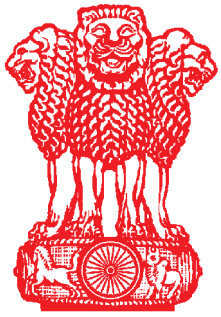

सत्यमेव जयते

National Working Plan Code - 2014

(For Sustainable Management of Forests and Biodiversity in India)

जहाँ है हरियाली ।
वहाँ है खुशहाली ।।

Ministry of Environment and Forests
Government of India
New Delhi

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DIG (SU)
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Paryavaran Bhawan,
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New Delhi- 110003

Published by:

Forest Research Institute , Dehradun
(Indian Council of Forestry Research & Education)
Ministry of Environment & Forests
Government of India

March 2014

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ABBREVIATIONS

ACF	Assistant Conservator of Forests
APCCF	Additional Principal Chief Conservator of Forests
AR/ANR	Artificial Regeneration/Aided Natural Regeneration
BCD	Biodiversity Conservation and Development
CAMPA	Compensatory Afforestation fund Management and Planning Authority
CASFoS	Central Academy for State Forest Service
CCF	Chief Conservator of Forests
CF	Conservator of Forests
DBH	Diameter at Breast Height
DCF	Deputy Conservator of Forests
DFO	Divisional Forest Officer
DGF & SS	Director General of Forests and Special Secretary
DSMs	Defence Series Maps
EC	Environmental Clearance
FC	Forest Clearance
FCA	Forest Conservation Act
FDA	Forest Development Agency
FRA	Forest Rights Act
FRH	Forest Rest House
FSI	Forest Survey of India
GCS	Geographic Co-ordination System
GHGs	Green House Gases
GIM	Green India Mission
GIS	Geographic Information System
GPS	Global Positioning System
HoD	Head of Department
HoFF	Head of Forest Force
ICFRE	Indian Council of Forestry Research and Education
IGNFA	Indira Gandhi National Forest Academy
IIFM	Indian Institute of Forest Management
ITRF	International Terrestrial Reference Frame
IUCN	International Union for Conservation of Nature
IVI	Importance Value Index
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
LULUCF	Land Use and Land Use Change and Forestry
MAI	Mean Annual Increment
MAPs	Medicinal and Aromatic Plants
MAR	Monitoring Assessment and Reporting
MEF	Minister of Environment and Forests

MIS	Management and Information System
MODIS	Moderate-resolution Imaging Spectroradiometer
MoEF	Ministry of Environment and Forests
MoU	Memorandum of Understanding
MRV	Measuring Reporting and Verification
NFI	National Forest Inventory of India
NRSC	National Remote Sensing Centre
NTCA	National Tiger Conservation Authority
OSMs	Open Series Maps
PA	Protected Area
PBRs	Peoples Biodiversity Registers
PCCF	Principal Chief Conservator of Forests
PESA	Panchayats (Extension to Scheduled Areas) Act
PF	Protected Forests
PRA	Participatory Rural Appraisal
PWPR	Preliminary Working Plan Report
RAPCCF	Regional Additional Principal Chief Conservator of Forests
RBA	Relative Basal Area
RBAFs	Relative Basal Area Frequencies
RD	Relative Density
REDD	Reducing Emissions from Deforestation and Forest Degradation
RET	Rare, Endangered and Threatened
RF	Reserve Forests
RFO	Range Forest Officer
SFDs	State Forest Departments
SFM	Sustainable Forest Management
SOI	Survey of India
TOF	Trees Outside Forests
UF	Unclassified Forests
UNFCCC	United Nations Framework Convention on Climate Change
WGS	World Geodetic Survey
WII	Wildlife Institute of India
WLS	Wildlife Sanctuary
WP	Working Plan
WPO	Working Plan Officer
WPU	Working Plan Unit

ACKNOWLEDGEMENTS

National Working Plan Code 2014 is the outcome of the project, 'Revision of National Working Plan Code 2004' assigned to the Forest Research Institute (FRI), Dehradun by the Ministry of Environment and Forests, Government of India. The Code was developed over a five-year period by involving as many organisations and individuals as possible. Forest Research Institute followed a multistage stakeholder consultation approach for revision of the code which included synthesis of working group reports, organization of consultative meetings and regional level workshops for seeking suggestions and comments from state forest departments (SFDs), non government organisations (NGOs), national institutes, academicians, foresters, researchers and other stakeholders. Draft National Working Plan Code was developed by FRI in 2012. The contributions of all of those who took part in the consultation process in producing the draft code and of those who made submissions at various stages of its development are appreciatively acknowledged. Draft code (FRI, 2012) was submitted to the then Director General of Forests and Special Secretary (DGF&SS), Ministry of Environment and Forests (MoEF) Dr P.J. Dilip Kumar and he decided on the following procedure for adoption of new code:

1. Copies of the draft code to be sent to HoFFs in all States/UTs for submitting their comments.
2. A workshop of all PCCFs/HoDs (preferably at Delhi for ease of travel and accommodation) to finalise the Code.
3. Approval of MEF and release of final version in printed form.

The draft code (FRI, 2012)was circulated to the States/UTs and national organizations like Forest Survey of India (FSI), Indira Gandhi National Forest Academy (IGNFA), Wlidlife Institute of India (WII), Indian Institute of Forest Management (IIFM), National Biodiversity Authority (NBA), Planning Commission, etc. for their comments. The comments thus received from the States/UTs were discussed and deliberated upon in the national workshop held in Paryavaran Bhawan, MoEF, New Delhi on 16th May, 2013. The national workshop was chaired by the then DGF&SS, MoEF, Sri K. Jude Sekar and was well attended by over 60 participants from across the country covering almost all the HoFFs of the States/UTs and /or their representatives and representatives of various premier forestry institutions of the country. His contribution is gratefully acknowledged for chairing the national workshop and leading the participants to arrive at a consensus on the contents of the code. The participation of the HoFFs/PCCFs and/or their representatives from Andhra Pradesh, Andaman and Nicobar Islands, Arunachal Pradesh, Assam, Chhattisgarh, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Delhi, Goa, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal; representatives from MoEF, FSI, IGNFA, FRI, IIFM and others is thankfully acknowledged. Their valuable comments/suggestions helped in finalising this Code.

The contributions of the following individuals/organisations are also appreciatively acknowledged:

- Shri. A. K. Mukerji, Ex-DGF&SS, for his continuous guidance as Chairman, National Team for Revision of National Working Plan Code – 2004, successfully conducting all the meetings and reviewing the drafts at every stage.
- Dr. S.S.Negi, former Director, FRI, and Shri. S Singhal, former Head RS & M Division for their efforts and contributions in the initial phase of this task.
- Dr. P.P. Bhojvaid, Director, FRI, for successfully leading the project team to accomplish the task of revision of the code.

- Shri. M.P. Singh, *Principal Investigator (P.I)* of the project 'Revision of National Working Plan Code 2004' and Head, Climate Change and Forest Influence Division, FRI, for his efforts in continuously evolving the draft versions of the code to include all important aspects related to forest management planning in the country and giving shape to the final version of the National Working Plan Code-2014 for sustainable management of forests and biodiversity in India.
- Shri. S.R. Reddy, *Co-P.I.* of the project and DCF, RS&M Division, scientists and office staff of RS&M Division, FRI, for their relentless efforts in successfully organising the workshops across the country and also for their dedicated support in evolving the draft versions of the National Working Plan Code-2014.
- Forest Survey of India, Dehradun and its centres; and Shri. A.K. Wahal, former DG, FSI, and Shri. Rajesh Kumar, Senior Deputy Director, FSI, Dehradun, for giving inputs to the Annexure I and II on geospatial database and forest resource assessment methodology.
- Mr. Tasneem Ahmad, former PCCF, Production & Management, Govt. of Maharashtra, Nagpur, for providing valuable inputs for Annexure III about the conventional signs, symbols and colours for stock mapping.
- Wildlife Institute of India, Dehradun, for providing the draft of Annexure IV on preparation of micro-plans and eco-development plans.
- Indian Institute of Forest Management, Bhopal, for sharing the initial draft report on pilot testing of Criteria and Indicators (C&I) related to sustainable forest management in natural forests for finalizing Annexure V.
- Indira Gandhi National Forest Academy, Dehradun and National Biodiversity Authority, Chennai, for facilitating discussion on the draft code in the Brain Storming Workshop held on 23rd Feb, 2013, in Dehradun.
- Indian council of Forestry Research and Education (ICFRE) and its institutes; and all officers/scientists for their inputs during the development of the Code.
- Forest Research Institute, Dehradun; and its scientists/officers for their inputs during the project period.
- Ministry of Environment and Forests and its regional offices for providing support and suggestions during the entire task.

It is pertinent to gratefully acknowledge the contributions of Dr. S.S. Garbyal, DGF&SS, Shri. A.K. Srivastava, ADG (Forest Conservation), Smt. Rekha Pai, IGF (EAP) and Shri. Ashok Kumar, DIG (SU) from Ministry of Environment and Forests for their invaluable guidance in successful accomplishment of this task and also getting the Code adopted in the country from 1st April 2014 with approval from Hon'ble Minister of Environment and Forests, Government of India.

PREAMBLE

To sustainably manage, conserve and utilize the forest resources and to bring uniformity in forest management planning across the country, Ministry of Environment and Forests, Government of India adopted a uniform code, the National Working Plan Code in 2004. However, in recent years there has been a paradigm shift in the approach to the forestry sector nationally and internationally. The focus has shifted to environmental stability, biodiversity monitoring and management, restoration of ecological balance of the disturbed areas, protective functions of the forest resources and other socio-economic benefits based on non-timber forest products (NTFPs).

The concept of sustainability in forest management thus implies not only sustainability of productive functions but also environmental functions (soil and water conservation, carbon sequestration etc.) and socio-economic benefits (meeting livelihood and basic needs) to forest dwellers and other forest dependent communities. Involvement of forest fringe communities in the protection and management of forest resources through micro-plans and eco-development plans has become imperative and must find linkages to the working plan.

Provisions have thus been made to integrate aspects of forest management, which are considered important for assessing sustainability, accompanied by a set of related quantitative, qualitative or descriptive attributes. These attributes when measured or assessed periodically, indicate the direction of change for each aspect of sustainable management of forests. This may also facilitate assessment of forest management under different forest certification schemes.

It has also been recognized that climate change phenomenon seriously affects and alters the distribution, type, composition, quality and mitigation potential of forests of the country especially in the realm of anthropogenic stressors. Working plan preparations also need to capitalize on the gains of technological advancements like remote sensing, GIS, GPS, computational and analytical systems available for real time monitoring of forest dynamics.

In the light of the above it has become necessary to review and revise the National Working Plan Code - 2004. The revised code is called "National Working Plan Code – 2014" for sustainable management of forests and biodiversity in India, to be enforced from 01-04-2014. The preparation of working plans, whose Preliminary Working Plan Reports (PWPR) are already approved before 01-04-2014 may be continued as per the proviso of National Working Plan Code - 2004.

CHAPTER I

GENERAL

1. Working Plan has been the main instrument of forest planning (more exactly forest working) in the country for scientific management of forests. It is a very useful document for evaluating the status of forests and biodiversity resources of a forest division, assessing the impact of past management practices and deciding about suitable management interventions for future. Periodical up-dating and revision of working plan is essential to keep pace with the trends emerging out of forest–people interface and to address national and international obligations. Brief historical reference of planned working of forests in India may be counted as under;

   i. The first planned working of forests in the country was crafted in 1837 by Mr. U. V. Munro, the then Superintendent of Forests in Travancore. On the basis of his personal observation and long experience of working in the woods he estimated that about 100,000 trees of teak were fit to be felled. Later in 1856, Dr. Dietrich Brandis propounded the fundamental principle that the first class trees (trees over a prescribed diameter) to be felled in a year should be restricted to the growing stock of the second class trees that will eventually replace them in that year. Based on this principle of yield control, he prepared the first forest management plan using strip sampling for the Pegu Yoma Forests of Myanmar in the year 1860.

   ii. When the Forest Department was decentralised in 1882, it caused a major setback to the progress of working plans. However in 1884, the diligent efforts of Sir Wilhelm Schlich, Inspector General of Forests, resulted in a country wide unified approach towards the preparation of working plans and scientific management of forests as per prescription of working plans. The experience so gained in the past led W.E. D'arcy to bring out his treatise “Preparation of Forest Working-Plans in India” (1891), providing guidelines for systematic working plan preparations.

   iii. From 1906, the work of checking working plans was entrusted to the Superintendent of Working Plans stationed at Forest Research Institute, Dehradun. It is from this time the working plans in our country reached the stage of academic discussions based on research undertaken in the institutional forum. Working plan officers based their prescriptions on more definite information about the silvicultural characters of most of the important tree species, techniques of obtaining their regeneration and their probable response to the main silvicultural treatments. However, central control was once again lost in 1935 and felling of forests was carried out in total disregard to the working plan prescriptions.

   iv. After India became independent in 1947, the forest department undertook big drives to recover substantial areas under the working plans. For the next half a century, the state/provincial governments adopted their own provincial working plan codes. As per regional requirements, provincial working plan codes were adopted in different states of the country. However with the intervention of Hon. Supreme Court of India in 1996, it was clarified that all working plans were to be approved by the Central Government on account of forests being brought in the concurrent list. The Ministry of Environment and Forests (MoEF), Govt. of India then adopted a uniform code, the National Working Plan Code - 2004 for preparation of working plans for the management of forests under the prescriptions of a working plan/scheme to standardize the procedure. The working plan facilitates monitoring, evaluation and impact assessment of forest management practices being followed in the country.

2. Preparation of working plan is a highly technical exercise under taken at regular interval in each forest division. The preparation of the working plan is based on stock and vegetation maps which is prepared through ground surveys. Recently, the use of modern tools like remote sensing, GIS and GPS is being utilized for preparing the forest cover maps of forest divisions. Every working plan includes the area specific scientific prescriptions for proper management of forests of a particular forest division, while 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. These prescriptions enable necessary co-existence of development with nature for simultaneous implementation of Indian Forest Act, 1927, Wildlife (Protection) Act, 1972, Forest Conservation Act, 1980, Panchayats (Extension to the Scheduled Areas) Act, 1996 (PESA), Biological Diversity Act, 2002, and Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006; and meeting the requirements of the objectives of the National Forest Policy and other international conventions/agreements.

3. All forests are to be sustainably managed under the prescriptions of a working plan/scheme. The National Forest Policy clearly states "No forest should be permitted to be worked without an approved working plan by the competent authority". 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 MoEF, will approve the working plan and ensure its implementation. Even working schemes have all major elements of a working plan and these schemes also need the sanction of the competent authority.

4. There has been a paradigm shift in the objectives of management of forests and forest management has become more people centric and oriented to provide the goods and services from forests on sustained basis, with an emphasis on ecological services and harvest of usufructs as well. The working plan should be in consonance with general planning, which is village based. Therefore the working plan should encompass the village as a unit and realign the compartments accordingly. Proper guidelines for sustainable use of community forests; extraction, processing, market and trade of minor forest produce, etc. may be provided under separate working circles. 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, 2006, can be exercised within the framework of sustainable use. On the other hand, management of forests adversely affected by mining, industries, urbanisation and other non-forest activities is also of great challenge for which special planning initiatives are needed.

5. For involvement and benefit of local stakeholders, micro plans are to be prepared within the ambit of working plan prescriptions for Joint Forest Management (JFM) areas and eco development plans are to be prepared for eco-sensitive forest areas adjoining the notified protected areas. The microplan of jointly managed forests is prepared by the members of the Joint Forest Management Committee (JFMC), through Participatory Rural Appraisal (PRA), with the technical assistance of forest staff of the territorial division as per MoU, for sharing the responsibilities of implementation and equitable sharing of usufructs among the stakeholders within the broad prescriptions of working plan. Micro plan is approved by concerned Working Plan Officer (WPO)/Divisional Forest Officer (DFO)/Forest Development Agency (FDA) as per prevailing conditions in the state/UT. Proper implementation of the micro plan by each JFMC should be reviewed at least once in two years by the Forest Development Agency (FDA).

CHAPTER II

OBJECTIVES AND OTHER ESSENTIALS OF FOREST MANAGEMENT PLANNING

OBJECTIVES OF FOREST MANAGEMENT PLANNING

6. Forest Management Planning must provide for sustainable management of forests and its biodiversity as enshrined in the National Forest Policy, encompassing the ecological (environmental), economic (production) and social (including cultural) dimensions. The objectives for attaining this goal include conservation of forests and reducing forest degradation, maintenance and enhancement of ecosystem services including ecotourism, enhancement of forest productivity together with establishment of regeneration to improve forest health and vitality as per ecological and silvicultural requirements of the species, progressively increasing the growing stock and carbon sequestration potential, maintenance of biological diversity, sustainable yield of forest produce, prevention of soil erosion and stabilization of the terrain; improvement and regulation of hydrological regime; people's involvement in planning and management of forests fulfilling socio-economic and livelihood needs of the people, albeit with simultaneous implementation of Indian Forest Act, Wildlife (Protection)Act, Forest Conservation Act, Biological Diversity Act, PESA Act and Forest Rights Act. All these entail that the specific composition and the structure of forests must harmonise with the environment of the locality.

BIODIVERSITY CONSERVATION AND DEVELOPMENT

7. Forests provide habitat for many plant and faunal species. The contribution of individual species to the overall diversity within a community or ecosystem varies to a great extent. The coexistence of organisms that differ widely from each other contributes more to overall diversity than the co-existence of very similar species. Functional diversity is considered to be one of the main factors determining the long-term stability of an ecosystem and its ability to recover from major disturbances. Assessment of status of plant and faunal species and their periodic monitoring can be helpful in formulating strategies for conservation, maintenance and enhancement of overall biodiversity through sustainable management and use practices. Assessment of biodiversity especially the lower forms of life (algae, fungi, lichens, epiphytes, parasites, etc.) of a forest division must be made an on-going programme with the support from State Biodiversity Board as it may be difficult for the working plan officer (WPO) to do it within two years, the normal time allotted for writing the plan. All these assessments will help in updating and enriching the People's Biodiversity Registers (PBRs) as provided in Biodiversity Act, 2002.

