocks and compartments or/and Beat, Sub-beat and village; all are arranged alphabetically and serially. A summary of assessment of enumeration data should invariably be given together with estimated total growing stock, wherever necessary.

#### Appendix IIB- Biodiversity Assessment

The detailed report of biodiversity assessment will be annexed indicating biodiversity richness of the area as per the following table

Name of the species	Density (Tree/area)	Frequency (%)	Total Basal Area (m <sup>2</sup> /ha)	IVI
Trees				
Shrubs				
Saplings				
Climbers				
Herbs				
Grasses/ Sedges				

### Appendix IIC -Regeneration Surveys

Regeneration survey data should be analysed and should be reported in full wherever applicable.

### Appendix IID- Socio-economic Survey Results

The detailed report of socio-economic survey will be annexed indicating dependence of people on forests

### Appendix IIE- NWFP (including MAPs) Estimation

Detailed estimated quantities along with type of plants, their part and its utility, area, species, etc should be provided.

Sl. No.	Scientific name	Local name	Type of plant	Part used	Location where found (Compartment no./beat/Range)	Area in ha	Potential harvesting Quantity per hectare	Estimated harvest/ hectare	Remark
1	2	3	4	5	6	7	8	9	10

### Appendix IV – Research Plots

A summary list of existing sample plots, Linear increment plots, Tree increment plots, Preservation plots, Protected trees, Plus and Elite trees, NWFP, Seed orchards, etc., along with location description should be given.

### Appendix V – Rights, Concessions, Grazing Regulations, etc.

All Government settlement reports, orders and notification **including** under STOFD RA (FRA), should be reproduced in full.

## **Appendix VI – Schedule of Rates**

The current schedule of rates of timber, NWFP and forestry works is to be given.

## **Appendix VII – Leases, Contracts, transfer etc.**

Give details of leases, contracts, Land transfer cases (FC act and FRA), etc.

## **Appendix VIII – Ranges and Beats, their head quarters and area**

Constitution of blocks and compartments or coupes of ranges and beats (along with maps) should be given alphabetically.

## **Appendix IX – Buildings and Rest Houses**

The list will be of all forest building, rest houses, location by lat/long, number of suites, distance from road, and elevation (in hill areas), etc. (May visit and assess the ground level situation for general recommendation for improvement and alternation/ addition required.)

## **Appendix X – Divisional Forest Officers**

List is given right from the day of formation of the division; and the period of holding charge is also mentioned.

## **Appendix XI – JFM**

The details of JFM villages (Range wise) along with location by lat/long, area allotted to JFM, status of micro plan should be given.

## **Appendix XII – FIRE**

Details of all FIRE cases (Range wise) would be given, for at least past three years to identify fire prone areas along with specific remarks with regard to severity and burnt area.

## **Other appendices**

Other Appendices which may be useful should also be given, such as, Roads and their status, Fire lines including the status of their maintenance, Chaks, forest employees killed on duty, Mahabrikshas, Vriksmitras, results of soil survey, etc

## CHAPTER VIII

### PREPARATION OF MAPS BY WPO

#### Map Policy of India

104. Map making process has seen many changes over the years from the conventional techniques to switching over to the digital techniques. Now-a-days the maps are available in both analogue and digital formats. Advent of satellite based techniques has brought in revolution in almost all the walks of life. Expectations for provision of higher order of accuracies and user oriented products have increased. One such free user friendly utility in the public domain is Google Earth, which is on World Geodetic Survey, 1984 (WGS 84) datum. Therefore, in order to meet the varied requirements, a 'New Map Policy' has been announced by the Government of India (Survey of India, 2005). Under this new map policy two series of maps viz; Defence Series Maps (DSMs) and Open Series Maps (OSMs) are being brought out. These maps are prepared by using the coordinate system based on International Terrestrial Reference Frame (ITRF), a geocentric reference frame. This switching over to the Geocentric Reference Frame will enable the country to be at par with the rest of the world. Apart from the above, the GPS data integration with Survey of India Toposheets is easy.

105. All our old series Survey of India Topographical maps (1:50000) are on Polyconic projection; with Everest-1830 ellipsoid used as reference datum. With regard to datum, Everest spheroid was the best fitting spheroid adopted 200 years ago when centre of the earth was not known accurately. Today, centre of the earth is known to us with an accuracy of  $\pm 5\text{cm}$ . Hence, most of the countries switched over to geocentric ellipsoid such as WGS 84 for mapping. Not less than 100 countries accepted this projection in the world. Recently, the Govt of India announced New Map Policy. Since the Universal Transverse Mercator (UTM) projection system is well established reference system all over the world, our National Map Policy suggests UTM projection to be adopted. However, Sol decided to have two different series of maps, viz; Open Series Maps and Defence Series Maps with different projections and datums.

#### Open Series Maps (OSMs)

106. Open Series Maps (OSMs) are used to support planning of developmental activities in the country. OSMs bear different map sheet numbers and will be in UTM projection on WGS-84 Datum. As per Survey of India, over 4000, 1:50,000 scale maps have already been prepared under OSM series and are available to the user community both in digital as well as in hard form.

107. The use of modern technologies and tools which includes satellite remote sensing, geographic information systems (GIS) and global positioning system (GPS) have become inevitable in preparation of working plans of forest divisions. For survey and acquiring latitude and longitude on the ground, GPS is to be set in Geographic Coordinate System (GCS) with WGS 84 datum for easy uploading data into the GIS software.

