

Executive Summary

1. Title of the Project : Nationwide Forest Encroachment Mapping Using Remote Sensing and GIS Techniques
- Manipur State

2. Name of the Members of the Research Team and their designations : **Space Applications Centre(SAC - ISRO), Ahmedabad**
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3. Number and date of Sanction Letter : F. No. 13/13/2003-EI / RE
Dated : 17/03/2004

4. Duration of the Project : 04 Years

5. Total outlay of the Project : Rs. 55, 84000
(Rs. 36,44,667/- Total released)
6. Date of Start of the Project : April 2004
7. Date of Completion of the Project : March, 2009

8. Introduction

The forests today are more threatened than in the past, owing to the increasing population pressure. Also the forests are being diverted to non-forestry land uses. Thus, the forest and tree cover area in the country in 2003 stood at 23.64 per cent of the country's geographical area. This is against the national policy of having the forest in 33 per cent of the geographical area as envisaged in the first National Forest Policy enacted in 1952. This meager amount of forest constitutes about 1.8 per cent of the global forest, which support 17 per cent of human population and 18 per cent of bovine population. Such population pressure accelerates deforestation. World Bank (1992) has noted the annual rate of deforestation between 1980 and 1990 averaging 1.2 per cent in Asia, compared with 0.9 per cent in the developing world. In view of these facts, Government of India has been initiating various activities not only to ameliorate the health of the forest but also to bring more areas under forest cover. An important task, in this direction, has been the identification of forest encroachment and removal of forest encroachers. In the Forest Policy enacted in 1988 and reviewed from time to time till 1992, Govt. of India requested every state to implement this policy in letter and spirit and to remove the encroachment at the earliest,

Hence, the present project was perceived to map the forest encroachment using latest remote sensing data and GIS. As a pilot study, the project was taken up in the state of Manipur with the financial support of MOE&F, Govt. of India, New Delhi.

9. OBJECTIVES

- ❖ To map and estimate recent status of forest encroachment using Remote Sensing data.
- ❖ To design and organize GIS database for the entire state.
- ❖ To work out statistics of total area under various types of encroachment.

10. Work done

The various types of encroachment has been derived using suitable period satellite data by digital and visual (Hybrid) techniques. The two seasons suitable for easy demarcation of all the required features are winter and summer. So, IRS P6 LISS-III December 2005, February 2006 (winter data) and March – April 2006(summer data) data has been used. The final analysis has been carried out in GIS environment. A GIS database has been organized for further use. The classified image has been thoroughly ground checked during the field visits and necessary corrections were incorporated. An error (confusion) matrix has been generated and both mapping and classification accuracies were estimated. Overall classification accuracy has been found to be 92.13% while the mapping accuracy was 85.42% at 90% confidence limits.

11. Results and Findings

As per the detailed analysis carried out and the through ground verification it is found that the major type of encroachment in the state is shifting cultivation.

As per the FSI report (2005) the total forested area in the state was about 78.01% (17418 sq. km) of the total geographical area apart from 224 sq. km of National park. The detailed distribution of encroachment under each type is given in the following table.

The Manipur Forest Department has supplied all existing and proposed forest boundaries. The proposed NP and RF boundaries have been taken from the digital database supplied by the Manipur Forest Department. Based on these boundaries the area under encroachment has been derived as per GIS database.

Status of Encroachment in Manipur State

Sr. No		Existing National park (NP)	Proposed National park (NP)	Existing Protected Forest (PF)	Existing Reserve Forest (RF)	Proposed RF	Forest Land under Non-Forestry use (Un-class Forest)
	Total Geographical Area (Sq. km.)	224	628 ^{\$}	4171	1467	1743 ^{\$}	11780 [*]
Area under Encroachment (Sq. km)							
1	Current Jhum (Shifting Cultivation)	23.60	117.72	249.66	126.35	138.01	358.04
2	Abandoned Jhum	29.86	68.85	247.75	179.17	111.24	346.54

Sr. No		Existing National park (NP)	Proposed National park (NP)	Existing Protected Forest (PF)	Existing Reserve Forest (RF)	Proposed RF	Forest Land under Non-Forestry use (Un-class Forest)
3	Permanent Agriculture	0.88	0.0	208.18	100.98	40.22	23.89
4	Settlement	3.84	1.63	22.98	15.36	8.86	6.95
	Total Encroachment	58.18	188.20	728.57	421.86	298.33	735.42

\$: Area as per GIS Database

***: Area includes proposed NP and proposed RF**

Conclusion and Discussions

Methodology for forest encroachment mapping using remote sensing and GIS at 1:50 000 scale has been developed and standardized for the state of Manipur. Encroachment status map (area and type of encroachment) has been prepared showing encroachment separately in National Parks (NP), Protected Forests (PF), and Reserve Forests (RF) areas. The methodology can be adopted in other forested regions for delineating encroachment.

It is observed that the type of encroachment in the state is mainly due to shifting cultivation (Jhum), and permanent agriculture which is predominant in the hill districts of the state.

It is also observed that good natural regeneration in the abandoned jhum areas, which can grow as a good forest in the future. These patches need a detailed study for protection and conservation so as to control the re-visit to the same spot for cultivation within NP, PF and RF areas.