JOINT FOREST MANAGEMENT

8. 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 a memorandum of understanding (MoU) between the two. The management of the jointly managed forests is done through the provisions of a micro-plan prepared by the community on participatory rural appraisal (PRA) basis with the technical help of the officials of the forest department. Micro-planning should be done in conformity with the overall working plan prescriptions of the forest division and may be reviewed by working plan wing of the state forest department. Approval of JFM micro-plan from MoEF 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 Office (MoEF).The latest directives issued by the MoEF /State Government for preparation of micro plans should be

incorporated in the JFM overlapping working circle. The compartments falling within any JFM may have to be realigned/ subdivided to keep them within the respective JFM/village boundary. Analysis of implementation of JFM programme, grading of JFMC, award winning JFMC, women's participation, etc. should be provided in the working plans. It should be made necessary to assess the dependence of villagers on the forests for their livelihood needs. Field works like socio-economic survey including NTFP survey, problems of grazing and firewood needs should be analysed carefully before making prescriptions for JFM. The activities related to JFM during the past working plan period along with results and comments over the results should be included in the preliminary working plan report (PWPR) along with supporting data.

COMMUNITY FOREST MANAGEMENT

9. Forest community rights related to use of community forest resources like minor forest produce, grazing grounds, water bodies, etc. recognized under the provisions of the Forest Rights Act 2006 or any other State Act/Rule (e.g. Van Panchayats in Uttarakhand), can be exercised within the frame of sustainable management. The term "sustainable use" given in section 2(n) of the Forest Rights Act, shall have the same meaning as defined under section 2(o) of the Bio-Diversity Act, 2002. As per section 2(o) of Biodiversity Act, "sustainable use means the use of components of biological diversity in such a manner and at such a 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". Details of existing rights are to be provided so as to assess their sustainability, reasoning for their continuity and enhancement of productivity. Therefore, special efforts in the form of good practice guidance, capacity building, orientation, provision of incentives for the exercise of rights would need to be provided not only for preparation of working plans of such community forests but also for creation of various working circles as per the prevailing conditions of the division to maintain the sustainability of these forests. This will also facilitate Gram Sabha to monitor the working of the committee constituted under clause 4 (e) of Forest Rights Rules 2012, which shall prepare a conservation and management plan for community forest resources in order to sustainably and equitably manage such community forest resources for the benefit of forest dwelling scheduled tribes and other traditional forest dwellers and integrate such conservation and management plan with the micro plans or management plans of the forests.

FRINGE FOREST MANAGEMENT

10. 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 fringes depend heavily on the forest for their fuel wood and fodder needs. In rural households, fuel wood is used for cooking as well as for heating water and household heating, more so in the hilly regions. The dependence of villagers' is heavy because commercial sources of energy are not easily available due to varied reasons. Non-timber forest products (NTFPs), referred to, in the system of national income accounts, as minor forest products are source of livelihood and food security for a large number of rural communities living in and around forests. They are important to rural households in terms of their contribution to health, food, energy and other aspects of rural welfare. The importance of management of the fringe forest lies in the fact that if properly managed, it can arrest people's entry into the forest by catering to their needs at the fringe only, thereby sparing the forest from the biotic pressure that has the potential to cause irreparable damage to the forest biodiversity and eco-system services. Forest fringe villages have been a major cause of forest fires due to increased dependency of people on forests as stated above, thus causing the forest more vulnerable in terms of fire. Alternatives may be discovered to reduce the dependency of people on forests residing in fringe forests.

WATER RESOURCES MANAGEMENT

11. The forests are also sources of water (surface, sub-surface and ground water). Over exploitation of the ground water resources results in declining ground water levels; there is an urgent need to augment the ground water resources through suitable management interventions. It is desirable to have forest management practices dovetailed with the principles of watershed based development approach especially in the source areas of water. Such areas should have restrictions on tree felling but there should be operations to improve the water regimes and natural regeneration. As such, special provisions should be made in the working plan to sustain water resources and livelihood issues of the people living in and around natural inland water sources.

SOIL AND WATER CONSERVATION

12. Heavy rains and rapid run-off severely affect not only the top fertile soil but leads to formation of gullies within forest areas. Suitable management imperatives need to be formulated to stop forest degradation due to natural causes and calamities. Apart from silvicultural operations, it is also necessary to make appropriate prescriptions for conservation of soil and water in the forest areas. Areas susceptible to soil erosion such as steep slopes and areas in the vicinity of perennial streams, etc. should be focussed for soil and water conservation interventions with the provision of an overlapping working circle.

FOREST HEALTH AND DISEASES

13. The pests significant to the Indian forests in the recent past are the sal borer, leaf gall of *Eucalyptus*, shisham mortality, etc. Interestingly, these pest phenomena cover both natural forests as well as plantations. Based on generalized symptoms (spots, wilt, etc.) and signs (mushroom like fruiting bodies); nature of pathogen- whether fungi, bacteria, nematode, plant parasite, etc.; pathogen survival especially in relation to weeds; photographic documentation of the problem and their confirmation through internet sources and expert advice; mapping of disease distribution may be done. Such details are very vital for timely diagnosis and effective management of the problem. Role of silvicultural practices that can reduce the pest problem; knowledge of species phenology to collect healthy seeds from the trees before they fall off on forest floor; scientific felling to reduce the standing tree damage as injury serves as an infection court for many heart rots, etc.; nutrient status of the soil governing the susceptibility/resistance of the host in many cases; identification and selection of superior individuals also as a source for resistance against the disease; identification and evaluation of lesser known species (and weeds) of an area for their biochemical profiling including bio-pesticide properties, etc. can be an effective, eco-friendly, economical and easily available source for pest/disease management.

FOREST FIRES AND PROTECTION

14. Forest fires are as old as the forests themselves. They sometime pose serious threat to the biodiversity and ecology. Forest fires have environmental impact in terms of tropical biomass burning, which produce large amount of trace gases, aerosol particles, and play a pivotal role in troposphere chemistry and climate aberrations. Thus, there is a need to carry out fire frequency and burnt area mapping for fire vulnerability on one hand and operational fire monitoring in real time/near real time for effective response on the other. Real time monitoring of forest fires is being carried out by FSI using MODIS sensor fire alerts on-board two of the satellites - Terra and Aqua. The processed signals on forest hot-spots are being transmitted to SFDs on regular basis during fire season. Hence real time monitoring of forest fires is a process now in operation to curtail fire severity and sensitize SFDs at operational level to prevent normal fires in getting converted into wild fires. The online feedbacks on forest fires which are a part of this system could help estimate the actual loss of forest strata as well as the loss caused to top-soil.

FORESTS AND CLIMATE CHANGE

15. Climate is an active factor in the physical environment of all living things. Climate change and variability are impacting forest ecosystem processes and functioning. Response time of forest ecosystems to disturbances ranges from a very short duration to decades and even centuries, depending on the condition of the system and the type, intensity and duration of the external stimuli. The actual state of forest ecosystem largely depends on processes and practices of the past. Therefore, forests are extremely complex to understand their functioning. Climate change further magnifies those complexities and adds more uncertainties. Forests are linked to climate change in three ways; i) they are source of greenhouse gas (GHG) emissions; ii) they offer mitigation opportunities to stabilize GHG concentrations; iii) they are impacted by climate change. Impacts of climate change on forest ecosystem are getting manifested as species range shifts, changing biodiversity, physiological changes in plant life cycles, forest growth pattern of species, changing boundaries of ecosystems and other biotic and abiotic responses/ stresses. There are evidences of increase in the frequency and severity of forest fires, changing water regimes and expanding forest insect infestation. Since forest ecosystems operate on large temporal scales, long observational studies are necessary to identify the key changes. Accordingly grid based sampling is designed to provide relevant information to cover the characteristic time scales.

CARBON SEQUESTRATION AND MITIGATION

16. 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 form of wood and wood products. Sustainably grown and harvested wood (and other biomass) also provides a renewable alternative to fossil fuels and enhance carbon storage. Enhanced carbon sequestration through recognised and innovative silvicultural practices, eco-restoration of degraded/mined out forestlands, improved biomass productivity, etc. will help in improving forest health and vitality. Forest soil must be kept healthy and fertile. The growth of forest crops must be kept vigorous to attain the most desirable level of biomass production within an optimal time scale.

REDD+

17. REDD stands for reducing emissions from deforestation and forest degradation. REDD+ (Plus) includes forest conservation, sustainable management of forests and enhancement of carbon stocks, and has been adopted by the United Nations Framework Convention on Climate Change (UNFCCC) as a tool for climate change mitigation. Deforestation happens when forests are cleared and such land is put to other than forest land use. Forest degradation implies a gradual depletion of forests driven by demand for biomass and disturbances like fire and soil erosion, which, result in dwindling carbon density and ultimately leading to complete loss of forests. Implementation of REDD+, therefore requires efforts/mechanisms to measure forest carbon, interventions and payments to local people in addition to alternative activities such as fodder development to avoid lopping of tree branches, efficient cooking energy devices, etc.

APPLICATION OF MODERN TECHNOLOGIES

18. Geomatics (Remote sensing, GIS and GPS) has got a wide range of applications in forest management. One can find application of geomatics in almost every forest management practice e.g. forest cover mapping in different canopy density classes, change detection (degradation as well as improvement), forest fire detection, burnt area mapping, biodiversity mapping, afforestation planning, wildlife habitat suitability mapping, boundary demarcation,

encroachment mapping and so on. For many of these applications, there are no practical alternatives to geomatics based methods.

19. A spatial database on forest in GIS is a set of geo-referenced layers of spatial data of an area on different themes relevant to forest management along with related text and statistical data. In each spatial layer, attribute data with every feature appearing as point, line or polygon (e.g. a forest patch, compartment, village, plantation, etc.) can be attached for analysing management alternatives, creating scenarios, building queries or general database applications. Spatial database of a forest division with spatial layers will be of immense use in preparation of working plan and later in day-to-day forest management decisions for the forest division.

20. Further, there is a need for standardized framework of spatial database at national level for capturing, storing and managing all spatial and non-spatial data using modern technology under the aegis of Forest Survey of India. The purpose is to integrate the divisional level information at state level and further at national level in a standardized framework. FSI and its centres will provide requisite support including capacity building and relevant software for WP data processing to SFDs so that WPO is provided with ready to use thematic layers for forest planning. Every WPO must also be equipped with GIS Cell/Lab.

21. Multi-dated satellite images may be used by the GIS Cell/Lab for change analysis and preparation of change matrix. Change matrix describes the change in forest cover of the division over the period of last plan or between any other two assessments by showing the areas changing from one class of land/forest cover to another. This qualitative information may be used during forest resource assessment for identifying the drivers of change. If necessary, institutional sources like FSI may be approached by the GIS Cell/Lab for procurement of forest cover layers of the required period.

FOREST INVENTORY, SURVEY AND MAPPING

22. Information on growing stock and its growth is necessary for efficient planning and management of forests. The forest inventory, survey and mapping provide this important input. Assessment of forests resources makes use of a combination of geomatics and field inventory data. For the first time in the country, inventory and mapping of the entire vegetation including herbs, shrubs, grasses and climbers along with trees, has been brought within the ambit of the forest resource assessment. This will also include inventory of the non timber forest products (NTFPs) and medicinal and aromatic plants (MAPs) which will ultimately help to prepare the livelihood plans for the local communities in a more effective manner. Fragmented patches of forest need to be covered in the survey and assessment so as to provide focused management prescriptions for ensuring no discontinuous forest patch is left out from the purview of survey.

GRID BASED SAMPLING DESIGN

23. The existing survey and assessment of forest resources for the working plan is carried out on the basis of random sampling with the aim of collecting information mostly on forest timber production and very limited information on forest biodiversity. In the present changing scenario of forest 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, wherein 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 in a standardized framework. 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 forests.

24. Grid based systematic sampling design offers best opportunity to revisit the area for change detection and its attribution to climate change. It can be used for species distribution models (SDMs) and also offers opportunity to validate dynamic vegetation models. Some of suitable sampling plots can even be used for regeneration, growth and carbon sequestration studies. The working plan prescriptions facilitate systematic observations on a continuous basis with improved coverage for scientific analysis of forest ecosystem functioning. The survey of forest resources on scientific lines is also required to be conducted for periodic collection, collation and publication of reliable data on relevant aspects of forest management.

GROWTH DATA AND CARBON SEQUESTRATION

25. A network of grid based permanent sample plots should be identified and established in different strata of the forests to provide necessary database for growth/increment. These permanent sample plots are necessary to assess the role of forests as source or sink for greenhouse gases on a long term basis and to study carbon sequestration and storage in trees both above and below ground biomass (stem and roots), deadwood, litter, soil and harvested wood products for different forest types of India with an emphasis on different management regimes. Establishment and maintenance of these plots be carried out by silvicultural wing for continuous collection of data.

LINKAGE WITH NATIONAL FOREST INVENTORY

26. There shall be a backward and forward linkage between forest inventory under Forest Resource Assessment for working plan and National Forest Inventory. 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 FSI's manual for national forest inventory since same methodology for collection of data has been provided in this code. The national inventory data as provided by FSI can be used as historical reference for a particular grid as backward linkage. The provision of staggering of 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.

TREES OUTSIDE FOREST (TOF)

27. Trees outside forests (TOF) are located on the lands other than forests, including agricultural lands (e.g. agro-forestry systems, farm forestry, industrial plantations, hedgerows, woodlots), built-up areas such as settlements and infrastructure (e.g. street trees, parks and other urban tree systems) and bare lands (e.g. dunes, both abandoned and accomplished mining sites). They not only contribute nearly one fourth of the total growing stock of the country but also have become major source of wood in India. 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 ecosystem. This will lead to a better understanding of off-forest tree management and towards integrated and sustainable management of forests as natural resources. Based on plot description and enumeration for areas outside forests, assessment will be done with respect to present scenario and their potential for forestry outside forests as part of sustainable land use management at landscape level within the forest division. The focus of forestry outside forest areas is on production forestry, revitalization of rural economy and expanding economic opportunities through innovations. This requires inter-sector synergy and convergence. WPO may therefore prepare a separate strategy as a new chapter, not being part of general prescription of working plan to address the concepts and issues related to TOF. Forest certification guide as marketing tool may also be developed for the trees outside forests.

CHAPTER III

ORGANIZATIONAL STRUCTURE

28. At the national level, the administrative structure includes Director General of Forests & Special Secretary (DGF&SS) 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 MoEF, New Delhi; and it is supported by the Regional Offices headed by Additional Principal Chief Conservator of Forests (APCCF)/Chief Conservator of Forests. There should be adequate number of Chief Conservator/Conservator/Deputy 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 plans in all workings/management of forests.

29. In the states, there is no uniformity in the constitution of the working plan wing. A working plan unit (WPU) at the field level should be headed by a working plan officer (WPO) of the rank of Conservator of Forests. For smaller states, deviation may be approved by the DGF&SS, MoEF. There are various levels of supervision and direction, of which, Principal Chief Conservator of Forests (PCCF), Additional Principal Chief Conservator of Forests (APCCF) and Chief Conservator of Forests (CCF) are the key functionaries. Overall situation is as under:

    Head (Policy level) **–** PCCF/APCCF (Working Plan)

    Field Supervisory unit – APCCF/ CCF (Working Plan)

    Field Functional unit – WPO should be assisted by minimum of two Asst. Conservator of Forests (ACFs), four Range Forest Officers (RFOs), twelve Foresters and one subject matter expert in each of the specialized field such as remote sensing and GIS, biodiversity assessment, socio-economic analysis, statistics, taxonomy, ecological dynamics, soil science, etc.

30. Considering the important nature and specialization of the work, PCCF should ensure that adequate core staff posts for 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 experts for field work and ministerial staff for maintenance of record and budget on contract basis. Irrespective of the circumstances, the responsibility of working plan preparation cannot be transferred to the territorial DFO/CF of the forest division.

31. Generally the working plan is to be revised every 10 years and the preparation of working plan of a territorial forest division should normally take two years 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. the number of territorial divisions for which working plans are to be prepared/ revised for a cycle of minimum 10 years. If the planning/prescriptions are given for a period of more than 10 years (for e.g., in a working circle if the conversion period of the crop is fixed for 30 years) then review will be done at the end of 10 years and the 11^{th}year coupe will become the 1^{st} year coupe, 12^{th} year coupe will become the 2^{nd} year coupe and so on after review. A mid-term review of the working plan may be carried to assess the progress made in implementation of the prescription for various working circles, review the difficulties being experienced and make mid-course corrections in the prescriptions, where ever required. Generally, one working plan unit may undertake the work of preparation/review 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 for each field supervisory unit to be headed by one APCCF/CCF (WP).

32. The working plan/working scheme of forests for other than those under the control of forest department such as municipal, cantonment, private, village, etc. may be prepared by WPO on the request of the owners themselves or it may be accomplished through consultants, preferably qualified foresters.

IDENTIFICATION OF DIVISIONS AND STAGGERING OF WORKING PLAN PREPARATION

33. 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 a few working plans may be extended or reduced for the purpose of staggering the exercise of working plan preparation in the state. However, PCCF (HoFF) should also ensure that all forest workings are carried out as per approved working plan prescriptions.

TENURE OF WPO AND OTHER SUPPORTING STAFF

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

HEAD QUARTER

35. Headquarter of territorial circle may be the headquarters of the working plan unit (WPU). It facilitates proper coordination and smooth flow of information/records.

STATUS AND ALLOWANCES

36. For all practical purposes, the working plan unit (WPU) 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. The WPO or his subordinate is delegated the powers of a drawing and disbursing officer. A WPO and other supporting officer/ staff of the Working Plan Wing 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 at training institutes like IGNFA, WII and CASFoS).

BUDGET AND ACCOUNTS

37. It has to be ensured that adequate budget provision for the preparation of working plans is made in time and regulated by the rules and regulations of the central/state/UT governments. The estimate should be prepared by the CCF/APCCF (WP) a year before the plan revision is due to commence and copies sent to the PCCF and the territorial forest circle concerned. Office management and maintenance of records, reporting of progress of works, and accounting of expenditure are carried out according to the procedures laid down by the central/state/UT government concerned as applicable. The budgetary provision for preparations of working plans should be made in the respective State Plan/Non-plan. However the state governments may utilize CAMPA funds/ forest grants under Finance Commission in addition to State Plan/Non-plan budget.

COOPERATION OF TERRITORIAL STAFF

38. It shall be mandatory for the DFO territorial forest division and Head, territorial forest circle to extend full cooperation and assistance to the WPO for fieldwork and provide logistic support, access to official records and other information so that the WPO can prepare good quality working plan expeditiously.

ASSISTANCE FROM SPECIALISED INSTITUTIONS AND CAPACITY BUILDING

39. The WPO may take assistance from specialized institutions like ICFRE Institutes, FSI, WII, IIFM and universities, etc. for preparation of working plans as and when required. Capacity building of working plan personnel especially with reference to survey and assessment of natural resources using modern technologies, etc. with the aid of national institutes like FSI, FRI, IIFM, etc. should be undertaken on continuous basis. A WPO specific training module and a manual may be developed by FSI/FRI/IIFM for capacity building of WPOs for preparation of working plans as per the code uniformly all over the country.