108. Remote sensing imageries help in mapping the land cover/land use of forest division and getting other details needed for preparation of stock maps. In India

Medium resolution latest remote sensing and GIS tools has been used to provide synoptic view and fairly accurate details of land cover classes of the divisional area of 1:50,000 scale with 1.0 ha minimum mapping unit. The changes occurring in the different classes of forest and between forest and non-forest over a period of time due to afforestation/ deforestation, damage due to forest fires etc can be also determined using Geomatic tools (hardware – workstation, DGPS/GPS; software - Digital Image Processing (DIP), Geographic Information System (GIS).

109. Finer resolution (about 5.8 m or less) satellite imagery on other hand can help in mapping more details, classifying forest into more different density, conducting inventory and preparing stock map on 1:12500 scale with the essential 0.1ha mapping unit for forest management. The role of GIS is integrated into image analysis by digitizing the different layers of boundaries (divisional, range, block, compartment etc.) and working out area of each section/class of forests and providing attributes of each class. The use of GPS has been well pronounced in quick survey of the forest areas, both for demarcating the boundary and also for determining the area. It also helps in bringing cadastral maps into digital and computer compatible mode.

110. As a general rule, if the stock maps of previous *working plan* are available, they should only be checked with the new stock map and any serious deviation is to be recorded along with reason for the same. If stock maps do not already exist, they will have to be prepared on 1:12,500 scale or 1:50,000 scale depending on the available resolution of satellite images. One set will be for the territorial divisional office and the other for the Working Plan Officer. Normally a stock map shows the details of blank areas, crop composition, density, quality, age classes, and regeneration. Different colours and symbols may be used in the preparation of stock maps.

### **MANAGEMENT MAP**

111. This is prepared on 1:50,000 scale cut and mounted. The WPO prepares sufficient number of master copies of the management map so as to provide them to all concerned including lower ranks like sub divisions, ranges of the division. This map will show divisional, range, block, compartment, and sub-compartment boundaries, and boundary pillars with their numbers. The most important aspects to be shown in colour are: Working Circle, Felling Series, Periodic Blocks, and coupe numbers. Other important features like roads, transmission lines, railway lines, water bodies etc. may also be shown if possible, clearly.

### **WORKING PLAN MAP**

112. These are prepared on 1:12,500 scale cut and mounted for each range. These are also like management maps, which in addition to silvicultural units- viz., Working Circle, Felling Series, and Periodic Blocks- show as many management, administrative, and physiographic features as possible.

### **REFERENCE MAP**

113. When reading a *working plan*, it is inconvenient and unnecessary to have to refer a separate *working plan/management map* except when detailed information

is required to be understood. Thus, each *working plan* will include a small reference map on the inside of the back cover on 1:1, 25,000. This map will be bound or attached to the printed volume in such a way that when it is unfolded it will be completely outside the volume. The map will be of such a convenient size as can be simply folded once or twice to the size of the printed volume. It should show the main boundaries, the forests, *ranges*, roads, canals, forest rest houses, neighboring towns and villages, and such other relevant features as can be shown without overcrowding it. The scale of map, which must be given, will, of course, depend on the size and shape of the *division*. Reference map is a miniature mix of *working plan* and management maps.



## CHAPTER IX

### COMPARTMENT HISTORY

114. This should be written by the WPO/DFO (Territorial) as his inspection of forests proceeds and should be typed at once on the standard forms. Normally they should be completed considerably before the *working plan* is completed. The following forms (in two sets, one each for *range* and the *division*) are used for writing the compartment history for each compartment or sub-compartment:

CH Form-1	Compartment Description	To be filled by the WPO
CH Form-2	Compartment Enumeration	To be filled by the WPO
CH Form-3	Trees marked for Felling since last plan	To be filled by the DFO
CH Form-4	Compartment Out-turn	To be filled by the DFO
CH Form-5	Past events during the last plans in the compartment	To be filled by the DFO
CH Form-6	Change in the Forest Cover (Such as dense, open, scrub forests, pastures & deserts)	To be filled by the WPO
CH Form-7	Species Diversity (The enumeration of the plant and animal species and their periodic assessment be done and recorded which will be helpful in formulating strategies for conservation, maintenance and enhancement of overall bio-diversity and Status of species prone to over exploitation is to be periodically monitored and recorded to bring in improve their status.	To be filled by the WPO
CH Form-8	Status of regeneration (Effect of natural calamities like fire, flood and effect of grazing, invasive species, pest and diseases on the crop to prepare and finalize the future strategies for control and management of the forest.	To be filled by the WPO
CH Form-8	Details of NWFP including medicinal and aromatic plants available and estimation of their quantity and level of harvesting	

### COMPARTMENT DESCRIPTION

115. The format (CH Form – 1) is as under:

## Identification

Division	Range	Block	Compartment

## Management details

Working Plan Period			
Author WPO			
Working Circle			
Felling Series			
Periodic Block			
Sample/research plots/preservation plots			
Forest types			

## Description

Title of description	Explanatory notes to write the description
Area (in Hectares)	Total as also under each species or type, blank unworkable, etc.
Situation	As accurate as possible with the help of GPS.
Boundaries	N, S, E, W (mention boundary pillars, ridges, spurs, streams, etc.)
Altitude	In meters. In case of hilly areas give lower and upper limits.
Aspect	Main aspect and variations if any
Gradient	Precipitous, very steep, steep, moderate, gentle, etc.
Configuration	Rugged, undulating, flat, etc.
Rock	Mention main underlying rocks including alluvial deposits
Soil	Texture, depth, permeability, drainage, surface compaction, humus, etc.
Growing Stock	Natural, artificial, storey-wise composition, age class quality, stocking density, regeneration of principal species, etc.
Quantitative analysis of vegetation	Name of the species, density, frequency, total basal cover, dominance, IVI etc.
Other information	The effect of biotic factors and any other information related to plantation, NTFP, medicinal and aromatic plants, bamboos and rattans, wildlife, invasive species etc., should be especially dealt with

The description will be signed and dated by the WPO. Each heading should commence in a separate paragraph. Details shall be based on information collected in plot approach form and plot description form for plots falling in the compartment/village.

