

Forest Conservation and Management in Global Climate Stress

Dr. Chandresh Kumar Singh

Dr. Tanu Shree Lakra

Dr. Moinuddin

Dr. Hasmukh N. Leua

Dr. H. L. Chaudhary

Dr. Wajid Hasan

Dr. Sheetanshu Gupta

Forest Conservation and Management in Global Climate Stress



**India | UAE | Nigeria | Uzbekistan | Montenegro | Iraq |
Egypt | Thailand | Uganda | Philippines | Indonesia**
www.empyrealpublishinghouse.com

Forest Conservation and Management in Global Climate Stress

Editors:

Dr. Chandresh Kumar Singh

Department of Forestry Wildlife and Environmental Science at Guru GhasiDas Vishwavidyalaya,
Koni, Bilaspur, C.G., India

Dr. Tanu Shree Lakra

Faculty of Forestry, Birsa Agricultural University, Ranchi, Jharkhand, India

Dr. Moinuddin

Associate Professor

Shri Guru Ram Rai University, Dehradun, Uttarakhand, India

Dr. Hasmukh N. Leua

Department of Fruit Science, College of Horticulture, S. D. Agricultural University, Jagudan,
Gujrat India

Dr. H. L. Chaudhary

Date Palm Research Station, Mundra, Kachchh, Gujarat, India

Dr. Wajid Hasan

Krishi Vigyan Kendra, Jehanabad, Bihar Agricultural University, Bihar, India

Dr. Sheetanshu Gupta

Department of Biotechnology, Institute of Technology and Management, BKT, Lucknow, U.P.,
India

Copyright 2024 by Dr. Chandresh Kumar Singh, Dr. Tanu Shree Lakra, Dr. Moinuddin, Dr. Hasmukh N. Leua, Dr. H. L. Chaudhary, Dr. Wajid Hasan and Dr. Sheetanshu Gupta

First Impression: March 2024

Forest Conservation and Management in Global Climate Stress

ISBN: 978-81-970603-8-0

Rs. 1000/- (\$80)

No part of the book may be printed, copied, stored, retrieved, duplicated and reproduced in any form without the written permission of the editor/publisher.

DISCLAIMER

Information contained in this book has been published by Empyreal Publishing House and has been obtained by the editors from sources believed to be reliable and correct to the best of their knowledge. The authors are solely responsible for the contents of the articles compiled in this book. Responsibility of authenticity of the work or the concepts/views presented by the author through this book shall lie with the author and the publisher has no role or claim or any responsibility in this regard. Errors, if any, are purely unintentional and readers are requested to communicate such error to the author to avoid discrepancies in future.

Published by:
Empyreal Publishing House

Preface

Forests, the lungs of our planet, are facing unprecedented challenges in the wake of global climate stress. As our world undergoes rapid environmental changes, the need for comprehensive understanding and effective management of forest ecosystems has never been more critical. This textbook, "**Forest Conservation and Management in Global Climate Stress**," aims to provide a comprehensive and insightful exploration of the intricate relationship between forests and climate change, offering practical guidance for conservationists, foresters, students, and anyone passionate about safeguarding the health of our planet.

Scope and Objectives: This book delves into the multifaceted aspects of forest conservation and management within the context of a changing climate. Through a series of chapters, we explore the impacts of climate stress on forests, addressing issues ranging from shifting biodiversity patterns to the increasing frequency of extreme weather events. Our focus extends to practical management strategies, incorporating adaptive approaches, sustainable practices, and innovative technologies to enhance the resilience of forest ecosystems.

Target Audience: Designed as a resource for students, researchers, policymakers, and practitioners, this textbook offers a balanced blend of theoretical concepts, real-world case studies, and practical insights. Whether you are a forestry student seeking foundational knowledge, a scientist exploring advanced concepts, or a decision-maker crafting policies, this book is crafted to cater to a diverse audience interested in the intersection of climate change and forest conservation.

Organization of the Text: The book is structured to guide readers through a progressive journey, starting with an introduction to the fundamentals of forest ecosystems and their significance. Subsequent chapters address the impacts of climate change on forests, exploring management strategies, and delving into specific

challenges such as pest outbreaks, wildfires, and biodiversity loss. Each chapter concludes with practical takeaways and points for further discussion.

Acknowledging Collaboration: Writing a textbook of this magnitude is a collaborative endeavor, drawing upon the collective wisdom of researchers, practitioners, and educators in the field. The insights shared within these pages are a testament to the dedication and passion of those working tirelessly to understand, conserve, and sustainably manage our world's forests.

As stewards of the planet, it is our collective responsibility to address the challenges posed by climate change and protect the invaluable ecosystems that are integral to life on Earth. This book serves as a guide, fostering a deeper understanding of the issues at hand and providing a roadmap for effective and sustainable forest conservation and management practices.