OFFICE AND RESIDENCES

40. Every state and UT government should provide necessary office and residential accommodation to all officials of working plan organization both at headquarters and field level as per rules and norms in force applicable to their rank and status.

EQUIPMENT AND FURNITURE

41. The working plan unit should be well equipped with all necessary equipment and furniture as per requirements including tents, boxes, folding chairs and tables, cots, callipers, wedge prism, diameter tapes, axes, prismatic compass, Abney's level, planimeter, acre square, drawing board, drawing instruments, laser range finder for height and slope measurement, crown densometer for determination of canopy density, etc.

TOOLS AND TECHNOLOGIES

42. The working plan unit should be equipped with required tools and technologies along with necessary geo-spatial software, hardware devices like computers, GPS, internet access and other accessories in consultation with FSI. The FSI should also study the present status of GIS/MIS capacity of states (hardware, software, trained manpower, etc.) and suggest programme of upgrading the same to meet the requirements of the procedure being laid in this code.

TRANSPORTATION AND COMMUNICATION

43. The WPO should be allowed the same scale of transport and communication facilities as per entitlement of his rank. However ACF, RFO and their staff should also be adequately provided with govt. field vehicles, if not available, may be hired for carrying out forest inventory and ground-truthing, etc. irrespective of their rank and entitlement.

STATIONERY AND BOOKS

44. Adequate stock of stationery and forms is to be provided to the WPO. The procedure (type, quantity, and rules for procurement and record keeping) is laid down by the respective state governments. Following are some reference books generally required by the WPO:

    Forest Manual of the state concerned, 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, National Working Plan Code, Working plan under revision and all previous working plans of the division, State Forestry Action Plan, FSI reports on forest cover and Manual for National Forest Inventory of India, Annual Forest Statistics of the State, technical books and forestry journals, etc. A permanent library along with internet and other communication facilities; a digital store house of all relevant working plans and maps along with necessary database should also be established and maintained.

CHAPTER IV

INPUTS TO WPO

MAPS, THEMATIC LAYERS AND REMOTE SENSING SATELLITE IMAGERY

45. DFO territorial traditionally supplies the toposheets of 4" to 1 mile or higher scale for stock mapping along with 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 to the WPO. In the present technological age, WPO should be provided digital maps of the division based on latest, cloud free, good quality satellite imagery along with the several copies of print outs of the map on 1:25,000 scale from the GIS Cell of the Forest Department or any such designated source in the state. Relevant and latest satellite data with spatial resolution of 5.8m or higher can be used for generating maps up to the scale 1:12,500. The satellite imagery based information can be used for various steps in preparation of working plan including
    - Forest cover map
    - Stock map
    - Picking up details for creating management maps
    - Planning surveys and field inventory
    - Base line reference map

    A map showing forest fire spots detected in the last five years by FSI/NRSC may also be part of the working plan. Scale of the maps used for different purposes in preparation of working plans and also maps produced as output of the exercise may be specified as follows.

    i. SOI topographic sheets on 1:50,000 or 1:25,000 scale if available for the area to be used as base map;

    ii. Forest cover and forest type maps from FSI on 1:50,000 scale for post; stratification of forest for sampling for resource assessment;

    iii. Forest cover mapping using at least IRS P6 LISS IV data on 1:12,500 scale; and

    iv. All management/ working circle maps, stock map-1:12,500 scale.

SPATIAL DATABASE in GIS

46. Spatial database of a forest division with spatial layers indicated in the list at Annexure I will be of immense use in preparation of working plan and later in day-to-day forest management decisions of the Forest Division.

COMPARTMENT HISTORIES, CONTROL FORMS AND DEVIATION STATEMENTS

47. The WPO is supplied with updated compartment / village/ management unit history, deviation forms, control forms and all other base line data required for working plan along with the list of JFM areas and work done by the DFO territorial.

PRELIMINARY WORKING PLAN REPORT (PWPR)

48. PWPR is of considerable importance as it forms the basis of the WPO's fieldwork to make required assessment to undertake forest management planning. Therefore, PWPR should contain necessary details of the working plan area, details of management practices adopted during the working plan period along with aspects of forest management which are considered

important for assessing the sustainability, accompanied by a set of related quantitative, qualitative *or* descriptive attributes. This information will subsequently form the basis for the summary of facts (Part I of the working plan) on which proposals/prescription for future management is made by WPO in Part II of the plan.

49. Specific comments are made on Part I of the working plan regarding such sections which are required to be updated. The PWPR indicates the work that the WPO has to do during the field work. The PWPR also makes clear what information the WPO has to collect and what information is already available, what maps are to be prepared and what maps are already available. It also indicates the kind of vegetation survey and other surveys that are to be undertaken and the kind of studies already done for the area, the type and intensity of enumerations to be done in each working circle and so on.

50. It also requires detailed comments and close analysis of the results of the past management for each working circle separately. Success or failure and reasons thereof, 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 the implementation of the past prescriptions in full. As far as possible, attempt should be made to quantify the results and effects of the past prescriptions.

51. PWPR 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), NTFPs, along with other goods and ecosystem services for the benefit of local people. Therefore, Part II should outline the objectives of management in view of past experience and stakeholders' requirement.

PREPARATION OF PWPR

52. In the working season immediately preceding the one, in which the working plan revision is due to commence (at least two and half years before the expiry of current working plan period), the concerned DFO territorial shall be directed by Head, 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 then suggest any necessary change for improvement. DFO must complete the notes within two months and submit the note to the Head, territorial forest circle, who in turn inspects the forests concerned and writes the PWPR during or soon after completing the tour within two months 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 and guidance from the committee.

CONSULTATIONS WITH LOCAL STAKEHOLDERS

53. The Head, territorial forest circle during the PWPR preparation will hold consultation with local people's forum, JFM committees, village Panchayats and forest development agency (FDA) about the expectations of people dependent on forests 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 PLAN

STANDING CONSULTATIVE COMMITTEE

54. There shall be a standing consultative committee of the state under the chairmanship of PCCF (HoFF) having representation from the state (including Chief Wildlife Warden) and MoEF (RAPCCF) for preparation of working plans. The experts from FSI and its regional centres and ICFRE institutes may be included in the committee.

FINALIZATION OF PWPR

55. 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.

56. The approval of PWPR by PCCF (HoFF) should be granted at least two years prior to the expiry of the current working plan, so that the preparation of working plan by the WPO, approval by the designated authority and delivery of approved working plan to the DFO territorial concerned for implementation can be completed prior to expiry of the current plan.

DRAFT WORKING PLAN

57. It is advisable for the WPO to submit first draft of the plan as per the approved PWPR and time frame. Part I of the working plan provides the information generated from various sources including forest inventory and assessment. The chapter "Past Systems of Management" and "Statistics of growth and yield" should be written as comprehensively as possible and should be completed soon after the data has been compiled and analysed. Part II will be written chapter by chapter 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.

58. The draft working plan should be 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 relevant point and drawing the attention of the CCF/APCCF (WP) to any deviation from the approved PWPR or from subsequent instructions. The complete plan along with required maps is first vetted by the CCF/APCCF (WP). Sufficient copies are to be sent to the PCCF for circulation to the members of standing consultative committee especially the RAPCCF (MoEF). The members especially RAPCCF (MoEF) should get the copies for examination and comments at least 45 days prior to the final meeting of the standing consultative committee. The draft working plan should be deliberated upon, in the meeting and commonly acceptable suggestions/alterations/ modifications may be incorporated in the final draft working plan for submission to RAPCCF (MoEF). In case of any serious and irreconcilable difference of opinion between the SFD and RAPCCF (MoEF), the matter may be referred by the PCCF (HoFF) to DGF&SS (MoEF) for final decision in the matter.

SUBMISSION OF THE PLAN

59. Draft WP as deliberated in the standing consultative committee and as revised after incorporating the suggestions of the committee, is sent to the RAPCCF (MoEF) by the PCCF (HoFF) under intimation to the state government.

SANCTION OF THE PLAN

60. After examining the plan, RAPCCF (MoEF) accords the approval on behalf of MoEF as such or with necessary suggestions, directions and modifications within three months.

PRINTING OF THE PLAN

61. Sufficient copies of the plan as approved by MoEF may be printed and soft copies uploaded on the website of the concerned state forest department (SFD). The minimum requirement of the printed copies will be as under:
    - Regional Offices, MoEF -1 copy
    - PCCF (HoFF) offices of all States/UTs-1 copy
    - All offices of the forest department, Home State/UT-1 copy each
    - Territorial forest circle concerned – 3 copies
    - DFO territorial concerned – 20 copies (office, ACFs, FROs, 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 regional centre-1 copy each
    - Indian Institute of Forest Management – 1 copy
    - Indira Gandhi National Forest Academy Library – 1copy
    - Central Academy for State Forest Service – 1copy
    - National/State Biodiversity Board-1 copy

AMENDMENTS

62. Any change in Silvicultural System, clear felling of natural forest, formation of new felling series, large scale fellings 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 RAPCCF (MoEF).

63. Any amendment in the plan involving points of technical importance leading to the change in the prescriptions should be sent with the necessary draft amendment to the RAPCCF (MoEF) by the PCCF (HoFF) through the state/UT government. When the Regional APCCF has approved an amendment, the Head, Working Plan Wing arranges for sufficient copies of it to be printed and issued to all concerned who have copies of the working plan. Amendments are serially numbered; the number and date of sanctioning letter is also given.

MONITORING BY MoEF (GOVT. OF INDIA)

64. The Regional Office (MoEF) will especially monitor following points:

    64.1 Process of working plan preparation for the entire state/UT is staggered over a period of 10 years and the revision of working plans does not get accumulated;

    64.2 Preparation of the working plan is carried out according to prescribed procedure, i.e. consultations, field visits, PWPR, writing of working plan, preparation/updating of maps, writing/editing of compartment histories, and prescription of control forms;

64.3 The working plan prescriptions are being followed and the system of annual updating of compartment histories and control forms is in place;

64.4 The removal should not exceed the increment normally, except to facilitate natural regeneration. This can be monitored through field visits, reports and allocation/utilization of funds provided in the budget for plantations and silvicultural operations.

65. There will be flexibility in the following matters and the state government can also take appropriate decision at its level

i. Organizational matters

ii. Administrative matters

iii. Intensity of sampling

iv. Carbon pool stock estimation

v. Soil survey and assessment

vi. Plot Approach Form

vii. Plot Description Form

viii. Plot Enumeration Form

ix. Formats of compartment histories

x. Formats of control forms

xi. Additional chapters/ information in the working plan (Deletions are not allowed)

xii. Matters related to prescriptions under NTFP (inclusive of medicinal and aromatic plants) and bamboos/rattans working circles

xiii. Trees outside forests

xiv. Scale of maps (they have to be SOI maps in any case)and colour schemes of relevant maps

xv. Registers and records

xvi. Divisional area statement format

66. In case of any ambiguity the matter may be referred to the DGF&SS (MoEF), whose decision will be final.

CHAPTER VI

SURVEY AND ASSESSMENT OF FOREST RESOURCES

EXAMINATION OF TERRITORIAL UNITS

67. States should digitize the forest boundary and generate geo-referenced version of map of scale 1:50,000 or higher after complete verification. There should be regular updating of data on the basis of continuous inputs. WPO will also inspect and examine the forest area (including range, beat, sub beat), village, block, compartment and sub-compartment and ascertain that the extent of forest cover is properly maintained on following counts:

- Area of forests under different legal classes (RF, PF, UF and others)
- Forest area under different working circle/ management plan
- Percentage of forest with secured boundaries
- Land use, land use change and forestry (LULUCF)
- Distribution of different forest types

FOREST RESOURCE ASSESSMENT

68. Assessment of forest resources is an essential and integral component of the forest management planning. On the basis of this assessment, past performance is evaluated and future management will be prescribed. In forest crops one has to identify multi-dimensional populations with various parameters and attributes. Forest data to be collected as per the forest resource assessment methodology detailed at **Annexure-II** for the preparation of working plan shall cover following aspects:

- **Maintenance, Conservation and Enhancement of Biodiversity:** Forest composition and distribution, plant species diversity, status of biodiversity conservation of forests, status of species prone to over exploitation, conservation of genetic resources, fauna and their habitats, threats and challenges to wildlife, protection and management of fauna;
- **Maintenance and Enhancement of Forest Health and Vitality:** Status of regeneration, area affected by forest fires, area damaged by natural calamities, area protected from grazing, lopping practices, area infested by invasive weed species in forests, Incidences of pest and diseases, forest degradation and its drivers;
- **Conservation and Maintenance of Soil and Water Resources:** Assessment of excess run-off from discharge zone and conservation measures for soil, groundwater, and soil moisture. Area treated under soil and water conservation measures, duration of water flow in the selected seasonal streams, wetlands in forest areas, water level in the wells in the vicinity (up to 5km) of forest area, status of aquifers;
- **Maintenance and Enhancement of Forest Resource Productivity:** Growing stock of wood / bamboo, increment in volume of identified timber species, efforts towards enhancement of forest productivity through quality plantation activities, carbon stock, carbon sequestration and mitigation;
- **Optimization of Forest Resource Utilization:** Recorded removal of timber, fuel wood, bamboo/ rattans, and locally important NTFPs including MAPs, demand and supply of timber and important non-timber forest produce, removal of fodder, valuation of the products;

- **Maintenance and Enhancement of Social, Economic, Cultural and Spiritual Benefits:** Number of JFM committees and area protected by them, status of empowerment of JFMCs, labour welfare, use of indigenous knowledge, extent of cultural/ sacred groves, social customs, status of compliance of Forest Right Act (FRA), other rights and concessions, ecotourism areas and activities, etc.

GROWING STOCK ESTIMATION

69. From the enumeration/field data, species wise distribution of trees in each diameter class will be generated for compartment/village/any other management unit. This data would be used for population structure and to identify the old group forests. The growing stock of trees must be so managed that it regularly provides the greatest possible quantity of the desired products including intangible benefits. Ratio method of estimation will be used for estimating the growing stock of important tree species using local volume tables developed by FRI/FSI or under previous working plans. Fresh local volume tables may be prepared, if required. Adding the growing stock of all compartments, 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.

ASSESSMENT OF NON-TIMBER FOREST PRODUCTS (INCLUDING MAPs)

70. WPO may plan and undertake survey, sampling and assessment for estimation of few prioritised species of NTFPs to start within the selected grids. In general, WPO does the assessment of potential NTFPs through available old records, local enquiry, and plot enumeration data. If few NTFP species have been identified then the estimation of resource species can be carried out using plot enumeration, shrubs, herbs and climbers 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 MAPs.

71. For estimating the production of NTFPs (fruits, flowers, leaves, seeds, etc.) of tree origin, total harvest of the desirable part(s) should be enumerated (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 out by using a laboratory oven if possible or sun drying. 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 from 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.

BIODIVERISTY ASSESSMENT

72. 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, m2/ha), density (D, trees per ha) and frequency (F, number of quadrates where trees are present in

relation to total plots observed). Relative values of BA, D and F will be calculated. The Importance Value Index (IVI) is calculated by adding up relative dominance (RBAF), relative density (RD) and relative frequency (RF). However, in case of shrubs, herbs, saplings and for regeneration, the IVI is calculated on the basis of 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 (100 each for RBA, RD and RF). Basal area and density of the tree species should be converted to hectare basis. To estimate the stand 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.

$$D_s = \frac{\text{Total number of individuals of a species}}{\text{Total area of quadrats studied}}$$

$$F_s(\%) = \frac{\text{Number of quadrats in which a species occurs}}{\text{Total number of quadrats studied}} \text{ x } 100$$

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

$$RF_s = \frac{\text{Frequency } (F_s) \text{ of a species}}{\text{Sum of frequecies of all species}} \text{ x } 100$$

$$RBAF_s = \frac{\text{Total basal area of a species}}{\text{Total basal area of all species}} \text{x } 100$$

$$IVI_s = RD_s + RF_s + RBAF_s$$

(where 's' denotes a particular species for which these variables are calculated)

73. Species diversity is an expression of community structure and is unique to the community. The number of species in a community is referred to as species richness when topography of compartment is homogeneous. The relative abundance of all 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/populated are the most diverse and communities with few species that are dominated by one species are the least diverse (i.e. 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 (λ) are calculated separately for trees, shrubs and herbs as their individuals differ in size and are sampled differently. 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.

ASSESSMENT OF REGENERATION STATUS

74. Young plants of tree species up to 10 cm diameter are taken into consideration for assessment of regeneration status of a particular species as practiced in National Forest Inventory by FSI. Data collected from the square plots of 3x3m for saplings (2cm to 10 cm collar diameter) and from the square plots of 1x1m for seedlings will be generally used to assess the regeneration status of species in the management unit (compartment, village or any other unit). Based on

the phytosociological data from plot level enumeration, the regeneration status of the sampled species may be assessed in the following categories:

a. Good regeneration, if seedlings are more in numbers than the saplings and likewise saplings are more than that of adults.

b. Fair regeneration, if seedlings are more in numbers than the saplings but the saplings are equal or less than that of adults.

c. Poor regeneration, if a species survives in only sapling stage, but not as seedlings (though sapling may be less, more or equal to adults).

d. No regeneration, if a species is absent both in sapling and seedling stage, but present as adult.

e. New regeneration, if a species has no adults but only sapling and/or seedlings

75. The lower categories of regeneration such as established, un-established (whippy and subwhippy), recruits, etc. giving value to each category and calculating total regenerative percentage may be required, in case, above classifications are absent or insufficient to indicate regeneration status.

PLANTATION SURVEY AND ASSESSMENT

76. 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, crops 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 or age of 10 years 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 or age of 10 years for maintenance of biodiversity; soil and moisture conservation and other socio-cultural benefits, which should be assessed and recorded. Plantation journals offer the best option for assessing such young plantations. Plantation journals 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 by the DFO concerned for assessment of young plantations. Nowadays the plantations are well recorded and in many of the cases their positional coordinates are also mentioned in the records. However, to monitor the success and the growth of such trees, high resolution satellite data mapping would be useful that are capable of detecting small size plantation growth.

ASSESSMENT OF BAMBOO/RATTAN

77. All culms occurring in the clump would be enumerated as per different classes of National Forest Inventory and these data would be used to assess the availability of bamboo/rattan using post stratification for a management unit as per the methodology adopted by FSI.

78. 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)
    (iv) Non-clump forming bamboos

SOIL SURVEY AND ASSESSMENT

79. Proper examination of soil profile leads to understanding the genesis of soil. Analysis of soil reveals its fertility, constraints thereof, if any, the required soil management strategies and suitability of species. Soil properties along with site features like slope, aspect, erosion, climate, etc. brings out information about the land capability class, land suitability, etc. For survey, soil samples may be collected in the selected grids from different horizons i.e. from soil surface upto 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. 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.