**COMPARTMENT ENUMERATION (based on enumeration of sample plots falling in the compartment)**

116. The format is as under:

**General information**

Block	Compartment	Sub Compartment	Total Area (Ha)	Area enumerated	Sampling method if partial	Year of Enumeration

**Result of Enumeration (if any)**

Species	Diameter class in cm. (Number in each class)									
	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90& over	Total

**Biodiversity Assessment**

Name of the species	Density (Tree/area)	Frequency (%)	Total Basal Area (m <sup>2</sup> /ha)	IVI
Trees				
Shrubs				
Saplings				
Climbers				
Herbs				
Grasses/ Sedges				

**Description on NTFPs:-**

Sl. No.	Scientific name	Local name	Type of plant	Part used	Location where found (Compartment no./beat/Range)	Area in ha	Potential harvesting Quantity per hectare	Estimated harvest/ hectare	Remark
1	2	3	4	5	6	7	8	9	10

### TREES MARKED FOR FELLING

117. This form is to be filled by the DFO from time to time as the markings take place. The format is as under:

Year	Area Ha.	Species	Diameter class in cm. (Number in each class)										
			10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90 & over	Total	

### COMPARTMENT OUTTURN

118. The format is as under:

Year	Area Felled in hect.	Species	Round Timber	Sawn timber	Fuel wood	Miscellaneous	Remarks

### Harvesting of NTFPs:-

Block	Compartment	Sub-Compartment	Species, Scientific name)	Harvesting time	Quantity harvested ( Kg)							
					Roots	Flowers	Leaves	Bark	Stem	Twig	Whole Plant	

### COMPARTMENT HISTORY

119. The format is as under:

Year	Event (since last plan)

Block..... Compartment.....

120. If compartment history with full entries already exists, past entries made by the DFO will be scrutinized by the WPO who may edit them if necessary. Usually no condensation should be necessary.

121. The DFO is responsible for recording current events as they occur and will make his entries on the separate sheet of the form and not on that prepared by the WPO. At the next revision of the plan, the WPO will scrutinize these entries and edit them if necessary.

122. The principal information, which the DFO should record, is as follows:

Felling, Subsidiary Silvicultural Operations, Slash Disposal with costs, Plantations, Control Burning with costs, Fire incidences and damage caused, Damage by other factors like Drought, Storm, Snow, Insect, Fungi, Grazing, etc., Remedial measures taken along with costs, Good seed or seedling years of important species.

123. The entries should be brief and concise; whole or part compartment that was involved should be made clear. For event timings- month or months- should be given. Any other activity if undertaken is mentioned along with cost.

## CHAPTER X

### THE CONTROL AND RECORDS

#### CONTROL FORMS

124. General prescriptions of the *working plan* should be written in such a way that it is quite clear as to what constitutes a performance norm and the Control forms provide for performance parameters/ targets/ annotations/ norms for all prescriptions/suggestions for every working circle to be monitored, assessed and reported on annual basis during the period of the working plan. Control forms should be prepared to include each of these prescriptions, as well as all definite suggestions regarding other operations left at the discretion of the territorial staff.

125. The WPO should prepare a draft set of control forms to control all the important operations prescribed and suggested in his *working plan* such as different types of felling, thinning, plantation works, subsidiary silvicultural operations, rotational lopping, soil and water conservation works, control grazing, fire protection, NWFP harvesting, bamboo harvesting, boundary pillars, spring recharge, lantana eradication, reducing degradation, removal of firewood etc., These forms will then be submitted to the CCF, Working Plan for approval and preparation of final sets. There shall be separate set of control forms for each working circle.

126. Three permanent sets of these control forms will be prepared in the office of the Working Plan Officer and one set each is distributed to CCF, *working plan*, the Territorial Circle Incharge, and the Divisional Forest Officer.

#### FORMATS OF CONTROL FORMS

127. Following are three formats of control forms:

**Coupe Control Form** – For the control of all silvicultural operations such as felling, subsidiary cultural operations, cleanings, thinning, burning, etc., which may be prescribed or suggested to be carried out in a given coupe for the duration of the working plan

**Felling Control Form** – For controlling and maintaining a record of all trees marked for felling and trees retained as seed bearers or to safe guard future yield.

**NWFP Control Form** – For controlling and maintaining a record of all NWFPs harvest so as to make the removal/harvest sustainable.

128. The DFO will annually make entries in his copy of the control forms and send them together with the deviation statement in triplicate to the Working Plan Officer through the Territorial Circle In-charge. After the entries have been checked and approved, the Working Plan Officer will first get his copy completed and then send the DFO's copy to the Territorial Circle In-charge. The later will then complete his copy and finally return the DFO's set for deposit in the latter's office till next year. The Working Plan Officer will send four copies of deviation statement with appropriate justification to the PCCF for sanction. After the sanction, one copy each will be sent to the Working Plan Officer, Territorial Circle In-charge and the DFO for their record and the CCF, Working Plan or the head of working plan organization as the case

may be, will retain the fourth copy for his set of control forms.

