



MEGHALAYA

The Land and Forest

A Remote Sensing Based Study

SIDDHESWAR SARMA

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Dedicated to my
maternal uncle
Sri Bibeka Nanda Sarma



Also expressing deep gratitude to my
brother-in-law
Dr. K.N. Chakraborty

Foreword

It gives me great pleasure to write this foreword to Dr. Siddheswar Sarma's book. In view of the extraordinarily rapid changes that are taking place in patterns of land use in recent times, detailed and accurate information about land, forests and people who live in close association with the forests is absolutely indispensable for planning for a viable and worthwhile human existence. Dr. Sarma's book provides just this kind of information with a degree of meticulousness and care that is indeed rare. I was told that it took him several years to prepare this book. To the reader this should not come as a surprise at all - for the time taken is but a measure of his total commitment to the work involved.

I have no doubt at all that this book will prove to be a necessary basic material for planning any sustainable changes in human living conditions. Dr. Sarma has used the latest technology for producing information that can be used for durable enhancement of human well-being.

Mrinal Miri
Vice Chancellor
 North-Eastern Hill University
 Shillong 793 022

Preface

Meghalaya is one of the seven states of North-Eastern Region of India, which is inhabited by tribal people. High hills covered by lush green forests are a typical geographical feature. The enchanting beauty of the forests raises an obvious question in the mind of the observer: "Whom does this forest belong?" If the very question were asked to any of the inhabitants, the answer would be clear and categorical: "It belongs to us". The logic behind it is very simple because they are the sons of the soil, and the forests grow over their soil. Forests, therefore, belong to them. If any one visits the sacred groves of Meghalaya he would pass the remark that our tribal people of Meghalaya are no less conscious than the Aryans of Indian mainland specifically about preserving the forests. The concept of preserving forests and wildlife of Aryans-*Dandakaranya*, *Panchavati Ban* and *Topo Ban* still exist in Meghalaya in the name of 'sacred groves'. The philosophy of preserving forests is the functional conservation of biological diversity, mitigation of climate change, protection against desertification, protection of soil and water resources, protection of wild life *etc.*

The ever-increasing population in the other parts of the country resulting in the non-judicious use of forests leads to a judicial intervention in the management of forests in the states. The Supreme Court had to intervene in 1996 to direct the states to ensure (i) protection of adequate forest cover, (ii) scientific management of forests and (iii) establishment of appropriate authorities to implement its direction. The National Forest Policy of 1988 aimed at

having a minimum forest cover of one-third of geographic area under forest cover in plain area and two-thirds in the hill area to prevent erosion and land degradation and to ensure the stability of the fragile eco-systems.

Spatial distribution of forest types is essential for understanding the total forest ecosystem and its accurate information is indispensable for the purpose of forest management especially for decision makers in planning forestland development and controlling measures (deforestation, forest fire, soil erosion, *etc.*). The conventional method of physical land survey has many constraints - inaccessibility to remote and difficult terrains, time consuming, expensive, unavailability to get real-time data *etc.* But the modern space technology, especially remote sensing, could easily overcome all these constraints as it efficiently provides systematised data-base in temporal sequence in real-time and in a very cost-effective way. The availability of IRS-1A, IRS-1B and IRS-1C and IRS-1D data are considered to be a powerful tool for surveying and mapping forest cover. In view of rapid changes in land utilization for various developmental activities from time to time, a completely up-dated knowledge of the forest area and its temporal changes is an obligatory pre-requisite for better scientific forest management.

The main purpose of this work is to present a detailed classification of forest cover in all the districts of Meghalaya using Remote Sensing data with the background note of its geography. To prepare the forest cover maps of Meghalaya of different categories, a base map has been extracted from Survey of India's topographical sheets on

1:253440 scale to show the districts, state, international boundaries *etc.*

The study, therefore, would be helpful in understanding optimal uses of forest resources, which are considered as the backbone of the state's economy. It would as well help in restoring soil, water and oxygen, the gift of forest and the very hinge of human entity.

The remote sensing data based study of its kind would remain as the document for Government and could be extended further by next generation research scholars, scientists, planners, as well policy makers involved in this field to keep stock of temporal changes of forest cover in the state.

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Phone:91-0364-211670
E-mail:geophil@sify.com

Siddheswar Sarma
Department of Geography
North-Eastern Hill University
Shillong 793 014

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Mr. Tarun Kumar and Mr. Jnanendra Sarma, worked as the Project Assistant in this project, Mr. Kiran Moyee Sarma, Research Scholar, Department of Geography, who extended hands in a big way, deserve special thanks. I am grateful to Professor R. K. Rai, former Dean, Centre for Environmental Sciences, North-Eastern Hill University, with whom I made extensive field survey for Ground Truth of forest areas and degraded areas of Meghalaya. I also thank Prof. B. K. Tiwari, Head, Centre for Environmental Studies, Prof. B. S. Mipun, Head, Department of

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Special recognition is due to my wife, Dr. (Mrs) Premalata Devi, who provided three years patient understanding and encouragement while this research work was in preparation during some very challenging times.

Siddheswar Sarma

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A Note on Publication

Forest is a renewable resource if properly husbanded, but it becomes a depleting non renewable, once the process of deforestation brings the stock and its variety below the threshold. Deforestation does not take long, while a forest takes a very long time to develop into a self contained a viable eco system. A satellite imagery survey a decade back reported a disappearance of 106 sq.km of forest cover from Meghalaya.

In the coming days of decentralized planning for social and economic development of North East India and particularly of a state like Meghalaya, it is essential to make an inventory of natural resources particularly forests and mineral resources. Dr. Siddheswar Sarma of Department of Geography, North eastern Hill University made a serious effort to this direction using Remote Sensing Data. The conventional method of physical land survey has many constraints and it is almost outdated. He has in this study provided the earth science data of Meghalaya plateau, temperature, rainfall, relative humidity, wind direction and velocity, major minerals. But the prime focus is on forest covers of Meghalaya, its depletion and regeneration, issues relating to wild life, National Parks and Sanctuaries in Meghalaya. We extended our support to this important study.

B. Datta Ray
Secretary
N. E. I. C. S. S. R., Shillong

About the Author

Dr. Siddheswar Sarma (b-1950) obtained his M. Sc. and M. Phil. degree in Geography from Gauhati University, Guwahati (India). He did his Ph. D. in the North- Eastern Hill University, Shillong (India). He started his service career as a Lecturer in Geography at Arya Vidyapith College and subsequently B. Borooah College, Guwahati. Then he joined as Senior Cartographer in the Department of Geography, North-Eastern Hill University, Shillong in 1977. Dr. Sarma received training in Remote Sensing from Indian Institute of Remote Sensing that equipped him necessary expertise in Remote Sensing based study and GIS. He has to his credit 35 research papers published in various journals and books. Dr. Sarma has attended over 40 conferences, seminars and workshops at regional, national as well as international levels. He is a life member of seven academic societies including Indian National Cartographic Association, Hyderabad and Indian Society of Remote Sensing, Dehradun. He has completed two research projects as Co-investigator and one research project as Principal investigator funded by State Council of Science Technology and Environment, Govt. of Meghalaya, Shillong. He was associated in the project on Literacy Survey in the North-Eastern Region of India funded by Planning Commission, Govt. of India. He is the co-editor of two books - (i) Renewable Energy Resources and its Management, (ii) Jaintia Hills, A Meghalaya Tribe-its Environment, Land and People. At present he is actively associated with the North-East India Council for Social Science Research as Joint Secretary and with Indira Gandhi National Open University, Shillong Study Centre as Assistant Coordinator.