SOCIO-ECONOMIC SURVEY AND ASSESSMENT

80. It is necessary to assess the dependence of villagers on the forests for their livelihood needs especially in the perspective of lifestyle change. It is also important in the context of preparation of micro-plans for Joint Forest Management and forest fringe management. Available 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 NTFPs 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.

81. 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 situated within the limit of 3Km from the forests will be considered as forest fringe villages for the assessment. Stratified multistage random sampling will be deployed 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, methodology provided for micro-plan preparation in Annexure IV may be adopted for assessment of socio-economic benefits and dependence on forests.

ASSESSMENT OF WILDLIFE HABITATS AND SPECIES

82. 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 grasslands, wetlands, wildlife corridors and water points must be identified. Threats, such as habitat loss and/or fragmentation; illegal trade; road and rail networks; etc. should be identified and appropriate corrective measures should be suggested for implementation. Similarly, areas of man animal conflict deserve special attention for amelioration.

ASSESSMENT OF TREES OUTSIDE FOREST (TOF)

83. For assessing TOF, geometrically rectified IRS P-6 LISS IV (5.8m) or any higher version imageries may be procured from NRSC, Hyderabad. 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 prescriptions of a working circle for forests.

CHAPTER VII

WRITING UP THE PLAN

CONTENTS OF THE PLAN (To be written by WPO)

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

<table>
<tr><th>Chap-ters</th><th>TITLE / SUB-TITLE</th><th>EXPLANATION</th></tr>
<tr><td></td><td colspan="2">Executive Summary along with the constraints faced during writing of the plan</td></tr>
<tr><td>I.</td><td colspan="2">INTRODUCTION
It should also include
a) Vision statement
b) Goals and objectives of management
c) SWOT analysis for prescription of strategies for achieving the goals and objectives.
d) Expected outcome
e) Abstract of plan prescriptions in following format
<table>
<tr><th>Chapter No.</th><th>Para No./Sub Para No.</th><th>Prescribed activity</th><th>Remarks</th></tr>
<tr><td>A</td><td>B</td><td>C</td><td>D</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
f) Works prescribed during the Plan period must be given in a tabular form along with annual target in the following format.
<table>
<tr><th>Chapter No.</th><th>Para No./Sub Para No.</th><th>Prescribed activity</th><th>Yearwise (year 1-10) distribution of physical target</th></tr>
<tr><td>A</td><td>B</td><td>C</td><td>D</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>II.</td><td>GLOSSARY OF TERMS</td><td></td></tr>
<tr><td>III.</td><td>List of Flora (indicating RET and unique species)</td><td>Local names of trees, shrubs, herbs and climbers (including epiphytes, parasites, grasses etc.) with English names, if any, in alphabetical order, followed by their botanical names. Make it as exhaustive as possible with a separate list of rare, endangered and threatened (RET) species of medicinal and aromatic plants and plants of ethno-botanical importance found in the Division. Special emphasis must be given to the plant species listed in the IUCN Red data book. Help of subject matter experts may be taken for updating the list.</td></tr>
<tr><td>IV.</td><td>List of Fauna</td><td>Local names with English name, if any, in alphabetical order, followed by their scientific names. List may be made as exhaustive as possible. Help of subject matter experts may be taken, if required.</td></tr>
<tr><td>V.</td><td>Others</td><td>List of lichens, algae, fungi, etc.</td></tr>
</table>

PART- I Summary of facts on which proposals are made		
Chap-ters	**TITLE / SUB-TITLE**	**EXPLANATION**
1	**The Tract Dealt with**	
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 buildings, forest roads, fire lines, etc. are to be provided in the appendix).
1.2	Configuration of the ground	It may be categorized as flat, gently rolling, hilly, very hilly, undulating foothills, gullied 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; this information can be obtained from Meteorological Department. Relevant GIS maps along with historical data may be provided**.**
2	**Maintenance/ increase in the extent of forest and tree cover**	
2.1	Area of forests under different legal classes (RF, PF, UF and others)	Entire forest area is notified as RF and PF. 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/protected forest is given; and mention is made of various forest settlements. Pending forest settlement work is also to be quantified.
2.2	Forest area under different working circle/ management plan	Range wise entire forest area is covered under WP/ management plan.
2.3	Percentage of forest with secured boundaries	A general note on the state of existing boundaries and boundary pillars especially on the status of demarcation and/or need for fresh demarcation may also be described. Locations of the boundary pillars should be shown on the map with latitude/longitude on village map or such other map of convenient scale.
2.4	Land use, land use change and forestry (LULUCF)	It is to be described here that the base year status of land use and forest cover is maintained or improved. Multi-dated satellite images may be used for change analysis and preparing change matrix. Change Matrix describes the change in land use, trees outside forests (TOF) and 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 land use to another and one forest class cover to another between the two periods. Summary of changes occurred during last plan period may be given. Details will come in divisional area statement, including list of area (range wise / beat wise) diverted under FCA, FRA and also mention non-forest land/degraded forest given for compensatory afforestation under FCA, encroachments, etc. (the analysis may be made for fresh encroachments since Dec, 2005 onwards in forest areas by GIS based change analysis).
2.5	Threats to the forest	All other threats to the existence of forests
2.6	Distribution of different forest types	The base year status of forest types along with GIS map may be referenced for any further change/shift.

Chap-ters	TITLE / SUB-TITLE	EXPLANATION
2.7	Tree cover outside forest area	Assessment of the growing stock and the potential area for extension of forestry outside forests and sustainable land use management within the geographical area of the forest division.
2.8	Shifting cultivation (Jhumming)	Jhumming is also a prevalent traditional agricultural practice in some parts of the country, especially in the north eastern region. Details of the land tenure system, present status and sustainability of jhumming or shifting cultivation may be provided.
3	**Maintenance, Conservation and Enhancement of Biodiversity**	
3.1	Forest composition and distribution	Based on the vegetation survey and forest inventory and compartment descriptions, a summary of important trees and other species found 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.
3.2	Plant species diversity	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. Base year documented species diversity is maintained or enhanced under sustainable management of forests.
3.3	Status of biodiversity conservation in forests	Status of implementation of the state guidelines/ strategic plan, if any should be given; Other in-situ and ex-situ conservation efforts undertaken for sensitive/RET/ IUCN Red List species and their habitats.
3.4	Status of species prone to over exploitation	Details of current harvesting practices of forest produce and preparation as well as implementation of measures for conservation of biodiversity; as far as possible status of the species prone to over exploitation and destructive harvesting should be given; 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.
3.5	Conservation of genetic Resources	Preservation plots, sample plots, medicinal plants conservation areas, community conservation areas, etc.; genetic diversity with the help of research organizations should be documented and monitored through research studies as far as possible especially for NTFPs including MAPs.
3.6	Fauna and their habitats	Give description of flagship wild species including mammals, birds, reptiles, amphibians, etc. along with their suitable habitats and micro habitats.
3.7	Threats and challenges to wildlife	Give details regarding habitat fragmentation/ loss, illegal trade, road and rail networks, extended habitats in proximity to protected areas for rare and endangered species; man animal conflict.
3.8	Protection and management of fauna	Details of measures taken and its effect therein.

Chap-ters	TITLE / SUB-TITLE	EXPLANATION
4	**Maintenance and Enhancement of Forest Health and Vitality**	
4.1	Status of regeneration	As per the base year assessment, the data on population dynamics of seedlings, saplings and young trees should be collected to monitor the status periodically and find out the conditions in which a species regenerates best. Depending upon the status of regeneration, research plots for regeneration study may be provided in the prescription under chapter "Science and Research".
4.2	Area affected by forest fire	Details of the locations along with area affected by fire incidents and appropriate measures taken may be analysed from the records of the fire register and appropriate prescription given.
4.3	Area damaged by natural calamities	The area affected by natural calamities such as storm, flood, frost, drought, erosion, etc. should be given and the preparedness and mitigation strategy plan for such areas susceptible to these calamites is highlighted.
4.4	Area protected from grazing	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. Vegetation survey should be taken into account for regulating grazing either by area or by number of livestock.
4.5	Lopping practices	Status of existing of lopping practices during fodder/NTFPs collection extent of damage to the affected species, if any; and period of lopping, etc. should be provided.
4.6	Area infested by invasive weed species in forests	Details to be given of forest areas infested by different invasive species. Plantation (AR / ANR) areas are free from weeds.
4.7	Incidences of pest and diseases	Practically necessary details of different incidences of pest and diseases are provided. Scientific information with regard to attack of fungus and other insect pests should be mentioned.
4.8	Forest degradation and its drivers	Details of drivers of forest degradation like unregulated removal of forest produce, encroachment, over grazing, mining, etc. along with the area description under different levels of degradation.
4.9	Pollution control and protection of environment	Incidences, extent of forest land degradation due to pollution (soil, water, in some cases air) and the measures taken to mitigate them.
5	**Conservation and maintenance of soil and water resources**	
5.1	Area treated under soil and water conservation measures	Soil erosion vulnerability assessment and intervention taken may be provided along with map.
5.2	Duration of water flow in the selected seasonal streams	Periodic monitoring of river flow pattern with reference to annual rainfall/duration of flow may be provided to show the status of improvements, if any.
5.3	Wetlands in forest areas	Details of wetlands in the forest areas along with maps may be provided for periodic monitoring using remote sensing technology. No reduction in wetlands from the base year, should be ensured. Addition of new wetlands and water bodies may be provided.
5.4	Water level in the wells in the vicinity (up to 5km) of forest area	Periodic monitoring of water level with respect to annual rainfall should be provided for the status of ground water assessment.
5.5	Status of aquifers	Details of aquifers to monitor their sustainability.

Chap-ters	TITLE / SUB-TITLE	EXPLANATION
6	**Maintenance and enhancement of forest resource productivity**	
6.1	Growing stock of wood	Trend detection in growing stock of wood with respect to the condition of fully stocked forest as per the site quality over the years and explanation thereof. All these will entail that the specific composition and the structure or form of the forest must harmonise with the environment or factors of the locality and the species grown and the methods of silviculture adopted must fully suit all peculiarity of site to ensure full growth.
6.2	Growing stock of bamboo	Growing stock of bamboo indicating the number of clumps and clump size with respect to base year; number of clumps and clump size is maintained or increased with respect to base year.
6.3	Increment in volume of identified timber species	Mean annual increment (MAI) of tree species is maintained or increased with respect to base year.
6.4	Efforts towards enhancement of forest productivity through quality plantation activities	Details to be given based on survey and assessment of areas under the plantation. About 10% of the total forest area may be brought under production forestry by raising quality plantation, however no forest land or any portion thereof can be cleared of trees which have grown naturally in that land or portion, for the purpose of using it for afforestation.
6.5	Carbon Stock	Details of biomass for carbon stock assessment may be given based on the forest types and land use.
6.6	Carbon sequestration and mitigation	Enhanced carbon sequestration through recognised and innovative silvicultural practices, eco-restoration of degraded/ mined out forestlands, improved biomass productivity, etc. results in improving forest health and vitality. Forest soil must be kept as healthy and fertile as possible and the forest crops must be kept as vigorous as possible to produce as rapidly as they can till the biomass production attains its most desirable level. The growing stock of trees must be so constituted that it provides regularly the greatest possible quantity of the desired products including intangible benefits. All these will entail that the specific composition and the structure or form of the forest must harmonise with the environment or factors must harmonise with the environment or factors of the locality and the species grown and the methods of silviculture adopted must be suitable to the site to ensure full growth.
7	**Optimization of forest resource utilization**	
7.1	Recorded removal of timber	Details of all removals of timber except for petty felling as per the control forms. Harvest should not exceed the accretion (growing stock/ MAI).
7.2	Recorded removal of fuel wood	Information based on socio-economic survey and assessment may be provided. Evolving mechanism for quantified data on recorded removals and sharing with the community may be explored and highlighted.
7.3	Recorded removal of bamboo/ rattans	Assessment of bamboo/rattans and mechanism for generating quantified data on their removal and sharing with the community should be provided.
7.4	Recorded removal of locally important NTFPs including MAPs	Assessment of demand and supply, sustainability and potentiality. A separate assessment may be made with respect to MAPs. NTFPs by all means should not exceed the annual yield or as indicated in the Working Plan.

Chap-ters	TITLE / SUB-TITLE	EXPLANATION
7.5	Demand and supply of timber and important non-timber forest produce	Description of recorded removal for agricultural customs, local needs, market and marketable produce including that of forest development corporations and other agencies may be given. Consumption of wood by wood based industries and other end users may also be given. Assessment and evolving mechanism to meet the demand may be provided.
7.6	Import and export of wood and wood products	Data on import and export of wood and wood products may be collected and analysed for the entire division.
7.7	Import and export of NTFPs	Data on import and export of NTFPs may be collected and analysed for the entire division.
7.8	Removal of fodder	Description of cattle rearing community of forest dwellers with regard to removal of fodder and availability of palatable species and pasture lands, etc.
7.9	Valuation of the products	Valuation of products may be done by including past and current prices of different forest products with price trend.
8	**Maintenance and enhancement of social, economic, cultural and spiritual benefits**	
8.1	Number of JFM committees and area (s) protected by them	Should match the JFM resolution; extent of the forest area under JFM. Details may be furnished in the appendix XI.
8.2	Status of empowerment of JFMCs	Aspects related to regular meetings at the 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.
8.3	Labour welfare	Details of welfare measures along with direct employment in forestry activities
8.4	Use of indigenous knowledge	Documentation of the indigenous traditional knowledge and incorporation of the same in the micro-plans and other prescriptions of the plan.
8.5	Extent of cultural/ sacred groves	Details of cultural and sacred groves along with ownerships, status of management and interventions to conserve them may be provided in the appendix.
8.6	Ecotourism areas and activities	Areas inside and adjoining designated forests, which have ecotourism potential are being visited by tourists, will be identified and systematically documented. The natural attributes viz. landscape, waterscape and wildlife and also the humanscape will be enlisted and explained for effective ecotourism management.
8.7	Social customs	Prevalent social customs relevant to forests.
8.8	Status of compliance of Forest Right 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 allottees.
8.9	Other Rights and Concessions	A brief account of other 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, etc. should also be included.

Chap-ters	TITLE / SUB-TITLE	EXPLANATION
8.10	Dependency of local people on NTFPs	Economic dependency on NTFP along with clear rights and responsibilities to access, use and manage the NTFPs resources; registration status of gatherers, traders and other stakeholders; existing regulation mechanism on transit storage and trade of NTFPs.
8.11	Other aspects	Other aspects which are not mentioned above but are intrinsic to forests. For example the impact and the dependency of transhumant populations mostly the grazer community which have not been well addressed in the working plan is required to be assessed. The season and area of grazing, migration route, transition camps, etc. need to recorded and accounted for in the working plan.
9	**Adequacy of Policy, Legal and Institutional framework**	
9.1	Existing policy and legal framework and their compliance	Status of compliance for sustainable management of forests may be given.
9.2	Status of approved working plan and compliance	A summary of prescription of approved working plan and valid reason for deviations in implementation of the plan should be given (as per deviation statement).
9.3	Number of forest offences	Details of all the cases booked and taken to court of law may be provided in the appendix.
9.4	Status of research and development	Application of research findings in addressing the problems along with appropriate transfer of technology to field should be given.
9.5	Human resource capacity building efforts	There should be a human resource capacity building plan (training plan) for efficient utilization of the human resource. At least 2/3rd staff should be trained at any time.
9.6	Forest Resource Accounting	All tangible benefits should be reported. Progressive and positive efforts should be made to quantify intangible benefits also.
9.7	Budgetary allocations to the forestry sector	Budget provision of the last plan period may be provided and the prescribed budget may be justified accordingly.
9.8	Existence of monitoring, assessment and reporting mechanism	Monitoring and evaluation parameters may be provided for all the prescriptions of the plan as control forms. Forest management unit level information system may be provided for reporting and dissemination.
9.9	Public awareness and education	The efforts to increase public awareness of the importance of and the benefits provided by forests and sustainable management of forest along with list of the published material such as brochures, pamphlets, leaflets, posters, etc.; meetings with the general public to inform them of the benefits provided by forests to society; details of forestry/environmental awareness and education programmes conducted for students.
9.10	Adequate manpower in forest division	The details of sanctioned, permanent, temporary, and seasonal posts are given in the appendix. 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 rates of past and present wages should also be mentioned.

Chap-ters	TITLE / SUB-TITLE	EXPLANATION
10	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 of the prescriptions provided in various chapters of the plan. Intersectoral (rural development, tribal welfare, etc.) contribution may also be taken into account.
11	**Past systems of management**	
11.1	General history of the forests	The historical background from the beginning of management of forests may be given with mention of source of information. Compartment history can be an important source of such information.
11.2	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 JFM, community involvement and functioning of the forest development agencies in the division along with the change matrix analysis. Assessment of invasive weed eradication, reduction in grazing, reduction in fuel wood and fodder collection, insect pest management and catchment protection needs to be done. Here secondary data could be used followed by ground truthing on sample basis.
11.3	Special works of improvement undertaken	Summary and results of works such as fire-protection, improvement in communication, interface activities, amenities to staff, etc.
11.4	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.
12	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 various working circles for calculation of outturn/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 non-destructive method for preparation of local volume may be adopted. Help of research institutes may be undertaken, if necessary. Site quality wise local volume table must be developed and applied.
12.1	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.
	PART II **Future Management**	
1	**Basis of proposals**	
1.1	Objectives of management	The objectives of the forest management plan may be organised around the following major elements for sustainable management of forests: (I) ***Dynamics of Forests and Stands:*** With the objective to increase productivity of the forest ecosystem and maintain the vitality.

		(II) ***Forests and Soil:*** With objective of reducing soil erosion, enhancing fertility of the soil and ensuring stability of the forest ecosystem. (III) ***Forests and Water:*** With the objective of conserving water sources, enhancing water conservation capacity of the forest ecosystem and assisting in regulating the flow of water from its catchment. (IV) ***Forest Biodiversity:*** With the objective of conserving genetic resources (both floral and faunal including micro-organisms) and their sustainable use. (V) ***Climate and Forests:*** With objective of reducing GHG emissions, enhancing mitigation/carbon sequestration capacity of the forests and finding ways for adaptation with change in climate. (VI) ***Socioeconomic considerations and generation of forest based employment opportunities and livelihood options:*** With the objectives of meeting the fuel wood, fodder and timber requirements of the local communities, enhancing livelihood and employment opportunities, ensuring usufruct/ benefit sharing and protection of their traditional knowledge and traditional/cultural practices, etc. (VII) ***Tool for integrated development:*** Management Plan must act as a tool for integrated development of the district/forest division. Performance indicators may be identified for different objectives of management.
1.2	Method of treatment to be adopted	A brief account may be given about the ecological and silvicultural requirements for sustainable management of different identified forests or crops keeping in view the stakeholder's requirements, aspects of biotic factors, legal status of forests, drivers of un-sustainability, etc.
1.3	Constitution of working circles	Mapping and listing of different working circles (including overlapping ones), their area and distribution giving justification for their constitution amongst various options for sustainable management of forests.
1.4	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 RAPCCF (MoEF). 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 recommendations of the standing consultative committee authorized for this purpose.
2	**CHAPTER 2 to last CHAPTER (say N)**	
2.1	(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 N (last in row) which has a numerical value like 15, 16, etc.
2.2	General constitution of working circle	Mapping and summarization of working circle area statement by ranges, blocks, and compartments included in the circle indicating gross area and showing forest type and density classes (as adopted by FSI).