The control forms should be submitted by the DFO to the Territorial Circle In-charge on or before December 1<sup>st</sup> and the latter should send them to the Working Plan Officer concerned on or before January each year.

### COUPE CONTROL FORM

129. The format of coupe control form is as under

Working Circle- Periodic Block-		Felling- Series- Cutting- Section	Localities prescribed Localities suggested				COUPE CONTROL FORM			
Prescription in brief	W.P.para		Year due	Year	Block/ Comptt.	Area	Volume	Coupe No.		Page
								Excess(+)Or Deficit (-)		
1	2	3	4	5	6	7	8	9	10	
									Remarks & Sanction	

### FELLING CONTROL FORM

130. The format of felling control form is as under:

Working Circle- Periodic Block-		Felling Series- Cutting Section-		Localities prescribed Localities sug gested (With Areas)				COUPE CONTROL FORM	
Range wise	Area	Species	Diamet er class	Trees marked	Unit Factor	Volume marked	Trees retained	% Trees retained	Remarks
1	2	3	4	5	6	7	8	9	10

1-Offence Reports- prosecuted, compounded, un-detected 2-Removal under rights/concessions3(a)-Forest land marked for individual patta under FRA-range, block area & compartment, mauza, revenue paper status3(b)-Forest land allotted to community for enjoying of rights- range, block area & compartment, mauza, revenue paper status

### NWFP Control Form

131. Format to incorporate the NTFPs:

Working Circle- Periodic Block		Felling Series- Cutting- Section- Collection area-	Localities prescribed Localities suggested				Coupe Control Form			
Prescription in brief	W.P. para		Year due	As carried out				Coupe No.		Page
				Year	Block/ Comptt.	Area	Name of NTFP with Scientific name of species	Vol./ Qty.*	Area	
										Remarks & Sanction

1	2	3	4	5	6	7	8	9	10	11

Quantity may be given in specified unit viz. Number/Weight/Volume according to type of NTFP

**DEVIATION FROM CONTROL**

132 Any large and unusual operation, variation from yield and target for plantation/regeneration and or other activities provided in Control Forms of the working plan constitutes a deviation. These also should be spelt out. The check is through Control Forms and reporting is through Deviation Statements. Deviation beyond 20% of target is considered to constitute a major deviation. Following is the format of Deviation Statement.

STATEMENT SHOWING DEVIATIONS FROM WORKING PLAN PRESCRIPTIONS

Year..... Division.....

Serial No. of deviation	Control book name, form no. Page	Reference to <i>working plan</i>		Nature of deviation requiring sanction
		Paragraph	Nature of Prescription	

133. The DFO will forward through the Territorial Circle In-Charge, typed copies of this form in triplicate yearly with his copy of control forms. No explanatory remarks are required on this form, but these should be given in the forwarding letter. All minor deviations, which do not permanently alter the basis of management, may be approved and sanctioned by the Head, Working Plan Organization on behalf of the PCCF provided he agrees with the necessity of these deviations. One copy of the statement will be returned to the DFO through the Territorial Circle In-Charge after the deviations have been sanctioned by the Head, Working Plan Organisation and the other copy will be sent to WPO for record. All major deviations without altering the basis of management, the prior sanction of the PCCF should have been obtained in advance; the sanction number and date should be quoted in the last column.

134. All deviations such as change in Silvicultural System; clear Felling of Natural Forest; formation of new Felling Series; large scale felling due to natural calamities, which cannot be adjusted against future yield, etc., which permanently alter the basis of management laid down in a *working plan*, will require prior sanction of the RCCF (Central), MoEF. For all major deviations with respect to prescriptions where sanction of central government is mandatory, an explanatory note along with request for regularization has to be sent by PCCF to RCCF (MoEF). In case where there is difference of opinion between the PCCF and RCCF (MoEF), the former will refer them to the DG (Forests) & Special Secretary, MoEF, Gol, whose decision shall be final in the matter. The PCCF will countersign the deviation statement for reporting to the Central government.



135. Registers and records: The following registers and records will be maintained by the division:

1. Compartment histories
2. Divisional notebook
3. Fire records
4. Register of boundary pillars
5. Plantation journals
6. Nursery register
7. Register of reserve
8. Register of right and concession
9. Record of forest produces harvested
10. Free grant
11. Register of leases
12. Register of land transferred to other departments
13. Register of soil and water conservation works
14. Register of rotational lopping
15. Grassland management
16. Wildlife management
17. Register of lantana eradication etc.,

## PREPARATION OF MICRO PLANS AND ECO-DEVELOPMENT PLANS

### 1.1 Guidelines issued by the MoEF, Govt. of India

As per the provisions of National Forest Policy 1988, the Government of India, vide letter No. 6.21/89-PP dated 1st June, 1990, outlined and conveyed to State Governments a framework for creating massive people's regeneration and development of degraded forest lands. In order to further strengthen the programme, the State Governments was suppose to take action on the following suggested guideline vide letter No. 22-8/2000-JFM (FPD) Dated: February 21, 2000.

