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Remote Sensing Applications

P. S. Roy
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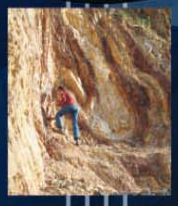
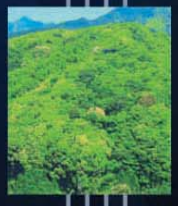
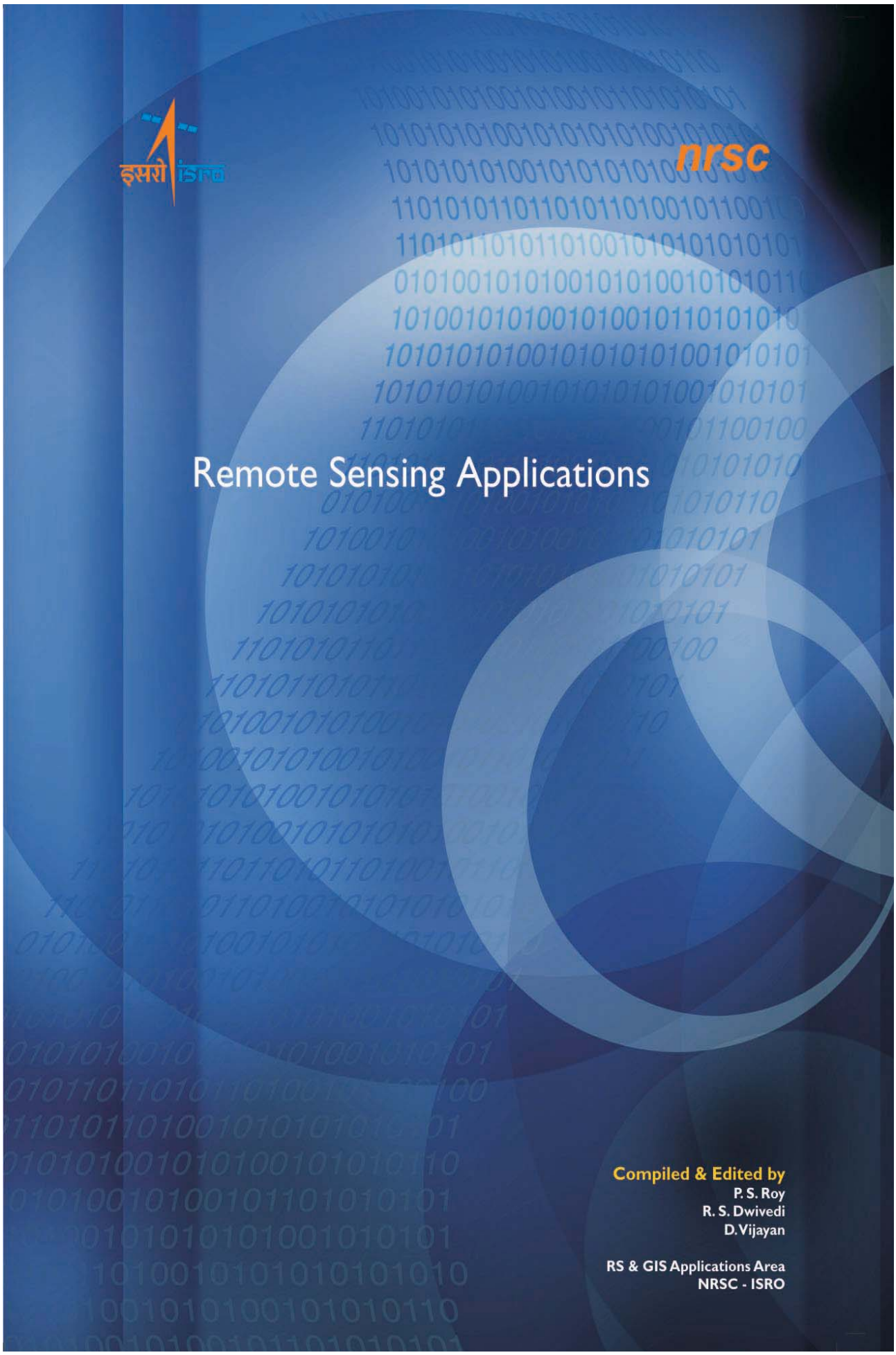
National Remote Sensing Centre



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RS & GIS Applications Area
NRSC - ISRO

Earth Observation (EO) Programme focus in India has been to support operational remote sensing for sustainable natural resources management, address national needs and provide space based information support for disaster management and grassroot planning. NRSC (ISRO) has carried out many application projects for various government agencies under the aegis of National Natural Resources Management System (NNRMS) to utilize the satellite data for various natural resources applications and disaster related information support. NRSC is mandated to build the capacity in country for usage of Remote Sensing and Geo-information for its utilization and institutionalization is arranged to support capacity building initiative by Remote Sensing and GIS Applications Area.

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V. Jayaraman
Director

MESSAGE

The recent times have seen galloping advances in space science, technology and applications, primarily due to ever improving advances in devices, computing, data handling and networking capabilities. Particularly the Earth Observation (EO) community has seen the advent of improved capabilities in imaging and non-imaging sensors as well as various advances in enabling techniques such as Geographical information system, Image Processing as well as the Global Positioning System, aided well by the information communication technology advances, resulting in vast outreach of EO potentials, touching almost every facet of human life.