Chap-ters	TITLE / SUB-TITLE	EXPLANATION
2.3	General characteristics 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.
2.4	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.
2.5	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.
2.6	Special objectives of management	These are enlisted in order of priority.
2.6.1	Analysis of the crop	Stock maps, range and mean of quality and age class distribution, selection of sample units, type of enumeration, assessment of NTFP bearing species, status of regeneration, comparison with previous data and special features, if any, are to be described.
2.6.2	Silvicultural system	Define the system and give reasons for its adoption
2.6.3	Rotation period	The growth and other data on which the rotation is based are discussed. Full reasons are also given for adopting a particular rotation, other than that of the greatest volume production. If there is a change from the previous plan, then it's possible effect on age class distribution is analysed. The yield calculation formula adopted for sustainable harvesting should be indicated.
2.6.4	Harvestable diameters	These are prescribed species wise according to their site quality and correspond to maximum volume/ growth production i.e., the average rate of growth or volume increment reaches a maximum. These would be different in case of technical rotation.
2.6.5	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.
2.6.6	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.
2.6.7	Division into periods and allotment to periodic blocks (PB)	This is done for the shelter wood systems. It is also necessary to monitor the progress of 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.
2.6.8	Calculation of the yield	The yield calculation method adopted for sustainable harvesting should be indicated. There must be provision for adjustment of extra ordinary felling against future yields to ensure vitality and regenerative capacity of the forests for enhanced carbon sequestration.
2.6.9	Table of felling	Fellings are tabulated year-wise by ranges, blocks, compartments, and sub-compartments for each felling series, village level JFMC areas.
2.6.10	Method of executing the felling	Guiding principles (general marking rules); it should be simple to understand and implement.
2.6.11	Subsidiary silvicultural operations cleaning and thinning	Good practice guide for silvicultural operations including thinning and its grades etc. should be given.

Chap-ters	TITLE / SUB-TITLE	EXPLANATION
2.6.12	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.
2.6.13	Associated regulations and measures	May cover controlled grazing, lopping schemes and regulated firewood removals; soil and moisture conservation measures fire protection; forest protection from illicit felling, unregulated removal of NTFP and MAPs, encroachments, illegal mining, jhumming, etc.; restriction on fellings along rivers, highways, hill slopes, etc., which are relevant to the working circle.

85. Besides above working circles related to maintenance and enhancement of forest resource productivity, suitable prescriptions may be made as an exclusive or overlapping working circle for sustainable management of bamboos/rattans based on the availability and assessment of bamboos/rattans. However, it is up to the state government to sanction these prescriptions to suit the local conditions for the vitality of the crop. Even annual workings for all bamboo clumps of thrifty category (All healthy, un-congested, 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 for bamboo clumps.

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

Optimization of Forest Resource Utilization

87. There shall be an exclusive or overlapping working circle for important NTFPs like gums and resin, tendu leaves, medicinal and aromatic plants (MAPs), fruits and seeds, etc. as a separate chapter. Based on the potential NTFP 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 NTFP 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. Therefore WPO may prescribe appropriate steps such as closure o0f an area for the collection or extraction of particular forest produce for a specified period (closed area); restricting or banning the collection or extraction of any forest produce for certain period or periods of a year (closed season); limits on quantities of any forest produce to ensure sustainable harvesting for the future (sustainable harvesting limits); sustainable harvesting/ collection practices; submission of returns by collectors; etc. Enhancing the productivity of NTFPs should be ensured through improving the site productivity while maintaining regeneration, health and vitality of resources and the biodiversity of the forests. Good practice guide may be developed not only to ensure purity and quality of collected material, but also its good storage, regulated transit and chain of custody so as to facilitate issuance of certificates for NTFPs. For NTFP, the community should be sensitised regarding the time of harvesting, its grading and storage for economical important species for sustainable management and value addition. The state government may make appropriate rules for the

conservation and sustainable management of NTFPs from Government Forests. Seven step methodology (Stockdale, 2005) for community based NTFP management may be followed as per details below:

STEP 1: Identify the NTFPS to be managed, their uses and the people who are to manage them

1.1. Which NTFPs are to be managed?
1.2. What are the uses of these NTFPs?
1.3. Who will manage these NTFPs?

STEP 2: Determine the community's rationale and goals for sustainable NTFP management

2.1. Rationale for sustainable NTFP management
2.2. Goals for sustainable NTFP management

STEP 3: Document the community's existing NTFP management system

3.1. What is the community's existing NTFP management system?
3.2. When to document the existing NTFP management system
3.3. How to document the existing NTFP management system
3.4. Questions to ask about the existing management system

STEP 4: Evaluate the existing system's potential for sustainable NTFP management

4.1. The potential for sustainability of the existing system
4.2. Ecological predictors of the potential for sustainability
4.3. Social predictors of the potential for sustainability
4.4. Economic predictors of the potential for sustainability
4.5. Political predictors of the potential for sustainability
4.6. Implications for investment of community effort

STEP 5: Consider incorporating new approaches to NTFP resource management

5.1. Consider incorporating new approaches to NTFP resource management
5.2. Quantitative approaches used in NTFP resource management

STEP 6: Develop a plan for sustainable NTFP management introduction

6.1. What is a management plan?
6.2. How to develop the management plan

STEP 7: Implement and monitor the management plan

7.1. Develop a monitoring plan
7.2. Implement monitoring and evaluation activities
7.3. Develop a new management plan

88. There may be exclusive or overlapping working circles namely Fringe Forest Management, JFM and Community Forest Management in the working plan for sustainable management of forests.

89. There shall be provision for exclusive or overlapping mandatory working circles related to maintenance, conservation and enhancement of biodiversity, maintenance and enhancement of forest health and vitality, conservation and maintenance of soil and water resource, maintenance and enhancement of social, economic, cultural and spiritual benefits and

institutional (infrastructural and capacity building) support subject to their applicability for a given forest division. Suggestive list relates to

i. Forest fire management,

ii. Invasive species and weed management,

iii. Water resource management,

iv. Management, protection and conservation of flora and fauna found in or associated with the water bodies including rivers, lakes, ponds, marshes and reservoirs frequented by migratory birds within or adjoining the divisional boundary,

v. Infrastructure development and maintenance: Construction and maintenance of staff quarters, offices, FRHs, bridle paths, roads, etc. and other infra-structural facilities with full justification have to be given.

vi. Establishment and manpower of forest division including technical skills: Suggestions may be made regarding increase or changes in the establishment including administrative set up and manpower if the current arrangements are not found to be satisfactory based on the assessment of present and future work load. Training needs of staff at all levels should be assessed and prescribed.

vii. Wildlife management working circle: Important areas from wildlife point of view should be identified in the division and provision for improvement and conservation of wildlife in such areas of the division, status of man-animal conflict, problems of poaching in the division, management of wildlife corridors, if any, should be incorporated with supporting data. It's mandatory to describe the location of waterholes; suitable habitat for wild animals, measures needed to conserve and improve the same and anything specific and beneficial to wildlife in the division should be included. The areas of the division adjacent to national parks and WLS shall be managed in consonance with the objectives and management prescriptions of the management plan of the respective protected area (PA). The contents of the wildlife management working circle will be vetted by the Chief Wildlife Warden of the state.

viii. Ecotourism: This is a chapter to assess the impact of present and future tourism in the area and explore the possibilities of ecotourism. The ecotourism management will focus on conservation, environmental education and community involvement. The assessment will capture the ecotourism potential areas, attributes (landscape/ waterscape/wildlife, etc.), activities (camping, trekking, bird watching, adventure activities like rock climbing, rappelling, water sports, botanization, nature interpretation), products (traditional handicrafts, arts – painting, dance, ethnic cuisine, tribal culture), ecotourism charter, regulation of tourism influx with respect to biotic pressure and carrying capacity and suggested measures for better ecotourism management to achieve effective conservation.

ix. Livelihood and Socio-Economic Development: Based on the socio-economic survey and assessments, livelihood and socio-economic development of forest dependent people may be aimed to address livelihood issues and make the dependency on forest sustainable.

x. Biodiversity Conservation and Development (BCD): The diversity of natural ecosystems and habitats in the forest area and the special needs of sensitive ecosystems and habitat should be identified, described and addressed. Along with conservation, maintenance and enhancement of biodiversity, the endangered species shall be identified and protected with special care. The natural biological diversity should be maintained and developed through sustainable management practices. Vegetation data should be quantitatively analysed for different biodiversity indices and based on this, suitable management strategy should be prescribed. Impact of climate change and other stressors including

existing forest management may also be adequately highlighted so as to take suitable adaptive and corrective measure for conservation and biodiversity development. Endangered species included in Red Data Book of BSI and IUCN Red Data Book should not be sacrificed due to ignorance during forestry operations.

90. Assuming the numerical value of Biodiversity Conservation and Development (BCD) Working Circle as N, as stated above; the succeeding chapters are as under:

CHAPTER (N+1)	General financial forecast and financial plan of operation	The WPO will give his assessment of expected revenue, estimated expenditure for the implementation of working plan prescriptions and other normal plan and non-plan activities of the division. WPO will also indicate or identify the possible sources of funding, taking cognizance of provisions of the five year plan, non-plan budget, CAMPA, green India mission (GIM), 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 concerned DFO) should also be given for comparison.
CHAPTER (N+2)	Miscellaneous regulations	
(N+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 for maintenance of these may be allowed, which do not cause much deviation.
(N+2).2	Rights and concessions	These are to be dealt in detail. The quantity allowed, actually used, requirement of future demand, etc., are to be assessed and suitable guidelines/prescriptions given.
CHAPTER (N+3)	Science and Research	Reference should be made to all research articles/ outputs/ findings used in the preparation of the plan. All research gaps and needs 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.
(N+3).1	Preservation plots	Sufficient number of preservation plots should be created and maintained for preserving representative patches of existing forests as far as possible in their present form and preserving such selected plots from all forms of disturbances so as to allow progression towards climax form and to study and correlate vegetation change matrix with the impact of climate variation.
(N+3).2	Sample plot	Similar to preservation plots, establishment of representative sample plots of all ages, all species in different site qualities along with revival of previous sample plots for growth studies and a set of separate sample plots for NTFP should be planned for more focused research aspects in this chapter. Even a time schedule for data collection should be provided so that sustainable management of forests can be prescribed on the basis of scientific analysis.
(N+3).3	Regeneration plot	Regeneration plots may be established to study the regeneration status of important species. Data should be collected on population dynamics of seedlings, saplings and young trees. By marking them and monitoring their status periodically, finding out the conditions in which a species

		regenerates best and creating those conditions can make the working plan effective with regards to forest sustainability. While monitoring the marked seedlings, causes of damage, effect of canopy gap, growth parameters, role of mycorrhizae and litter cover management should be considered.
(N+3).4	NTFP plot	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 marketable parts (by removing the whole number) 75 % harvest of the marketable parts (by leaving 25 % of the whole number) 50 % harvest of the marketable parts(by leaving 50 % of the whole number) 25 % harvest of the marketable parts(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.
(N+3).5	Other research and experimental plot	Status of seed orchards, clonal seed orchards and improved nurseries to generate quality seeds/ seedlings and planting stock; other experimental plots for growing stock development data and silvicultural system, etc.
CHAPTER (N+4)	Summary of prescriptions	This is a brief description of prescriptions and suggestions as per working circles. This would help as ready reference.
CHAPTER (N+5)	Trees Outside Forests (TOF)	Include the present scenario and potential areas and efforts required to increase TOF so as to make forests sustainable and rural economy more revitalized.

NUMBERING AND PAGING

91. Pages are numbered from the beginning of part I, chapter I and form a consecutive series right through the plan. There should be one continuous sequence for the chapters of working plan including Part I and II. The chapter numbers should be in Arabic numerals.

92. 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 for example, paragraphs of chapter 8 should be numbered as 8.1, 8.2, 8.3, … 8.9, …, 8.99, 8.100, etc.

93. 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.

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

STANDARD SIGNS, SYMBOLS AND COLOURS USED

95. Looking at the different patterns of symbols, signs and colours used in stock mapping in preparation of working plan, there is a need to bring in commonality across the country to

make working plans easily understandable. Certain attributes may be standardized at the national level leaving remaining attributes to the states. Accordingly a list of signs, symbols and colours used in the preparation of stock maps is annexed as Annexure III. However FSI/FRI may develop a standard set of signs, symbols and colours to be used in the preparation of stock maps while developing a manual for preparation of working plan.

WORKING SCHEMES

96. General headings, in which the working scheme to be written, may be as under, but there is no hard and fast rule for this. The DFO territorial forest division, Head, territorial forest circle and the Head, working plan wing of the state can use their discretion.

PART – I

- Area dealt with – location
- Details of forest land like legal status, boundaries, area, rights of others (if any), etc.
- 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

97. 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 concerned paragraphs of the working plan should be indicated in brackets below the title of the appendix.

98. The following is the list of essential appendices. Other appendices which may be useful should also be given, such as, sacred groves, roads and their status, fire lines including the status of their maintenance, forest employees killed on duty, mahavrikshas, vrikshamitras, results of soil survey, etc. A list of reporting formats on different aspects of sustainable management of forests is annexed as Annexure V which may be included as additional appendices.

Appendix I – Divisional area statement

Block Range	Village/compt/ sub- comp/ coupe	Composi-tion of area	WC FS PB	Density	Site quality	Growing stock	Area	No. of cattle units permitted	Other details	Remarks
Order alphab etical	Serially	Separate for important species	WC main or over lapping indicate	As assessed by WPO	As assessed by WPO	As assessed by WPO	To be ment-ioned	If regu-lated	Anything important	Important observant-ions
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**

Appendix IIA – Enumeration and its Results

Full details in compartment history including major NTFPs and also an abstract are to be given in this appendix. The figures are detailed by working circles, felling series, blocks and compartments and/or 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/unit area)	Frequency (%)	Total basal area (m^2/ha)	IVI
Trees				
Shrubs				
Saplings				
Seedlings				
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

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

Appendix III-NTFP (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/beat/ range)	Area in ha	Potential harvesting Quantity per hectare	Estimated harvest/ hectare	Remarks
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, NTFPs, seed orchards, etc., along with location description should be given.

Appendix V – Rights, concessions, grazing regulations and notifications

All Government settlement reports, orders and notifications including the notifications under Forest Rights Act (FRA) should be reproduced in full.

Appendix VI – Schedule of rates

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

Appendix VII – Leases, contracts, transfers

Details of leases, contracts, land transfer cases (FC Act and FRA), other related activities, etc. are to be given along with approved rehabilitation and reclamation plan for each mining lease and stipulated conditions of EC & FC clearances.

Appendix VIII – Ranges, beats and their headquarters and area

Range wise and beat wise constitution of blocks and compartments (along with maps) should be given.

Appendix IX – Buildings and rest houses

List of forest buildings, rest houses, their location by lat. /long., number of suites/ rooms, distance from road and altitudes etc. is to be given.

Appendix X – Divisional Forest Officers

List of DFOs served in the division is given right from the day of formation of the division.

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) should be given, for at least past three years to identity fire prone areas along with specific remarks with regard to severity and burnt area.

Appendix

For list of forest offences may be considered for inclusion

CHAPTER VIII

PREPARATION OF MAPS

Map Policy of India

99. Map making process has seen many changes over the years from conventional techniques to switching over to the digital techniques. Now-a-days the maps are available in both analogue and digital form. 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 and user friendly utility in the public domain is Google Earth, which is based 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 and convenient.

100. All our old series Survey of India topographical maps (1:50000) are on polyconic projection with Everst-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 ±5cm. Hence, most of the countries switched over to geocentric ellipsoid such as WGS 84 for mapping. Over 100 countries accepted this projection in the world. 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.

Open series maps (OSMs)

101. 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. Survey of India has prepared over 4000 maps on1:50,000 scale under OSM series. They are available to the user community both in digital as well as in analogue form.

102. 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.GPS is to be set in geographic coordinate system (GCS) with WGS 84 datum for easy uploading of data into the GIS software.

103. 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 data from latest remote sensing satellites and advance image processing have been used to provide synoptic view and fairly accurate details of land cover classes of the division in1:50,000 scale with 1.0 ha minimum mapping unit. The changes occurring in 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 also be determined using geomatic tools.

104. Finer resolution (about 5.8 m or less) satellite imagery on the other hand can help in mapping more details, classifying forest into more precise density classes, conducting inventory and preparing stock map on 1:12,500 scale with the minimum 0.1ha mapping unit for forest

management. The result of the image analysis of satellite data to generate forest cover layer can be further enriched by integration of digitized 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.

105**.** 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 higher scale depending on the available resolution of satellite images. One set will be for the territorial divisional office and the other for the WPO. 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 MAPS

106**.** These are prepared on 1:50,000 scale. Sufficient number of master copies of the management maps are prepared so as to provide them to all concerned including subordinate offices like sub divisions, ranges of the division, etc. 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 clearly as far as possible.

WORKING PLAN MAPS

107. These are prepared on 1:12,500 or higher scale 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. Working plan maps should preferably be generated using spatial data in GIS.

REFERENCE MAP

108. When reading a working plan, it is inconvenient and unnecessary 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 should be attached to the printed volume in such a way that when it is unfolded it will be completely outside the volume. The map should 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 ranges, roads, canals, forest rest houses, neighbouring towns and villages along with main boundaries of the forests and such other relevant features which can be shown without overcrowding it. The scale of map depends on the size and shape of the division. Reference map is a miniature mix of working plan map and management map.