#### 1.1.1 Preparation of microplan in JFM areas

In case of new working plans a JFM overlapping working circle should be provided to incorporate broad provisions for micro plans. To achieve these flexible guidelines should be evolved for preparation of local need based micro plans. For this purpose, the working plan officer will work in tandem with the territorial DFO and CF for finalization of the prescriptions of the JFM overlapping working circle. The micro plans should be prepared by the Forest Officers and Village Forest Protection Committees after detailed PRA exercise and should reflect the consumption and livelihood needs of the local communities as well as provisions for meeting the same sustainably. It should utilise locally available knowledge as well as aim to strengthen the local institution. It should also take into account marketing linkages for better return of NTFPs to the gatherers and should also reflect the needs of local industries market. This should be done with due regards to the environmental functions and productive potential of the forests and their carrying capacity as also their conservation and biodiversity values.

1.1.2 In areas the existing plans are in force (till their revision in future), for incorporation of micro plans in the working plans, a special order may be issued by the PCCFs for implementation of the micro plan should aim at ensuring a multi product and more NTFP oriented approach. Without changing the basic principles of silviculture, deviations may be approved in the existing working plans if necessary. To ensure this, the concerned DFO and CF should dovetail the requirements of micro plans with the working plans.

1.1.3 The micro plan should also take into consideration and provide suitable advice for areas planted/ to be planted on community lands and other Government lands outside the notified forest areas including in the district council areas of North East.

1.1.4 Infrastructure/ Eco-development under micro plan should form a separate entity for funding it through concerned development agencies.

### 1.2 Extension of JFM in good forest areas

This circular also envisages that the JFM programme should cover both the degraded as well as good forests (except the protected area network). The microplan or treatment plan and memorandum of understanding should be different for degraded forests and good forests (crown density above 40%). In good

forest areas, the JFM activities would concentrate on NTFP management and no alteration should be permitted in the basic silvicultural prescription prescribed in the Working Plan but to promote regeneration, development and sustainable harvesting of NTFP which can be given free or on concessional rates as per existing practice in degraded areas under JFM. The benefit sharing mechanism will also be different for the good forest areas. The JFM committees will be eligible for benefit sharing for timber, only if they have satisfactorily protected the good forests for a minimum period for timber, only if they have satisfactorily protected the good forests for a minimum period of at least 10 years and the sharing percentage should be kept limited to a maximum of 20% of the revenue from the final harvest. The felling of trees and harvesting of timber will be as per the provisions of the working plan. A certain percentage of revenue from final harvest should be ploughed back in the silviculture and management of the forests. The extent of good forest areas to be allowed will depend upon the number of village household and should be restricted to a maximum limit of 100 ha and generally limited to 2 km from the village boundary. For degraded forests also as far as possible JFM should be first concentrated on areas sup 5 km from the village boundary. The implementation of JFM in good forest areas shall be done in a phased manner on pilot basis. The pilot areas may be monitored closely for a few years and based on the feedback and success achieved the programme can be extended further in consultation with the Central Government. Before allowing the good forests on pilot basis, all the degraded forests of that locality should be covered simultaneously.

### **1.3 Relationship with Panchayats**

The relationship between panchayats and JFM Committees should be such that the JFM Committees take advantage of the administrative and financial position and organizational capacity of the panchayats for the management of the forest resources. However, the unique and separate non-political identity of the JFM Committees as 'guardian of forests' should be maintained and ensured. The benefits accrued from NTFP sales should be shared with all the members of the gram sabha including the JFM committees. In order to achieve a better coordination with Panchayat raj institutions, a committee may be constituted at the district level under the chairmanship of President, Zila Parishad and under Collector in those districts where the Zila Parishad is non-functional for the time being with the DFO acting as Convener and other district level officers as members.

### **1.4 Memorandum of Understanding (MOU)**

To ensure smooth working relationship between the forest department and the JFM Committees and also to bring in a sense of empowerment and accountability, a Memorandum of Understanding (MOU) should be signed between the forest department and the JFM committees outlining the short term and long term roles and responsibilities, implementation of work programme, pattern of sharing of usufructs and conflict resolution. In the MOU, JFM Committees should form the basic Forest Management Units to provide them a feeling of empowerment and enable them to effectively protect and conserve the forest resources. The MOU for each committee shall have location specific work programme based on site-vegetation profile and mutual understanding. The MOU should reflect the consumption and livelihood needs of the forest dependent communities, plan for restoration of vegetation and clearly spell out the roles, responsibilities and powers.

The MOU should define the procedure for necessary transparent accounting of all types of forest produce (seasonal, annual and periodical) accrued from the forests as per the working plans and micro plan prescriptions, financial accountability and distribution of sharing mechanism including ploughing back of revenue for the regeneration in terms of Government of India letter No.22-8/2000-JFM (FPD) dated 21st February, 2000. All JFM Committees should be assigned specific roles for boundary demarcation, fire prevention and control of grazing, encroachments and illicit felling as well as ensure sustainable non-destructive harvesting of NTFPs including medicinal plants and for this, the Committees should be given authority to act, monetary and other incentives as genuine stakeholders. A provision to assist the JFM Committees has been made under the Centrally Sponsored Plan Scheme 'Integrated Forest Protection Scheme'. Similar provisions should also be made in other State sector schemes. A GIS based map of the JFM area of the States along with village boundaries may be prepared every two years to monitor the performance and to ascertain the status of vegetation. Similarly, the socio-economic changes brought about by JFM should also be monitored by obtaining regular feedback from the committee members. The action programme should also be linked with the State Forestry Plan activities in order to make JFM integral to the overall forestry activities including afforestation on all types of lands. The MOU should also include planning and development of grasslands, other common lands, agro-forestry and water bodies as a reflection of peoples voluntary action for holistic land use planning and management. Agroforestry models developed in various states under different conditions should be studied and adopted.

