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Ecological Study on Vegetation Structure in Hadagarh Forests of Keonjhar District, Odisha, India

- Dr. Ashis Kumar Dash
- Dr.V. P. Upadhyay
- Prof. H. K. Patra

First Edition

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PREFACE

Phytosociological study occupies the central part of any ecological research and provide valuable insights into plant communities and ecosystems. Therefore, vegetation study should be assigned an important role in informed decision-making, conservation efforts, and sustainable development policy initiatives. This book is a presentation of research output from the PhD thesis entitled 'Ecological Study on Vegetation Structure in Hadagarh Forests of Keonjhar District Odisha, India'.

In the quest to understand the intricate tapestry of nature and the delicate balance that sustains itself, extensive work was carried out in the forests of Hadagarh forests, a sanctuary with unique biodiversity located in Odisha, a state located in eastern part of India. It is within this spirit of ecological inquiry that the following pages in the book unfold, portraying an in-depth investigation into the forest vegetation of the area. The forests and its three important vegetation layers i.e trees, shrubs and herbs have long captivated the imagination of researchers and conservationists alike. The urge to unravel the treasure of bio- diversity with each species being a thread in the rich fabric of this unique ecosystem and the intricate dynamics propelled us on this journey that encompassed not only the tangible aspects of flora but also the deeper ecological nuances that shape the sanctuary's identity.

At the core of our endeavour lay a series of objectives meticulously crafted to describe every facet of the forest vegetation. First and foremost was to conduct a comprehensive reconnaissance survey, a foundational step in our journey to unveil the sanctuary's ecological wealth. Through this survey, we selected representative sites that would serve as windows into the diverse habitats and communities. Once these sites were identified, our focus shifted to documentation; a meticulous cataloguing of the species that forms the sanctuary's landscape. In addition to enumeration with the help of phytosociological tools, we delved deeper, seeking to unravel the intricate web of relationships that signifies the sanctuary's vegetation e.g frequency, density, abundance, IVI, basal area, equitability, concentration of dominance, species richness, maturity index, species diversity, β-diversity, Presence x Frequency (PXF) value, population structure, and regeneration potential, each contributed to ecological understanding we sought to foucs.

We also discerned patterns of distribution that hint at the underlying processes shaping the sanctuary's vegetation communities. Through rigorous

analysis and interpretation, we endeavoured to unveil the species distribution and abundance, offering insights into the sanctuary's ecological dynamics. It is not enough to merely understand nature; we must also strive to conserve and protect it for future generations. Underlining this philosophy, we also ventured into the realm of ecological management, offering recommendations based on our findings.

We find that the objectives of declaring the area as a protected area have not been truly fulfilled with the current management practices. Hence, the vegetation of the sanctuary requires immediate attention from the perspective of habitat conservation and needs expeditious management interventions for regeneration of species. Also, the urgent need to curb the present anthropogenic interferences emanating both from within and outside the sanctuary has been highlighted in this book. The phytosociological analysis of the sanctuary exhibited fair regeneration potential of the flora. Trees with low IVIs and seedlings and saplings require management intervention for their uninterrupted growth. Strict enforcement and monitoring coupled with a comprehensive understanding of the present state of ecological health will help in addressing forest management problems of this habitat; a fact that forms the core of our recommendations.

Seedlings recruitment dynamics, especially in the periphery areas, needs more attention with a massive awareness drive partnering with the community living in and around the sanctuary. This will lead to better regeneration leading to well stocked forests in the area. Protection will help the forest-dwelling population meet their livelihood resources in a sustainable manner. In this context, a participatory approach will go a long way in preserving the existing vegetation and help the seedlings grow faster. Therefore, modification of the management methodology by devising a Long-Term Research Ecological Network(LTER) is recommended. The improvement in the functioning of the ecosystem and habitat conservation has been emphasized along with incorporation of a more scientific management system based on comprehensive research findings in the Working Plan for the management of the Wildlife Sanctuary.

We hope, this book will serve as a beacon of knowledge and inspiration, guiding the present and future generations in their quest to understand the mysteries of our precious ecosystems and act as a tool for devising conservation strategies for researchers, policy makers and regulators.

Authors

About Author(s)

Dr. Ashis Kumar Dash

Dr. Ashis Kumar Dash specializes in Environment Impact Assessment and Management of River Valley Projects in India. He has Masters & MPhil in Environment Science from Sambalpur University and Ph.D in Environment Science from Utkal University, India.