CHAPTER IX

COMPARTMENT HISTORY

109. This should be written/updated by the WPO/DFO territorial as his inspection of forests proceeds and should be a well documented description of the lowest management unit in the field i.e. compartment/village. Normally they should be updated 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 management unit (compartment/village):

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	Bio-diversity assessment	To be filled by the WPO
CH Form-4	Management details	To be filled by the WPO
CH Form-5	Details of NTFP including MAPs	To be filled by the DFO
CH Form-6	Trees marked for felling since last plan	To be filled by the DFO
CH Form-7	Compartment out-turn	To be filled by the DFO
CH Form-8	Harvesting of NTFP	To be filled by the DFO
CH Form-9	Past events during the last plans in the compartment	To be filled by the DFO

COMPARTMENT DESCRITPION

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

Identification

Division	Range	Block	Compartment

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.)
Legal status	Legal status of the forests may be as reserve forest, protected forest, un-classed forest, national park, private forest, private land with tree owned by government and undetermined, etc.
Land Use	The land use type of the plot may be categorised as closed forests, dense forests, open forests, scrub, bamboo brakes, shifting cultivation, young plantations of forestry species, tree in line, forest roads, grass lands, and barren, agricultural land without trees in surround, agricultural land with trees in surround, non-forestry plantations, habitation, and water bodies.
General topography	The topography of the area may be determined from the toposheets and the same may be confirmed by field observations. It may be categorized as flat, gently rolling, hilly and very hilly.
Altitude	In meters. In case of hilly areas give lower and upper limits.
Aspect	Main aspect and variations if any; The direction of the slope may be recorded as northern, north-eastern, eastern, south-eastern, southern, south-western, western, north- western and no aspect.
Gradient/slope	Precipitous, very steep, steep, moderate, gentle, etc.
Configuration	Rugged, undulating, flat, etc.

Rock and geology	Mention main underlying rocks including alluvial deposits
Soil	Texture, depth, permeability, drainage, surface compaction, humus, etc.
Soil erosion	Heavy/ moderate/ mild/ no erosion
Crop composition	Mention of major tree species predominant in the area and extent of their representation in terms of percentage may be made.
Regeneration status	Regeneration status may be observed and recorded as adequate/ moderate/poor/absent for major tree species.
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.
Grazing incidence	Depending upon the pressure of grazing exerted on the forests by livestock the incidences of grazing may be categorized as heavy/ moderate/ light/ none.
Presence of bamboos	If yes, brief description of bamboo density, bamboo quality, bamboo regeneration and bamboo description may be made.
Presence of grasses	Ground cover on an area of about 2 ha around the plot (grid) centre may be intensively observed to classify the area for grasses as very dense, dense, moderate, scanty and absent.
Presence of weeds	Ground cover on an area of about 2 ha around the plot (grid) centre may be carefully observed to classify the area for presence of weeds as very dense, dense, moderate, scanty and absent.
Plantation status	If a plantation is in existence in a plot (grid) area fully or partially, the details of the plantation with regard to its area, year of plantation, species, spacement, general growth conditions, average crop diameter, any specific events or happenings related to plantations may be observed, assessed and recorded.
water bodies	Name, type, extent, seasonality of the water body may be explored and recorded. Potability i.e., safe enough for drinking has to be ascertained.
Drivers of degradation	Biotic: Brief account of degradation sources may be given and on the basis of various factors of degradation like grazing, browsing, fire, lopping, girdling, illicit fellings, mining, encroachment, etc. the intensity of degradation may be categorized as heavily degraded, moderately degraded, mildly degraded and not degraded. Natural calamities: 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.
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.
Faunal traces of flagship species	The entire 2 ha area around the centre of plot (grid) may be scanned for any faunal traces of flagship species. If found the details of the same may be observed and recorded.

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)

111. The format (CH Form 2) 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 and Regeneration Assessment

112. The format (CH Form 3) is as under

Name of the species	Density (No. of tree/unit area)	Frequency (%)	Total basal area (m^2/ha)	IVI
Trees				
Shrubs				
Saplings				
Seedlings				
Climbers				
Herbs				
Grasses/ Sedges				

Management details

113. The format (CH Form 4) is as under

Working plan period			
Author WPO			
Working circle			
Felling series			
Periodic block			
Sample/research plots/preservation plots			
Forest types			
Forest cover and change			

Details of NTFP including MAPs

114. The format (CH Form 5) is as under

S.N	Scientific name	Local name	Type of plant (Habit)	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

115. This form is to be filled by the DFO territorial from time to time as the markings take place. . The format (CH Form 6) 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

116**.** The format (CH Form 7) is as under:

Year	Area felled in ha.	Species	Round timber	Sawn timber	Fuel wood	Miscellaneous	Remarks

HARVESTING OF NTFPs

117. The format (CH Form 8) is as under:

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

COMPARTMENT HISTORY

118**.** The format (CH Form 9) is as under:

Range: ....., Block: ....., Compartment:....., Beat:.....

Year	Event (since last plan)	General comment on the impact of the said event
a	b	c

119. If updated 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.

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

121. The principal information, which the DFO territorial 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, cloud burst, landslides, insect, fungi, grazing, etc.), remedial measures taken along with costs, gregarious flowering, seed masting, good seed or seedling years of important species, etc.

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

CHAPTER X

MONITORING, ASSESSMENT AND REPORTING

CONTROL FORMS

123. 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 for each prescription. 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.

124**.** The WPO should prepare a draft set of control forms to monitor all the important operations prescribed and suggested in his working plan such as different types of fellings, thinnings, plantation works, subsidiary silvicultural operations, rotational loppings, soil and water conservation works, controlled /regulated grazing, fire protection, NTFP harvesting practices, bamboo harvesting, boundary pillars, spring recharge*, lantana* /weed eradication, reducing degradation, removal of firewood, etc., These forms will then be submitted to the CCF/APCCF (WP) for approval and preparation of final sets. There shall be separate set of control forms for each working circle. In this regard, help may be taken from suggested reporting formats for sustainable management of forests (Annexure V).

125. Three permanent sets of control forms should be prepared in the office of the Working Plan Officer and one set each is to be sent to CCF/APCCF (WP), head, territorial circle, and the DFO territorial.

126. Following are examples of control forms:

- **Silvicultural Control Form –** For the control of all silvicultural operations such as fellings, subsidiary cultural operations, cleanings, thinnings, burnings, etc., which may be prescribed or suggested to be carried out in a given management unit for the duration of the working plan.
- **Felling Control Form –** For controlling and maintaining the record of all trees marked for felling and trees retained.
- **NTFP Control Form –** For controlling and maintaining a record of all NTFPs harvest so as to make the removal/harvest of NTFPs remain sustainable.

SILVICULTURAL CONTROL FORM

127. The format of coupe control form is as under

Working circle- periodic block-		Felling-series cutting section	Localities prescribed localities suggested				Coupe control form		
							Coupe No.		Page
			As carried out				Excess(+) or deficit (-)		
Prescription in brief	W.P. para	Year due	Year	Block/ Compt.	Area	Volume	Area	Volume	Remarks and Sanction
1	2	3	4	5	6	7	8	9	10

FELLING CONTROL FORM

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

Working circle- periodic block		Felling series- cutting section		Localities prescribed localities suggested (with areas)				Coupe control form	
								Coupe No.	Page
Range wise	Area	Species	Diameter class	Trees marked	Unit factor	Volume marked	Trees retained	% Trees retained	Remarks
1	2	3	4	5	6	7	8	9	10

i. Offence reports- prosecuted, compounded, un-detected

ii. Removals under rights/concessions

iii. Forest lands marked for individual patta under FRA-range, block area and compartment, mauza, revenue paper status

iv. Forest lands allotted to community for enjoying of rights- range, block area and compartment, mauza, status as per revenue records.

NTFP CONTROL FORM

129. 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. Excess (+) or deficit (-)		Page
			Year	Block/ compt.	Area	Name of NTFP with scientific name of species	Vol./ Qty.*	Area	Vol./ Qty.*	Remarks and 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. Bamboos may be quantified in notional tons for uniformity.

130. The DFO territorial will annually make entries in his copy of the control forms and send them together with the deviation statement in triplicate to the Head, territorial circle. After the entries have been checked and approved, the Head, territorial circle will first get his copies completed and then send it in two copies to the concerned WPO. 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 WPO will send the deviation statement with appropriate justification in four copies to the PCCF (HoFF) for sanction. After the sanction, one copy each will be sent to the WPO; Head, territorial circle and the DFO territorial for their record and the CCF/ APCCF (WP) 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 territorial to the Head, territorial circle by October and the latter should send them to the WPO concerned by December each year.

DEVIATION STATEMENT

131. 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 working plan		Nature of deviation requiring sanction
		Paragraph	Nature of prescription	

132. The DFO territorial will forward through the Head, territorial circle, 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 (HoFF) provided he agrees with the necessity of these deviations. One copy of the statement will be returned to the DFO territorial through the Head, territorial circle 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 (HoFF) should have been obtained in advance; the sanction number and date should be quoted in the last column.

133. For all major deviations with respect to prescriptions where sanction of the MoEF is mandatory, an explanatory note along with request for regularization has to be sent by PCCF (HoFF) to RAPCCF (MoEF). In case where there is difference of opinion between the PCCF (HoFF) and RAPCCF (MoEF), the former will refer the matter to DGF&SS (MoEF), whose decision shall be final. The PCCF (HoFF) will countersign the deviation statement for reporting to the MoEF.

134. Registers and records including spatial data: The following updated (till last financial year) registers and records will be maintained by the division:

1. Compartment histories
2. Divisional notebook
3. Fire records and registers
4. Register of boundary pillars
5. Plantation journals (along with list of plantation raised area and location last five years)
6. Nursery register (location, permanent nursery)
7. Register of reserves
8. Register of rights and concessions
9. Record of forest produces harvested
10. Free grants
11. Register of leases
12. Register of land transferred to other departments or under FC act and FRA
13. Register of soil and water conservation works (along with list of plantation raised, area and location last five years)

14. Register of rotational loppings
15. Grassland management (last five years)
16. Wildlife management
17. Register of invasive species eradication e.g., *Lantana* eradication, etc.
18. Register of wildlife management may include detailed record of human-wildlife conflicts that includes data on human casualties and injuries, loss of domestic animals and crop damage and compensation paid etc.
19. Register of government buildings that includes log of the repairs and addition (if any) undertaken in the buildings.
20. Register of licensed gun holder(s) in the division.
21. Register of places of religious significance that has been historically been given recognition (However, mention must be made of the fact that mere mention in the register does not automatically give legal sanctity to the structure).
22. Register of registered saw-mills in the division.
23. The divisional note book must have record of water table at various places in the division.

135. Annual inspection of DFO territorial office by CF/CCF and range office by DFO territorial is mandatory within three months of completion of financial year to have checks on annual statements in control forms and deviation statements and maintenance of registers and records.

Annexure I

Spatial Database in GIS

Geomatics offer very effective tools for an exercise like working plan (WP) preparation, which involves analysis of several spatial layers and parameters in relation to forests for prescribing management practices. The techniques and methods based on geomatics add to the precision, objectivity and scientific analysis into the process and also lead to significant saving of cost and time. A spatial database on forest in GIS is a set of geo-referenced layers of spatial data of an area in which each layer is devoted to a particular theme or an entity on the ground e.g. administrative boundaries, road network, forest cover, forest types, altitude, etc. A layer can be either in vector or raster format. In vector format, features are shown by point, line or polygons, whereas, in raster, the layer appears as an image and is made of pixels. In each spatial layer (vector), attribute data with every feature appearing as point, line or polygon (e.g. a forest patch, compartment, village, plantation, etc.) can be attached for analysing management alternatives, creating scenarios, building queries or general database applications. A set of layers on different themes relevant to forest management of a given division makes the spatial database in GIS. Spatial database of a forest division with spatial layers indicated in the list given at annexure I will be of immense use in preparation of working plan and later in day-to-day forest management decisions of the forest division.

Creation of spatial database of the division should be undertaken as an exercise towards preparation of working plan and not only to create an end product, as the spatial database itself would provide a scientific basis for collecting data on various parameters, stratification and for efficiently storing/compiling the data for each compartment, block or range. The spatial database would be of immense use in analysis and creating different scenarios for identifying working circles and writing prescriptions for management of forests. Creation of spatial database should be accomplished in first four months of working plan preparation exercise.

Creating spatial database

(i) Suitable GIS software along with a high-end PC or workstation can be used for creating spatial database of the division in GIS.

(ii) The spatial database will comprise layers on different themes and in each layer, attribute data will be attached with the features in attribute table, wherever applicable pictures should also be part of the attached data.

(iii) On screen digitization for creating various layers should be done on sufficiently large scale 1:25,000 or higher.

(iv) A common projection parameters, as given below should be followed for the spatial database

Projection system – UTM
Datum – WGS 84
Spheroid – WGS84 / Everest

(v) An indicative list of the layers for the spatial database with possible sources is given in Table 1. Mandatory layers have been indicated, other layers can be according to the specific planning and management needs of the division.

(vi) For creating layers from the satellite images, images with spatial resolution 5.8m or higher only should be used.

(vii) Discrepancy in the area of forest appearing in the records and that which is measured through GIS tools in the spatial database is always possible because of various reasons. For the purpose of spatial database, an attribute of forest area according to the government records should be added in the attribute table (PAT).

An indicative list of various layers in the Spatial Database in GIS is given as under which are to be provided to the WPO by the GIS cell of the department or any such designated source to be used in preparation in working plans.

Indicative list of layers in the Spatial Database in GIS

S.N.	Layers in the Spatial Database	Possible source(s)
1	Division boundary*	Maps in the division/ department
2	Range boundary*	Maps in the division/ department
3	RF and PF boundary*	Maps in the division/ department / SOI toposheets/existing digitized boundary
4	National parks and wildlife sanctuaries*	Maps in the division/ department/ WII
5	Beat boundary	Maps in the division/ department
6	Block*	Maps in the division/ department
7	Compartment boundary*	Maps in the division/ department
8	Location of all the offices*	Maps in the division/ department/GPS
9	Village locations*	SOI toposheets /Census
10	Road network*	SOI toposheets /Google Earth
11	Railway line	SOI toposheets
12	Forest check gates*	Maps in the division / department /GPS
13	Rest houses	Maps in the division / department /GPS
14	Stream network*	SOI toposheets /Satellite Image/ASTER DEM
15	Nurseries*	Maps in the division / department/GPS
16	High resolution satellite imagery*	NRSC
17	Forest cover*	FSI / Self Interpretation
18	Forest type/stock map*	FSI/ maps in the division/ department
19	Police station/chowkis	SOI Toposheets/ Police Department's Map
20	JFMCs*	GPS
21	Plantation locations in the last 15/20 years	Maps in the division/ department/GPS
22	Forest depots	Maps in the division/ department/GPS
23	Fire locations recorded in the last 5 years	FSI's website and conversion of the same in to point coverage
24	Parent geology	Maps from GSI
25	Protected areas*	Maps in the division/ department/ WII
26	Wildlife corridors	Maps in the division/ department/ WII
27	Eco-tourism spots	Maps in the division/ department /GPS
28	Soil type	NBSS&LUP map on 1:250,000 scale
29	Altitude zones*	ASTER DEM
30	Slope	ASTER DEM
31	Aspect	ASTER DEM
32	Fire affected area	Burnt area mapping using IRS P6 LISS III data
33	Fire sensitive spots	Grid analysis using FSI's forest fire spots data
34	Encroachment*	Existing map in the division / remote sensing based change detection
35	Management areas and working circles	To be identified/created in GIS in the course of preparing WP
36	location of saw mills	Existing maps/GPS survey
37	Mining areas	Existing maps/GPS survey
38	Grid layer of rainfall	Indian Meteorological Department, Pune
39	Grid layer of temperature	Indian Meteorological Department, Pune
40	Forest research plots	GPS
41	Seed production areas /Plus trees/CSOs	GPS

* indicates mandatory layers

Annexure II

FOREST RESOURCE ASSESSMENT METHODOLOGY

Natural populations have peculiarities of spatial auto-correlation and spatial heterogeneity, more so in case of forest resources. Therefore, for forest resource assessment of large forest area like a division, systematic sampling gives quite precise estimates of population parameters. The precision of estimate may further be improved using post-stratification technique. Post-stratification may be carried out using field survey or using GIS tools or using GIS tools in conjunction with classified maps based on remotely sensed satellite data.

Forest resource assessment requires sampling of plots of optimum area (area sampling) for various parameters. For assessment of growing stock, volume or number of stems, 0.1 ha plot is optimum. Similarly for assessment of regeneration status 2mx2m or 3mx3m plot is optimum. For assessment of soil organic carbon, a 3-dimentional plot (pit) of 30cmx30cmx30cm is optimum. For ecological study of trees, shrubs and herbs plots of sizes 10mx10m, 3mx3m and 1mx1m respectively are optimum. It means that if the plot size is increased, it will not increase the precision of estimate of the corresponding parameter, though it will increase the sampling intensity. Therefore, for area sampling situation, sampling intensity is not very relevant but just indicative. The optimum sample size i.e. optimum number of plots to be included in the sample which may provide the estimate of population parameter within prescribed limit of error is more important. Instead of prescribing sampling intensity, the allowable level of error in the estimate at division/range level say, ± 5% at 95% probability level is fixed.

Determination of optimum sample size is a crucial decision in any sample survey design. The size of sample depends on the variability of main characteristic in the population (say, volume/ha), allowable error in the estimate and time and cost factors. Generally, time and cost is not considered in the calculation. It is the variability of the population parameter (characteristic/attribute) allowable error that decides the sample size. A general formula for calculation of optimum sample size is given as –

$$n = \frac{{t_v}^2 \left(\frac{CV}{AE}\right)^2}{1 + 1/N \left(\frac{CV}{AE}\right)^2}$$

Where,

- n = sample size,
- CV = Coefficient of variation of the main characteristic/attribute (which can be calculated through past WP or pilot survey or using correlated variable. In absence of any these it can be asked from FSI from similar nearby area of that forest type),
- AE = allowable error (%),
- t_v = value of t-statistic with v degrees of freedom and 5% significance level
- N = total number of plots of optimum size of main characteristic in the population (division/Range etc.)

Generally, the N is very-very large in forest resource assessment making denominator approximately one and for that reason and brevity the numerator becomes the formula for sample size calculation.

Having calculated the sample size, the sample plots may be laid out following systematic sampling scheme. The systematic sampling may be based on the system of grids of latitude and longitude or distance, say 1kmx1km, basis. The size of grid can be ascertained using area of the concerned division and optimum sample size and sample grids be selected. It may be all grids of 25''X25''size (approximately one plot per 0.56 km^2 , assuming that at the centre of country on an

average 2.5'X2.5' covers an area of 20 km^2) or alternate grids of 25''X25'' size (approximately one plot per 1.11 km^2) or all grids of 50''X50'' size (approximately one plot per 2.22 km^2) or alternate grids of 50''X50'' size (approximately one plot per 4.44 km2) all grids of 1.25'X1.25' size (approximately one plot per 5.00 km^2) and so on. All these grid sizes can be merged with existing NFI grids of FSI. At the centre of grids plots of optimum sizes may be laid out. For the purpose of assessing attributes like growing stock, NTFPs, etc. of a compartment/ village/ management unit, provision of lateral(side) sample plots at a fixed distance from the centre of the grid in addition to the central plot may be provided depending upon the requirement of the sample size. To increase the precision of estimate, the data may be processed using post stratification techniques on the basis of canopy density /forest type, etc. as being done in most of the developed countries.