## **2.1. PLANNING**

Preparing a micro plan for a village requires groundwork before actually taking up of collection of data. It is important for planners to know the village in details to understand the problems and available resources in the reference village. An in-depth understanding of issue, time spent in consulting local people to understand their needs and rational approach to their requirement are all very important in micro planning. The planning stage is important and can be divided into 3 steps

Step – I – Village identification

Step – II – Methodology

Step – III- Implementation

### **3.1 Village Identification**

3.1.1 **The village:** - Brief introduction of the village.

3.1.2 **The Micro plan:** - A brief description about the general understanding of the villagers and the frontline staff of micro plan.

3.1.3 **Details of the village:** - It will describe about all the natural / created resources of the village as well as requirements and the problems faced by villagers.

3.1.4 **Justification for selection of village:-** It will describe the reasons for selection of the village for program implementation.

3.1.5 **Methodology:-** It will deal with the Procedures for preparation of micro plan, and Modes of People's participation.

## **4.1 Methodology**

### **4.1.1 Description of the village**

This chapter will deal with the details of the village, such as: -

- (i) **Geographical / political location** :- This section will include the details of location of village
- (ii) **Communication facilities**:- This section will deal with the infrastructure for communication and transportation facility.
- (iii) **Natural and created Resources**: - It will deal with the available natural resource and other manmade structures created in the past for the villagers.
- (iv) **Climate**:-This will include the distribution of rainfall temperature and humidity condition of the villages.
- (v) **Population structure**: - This will deal with the details of male, female, employment rate child mortality etc.
- (vi) **Land use patterns**: - It will deal with the different types of land uses and their status.
- (vii) **Socio - Economic status**: - This will deal about the social setup, economic condition, land holdings their earnings and Livestock status etc.

The outcome of the above exercise will be accompanied by the preparation of (i) village map (ii) village social map (iii) village resource map.

#### 4.1.2 Activities

To prepare a micro plan, various steps are needed to be executed in a systematic manner and through an accepted methodology. The whole process can be accomplished in following steps.

- (i) **Secondary data**: - In the primary stage authentic secondary data of the village is collected through published or unpublished records. Published data are usually available in census reports, Panchayat records and from different government offices and unpublished data may be found in official reports, official records and in their communications.
- (ii) **Primary data**: - The collection of primary data will depend on kind of data. The primary data required for micro planning can be categorized into two broad categories
  - (a) Bio-physical data:-This includes biological and physical components of the village.
  - (b) Socio economic data: - This includes socio-cultural, political and economic components.
- (iii) **Data Analysis**: - The collected data is required to be processed and analyzed before being put to further use. The analysis means editing, coding computation, classification and tabulation of collected data so that it can be analyzed for rational conclusion and recommendations.
- (iv) **Recommendations**: - After the systematic and complete analysis of all the collected data, the recommendation are drawn for future management and developmental activities and these activities are listed and prioritized for implementation in the target village.

#### 5.1 Implementation

The recommendation given in the micro plan are to be implemented judiciously as per the availability of funds and importance of the activities, therefore, it is important to give details of the followings items in the micro plan.

- (i) **Budget**: - Based on the recommendation, various management activities which have been finalized needs funds for implementation. Therefore, it is

important to link the activities with the source of funding and available funds. The various activities should be prioritized as per the funds position.

- (ii) **Monitoring and Evaluation:** - This will deal with the indicators for continuous timely monitoring of the project and its evaluation, to keep the project on track.
- (iii) **Rights and responsibilities:** - The resources created and benefits accrued are needed to be rationally used by the stakeholders. Therefore it is important to clearly mention arrangements for access to resources and assets created and for this a written agreement between F.D. & Villagers is required, which will clearly state the obligation of both parties.

## 6.1 Eco-development of Areas outside the Adjoining Wildlife Areas

### 6.1.1 Impact of Wildlife areas on adjoining forests, villages and villagers

Here all outcomes of wildlife area declaration and their impacts on adjoining forests, villages and villagers should be mentioned. Following are the possible outcomes of wildlife area declaration.

- i. **Positive impact of Wildlife area on adjoining forests, villages and villagers:** This can include tangible benefits like employment, economic benefits due to tourism and resources, from the buffer zone as well as intangible benefits like cultural values and religious linkages, soil and water conservation and the environment.
- ii. **Negative impact of Human-wildlife conflicts:** This section should discuss all aspects of the problems caused by wildlife to village and villagers and their repercussions on the adjoining forests. This would include the wild animal species involved, number of people or extent of area affected, history and seasonality of the problem, extent of damage or loss and compensation patterns. Sketch maps can be used to show highly, moderately and mildly impacted villages/areas. The discussion would generally include the following:
  - a. Crop raiding
  - b. Cattle lifting
  - c. Death/injury to humans
  - d. Damage to property e.g., by elephants
- iii. **Impact of villagers on adjoining forests due to Wildlife area:** Here all forest dependencies/uses, both for self consumption and sale, have to be, discussed. This would cover both the qualitative and quantitative information about the following:
  - (a) Grazing/fodder collection
  - (b) Fuelwood collection
  - (c) Timber and small wood
  - (d) Thatching fencing materials
  - (e) Collection of NTFPs
  - (f) Other resources
- iv. **Forest dependent occupations:** Here all the occupations based on raw materials drawn from the forests, the number of families involved, various castes/ tribes involved, whether full time or part time, estimated incomes and seasonality of such occupations should be discussed.

