

Information and Analysis for Forest Management Planning: Linking the Efforts of Royal Government in Cambodia

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INTRODUCTION

Cambodia lies between latitudes 10⁰ and North and longitudes 102⁰ and 180⁰ East, covering an area of 181,035 square kilometers in the lower part of the Mekong Basin. The country shares borders with Thailand, Laos and Viet Nam. The total population of Cambodia was 11.43 million people in 1998, with a population growth rate of 2.4 percent per annum. Forests play a significant role in securing the livelihood of rural people. Although Cambodia has few mountainous areas, forests are essential for regulating the flow of water during the monsoon and dry seasons. In addition, forests are the economically most important renewable natural resource in terms of income generation for the private sector and the Government.

FORESTRY IN CAMBODIA

According to a 2002 survey based on satellite imagery, Cambodia was covered by 18,160,673 million hectares of forests (61.14 percent of the total land area).

FOREST COVER OF CAMBODIA IN 2002		
Forest Types	Area (ha) in 2002	Percentage
Evergreen forest	3,720,507	61.14
Semi evergreen forest	1,455,190	
Deciduous forest	4,833,861	
Other forest	1,094,727	
Non-Forest	7,056,388	38.86
Total	18,160,673	100%

Major forest types are evergreen, semi-evergreen and deciduous dry dipterocarp forests. Not all forests are highly productive and the mean annual diameter increment is estimated at around 0.5-0.58cm per year for trees with a diameter between 30cm-60cm. For trees with a dbh greater than 60cm, the average diameter increment is higher, about 0.7cm/year. In the Semi-evergreen forest, however, the average diameter increment is higher, ranging from 0-0.7cm/year for trees between 30cm-60cm, and about 0.9cm for a bigger tree. For the Deciduous forest, the average increment is between 0.3cm-0.4cm/year.

RESPONSIBILITY AGENCY

The Forestry Administration (FA) is responsible for the control and administration of all aspects of the forest management system on behalf of the Government and the people of Cambodia.

POLICY AND STRATEGY DEVELOPMENT

To use the natural resource in a sustainable way, the Royal Government of Cambodia has issued many decrees, which relate to the utilization of natural resources. In year 2002, the Forestry Law was enacted by government. A thousand copies of the Forestry Law have been published and have been distributed to ensure that the implementation of the law is successful.

In reviewing the forest concession management plans are fully consistent with the relevant Cambodia laws and regulations and reflect the appropriate application of the relevant guideline, including:

- Forestry Law (2002)
- Sub-decree on Forest Concession Planning, Management and Control system (1999);
- Cambodian Code of Practice for Forest Harvesting (1999); and
- Guidelines for Sustainable for Forest Engineering Works,
- Guidelines for Special Management Area Management,
- Biodiversity Conservation Guidelines for the Managed Forests,
- Guideline for Socio-Economic Surveys of Communities Surrounding Forest Concession Areas,
- Guideline for Environmental Impact Assessments for Forest Concessions,
- Inventory handbook (2004)
- Forest Planning handbook (2004)
- Guidelines for The Review of the Forest Management Plans (2004)
- Forest Systems Research and Modeling handbook (2004).

PAST EFFORTS BY ROYAL GOVERNMENT OF CAMBODIA

The Royal Government of Cambodia has taken many efforts in forest sectors including:

- Letters requested cooperation from neighbor countries to combat illegal timber trade
- Letters requested support from embassies;
- Declaration on wood products ban from export;
- ***Prime Minister Hun Sen declared the comprehensive forestry sector reform (22 Oct. 1998)

Concrete & strong actions by Royal Government of Cambodia:

- Old logs collection were declared prohibited, and nullified 42 quotas equal to 673,000 m³
- Order No.02 & Declaration No.01 (measures to curb forest anarchy 6 January & 25 January 1999)
- Declaration No.06 (to curb forest land encroachment, 25 September 1999)
- The Forest Concession Management Sub-Decree was adopted in Feb.2000;
- Codes of Practice for Sustainable Forest Management were adopted and applied in operations (July 1999).
- Forest concession performances were completely reviewed 1999/2000 (by Forestry Administration /Asia Development Bank):
- Terminated agreements from 15 companies with the area more than 3 millions ha;
- 14 valid companies need new Forest Management Plans & Environmental Social Impact Assessment and new investment agreements.

