

Integrated Forest Management Toolbox

The Integrated Forest Management Toolbox is a forest management planning model that can assist senior and mid-level officers in India’s state forest departments to develop working plans in accordance to the National Working Plan Code, 2014 (hereafter NWPC) that calls for management of forests for a range of ecosystem services. The Integrated Forest Management Toolbox includes geospatial tools that can suggest optimized locations for implementing forest management activities, a consultation model to facilitate decision-making based on trade-offs between ecosystem services and a user manual that describes the functioning of the Toolbox.

Background

Over the years, Indian forestry has witnessed a paradigm shift in the approach to forest management, which has moved away from sustainable utilization of timber to environmental stability, biodiversity monitoring and management, protecting ecosystem services rendered by forests and sustained delivery of socio-economic benefits. These goals are enshrined in the NWPC which, calls for the management of forests for provisioning multiple ecosystem services including biodiversity conservation, water resource management and conservation, and carbon sequestration and adaptation (NWPC, 2014; pg. 7, 11 -16). The NWPC considers major technological as well as analytical advances in forest data collection and use, including in the field of GIS and Remote Sensing (NWPC, 2014; pg. 60). Importantly, the NWPC necessitates the process of development of working plan to be consultative with input from various stakeholders including local people’s forum, Joint Forest Management Committees (JFMCs), village panchayats and representatives from forest fringe villages (NWPC, 2014; pg. 21).

Integrated Forest Management Toolbox

The Integrated Forest Management Toolbox consists of a suite of tools that together collect and collate geo-spatial and ground level data, analyze flow of ecosystem services, identify potential forest management activities and provides a stakeholder consultation mechanism to identify trade-offs between ecosystem services and finalize working plan prescriptions. The individual tools that constitute the toolbox were developed/adapted by WRI India, FES and partners over a period of time. These tools have been consolidated under the Toolbox to meet the requirements of NWPC. The tools were customized to meet three specific requirements of the NWPC; consideration of landscape level activities, participatory and consultative approach and consideration of multiple ecosystem services. A brief description of the tools is given in Table I.

Table I Description of individual tools

Tool	Description
Forest Resources Observatory (FRO)	A repository of data from publicly available open data sources that can provide certain mandatory spatial layers called for by the NWPC.
Forest Data Kit (FDK)	A mobile android application that provides a digital platform for collection of field data. The data can be analyzed and processed to create geo-spatial layers for visualization.
Restoration Opportunities Mapping (ROM)	Method for identifying areas for potential forest management activities.
Composite Land Assessment and Restoration Tool (CLART)	Tool for classifying areas based on water recharge potential and identify areas for forest management activities that can improve yield of water.

GFW MapBuilder	Online platform for collating and visualizing multiple geo-spatial layers.
Ecosystem Services Diagnostic	Stakeholder consultation mechanism for identifying trade-offs and synergies between ecosystem services Finalizing working plan prescriptions.

Objectives

The Toolbox is intended to support forest officials who are developing working plans to use digital data collection and GIS tools and address issues related to trade-offs between ecosystem services. In doing so, the Toolbox aims to:

- assist officials of the forest department to operationalize the NWPC, taking into consideration regulatory and provisioning ecosystem services.
- facilitate collection of data both geo-spatial and field data, as prescribed in the NWPC.
- facilitate development of a multi-stakeholder consultation mechanism to identify trade-offs and synergies between ecosystem services to help finalize working plan prescriptions.

Work flow

Individual tools of the Toolbox interact with each other in three phases to identify the final working plan prescriptions.

1. Phase 1 - preparation and data collection: In this phase, the forest department will collect spatial and primary data as prescribed in the NWPC. The Toolbox will assist data collection in two steps. First, some of the spatial data called for by the NWPC will be made available through the FRO. Second, the Toolbox provides a digital platform for collecting primary data through the FDK.
2. Phase 2 - analysis of ecosystem services and map of potential forest management activities: The Toolbox will facilitate analysis of data collected using the FDK to spatially represent the flow of ecosystem system services such as biodiversity, carbon and provisioning of NTFP, fuelwood and fodder. The Toolbox uses the CLART tool to develop spatial layer for water.

Subsequently, the Toolbox provides a method for developing a map of potential forest management activities. This involves three key steps; first, a list of all the forest management activities relevant to the target region is created. Second, a list of criteria for prioritizing forest management activities is prepared. In the final step, spatial data related to the criterial are collated, classified and overlaid using ArcGIS to develop the map of potential forest management activity.

The Toolbox collated all the spatial data/maps under one online platform using GFW MapBuilder. This allows visualization of individual as well as combinations of map/layers which enables to user to understand the synergies and conflicts between flow of ecosystem services and forest management activities.

3. Phase 3 - consultation and finalization of working plan prescriptions: In the final phase, the Toolbox provides a consultation mechanism called the ecosystem services diagnostic to involve stakeholders in finalizing the working plan prescriptions.

Table 2: Suggested Workflow of Integrated Forest Management Toolbox

Phases	Preparation Data Collection	Analysis of ecosystem services and map of potential forest management activities and	Consultation and finalizing WP Prescription
Description	<p>In this phase, the data required for analysis is collected and collated in the forest department's database. This includes the mandatory data listed in the NWPC (pg no. 60) and field data collected using the digital data collection.</p>	<p>The data collected in phase 1, will be analysed for identifying potential forest management activities and flow of ecosystem services.</p>	<p>In this phase, a multi-stakeholder consultation will be organized to present the outputs from phase -2. Stakeholder will visualize the potential forest management activities and flow of ecosystem services. This will be followed by a discussion on trade-offs and synergies between ecosystem services associated with the activities. The discussion will be facilitated by the ecosystem services diagnostic.</p>
Tools	<ul style="list-style-type: none"> • Forest Resources Observatory (FRO) • Forest Data Kit (FDK) 	<ul style="list-style-type: none"> • Restoration Opportunities Map (ROM) • Composite Land Assessment and Restoration Tool (CLART) • GFW MapBuilder 	<ul style="list-style-type: none"> • Ecosystem Services Diagnostic
Processes	<ul style="list-style-type: none"> • Collect geo-spatial data called for in the NWPC. Some of these layers will be available in the FRO. • Use the FDK to collect field data. • Save the data layers in a database. • Create a preliminary list of stakeholders to be involved in the consultation. 	<ul style="list-style-type: none"> • Use the Restoration Opportunities mapping method to develop a map of potential forest management activities. The method will use data layers from phase 1 (FRO and other forest department data) • Collect geo-spatial layers related to provisioning services and regulatory services obtained from the FDK. • Collate the layers in one online platform using the GFW MapBuilder. • This will allow visualization of forest management activities against flow of ecosystem services. 	<ul style="list-style-type: none"> • Organise stakeholder consultation • Present the findings from phase 2 – map of potential forest management activities and flow of ecosystem services. • Implement the ecosystem services diagnostic to facilitate discussion on trade-offs between ecosystem services.
Output	<ul style="list-style-type: none"> • A set of geo-spatial layers as called for by NWPC. • A set of geo-spatial layers based on field data collected using digital platform. 	<ul style="list-style-type: none"> • Map of potential forest management activity areas • Maps of flow of ecosystem services • Online platform for visualizing multiple maps. 	<ul style="list-style-type: none"> • Stakeholder consultation on the working plan as called for by NWPC (pg. 21). • Finalization of working plan prescription.