India has conscientiously pursued with the EO applications for societal developments through multifarious activities in agriculture, land and water resources, environment and energy domains. With the continuous explosion of developments with the availability of newer sensors with enhanced capabilities and emerging demands with increasing expectations, the avenues for exploiting newer applications have broadened further. Obviously, these advances need corresponding concurrent efforts in the capacity building activities. It is well appreciated that capacity building itself is more than just training & education, and that it is also encompasses human resources development, organisational strengthening and institutional building to ensure a sustainable follow-up. At the same time, it is realised that in the chain of capacity building, bringing up talent and skill at every level is very important. For that to happen, it is of paramount importance that organised courses with appropriate contents are periodically organised, imparting both the theoretical basics for understanding the technology and techniques; and practical hands-on exposure to EO applications to ensure adoption and assimilation by the user community.

Towards the above, National Remote Sensing Centre has been conducting short duration and appraisal courses on Remote Sensing and allied technologies, meeting the needs of around 500 trainees at various levels every year. This comprehensive publication, principally addressing the Remote Sensing Applications segment has been expanded with the above intention, both in terms of depth of treatment as well as coverage of topics, supported by appropriate case studies. This effort, I am sure, will promote not only for a better understanding of the operational Remote Sensing applications, but also will trigger sufficient interests and imagination for taking up research in this domain.

I wish that this publication will reach all those in need, thus serving the larger purpose for which it is intended for.

(V. Jayaraman)

भारतीय अन्तरिक्ष अनुसंधान संगठन इसरो isro **Indian Space Research Organisation**

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सु.सं. एवं भौ.सू.प्र. -अ. क्षेत्र

Dr. P. S. Roy
Deputy Director
RS & GIS Applications Area

PREFACE

Space technology has immense influence in the decision making process in almost all social spheres. It encompasses information generation on natural resource viz., land use, agriculture, climate, urban systems for better management of resources and in protecting ourselves from the impact of natural calamities like flood, cyclone, drought, forest fire and landslide etc. by being informed about the probability of occurrence and preparing contingency to face it. Natural resource management is dependent on the availability and quality of the geo-information on every sphere of human activity and its interaction with the environment. The recent advances in information technology and earth observation have facilitated unprecedented growth and need of spatial information in various facets of our life.

The information and its dissemination have created awareness among people and an informed society can be considered a precursor to development. In this direction, National Remote Sensing Centre (NRSC) is carrying out various nationwide application projects so that the end use of remote sensing and Geo-information technology reaches common man at the grass root level. Capacity building through training creates skilled professionals in specific area of applications to bridge the demand and requirement of trained manpower in India.

To share the expertise gained in Remote Sensing and GIS applications of natural resources and their management through capacity building, a comprehensive study material in the form of this publication has been prepared. This publication consist of 16 chapters convey remote sensing & GIS applications in land, water and atmosphere besides natural disasters.

This publication has been made possible due to the efforts of so many scientists of NRSC who are experts in their own field. This publication is lucid with appropriate well supported illustrations, diagrams, tables, figures, references and case studies for ease of understanding even for a non-expert. I take this opportunity to thanks all the authors for their contributions. I feel that providing access and sharing of resources will fasten the growth and use of geo-informatics technology for societal benefits. I hope that the readers will derive maximum benefit from this publication and use it for further development of Remote Sensing Applications in the country.

(P.S. ROY)

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NATIONAL REMOTE SENSING CENTRE

Realizing the importance of space technology in national developmental programmes, the Department of Space was established in 1972. The utility of aerospace data for management of natural resources was then demonstrated through R&D efforts and pilot studies with the users. The need for upscaling such studies at operational level was subsequently visualized which had led to the establishment of National Remote Sensing Agency (NRSA) in 1974 at Hyderabad under Department of Science and Technology. In 1980, NRSA was brought into the folds of Department of Space, Govt. of India as an autonomous body. In September, 2009, NRSA had attained the status as government organization, rechristened as National Remote Sensing Centre (NRSC), and had become part of Indian Space Research Organization (ISRO), Department of Space.

Commensurating with its mandate, NRSC (erstwhile NRSA) has been striving for operationalization of space technology in India for management of natural resources, environment and natural disasters by way of acquisition, processing, dissemination and value addition of aerospace data. In order to realize its goal, NRSC operates through its five wings, namely Satellite Data Acquisition, Data Processing, Remote Sensing and GIS Applications, Aerial Survey and Digital Mapping, and capacity building facilities at the Indian Institute of Remote Sensing, Dehradun and Training and Education facility under RS & GIS Applications Area at Hyderabad. The satellite data acquisition facility (ground station) is located at Shadnagar about 60 km south of Hyderabad. The NRSC Data Centre (NDC) is responsible for dissemination of satellite data to the users. The Aerial Survey and Digital Mapping wing is equipped with state-of-the art facilities i.e., medium format digital camera, Differential GPS, Airborne Laser Terrain Mapper (ALTM) and digital photogrammetry systems and two aircrafts (Beach craft 200) for infrastructure and utilities surveys, and for generation of DEM.

The Remote Sensing and GIS Applications Area (RS&GIS AA) plays a vital role towards achieving the national goal of food, water, energy and environmental securities. NRSC undertakes the operational projects on applications of space technology for natural resources and disaster management at national level apart from carrying out research in frontier areas of space applications. Additionally, the RS&GIS AA strives for capacity building and promotion of space technology applications through State Remote Sensing Centres across the country. This book provides an overview of the applications of geospatial data for the benefit of resource scientists and technologists.