Evaluating Community Forest Management in Sustainability Perspective

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Introduction

Community forestry is one of the widely accepted forestry practices in the world. Nepal is renowned for pioneering and developing this kind of forest management system. About half of Nepal's productive forests lie in tropical and subtropical regions and more than 11% of these forests are already under community forestry. Despite its promising development, there are still some unsolved issues like debates over active versus passive management and under utilization vs. over exploitation of the forest resources. The bitter fact is that Nepal's subtropical terai forest has never passed through sustainable management. Therefore, evaluation of community forest management practices is important for sustainable resource management.

Objective

This study was carried out to evaluate the sustainability by analyzing the existing management practices, and to suggest a model of yield regulation for maximum ecological and economic benefits.

Study Area

Kankali community forest (737 ha.) accepted as one of the most successful in foothills of Churia range in southern subtropical region of central Nepal was selected for this study. The paradigm of management was shifted from state owned control system to community based participatory system in 1994 with the twin core objectives of rehabilitating degraded forest and supplying people's basics needs of forest products in perpetuity.

Methods

An extensive forest inventory using systematic sampling method on the basis and modifications of existing inventory guidelines was conducted to collect biophysical data. Different social survey methods like questionnaires, group discussions, interviews were carried out to collect social data that constitutes the aspects of management, forest product utilization patterns, users' participation and perception toward forest related activities and needs and expectation of users from their forest. The forest management plan and other relevant records were thoroughly reviewed.

All the inventory data were analyzed by adopting post-stratification sampling approach. The whole forest was stratified into two strata, one stratum with big trees in abundance as old growth stand and the other with regeneration poles in abundance as regeneration stand. Fittings of the height curves and diameter distribution were made by using equation developed by HUSCH et al. and Weibull function respectively. The volume, basal area and biomass estimation was done by using the functions developed by SHARMA and PUKKALA (1990).

Based on all the inventory data analysis and management reviews, a suitable yield regulation method was prescribed.

Results

Diameter Distribution

The fitted diameter distribution of both stands of Kankali CF show the uneven-aged structure with inverse J-shape curves as shown in figures 1 and 2.

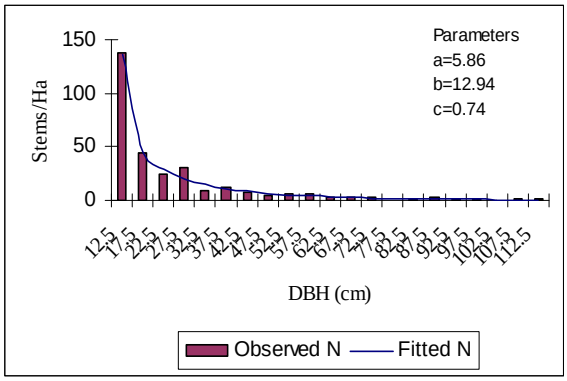

Figure 1: Diameter distribution in old stand of Kankali CF

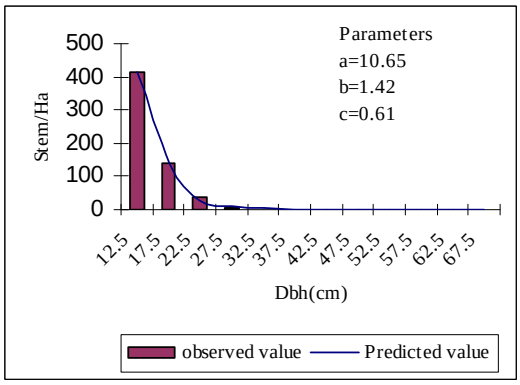

Figure 2: Diameter distributions of reg. stand of Kankali CF

Stand Characteristics and Stocking

Kankali Community Forest F has homogeneous species distribution in both young and mature forms and dominated by ***Sal*** (*Shorea robusta),* a valuable Terai hardwood timber species*.* The old growth stand of the forest has reasonable level of stocking with growth rate above the national level and the regeneration stand also has encouraging growth trend.

Stand Parameters	Regeneration Stand		Old-growth Stand	
Area (ha)	368		379	
Sampling units	20		16	
Number of species	30		15	
Average age of stand (years)	26		48	
	Mean	Std. dev.	Mean	Std. dev.
Regeneration Counts	6,160	1,782	8,325	2,506
Stem/Ha	599.00	353.90	300.00	206.00
Basal area (m^2/ha)	10.22	4.24	20.70	13.03
Stem volume (m^3/ha)	61.14	27.29	176.73	147.83
Mean Annual Increment (m^3/ha)	3.04	0.72	4.20	1.32
Total biomass (1000 kg/ha)	83.873	33.284	251.324	176.699

Prescribed Yield Regulation

The management practices adopted by users are merely protection and exploitation oriented without any consideration to productive capacity of forests. Inventory results show the high potential of timber and fuel wood production which should contribute to economic benefit to the communities. Regeneration stock of forest is also in viable position to replace the mature crop.

In such a forest, the assumption is made that the current growth can be removed periodically while maintaining the ideal dbh distribution, basal area and stand volume (CANCINO and GADOW, 2002). Hence, ***"Stem Number Guide Curve method"*** developed by CANCINO and GADOW (2002) is the best option for yield regulation of this forest due to its ease of application.

With the application of chosen yield regulation method, 21 trees (>50cm dbh) in old stand and 4 trees (>50 cm dbh) in Regeneration stand can be cut annually that produce 3.36 m3/ha and 0.85 m3/ha timber volume respectively.