- v. **Problem analysis:** This section would include the major problems and identification of the root causes of these problems. This should be done after a joint problem analysis exercise.
  - vi. **Strategies and activities to solve problems:** This section should contain various strategies to solve each problem. The strategies should also explain various other processes like generation of people's participation, ways to integrate the programs of other department/agencies, cost sharing between the people and the project authorities, fund raising mechanisms, awareness and environmental education, etc. From the strategies, should emerge different activities for each problem. Linkages with Panchayat should be made clear while deciding the strategies.
  - vii. **Feasibility analysis of proposed activities:** The proposed activities have to be tested for various feasibilities. This includes environmental feasibility, social feasibility, financial/market feasibility, technical feasibility as well as administrative/legal feasibility. The results of the feasibility analysis could be presented in the form of a table.
  - viii. **Agreed activities and their details:** This section would include the activities agreed upon after the feasibility analysis along with the man power requirement, intended beneficiaries and financial requirement for carrying out these activities (with unit costs). This section would also include cost sharing arrangements among the communities and project management/line agencies. Sometimes the contribution of the village communities may not be in financial terms, but in physical terms. This should also be clearly spelt out. The agreed responsibilities of the various line agencies if any, should also be laid down along with the activities and time frame. Ultimately, the entire micro plan can be presented in a simplified logical framework, so that all the problem, output, activities, monitoring indicators and assumptions can be seen clearly along with the linkages of these components, by the villagers.
  - ix. **Annual physical and financial targets:** This section would be the gist of year wise physical and financial targets for the period. This should also mention about the amount of common fund expected from these activities and the strategies to manage and enhance this common fund.
  - x. **Monitoring and evaluation:** This will give details about different indicators which will be monitored to see if the program is going on in the right direction. This will also clearly mention who will be responsible for monitoring, what will be monitored, where it will be monitored and how frequently it will be monitored. Evaluation, however, will be an external process, carried out generally by a team identified by the wildlife Management.
- For the successful implementation of the micro plan, two supporting components are important which are
- a) Capacity building – the JFC members may be knew to many of the responsibilities they will be undertaking and will required training and other forms of capacity building before they can take independent charge of resource development and livelihood improvement activities.
  - b) Institutional development - For systematic execution of the plan, there will be need for proper management through JFMC, therefore, institutions required strengthening and attention to how it systems are designed and its functions carried out.

## PLOT APPROACH FORM

Name of Division

(DD/MM/YYYY)

S. No	Heading	Description
1	Range	Name of the Range.
2	Block and or Beat	Name of the Block and or Beat.
3	Comptt.	Compartment No. or name of Village or any Management Unit in practice.
4	Grid and Sub Grid	The grids of 1` 15``X 1` 15`` and sub grids of 25``X 25`` are conveniently serial numbered for each compartment or Village or any Management Unit in practice.
5	LAT.	Using GPS Plot (sub grid) centre is located and latitude recorded.
6	LONG.	Using GPS Plot (sub grid) centre is located and longitude recorded.
7	Journey/Approach to the plot	All the details of journey by vehicle and on foot including the lats and longs of various places or prominent reference points and the distances in between these places or prominent reference points will be recorded sequentially so that the plot can be revisited easily in future.
8	Ocular Stock Assessment	While approaching the plot general assessment of the forest crop and stock is done ocularly and mapping of the same is done accordingly.
9	General observational information	information on tract, configuration of the ground, aspect, slope and drainage; geology, rock, soil and water resources; under wood – proportion of species, density; undergrowth – climbers, weeds, grasses, regeneration of principal species; mention of important herbs, shrubs medicinal and aromatic plants (MAP); bamboo and rattans; NWFP yielding species; intensity of invasive species; flagship faunal species, their special habitats and their interface with humans, biotic factors, drivers of forest degradation; resource utilization; dependence of local people on forest; and their social, cultural and spiritual aspects etc. may be observed and noted.
10	Conspicuous features	Brief description of conspicuous features pertaining to the terrain and forest like grassy patches, scattered trees, plantations raised etc. observed during the journey by vehicle to the Plot (sub grid) are recorded so as to make use of the same while writing the description of the compartment.
11	Removal of fuel wood and fodder	Estimating number of head loads of fuelwood and fodder and their quantity



**PLOT DESCRIPTION FORM**

A separate description form will be filled up for every Plot of 0.1 ha for various parameters pertaining to the Plot including location, land use, topography, aspect, rock, soil, crop, regeneration, fire, grazing etc. and qualitatively described.