During a span of more than two decades he has been involved with Environment Impact Assessment and Management of River Valley Projects in states like Arunachal Pradesh, Assam, Uttarakhand, Himachal Pradesh, Madhya Pradesh and Uttar Pradesh. He has more than 23 years of experience in various thrust areas such as; Preparation of Prefeasibility Reports (PFR), Detailed Project Reports (DPR), Environment Impact Assessment and Environment Management, Rehabilitation & Resettlement Plans including first hand implementation of Environment & Forest Acts (Environment, Forest and Wildlife clearances) and management plans like Catchment Area Treatment, Compensatory Afforestation, restoration of dumping areas, conservation of Biodiversity in hydro and irrigation projects located in varied geographical locations spreading across multicultural socio-economic environment in India. During this period he had worked in NHPC Ltd (A Govt. of India Enterprise under Ministry of Power) and currently with KBLPA, Ministry of Jal Shakti, Government of India.

Dr. V.P. Upadhyay

Dr. V.P. Upadhyay did Ph.D. in Botany (Forest Ecology) from Kumaun University Nainital, India. He carried out research from 1981-1989 on Structure and Functioning of Himalayan Forest Ecosystems especially on Decomposition and Nutrient Release and Eco-Restoration of Ecosystems. In the Ministry of Environment, Forest & Climate Change (MoEFCC), he served in the Eastern, North Eastern and Central Regional Officesand also in HQ New Delhi. He retired as Adviser from Government of India, MoEFCC in July, 2018. He is a Fellow of International Society for Tropical Ecology (FTE), Eastern Himalayan Society for Spermatophyte Taxonomy (FEHSST) and National Institute of Ecology (FNIE) and has received "Environmental Conservation Awareness Award" from Odisha Environmental Society from His Excellency Hon'ble Governor of Odisha. IME Journal and Society for Geoscientists & Allied Technologists (SGAT) awarded him with Life Time Achievement Award. SGAT Odisha also felicitated him for work on Environmental Conservation and Management.

Prof.(Dr.)Hemanta Kumar Patra

Prof.(Dr.)Hemanta Kumar Patra was born on 9th October, 1952 of Kendrapara District, Odisha, India. He qualified B.Sc.(Hons), M.Sc. and Ph.D. Degree in Botany under Utkal University. He started his research career with the award of UGC Junior Research Fellowship. Subsequently he has been awarded CSIR Senior Research Fellowship/Post-Doctoral Fellowship, UGC Visiting Associate ship, USSR Govt's Post-Doctoral Fellowship (At Moscow State University), German Govt's DAAD Fellowship (At University of Hohenheim) and UGC award for Visiting Professor to University of Hohenheim (Germany). Consequently, Dr. Patra was honoured with the award of CSIR-Emeritus Scientist Fellowship (2012-2017) and UGC Emeritus Fellowship (2017-1019) for advance research in Environmental Biotechnology and worked for the period of 7 years in the Department of Botany, Utkal University. Subsequently he joined as professor Emeritus in Centurion University, Bhubaneswar with effect from 2021-2023. Now he isalso working as a guest faculty in the Dept. of Botany, Utkal University with effect from 2012 and involved in Post-Graduate teaching in Environmental Science & Microbiology.Earlier , he was HOD , Department of Botany from 2000 to 2002.

Prof. Patra has been privileged with several awards naming a few 'Eminent & Best Scientist of the year Award by National Environmental Science Academy (2004,2005) and 'International Benevolent Research Fellowship (Environmental Science)' in 2005. Being the fellows of various renowned science societies like 'Fellow of Indian Society of Agricultural Biochemists:FISAB-2001', 'Fellow of National Environmental Science Academy:FeNESA-2006' and 'Fellow of National Environmentalist Association:FeNEA-2009', he earned pride to the country. Prof.Patra has also been awarded Professor Harihar Pattanaik Memorial Award in the field of Environmental Biology and College of Basic Science & Humanities Award for his significant contribution to Botany by Orissa Botanical Society. He was elected as president, Orissa Botanical Society for the year 2015.The Department of Botany, Utkal University came to lime light for its advance research by the recognition UGC & DST funded under DRS-SAP and FIST programme during the year 2000 with his leadership.

His expertise research outputs in the field of Stress Biology and Environmental Biotechnology have been recognised through his publications and wide-ranging citations. He has successfully executed research projects funded by UGC, CSIR, NORAD, IBM (Coal & Mines, Govt. of India), MoEF (Govt. of India) and MCCL Ltd. Prof Patra has published 217 research papers in peer-reviewed international/national journals, book chapters including the proceedings of the national and international seminars. He has published 11 books/ proceedings and 27 scientific articles in Science Reporter and others. To date, Dr. Patra has guided one D.Sc. and 25 Ph.D. students of Utkal University. Dr Patra has organised 11 national/state level seminars/workshops and chaired/delivered lectures in International /National seminars. He has successfully managed editorial assignment as Chief-Editor, Managing Editor and reviewers of various journals at the state, national and international level.

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