LAYING OUT GRIDS ON THE TOPOSHEET AND SAMPLE PLOTS

For forest resource assessment in the working plan, sample plots are systematically laid out in the forest area which is indicated on the Survey of India topographic sheet (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 ¼′× 1 ¼′. To carryout forest resource assessment, each of these 1 ¼′× 1 ¼′ grids are further sub-divided into 9 grids (or as per the requirement of sample size) thus forming the basic sampling frame of 1296 (144 X 9) grids, each of size 25″× 25″ (each grid of twenty five seconds latitude and twenty five seconds longitude representing approximately 56 ha area on the ground). The latitude and longitudes of the intersection of diagonals of grid will be identified as the centre of the grid. These latitude and longitudes will be used for reaching the centre of the grid by using GPS. The grids are conveniently serial numbered by WPO.

DESCRIPTIVE WORK WHILE REACHING SAMPLE PLOTS

The recent version of satellite imagery in digital form may also be used to determine the possible accessibility, land use, land use change and forest cover change. 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 (Forest Survey of India).

After earmarking the grids to be surveyed, the survey team leader should find a nearest convenient route to reach the sample plot i.e. centre of the grid from minimum traverse by vehicle or on foot. After arriving at a nearby location of the plot, the next task would be to search a reference point, which can be identified on the map as well as can be located on the ground. The grid centre is reached after covering the desired distance and tracking the 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, railway crossings, road, river, streams, ponds and wells, milestone 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 plot in future.

While approaching the sample plot, stock assessment and mapping (earmarking the stocked area on the map), ground truthing of remote sensing data should be done by 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. Changes at all locations should be described in 'plot approach form' (Form I) and depicted/delineated on the map. Presence of special features within the

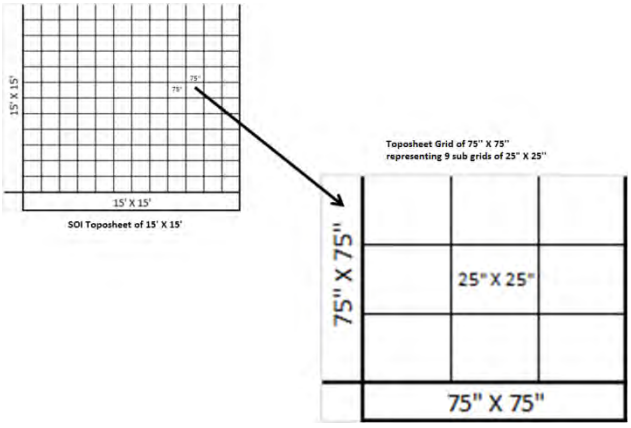
compartment/village/other management unit, namely grassy patches, scattered trees, plantations raised, etc., should also be described in 'plot approach form' (Form I) and depicted on the stock map, as per the standard set of conventional signs, symbols and colours given in Annexure III. Regeneration status of main species should also be observed. As regards the site quality (SQ), the criteria for determination of site quality as given by FRI will be followed uniformly across the country.

Plot approach form also contains general observational information on undergrowth – climbers, important herbs, grasses, shrubs, MAPs, bamboo and rattans, NTFP yielding species, intensity of invasive species, flagship faunal species and their traces, ecotourism potential areas*, special wildlife* habitats and their interface with humans, biotic factors and any other thing or special treatment required should find a mention here.

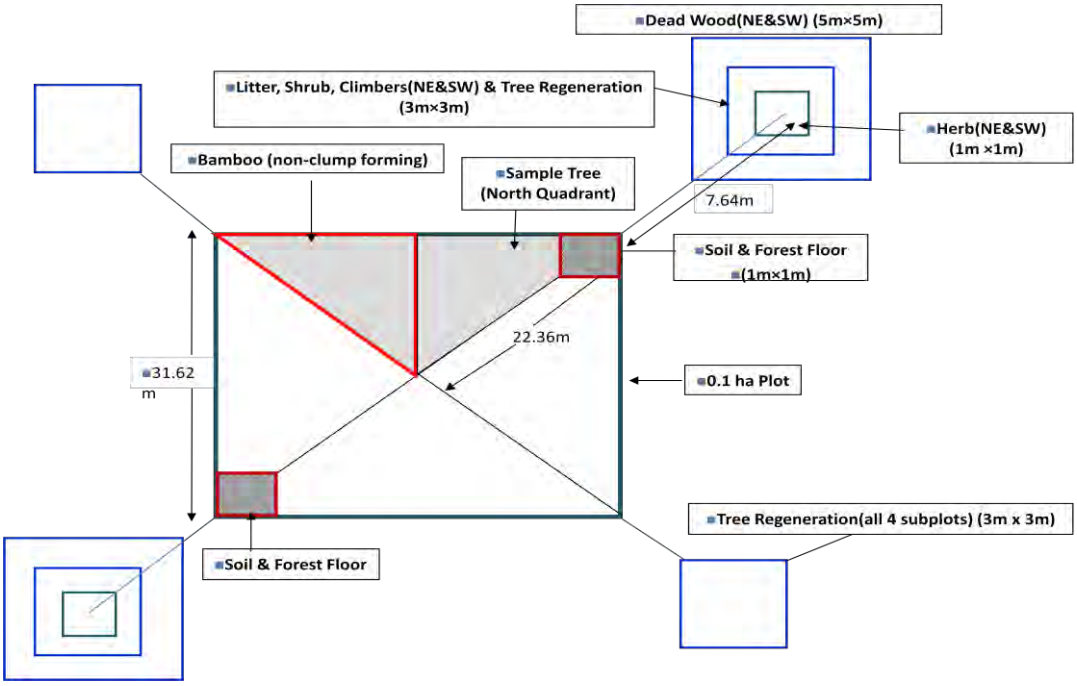
Drivers of forest degradation, forest resource utilization, dependence of local people on forest and their social, cultural and spiritual aspects may be explored. The notes prepared by the WPO and his team during the field visit are very important as they form the basis of the description of compartment/village/other management unit, which again form the basis of future management. Notes are taken under the headings mentioned in the 'plot approach form' (Form I). 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. Stock mapping in sample plots may be done on 1:12,500 or higher scale. However, all the classes on the map should be shown in the form of polygons digitized on the basis of field observations.

LAYOUT OF SAMPLE PLOTS IN THE FIELD

After reaching the sampling plot i.e., the centre of the grid, a square plot of 0.1 ha (main plot) will be laid out by measuring 22.36 m horizontal distance i.e., half of the diagonal in all the four directions at 45^0 in north-east, at 135^0 in south-east, at 225^0 in south-west, and at 315^0 in north-west corners of the plot from 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. Nested quadrates of size 3m $\times$ 3m and 1m $\times$ 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/grasses respectively. Selected grids must contain one central plot of 0.1 ha (31.62m X 31.62m).



Graphical representation of Grids



Plot configuration of main plot and attached sub-plots

GENERAL PLOT VARIABLES TO BE RECORDED

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, presence 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' (Form II). This information along with the general observations made in 'plot approach form' 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

The sample plot, which cannot be laid out due to steep slope or other conditions, may be left out of enumeration and its conditions of inaccessibility need to be mentioned in 'plot enumeration form' (Form III). All trees having diameter 10 cm and above will be enumerated, species wise and diameter class wise from all the identified sample plots of 0.1 ha and recorded in the 'plot enumeration form' . 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 and 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.

The data of shrubs, climbers and regeneration status from all 4 quadrats of 3 X 3m laid out at a distance of 30 meters from the centre of the main plot of 0.1 ha. 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 is to be collected and recorded in the 'plot enumeration form'.

CARBON STOCK ESTIMATION

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 (ICFRE Institutes) and further research needs should be explicitly highlighted.

Along with the nested quadrates of size 3×3m and 1×1m, one more quadrate of size 5×5m at NE and SW direction, may be laid out in the selected grid for the estimation of carbon stock subject to availability of resources and funds. In 5×5m plot, all the dead wood above 5cm diameter would be collected, weighed and recorded. In 3×3m, all the woody litter, that is all branches below 5cm diameter, would be collected, weighed and recorded. All shrubs and climbers in 3×3m plots would be up-rooted, weighed and recorded. For trees, allocation of carbon in root, stem, branch, twigs and leaves may be obtained separately. In 1×1m plot, all the herbs/grasses including leaf litter would be collected, weighed and recorded. Dry biomass would be converted into carbon stock. For collecting data on humus and soil carbon, forest floor of 1×1m plot at the NE and SW corner of the main 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 30×30×30cm would be dug at the centre of these 1×1m plots and a composite sample of soil weighing 200gm would be kept for organic carbon analysis (These information can be taken directly from FSI if survey is cost prohibitive).

Form I

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	Compartment	Compartment No. or name of Village or any management unit in practice.
4	Grid	The grids are conveniently serial numbered for each compartment or village or any management unit in practice.
5	Latitude	Using GPS, Plot (grid) centre is located and latitude recorded.
6	Longitude	Using GPS, Plot (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 lat. and long. 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 occularly 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

S.No	Heading	Description
		of species, density, undergrowth – climbers, weeds, grasses, regeneration of principal species, mention of important herbs, shrubs MAPs, bamboo and rattans, NTFP 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 (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 fuel wood and fodder and their quantity

Form II
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	Compartment	Compartment number or name of village or any Management Unit in practice.
4	Grid	The grids are conveniently serial numbered for each compartment or name of village or any management unit in practice.
5	LAT.	Using GPS, plot (grid) centre is located and latitude recorded.
6	LONG.	Using GPS, plot (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, trees 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, ravines, gullies, 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 3^0, 4^0 - 15^0 , 16^0-40^0 , 41^0 and above, respectively.

S.No	Description	Remarks
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 and 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 species 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 livestock 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 (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 (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 (grid) area fully or partially, the details of the plantation with regard to its area, year of plantation, species, spacement, 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. Potability i.e. safe enough for drinking has to be ascertained.
25	Drivers of degradation	Biotic: 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. Natural calamities: 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 species.	The entire 2 ha area around the centre of plot (grid) may be scanned for any faunal traces of flagship species. If found the details of the same may be observed and recorded.

Form III

PLOT ENUMERATION FORM – A1 (31.62mX 31.62m Central Plot/lateral 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.

(DD/MM/YYYY)

Compartment No…….. Block /Village …….. Beat ……..
Range …….. Division……..…….. ALT ……
LAT…….. LONG…….. Grid No……..

S. No	Species name	Local name	DBH (OB) in cm	Height of selected dominant trees	NTFP utility		Remarks, if any, about the tree condition
					Part of the tree	Approx. weight and or no.	

BAMBOO CLUMP ENUMERATION FORM-A2 (31.62mX 31.62m Plot)

This form is used to record data of all the clumps occurring in the plot. Separate form will be used for each of the quadrant.

Sl. No	Species name	Local name	Clump dia in cm	Green sound culms									Green damaged/ twisted	Dry culms		Remarks, if any, about the clump condition
				Current years			One to two years			Over two years				Sound	Damaged/ twisted	
				a	b	c	a	b	c	a	b	c				

a denotes diameter class of culm between 2<5cm; **b** denotes diameter class of culm between 5<8cm; **c** denotes diameter class of culm above 8cm

PLOT ENUMERATION FORM – B (3m X 3m Plot)

This form is used to record data of all shrubs (including medicinal and aromatic plants) and young tree plants (saplings+adults) 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 or dbh will be measured and recorded. All tree-plants having dbh equal or more than 5cm and less than 10cm are called adults while other young tree plants with 2 to 5 cm collar diameter at the base are called saplings for assessment of regeneration status.

Sl. No	Species name	Local name	Collar dia at base in cm	DBH In cm (if any)	Height	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 Plot)

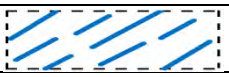
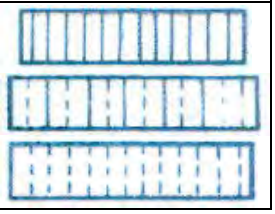
This form is used to record data of all the herbs (including medicinal and aromatic plants) and seedlings counted in the 1m X 1m quadrants. Separate form will be used for each of the quadrant. All individuals below 2 cm collar diameter at the base will be measured and recorded. All tree plants below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

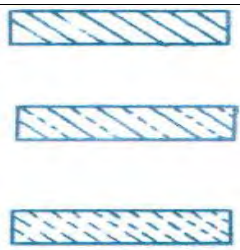
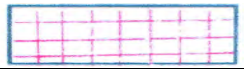
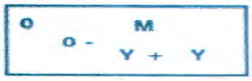
Sl. No	Species name	Local name	Height	NTFP utility		Remarks, if any, about the condition of herbal vegetation
				Part of the plant body	Approx. weight and or no.	

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

Annexure III

Signs, Symbols and Colours used in Stock Mapping

S. No	Type	Quality	Description	Conventional signs
1	2	3	5	6
A	Teak	I	Blue (Cobalt Blue) Single vertical lines	
		II	Blue (Cobalt Blue) Double horizontal lines	
		III	Blue (Cobalt Blue) Tripe diagonal lines (Top right & Bottom left)	
		IV-a	Blue (Cobalt Blue) Diagonal cross hatch	
		IV-b	Blue (Cobalt Blue) Vertical horizontal cross hatch	
		V-a	Blue (Cobalt Blue) Broken vertical lines	
		V-b	Blue (Cobalt Blue) Broken diagonal lines	
B	However, different colours may be used for different dominant species for the state			
C	Special type e.g. Salai, Khair, Babul, Anjan, Chandan etc.	Qualities may be shown if necessary by dark orange lines as per above pattern	Orange wash. Particular species to be depicted by symbolic letters prescribed i.e. S for Salai, Kh for Khair, Ch for Chandan, etc. with a circle in red	 Salai forest with scattered Khair
D	Shrub	-	Brown	
E	Under- stocked areas	-	Yellow wash (Lemon yellow)	
F	Grasses, etc.	-	Violet colour wash	
G	Existing plantations	-	Green (Emerald Green) faint wash with superimposed symbolic letters for the species add letter 'F' after the letter for species if it is failure and year of plantation below it.	
H	Blank areas		No colour	
I	Eroded areas		Black dots, heaviness of the erosion will be shown by concentration of the dots.	
J	Cultivations		No colour with letter "Cl" in red	
K	Bamboo:Luxuriant-healthy, uncongested, undamaged and in good condition	Density: A: Well stocked: 100 and above clumps/ha B: Moderately stocked: 50 to under 100 clumps/ha C: Under stocked: Below 50 clumps/ha.	Specification: Black vertical lines. Black vertical lines with interrupted lines in between. Interrupted vertical lines in black.	

	Culturable	A: Well stocked: 100 clumps/ha. B: Moderately stocked: 50 to 100 clumps/ha. C: Under stocked: Below 50 clumps/ha.	Black diagonal lines top left and bottom right. Black diagonal lines as above with interrupted lines in between. Black interrupted diagonal lines.	
	Degraded	Bamboo forests not capable of being rehabilitated and of attaining normal productivity		Bmb
L	Mixed	Quality I	Red (Crimson lake) Single vertical lines	
		Quality II	Red (Crimson lake) Double horizontal lines	
		Quality III	Red (Crimson lake) Tripe diagonal lines (Top right and Bottom left)	
		Quality IV-a	Red (Crimson lake) Diagonal cross hatch	
		Quality IV-b	Red (Crimson lake) Vertical horizontal cross hatch	
M	Scattered species	Forests mixed with scattered growth of other species for example, khair.		
N	Regeneration	Regeneration of the above species to be shown by adding letter 'r' to the above symbol i.e. teak forests of III quality with teak regeneration.		 Tr in blue & other species in red.
O	Forest village (or Forest settlement)	Burnt Sienna Wash		
P	Age class	O-Old, M-Middle aged, Y-Young with + and – signs to show intermediate stage, the service could be O=, O, O-, M+, M, M- and Y+, Y & Y- the plus and minus signs to be used only when doubt arises.		
Q	Density	It should be shown by decimal points and decimal figures written in black Indian – ink.		
R	1. Sample plots 2. Experimental plots 3. Preservation plots	(1) 	(2) 	(3) 
S	Areas suitable for plantation and afforestation 1. Teak- + sign in Red 2. Mixed- + sign in Green 3. Afforestation- + sign in Blue	Teak  1	Mixed  2	Afforestation  3

Notes:

1) All figures and lettering works should be done in water proof inks.
2) In case of scattered important species, the relative incidence of the species should be indicated by manipulating the concentration of the respective symbolic letter.
3) If any species other than those shown above are considered necessary to be shown, suitable lettering pattern should be used after the approval from the Head, Working Plan Wing of the state.
4) The thickness of the lines and dimensions of letter and numbers thickness should be used which will enhance the all round get up of the map as a whole.

Annexure IV

PREPARATION OF MICRO PLANS AND ECO-DEVELOPMENT PLANS

1.1.1 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 are supposed to take action on the following suggested guidelines vide letter No. 22-8/2000-JFM (FPD) Dated: February 21, 2000.

i. 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 utilize 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 and also their conservation and biodiversity values.

ii. In areas where, 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.

iii. 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.

iv. 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 micro plan 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 upto 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. The unique and separate non-political identity of the JFM committees as 'guardian of forest' 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 Panchayati 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 territorial 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 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, should 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 people's 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.

3.1 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.

viii. Methodology: - For preparation of Micro plan and modes of people's participation in context of the general understanding of the villagers and frontline staff. 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 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

iii. Bio-physical data:-This includes biological and physical components of the village.

iv. Socio economic data: - This includes socio-cultural, political and economic components.

v. Data Analysis: - The collected data is required to be processed and analyzed before being put to further use. The analysis includes editing, coding, computation, classification and tabulation of collected data so that it can be analyzed for rational conclusion and recommendations.

vi. 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 forest department and 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 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 manpower 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 list 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 new to many of the responsibilities they will be undertaking and will require 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.

7.1 Suggested formats for field data collection for assessment of economic and social benefits

A. Village Level Information (through PRA)

A.1 Sources of fuel wood (focused group interview with land owner and landless separately)

1. Are your fuel wood requirements met with the existing wood in the forest ? Yes /No.
   If no, then how do you meet this deficit; own farm -1; village common land-2; purchase-3.
2. Do you sell the excess fuel wood collected from the forest after meeting your village requirements ? Yes/No.
3. If yes, where and at what rate: Place code: Within village– 1; Outside village – 2; Rate (Rs./qtl): …….
4. Distance travelled for fuel wood collection per trip (km): _____
5. No. of trips per week: _____
6. Weight of the fuel wood (one head load) (kg): Man: _____, Woman: ____, Child: ____
7. Species wise priority rating of fuel wood according to its advantages/Utility.
   1.
   2.
   3.
   4.