Name of Division:

DD/MM/YYYY:

S. No	Description	Remarks
1	Range	Name of the Range.
2	Block and or Beat	Name of the Block and or Beat.
3	Comptt.	Compartment No. or name of Village or any Management Unit in practice.
4	Grid and Sub Grid	The grids of 1` 15``X 1` 15`` and sub grids of 25``X 25`` are conveniently serial numbered for each compartment or name of Village or any Management Unit in practice.
5	LAT.	Using GPS Plot (sub grid) centre is located and latitude recorded.
6	LONG.	Using GPS Plot (sub grid) centre is located and longitude recorded.
7	ALT.	Altitude of plot centre is measured and recorded in meters.
8	Legal status	Legal status of the forest may be as reserve forest, protected forest, un-classed forest, national park, private forest, private land with tree owned by Government and undetermined.
9	Land Use	The land use type of the plot may be categorized as , closed forests, dense forest, open forests, scrub, bamboo brakes, shifting cultivation, young plantations of forestry species, tree in line, forest roads, grass lands, barren, agricultural land without trees in surround, agricultural land with trees in surround, non forestry plantations, habitation, water bodies.
10	General Topography	The topography of the area around the centre of the plot may be determined from the toposheets and the same may be confirmed by field observation. It may be categorized as flat, gently rolling, hilly, and very hilly.
11	Slope	By standing at the centre of the plot the average slope of the area may be measured and recorded as up to 3°, 4°-15°, 16°-40°, 41° and above respectively.
12	Aspect	The direction of the slope may be recorded as Northern, North-Eastern, Eastern, South-Eastern, Southern, South-Western, Western, North- Western and no aspect.
13	Rock & geology	Type of rock including alluvial deposits
14	Soil Data	Mention of texture, depth, permeability
15	Soil Erosion	Heavy/ Moderate/ Mild/ No erosion
16	Crop Composition	Mention of major tree spp. predominant in the Plot and extent of their representation in terms of percentage may

		be made.
17	Regeneration status	Regeneration status may be observed and recorded as Adequate/ Moderate/Poor/Absent for major tree spp.
18	Injury/ Damage to crop, if any	Insect attack, fungal infestation, leaf defoliator, top drying, girdling, scarring, lopping, damage by natural calamities/ wildlife/fire may be observed assessed and recorded.
19	Grazing incidence	Depending upon the pressure of grazing exerted on the forest by live stock the incidence of grazing may be categorized Heavy/ Moderate/ Light/ None.
20	Presence of Bamboos	If yes, brief description of Bamboo density, Bamboo quality, Bamboo regeneration and Bamboo description may be made.
21	Presence of grasses	Ground cover on an area of about 2 ha around the Plot (sub grid) centre may be intensively observed to classify the area for grasses as very dense, dense, moderate, scanty and absent.
22	Presence of Weeds	Ground cover on an area of about 2 ha around the Plot (sub grid) centre may be intensively observed to classify the area for presence of weeds as very dense, dense, moderate, scanty and absent.
23	Plantation status	If a plantation is in a existence in a Plot (sub grid ) area fully or partially, the details of the plantation with regard to its area, year of plantation, species, spacing, general growth conditions, average crop diameter, any specific events or happenings related to plantations may be observed, assessed and recorded.
24	water bodies	Name, Type, Extent, Seasonality of the water body may be explored and recorded. Pottability i.e. safe enough for drinking has to be ascertained.
25	Drivers of degradation	<b>Biotic:</b> Brief account of degradation sources may be given and on the basis of various factors of degradation like grazing, browsing, fire, lopping, girdling, illicit felling, mining, encroachment etc. the intensity of degradation may be categorized as heavily degraded, moderately degraded, mildly degraded and not degraded. <b>Natural calamities:</b> Degradation due to calamities such as landslides, avalanches, floods, frost, cyclones, droughts may be categorized as heavily degraded, moderately degraded, mildly degraded and no calamities.
26	Faunal sighting, if any	The flagship species including mammals, birds, reptiles, amphibians, plants etc which may be very significant to the area may be identified. Suitable habitats and micro-habitats for such key faunal species may be identified and recorded so as to prescribe appropriate measures needed to conserve and improve.
27	Faunal Traces of flagship spp.	The entire 2 ha area around the centre of plot (sub grid) may be scanned for any faunal traces of flagship species. If found the details of the same may be observed and recorded.

**PLOT ENUMERATION FORM – A. (31.62m X 31.62m Plot)**

This form is used to record data of all the trees and bamboos measured in the sample plots of 0.1 ha. Separate form will be used for each of the sample plot. All trees with 10cm and above diameter at breast height are measured and recorded. Diameter of bamboo clumps will be measured at its base.

Compartment No..... Block /Village .....

Beat ..... Range ..... Division.....

Grid No..... Sub Grid No. .... (DD/MM/YYYY)

LAT..... LONG..... ALT.....

S. No	Species Name	Local Name	DBH (OB) in cm	Height of selected dominant trees	Remarks, if any, about the tree condition

**PLOT ENUMERATION FORM – B. (3m X 3m Plots)**

This form is used to record data of all shrubs and saplings measured in the 3m X 3m quadrants. Separate form will be used for each of the quadrant. All individuals with 2 to 9.9 cm collar diameter at the base will be measured and recorded.

S. No	Species Name	Local Name	Collar Dia at base in cm	NTFP utility		Remarks, if any, about the condition of shrub vegetation
				Part of the Plant body	Approx. Weight and or no.	

**PLOT ENUMERATION FORM – C. (1m X 1m Plots)**

This form is used to record data of all the herbs including medicinal and aromatic plants counted in the 1m X 1m quadrants. Separate form will be used for each of the quadrant. All individuals below 2 cm collar diameter at the base, will be measured and recorded.

S. No	Species Name	Local Name	NTFP utility		Remarks, if any, about the condition of herbal vegetation
			Part of the Plant body	Approx. Weight and or no.	

Information collected in Plot Approach Form and Plot Description Form along with Compartment History may be used to update information under different subheads.