- Royal Decree on Conservation area for Sarus Crane at ATT (12.650 ha)
- Sub-Decree to set aside Central Cardamom as watershed, wildlife and biodiversity conservation area (401.313ha no 77, 30.7.2002)
- Sub-Decree on Preah Vihear Wildlife and Genetic Resource Conservation Area (190.027 ha, no76, le 30.07.02);
- Sub-Decree on Mondul Kiri Wildlife and Genetic Resource Conservation Area (429.438 ha, no 75, le 30.07.02) ;
- *** Adding up to more 25% of the total country area under conservation & protection system (> 4.5 millions ha.)
- The new Forestry Law was adopted & promulgated in August 2002;
- The National Policy statement on Forestry Sector has been declared by Prime Minister in July 2002.
- *****In conclusion, the Royal Government of Cambodia has successfully implemented its forest reform program by establishing the normalcy and orders in the sector as well as the fundamental conditions for towards to Sustainable Forest Management in Cambodia.

ONGOING BY ROYAL GOVERNMENT OF CAMBODIA

- Reviewing Forest Concession Management Plans & Environmental Social Impact Assessment Reports by Forest Resource Management and Forestry Administration under Forest Concession Management and Control Pilot Project (LIL-WB);
- Reassessment of the Remain Forest Resource & new forest Maps by Geographic Information System/Forest Resource Management;
- Further Cancellation of Forest Concession;
- Sub-decree on Community Forestry;
- Renegotiate new concession agreements;
- Establish a new structure for Forestry Administration, and regulations for effective & comprehensive enforcement of new adopted forestry law;
- Develop & apply a comprehensive National Forest Planning.

MANAGEMENT PLANNING

As required by the National forest Policy and Forestry law, the aim is to bring the government reserved forest of the country under effective and scientifically prepared forest management, approved forest management plans are-requisite for any commercial harvesting of forest produce. Therefore, the forest management plans are prepared with primary objectives of achieving the followings:

- conservation of the fragile environment of the country;
- ensuring a sustainable supply of timber, fuel wood and non timber forest products for the local consumption; and
- allocating sustainable forest products in excess of local needs to promote value-added forest based industries.

Each plan will be guided by terms-of-reference prepared prior to the beginning of plan preparation in consultation with all stakeholders: relevant national and provincial government agencies and local communities. The terms of reference tasks will be a commitment to:

- Identify all significant forest management, social and environmental issues to be addressed in the plan;

- Harmonize the requirements of the forest management planning and environmental and social assessment processes;
- Determine the interests of local communities in the concession area, and through a consultative process, involve them in planning and management;
- Agree on criteria and indicators to monitor and evaluate the success of the plan; and
- Establish benchmarks and delivery schedules to assess compliance and commitment.

A number of important criteria have been developed to guide the development of these forest management plans in order to achieve the above mentioned objectives;

- Managed forests should attempt to satisfy local requirements for timber, fuelwood and other traditional uses as a first priority.
- Forest will be managed for long term sustainable yield, with allowable harvest calculations based on a detailed forest inventory and scientific growth and yields studies.
- Forest harvesting systems should ensure environmental protection by minimizing soil erosion and land degradation, protecting natural drainage systems and avoiding permanent changes in the composition of vegetative species.
- Forest management should be holistic and should consider not only the production of forest commodities but also watershed protection, wildlife conservation, maintenance of biodiversity and social uses.
- Silvicultural systems should ensure regeneration of the principal species by natural means and only if natural regeneration is not obtainable should artificial regeneration techniques be adopted.