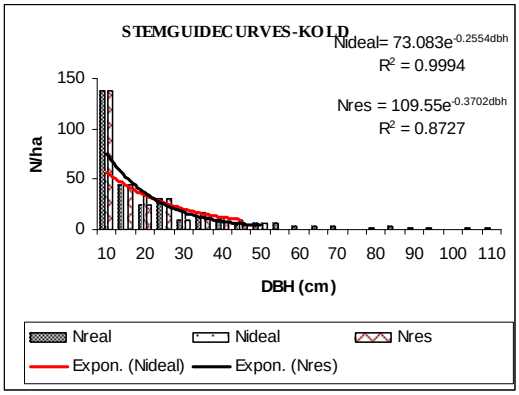

Figure 3: Stem number guide curves for Old stand of Kankali CF

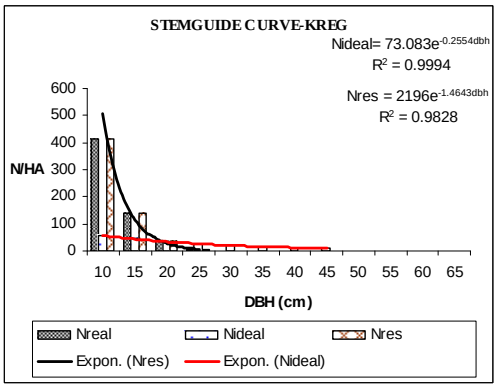

Figure 4: Stem number guide curves for Regeneration stand of Kankali CF

(Adapted from "Stem Number Guide Curve Method" developed by CANCINO and GADOW (2002))

Change in Vegetation Cover

The most promising result of this forest is the significant change in vegetation cover during 17 years period of time. The area of well stocked forest has been increased significantly while the condition of open area with scattered old trees in regeneration stand has shifted to pole size forest due to vigorous regeneration after protection.

(Vegetation cover change in Kankali Community Forest, Chitwan, Nepal)

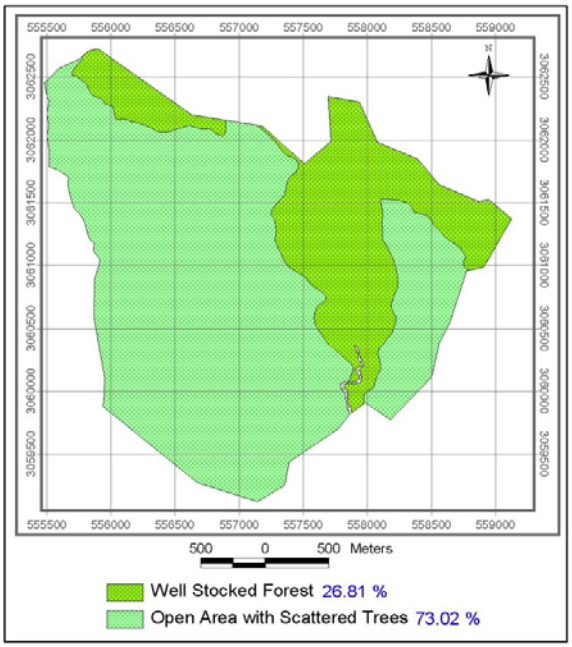

Figure 3: Adapted from Aerial Photo (1992

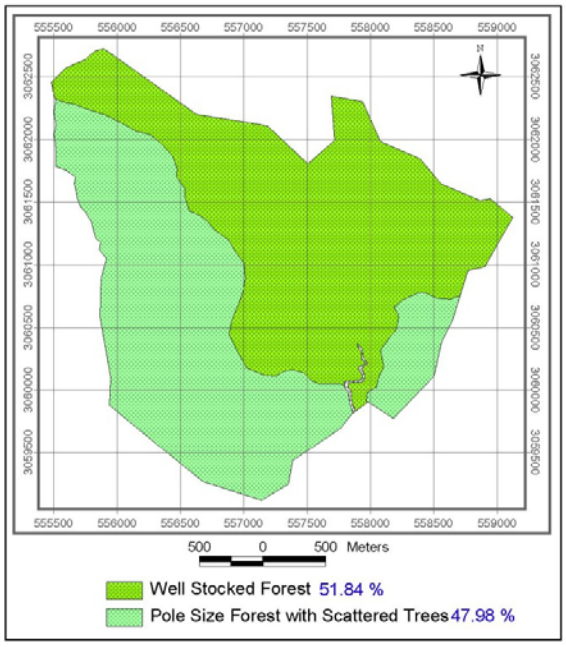

Figure 4: Adapted from GoogleEarth Image (2005)

Question of Sustainability

Production vs. Utilization

Indicators	Timber (m3/year)	Total Biomass (ton/year)
Productivity	**2710**	**3453.34**
Allowable cut (this study)	1588	2019.45
Allowable cut (Inventory guideline in use)	813.15	1036
Utilization	***174.6***	***2208.486***

The records of forest product utilization show that it is quite below the level of productivity of the forest. The biomass utilization pattern is in near equilibrium.

Conclusions

Once heavily degraded forest has revived to well-stocked forest after active involvement of community. As timber utilization is 9 times below the level of allowable cut, so community is losing a great amount of revenue, as a result the present management system cannot ensure sustainability. Community forests need immediate action for intensive management to maximize ecological and economic benefits.

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