A.2 AII open grazing, stall feeding and fodder sources (separate focused group interviewed for Land owner and Landless)

1. Are your fodder requirements met with the existing sources in the forest? Yes/ No.
2. If no then how the deficit requirement is met: own farm–1; village common land– 2; purchase– 3;
3. Do you sell the excess fodder collected from the forest after meeting the requirements? Yes/ No.
4. If yes, where and at what rate: Place code: Within village – 1; outside village- 2; rate (Rs./qtl) : ……
5. Distance travelled for fodder collection per trip (km): ……

6. No. of trips per week: ……

7. Weight of the fodder (one head load) (kg): Man: ……, Woman: ……, Child: ……

8. Is 'Dati system' practice prevailing in your area? Yes/No/ Any other practice

9. Is practice of sillage making followed? Yes/No

10. Name of fodder grasses and its priority rating according to its advantages/ Utility.
    1.
    2.
    3.
    4.

11. Non timber forest produce (NTFP) found in the village, if any. Yes/ No
    If Yes, write the names: ……

12 Have measures taken to stop open grazing? Yes/ No

B. Household Information

Forests and Fodder products obtained from different lands

B.1. Private lands (non-cultivated) /community lands

Parameters	Small timber, etc.	Fuel wood	Leaf fodder	Grasses	NTFP products	Quantity of fodder used for stall feeding	Quantity of total fodder sold/ purchased
1	2	3	4	5	6	7	8
Quantity (qtl) per week							
Duration of collection a - no. of weeks in a month							
b - no. of months in a year)							

B.2. Forests lands

Parameters	Small timber, etc.	Fuel wood	Leaf Fodder	Grasses	NTFP products	Quantity of fodder used for stall feeding	Quantity of total fodder sold/ purchased
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
No. of head loads per week							
Weight of each head load (kg)							
Time consumed (hrs) for collection per day							
Distance traveled for collection per trip (km)							
Quantity (qtl) per week							
Duration of collection a - no. of weeks in a month, b - no. of months in a year)							

Annexure V

Suggested Reporting Formats for Sustainable Management of Forests

Area of forests under different legal classes (RF, PF, UF and others)

Year of assessment	Forest area (sq. km./ha)					Change status (ha or Km^2)		
	Reserved forest	Protected forest	Un-classed	Others (specify)	Total	Change in RF area	Change in PF area	Change in others
Enclosure: Territorial division map (division, range, compartment, beat boundary) with suitable map scale. Remarks								

Forest area under different working circle/ management plans

Name of the working circle/ over lapping circle	Total area	Forest type/ sub-type	No. of compartments/ beat	Erosion	Relief	Density	Age class	Site quality	Other
Enclosure: Stock map of appropriate scale									

Forest type/ sub-type	Area in ha or sq.km				
	Total	RF	PF	Un-classed	Others (Specify)
1.					
2.					
3.					
N...					
Other type of land					
Mined out area					
Jhum/ shifting cultivation					
Others (specify)					

Percentage of forest with secured boundaries

Assessment year	Total length of boundary		Total number of boundary		% of forests under secured boundary	Change in % over the plan period	Required budget (Rs.)	Budget available (Rs.)
	Natural	Man-made	Estimated	Constructed/ maintained				
Enclosure: Maps showing boundary pillars/ natural features on appropriate scale or list of pillars made in the field with lat./long.								

FSI categorize the forest and tree cover into

Type of forest cover	**Canopy Density (%)**
Very dense forest (VDF)	>70
Moderately dense forest (MDF)	40 to 70
Open forest (OF)	10 to 40
Scrub forest	<10

Change in area of forest cover (very dense, moderately dense, open scrub forests etc.)

	Area of forest cover (ha/Km^2)					Area treated under compensatory and other afforestation measures
	Very dense forest	Moderately dense forest	Open forest	Scrub	Others (specify)	
Reporting year						
Change to last assessment year						
Enclosure: Maps with forest density and change detection using appropriate scale. Area selected for afforestation (including compensatory afforestation)						

Species diversity - Fauna

Assessment year	Particulars	No. of species	Identified species as per the CITES	% of change during the assessment year
	Birds			
	Reptiles			
	Mammals			
	Others (specify)			
Total				

Species diversity - Flora

Assessment year	Category	No. of species	Number species indentified under RED data category	% of change during the assessment year
	Trees			
	Shrubs			
	Herbs			
	Others (climbers, orchids, epiphytes, parasites)			
Total				
Encl: Glossary of species (Name: local, English and botanical) and CITES category				

Genetic diversity

Animals					Plants			
Assessment year	Particulars	No. of unique genotypes	Status and conservation measures	% of change during the assessment year	Plants	No. of Unique genotypes	Status and conservation measures	% of change during the assessment year
	Birds				Trees			
	Reptile				Shrubs			
	Mammals				Herbs			
	Others				Creepers and others			
Total								
Encl: Glossary of such species (Name: local, English and botanical) and locally factor								

Area affected by forest fire

Year/ session	Number of beat/compartment affected	Frequency of fires (no of fire incidences in a season/year)	Total forest area affected (ha)	Fire sensitive blocks	Trend to the last assessment year/season
Encl: list of compartments affected, committee, team involved, budget allocated, etc.					

Area damaged by natural calamites

Year/ session	Type of natural calamity	Frequency of natural calamity (incidences)	Forest area affected (ha) and level of impact	Intervention made	Impact of intervention
Encl: List of previous incidents, WP prescriptions made for the prone areas					

Area protected from grazing

Assessment year	Number of villages in the vicinity/ cattle units	Livestock population in the vicinity/ cattle units	Carrying capacity of the forest (unit/ha)	Area closed for grazing	Area open for grazing	Alternate means created to meet the fodder requirement	Impact assessed
Change to last assessment year %							
Encl: list of villages fall in the vicinity and village wise livestock (animal census) observations on the migratory livestock (number of unit and months/ season), fodder provided under Nistar scheme (if any), impact assessment of efforts made- report (if any)							

Area infested by invasive species in forests

Assessment year	Name of species	No. of compartments/ forest area affected		Type of forest affected	Treated compartment/ forest area (during reporting year)	Impact and percentage of change in comparison to last reporting year
Encl: list of compartment affected and number time interventions made. Details on the species and action taken to combat them.						

Incidences of pest and diseases

Assessment year	Name of insect pest/ disease	Major species damaged	Compartment/ Beats	Epidemics occurred in the past (year and type) or frequency	Prescriptions/ remedial action taken	Impact of the remedial measure
Encl: list to be enclosed on the above variables						

Area treated under soil and water conservation measures

Area under soil and water conservation measures		Prescriptions/ suggested interventions for soil and water conservation	Extent of implementation of the prescription	Innovative approaches including biological means	Impact of the intervention
Total forest area affected due to soil erosion	Forest area managed exclusively for the protection of soil and water				
Encl: Details on the geological formations, general information on soils and problematic soils, general slope, elevation, relief feature, degraded forest land over steep slope, total area identified for watershed treatment, maps showing forest area falling in the watershed.					

Duration of water flow in the selected seasonal streams

Assessment year	Name of the identified stream and past nature of flow	Duration of water flow (average months/ year)	Annual rainfall/ rainy days	Trend/ change in comparison to the last assessment year	Incidents due to the poor quality of river water
Encl: % of catchment area of the identified rivers covered with forests, list of villages taking the use of the identified rivers/ streams, abstract of the report on the river water quality monitoring (if any), brief description of the water quality related incidents in the command area of the forest (say up to 5kms from the forest area).					

Wetlands in forest areas

Assessment year	Number of wetlands (nos)		New water bodies created during the reporting year (in No)		Extent of forest area under wetland (ha)		Budget allocated and utilized
	Perennial	Seasonal	Perennial	Seasonal	Perennial	Seasonal	
Encl: Documents on aquatic flora/ fauna, local and migratory birds (if any), visitors to wetland							

Water level in the wells in the vicinity (up to 5kms) of forest area

Assessment year	Name of the selected village and distance from the forests	Water level in the well from the surface (meter)			Depth of the well (meter)	Change in the quality of the water (physical, chemical, biological)	Number of soil and moisture conservation work under taken in the catchment
		Jan	May	Sept			
Encl: list of soil and water conservation work and budget allocated for such work							

Growing stock of wood

Year	Forest type (as per the champion and Seth)	Working circle	Name of the major trees species	Area (ha)	Growing stock as per the unit (cmt)/ha/yr)	Change to the bench mark data (norms)
Encl: list of species and growing stock, norms set for the species/forest type/working circle						

Growing stock of bamboo

Year	Forest type (as per the champion and Seth)	Working circle	Name of the major trees species	Area (ha)	Growing stock as per the unit (cmt)/ha/yr)	Change to the bench mark data (norms)
Encl: list of species and growing stock, norms set for the species/working circle						

Increment in volume of identified species of wood

Assessment year	Name of the species	Area (ha)	Standing volume	Rate of increment (cmt/yr)	Comparison to norms/standard value
Encl: Methods of assessment, documentation of the working of tree species, list of species with increment in natural forest and plantations, published statistics relating to growth, yield, and out-turn, derived values for "t" and "z" in Smithies and other formulae (WP code 2004). Methods of calculating outturn and value of outturn units, norms and thresh value fixed for the reporting years					

Enhancement of forest productivity through activities of quality plantations (including ANR operations and appropriate silvicultural operations).

Assessment year	Category	Efforts/ techniques	No./Area (ha)	Productivity (increment)	Budget allocated and utilized	Norm/ standard value/ remarks
	Nursery					
	Economic species					
	Plantation techniques					
	Maintenance/ operation					

Extent of seed production area and seed orchards

Assessment Year	Name of the SPA/ seed orchards (compartment/ beat/forest type)	Species	Total extent/ area (ha)	Seed production (kg/year)	Norm/ standard value/ remarks
Enclosure: Certificates of the silviculturist, suggestion/ prescription made for quality seeds/ orchards, norm/ thresh hold value fixed for the orchard/ species in the forest division					

Recorded removal of timber

Reporting Year	Wood		Poles/ small wood		Total extraction (cmt)	Total extraction from unauthori-zed means (if any)	Total extraction from ToF (cmt)	Compared with the roster and norm
	Type/ quality	Extraction (cmt)	Type/ quality	Extraction (cmt)				
Enclosure: socio-economic survey of the village, demand for the forest produces, list of couple/ felling series, methods of harvest/ collection, measures taken to combat un-authorized collection in the forest division, measures taken to increase/ match the removal								

Recorded removal of fuel wood

Reporting Year	Recorded removal (qtl/ton)		Unrecorded (Number of head loads-Average/ yr/ month)		Total extraction (Tons)	Comparison made against the prescription and norms
	Extraction from plantations	Extraction from natural forest	Planta-tions	Natural forests		
Enclosure: Demand for the fuelwood, demand met in percentage, other source of fuelwood in the forest division, quality of the fuelwood collected and used. Measures (alternate measures – solar, energy efficient stoves, wood gasifier, biogas, etc.)						

Recorded removal of bamboo

Reporting Year	Bamboo area (ha)		Extraction	Utilization		Comparison with the productivity with the growing stock	Skill enhancement program for the community
	Natural	Planted	Number notion tons/ha	Community use	Sold in the market		
Enclosure: List of village/ community involved/ benefitted, interventions made to increase the harvesting efficiency, including community training/ skill enhancement, value addition if any to increase the community							

Recorded removal of locally important NTFP

Reporting Year	Name of the major NTFP/ Spp.	Total collection (kg, metric tons, std. Bags)	Difference in the target and actual collection	Measures taken maintaining the productivity	Budget allocation for NTFP management
Enclosure: List of villages involved in NTFP collection, average/ community benefitted in a year, market channels and any measure made for sustainable harvest and value addition and market system for better return for the collector, target value fixed, good collection practice and awareness program.					

Direct employment in forestry activities

Assessment Year	Number of sources of forest based employment	Number of persons/ family benefited due to the employment		New opport-unities created during the reporting year	Difference in the planned and actual employment generation	Change/ trend in comparison to previous assessment year
		Family	Persons			
Enclosure: List of forest based industries, employment generation through value addition to forestry products, list of schemes and benefit to forestry due to the schemes, brief note on Policy guidelines for generation of employment for local community						

Demand and supply of timber and important non timber forest produce

Reporting Year	Timber		Fuelwood		Non-Timber Products		Demand met by other sources (un-official collection from forest, raised from agriculture areas, import, etc.)	Change/ trend in comparison to previous assessment year
	Supply and production	Demand	Supply and production	Demand	Supply and production	Demand		
Enclosure: List of timber and NTFP species, locally consumed and marketable products, demand and level production, value addition to reduce the demand and enhance the return to the collections, institutions measures taken for meeting the demand								

Number of JFM committees and area

Reporting year	Type/ category of JFMC	Total number of JFMCs created and total members	% of forest area allotted/ protected by the community (ha)	JFMC participation		Scrutinizing JFMCs by CAG	Others/ remarks
				No. of MoU signed	No. of microplans		
Enclosure: List of JFMCs, members, area allotted (compartments), status of activity, savings in the bank account, SHGs (if any) formed and economic activities under taken							

Status of people's participation in management and benefit-sharing

Reporting year	JFMC meetings		Attendance in the GBM		No. of EC meetings		Grading of the JFMCs			Saving (Funds) with the JFMCs
	No. /periodicity	Agenda	% of attendance	Minutes approved	% of attendance	Minutes approved	A	B	C	
Grades A, B, C need to be quantified as per local requirement										

Reporting year	Type of benefit	Sharing %	Social auditing done	Existence of conflict and management	Change/ trend in the level of participation and benefit sharing
Enclosure: JFMC wise benefit sharing, social auditing report, number conflicts and resolved					

Labour welfare

Reporting year	Welfare measures							
	Drinking water and shade in the work place	Provision of specific equipment and handling	Child care at work place	First aid facility at work place	Accidental insurance	Payment of minimum wage	Number of cases registered	Budget allocated
List of welfare schemes and expenditure, cases complied and registered, minimum wages and deviation if any								

Status of compliance of Forest Right Act (FRA)

Reporting year	Number of claims	Number of claims finalised	Forest area mapped and approved for transfer	Any pending of cases and reason for non-compliance of act

Use of indigenous knowledge (IK)

Year of assessment	Type of IK	Prevailing communities	Application/ use of IK	Incorporation of IK in micro-plan/ management plan	Biodiversity registered	Trend of IK use during the assessment period
	Enclosure: Community and IK system, level of its application, development work based on the IK, number of IPR registered if any					

Extent of cultural/ sacred groves

Reporting year	Extent of sacred groves		Belief and faith	Protection provided	Visitors (Annual)	No. of species traditionally protected	Trend in maintenance of belief during reported year
	Number cluster	Area					

Existing policy and legal framework

Category of policy and legal framework	General awareness created	Enforcement at forest division level	Constrained in implementation	Impact in terms of participation
Encl: List of laws and regulations and description				

Status approved working plan

Working plan period		Status of working plan revision	Skill and support enhanced for WP revision	Status of implementation of prescription (monitoring)		Constraints in implementation of the prescription
From	to			Deviation	As per	
Encl: Brief note on the important prescription/ activities, working circle and duration of the working, monitoring mechanism, important achievements						

Number of forest related offence

Assessment year	Types of offence	Number	Cases taken to the court of law	Types of loss to forest and revenue	Trend in comparison to last assessment
Encl: List/ number of cases and its status, extent of loss to the forest and remedial measures taken. List of cases booked against the JFMC members and department people.					

Status of Research and Development at Division level

Assessment year	Budget for R&D and transfer of technology (Rs.)	Number of problems identified and referred/ addressed (No.)	Transfer of technology (TT) in the field	Quantified benefit due to R&D and TT	Progress made during the reporting year
Encl: List of activities under taken, list organizations consulted for the problem and help and cooperation received, identified good practice and transfer technology in the field. Documents on the benefit assessment, list of research plots if any exists					

Human resource capacity building efforts

Category/ theme of training (indicate separately for trainers and trainees)	Annual (No.)	Total number of trainees (No.)	Training/ exposure visits rendered by %		Annual expenditure (Rs.)	Effectiveness of the training (activity relevant to the training) (%)	Progress during the assessment period
			GO	NGO			
Enclosure: List of training and capacity building programs suggested by the DFO, programmmes conducted/ visits arranged, budget and expenditure, deviation from the plan with justification							

Budgetary allocations to the forestry sector

Reporting year	Budgetary allocation (Rs. In lacs)	Total budget received	Timely completion of the work	Efficiency in cash flow	Audited report and reporting
	Plan				
	Non –Plan				
	FDA				
	GIM				
	CAMPA				
Enclosure: Plan and Non-plan budget, demand made by the DFO, allocation, released, shortfall, List of activities and Head wise budget allocation, expenditure, write up on the ash flow at forest division and deviation in the plan and actual cash flow					

Existence of monitoring and evaluation mechanism

Evaluated by	No. of evaluation/ visits	Midterm/ Concurrent evaluation and name of agency	End term/ post evaluation and name of agency	Remarks
CCF				
CF				
DFO				
External/ independent agency				
Enclosure: List of activities and M&E activities under taken. Brief report on the important recommendations made in the report. Follow up action taken and its impact.				

Status of data collection, information, utilization and dissemination

Types of data/ information collected	Level of data and information collected and utilized	Institutions involved including JFMCs	Category and means of dissemination system	No. of Publications		Progress made during the assessment year
				Printed	Distributed	
Enclosure: Status of FMIS, data attribute and variable, utilization of the data/ information, budget allocated and spent on the task, list of publications, means of dissemination on the progress made.						

Adequate manpower in forest division

Reporting year	Regular employees of the forest division		Ad-hoc-employees		Average age of the field employees	Total prescri-bed staff at forest division	Implementation of recruitment plan
	Approved	Existing	No. of hired workers	No. of Days employed			
Enclosure: List of employees with age, sex and category, recruitment plan, list of experts and their services taken for the work, number of fresh recruitment and number of retained staff.							

जहाँ है हरियाली ।
वहाँ है खुशहाली ।।

National Workshop on
Draft National Working Plan Code

(Submitted by FRI)

Date: 16th May 2013

Venue: Paryavaran Bhawan, New Delhi

Photo Credits - S R Reddy

Printed by: S.S. Technoprint Pvt. Ltd., Dehradun #2715092