TYPE OF INFORMATION

Broadly, the following types of information are collected:

- Information on forest Resources;
- Information on socio- economic status of the people living in and around the management units; and
- Information on the ecological condition of the forest.

INFORMATION ON FOREST RESOURCES

Forest resources inventory

Selection of the Area

The area to be inventoried is selected based on field survey. Economic, ecological and social criteria are considered while selecting the area for Forest Management Unit.

Data collection

All possible data are collected in order to provide a sound base for decision-making in management planning. The data collection is divided into three separate parts. Each part is described briefly below. The data are collected using the following formats:

- Forest resources data using format
- Forest functions mapping within the management unit; and
- Socio economic data using the format.

Inventory design

In inventory design one of the first decisions to be made is what level of inventory is to be carried out. The options range from a global estimate statistically appropriate for the entire Cambodia resource down to an estimate of the commercial volume available in an inventory unit, to a set of predetermined commercial standards.

This design is the following points considered:

- the objective of inventory;
- the accuracy desired;
- the extent and nature of the area;
- condition of the forests; and
- costs.

Rapid resource appraisal targeting an estimate of total standing volume (TSV) with precision of + or - 20 m³/ha at the 95% confidence interval.

Forest typing

The proposed primary sampling unit to be used for the inventory is a typed forest unit. This is loosely defined as the smallest unit of forest that can be typed using existing GIS technology that could be of value as a managerial unit. The six broad forest types are chosen as strata for forest inventory.

Sampling design

The number of plot to be established in each typed forest unit can be estimated from the following calculation.

$$m = \text{Sqrt}(Sv^2/n) \quad \text{Where} \quad \begin{array}{l} m = \text{number of plots per typed forest unit} \\ n = \text{number of typed forest units to be sampled} \\ Sv^2 = \text{sample plot volume variance} \end{array}$$

This is based on the sample size formulae for two stage sampling, constrained to a 20% sample of typed forest units, aiming for an estimated + or - 20 m³/ha error at 95% confidence interval. A more accurate estimate of the sample size can be calculated from the sample data using the two stages sampling formulae, which can be found as the following:

- First stage sampling: Selection of units; and
- Second stage sampling unit: Randomized systematic strip plots.

Data recording on sample plots

The data, on each sample plot, are recorded on format. The details of each parameter are briefly given below:

- Plot identification;
- Site Characteristics;
- Soil;
- Wildlife; and
- Regeneration

Tree information to be collected includes local species name; diameter at breast height or diameter above buttress; tree quality. a sample of heights, and a count of saplings in the sapling count plot.

Standing Tree Volume Functions

There are two types of equations: First, using the dbh as the only independent variable; Second, dbh and the length as independent variables. The second type of equation

is probably the additional element of the way to estimate the standing volume to trees for two reasons: First, the number of logs being estimated during the inventory could be better utilized; second, the inclusion of this information in the equation could further improve the estimate. The estimate of the number of logs is based on best judgment on the field by forest inventory team.

Forestry Administration uses a series of local volume functions based on different forest types for different diameter classes as presented below;

- Evergreen forest;
- Semi- evergreen forest;
- Deciduous forest;
- Keruing; and
- Mersawa.

Inventory data analysis

The data should be processed to provide estimates of volume by species, diameter classes, and overall to totals. Data analysis can be done by any suitable inventory data analysis package, database or spreadsheet program.

Information on growth and yield of main species group

To have accurate estimation for forecasting future yield from a forest the growth and yield table, at least, for the main species is very necessary.

The result of the data analysis in the available Permanent Sample Plots (PSPs) in Cambodia is based on the two measurements taken in 1998 and 2000. It is a fact that the two measurements will create only one data for increment, which is not a good estimating factor. Despite this constraint, the information and outputs from this analysis could provide, at this stage, critical information for the formulation of forest management planning.

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