Throughout the book, a strong emphasis is placed on the need for climate-responsive forest management strategies. The authors discuss approaches aimed at enhancing the resilience of forests to climate stressors, including sustainable harvesting practices, reforestation initiatives, and adaptive management techniques. Additionally, the book delves into the critical role of forests in carbon sequestration and climate mitigation, highlighting initiatives such as REDD+ and afforestation projects as integral components of global climate change mitigation efforts.

We hope this textbook inspires readers to engage with the complex interplay between forests and climate change and empowers them to contribute to the ongoing global efforts to preserve the ecological balance of our shared home.

Happy reading and a journey of discovery in the realms of forest conservation and management!

About the Editors



Dr. Chandresh Kumar Singh is working as an Assistant Professor in the Department of Forestry Wildlife and Environmental Science at Guru GhasiDas Vishwavidyalaya Koni Bilaspur, India. He has more than 9 years of teaching and Research Experience. Earlier, Dr Singh worked at Dr Ram Manohar Lohiya Awadh University Ayodhya and Chhatrapati Sahu Ji Maharaj University Kanpur also published and presented research papers at many national and international conferences author is also a member of so many national and international scientific Bodies and was awarded Best Teacher by AETDs.



Dr. Tanu Shree Lakra did her Graduation and Postgraduation in Forestry from Birsa Agricultural University, Ranchi, Jharkhand. Dr Lakra completed her doctorate in Agroforestry from the Faculty of Forestry, Birsa Agricultural University, Ranchi, Jharkhand. Dr. Lakra has good domain knowledge of Socio-Economic Analysis of Agroforestry Practices in Jharkhand. Dr Lakra has published many research papers and participated in national and international seminars/symposiums. Dr Lakra is well-versed in research and soil testing too.



Dr. Moinuddin is working as Incharge, of the Automatic Weather Station & Associate Professor in the Department of Agronomy, School of Agricultural Sciences, Shri Guru Ram Rai University. He holds B. Sc. Agriculture from N.P.G. College, Barhalganj through Deen Dayal Upadhyay Gorakhpur University, Gorakhpur and M. Sc. Ag. Agronomy from Allahabad Agricultural Institute Deemed University, Allahabad in Uttar Pradesh, India. Dr. Moinuddin has a doctorate in Agriculture (Agronomy) from Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad in Uttar Pradesh, India. He has twelve years of experience in teaching, research, extension, farm management and academic activities. He teaches and supervises undergraduate, postgraduate and doctorate courses and research and extension activities at the university. He has guided more than thirty M. Sc. and seven Ph. D. Scholars in Agronomy. Dr. Moinuddin has participated in and presented papers at National and International conferences, seminars, symposiums and workshops. In addition, he has published several research papers in peer-reviewed UGC-CARE listed as well as NAAS-rated scientific journals of National and International repute. Dr. Moinuddin has to his credit several books, book chapters, practical manuals, popular articles and technical folders. Dr. Moinuddin is also a recipient of prestigious awards like the Young Scientist Award, Best Teacher Award, Young Agronomist Award, Best Agronomist Award, Outstanding Scientist Award and Excellence in Teaching Award. He stayed as one of the organizers of many national and international conferences. He has also a Life Membership of the Indian Society of Agronomy, Division of Agronomy, Indian Agricultural Research Institute, New Delhi.



Dr. Hasmukh N. Leua worked as an Assistant professor at Polytechnic in Horticulture, Navsari Agricultural University, Paria. Now, he is working Assistant Professor & Head, Department of Fruit Science, College of Horticulture, S. D. Agricultural University, Jagudan. He has more than ten years of experience in the field of teaching, research, and extension. He has published four book and more than 25 research papers in national and international journals. He is a member of several academic societies. He has guided six M. Sc. (Horti.) students in the discipline of Fruits and Vegetable Science. He has been awarded the ‘best presentation award’, ‘Young Scientist Award’, ‘Excellence in teaching award’ as well as ‘The Young Horticulturist Award’.



Dr. H. L. Chaudhary presently working as a Senior Research Fellow at Date Palm Research Station, Mundra, Kachchh, Gujarat. He graduated in Horticulture (Hons.) from the College of Horticulture, Sardarkrushinagar Dantiwada Agricultural University, Dantiwada, Gujarat. He completed his M.Sc (Fruit Science) from Aspee College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat. He has a doctorate in (Horticulture) in Fruit Science from B. A. College of Agriculture, Anand Agricultural University, Anand. He qualified ICAR-NET in Fruit Science conducted by ASRB, He has published 1 book, 10 research papers in national and international Journals, 13 articles, 3 review papers, and 15 book chapters. He also received the “Best Ph. D. Thesis Award” in 2023.



Dr. Wajid Hasan, PhD PDF, is devoted to research and extension activities in Agriculture Entomology. Dr Hasan is a Subject Matter Specialist in Entomology at KVK Jehanabad, Bihar Agricultural University in Bihar. He was awarded Dr DS Kothari UGC-Post Doctoral Fellow (PDF) in 2010, offered by the University Grant Commission of India. He holds a doctorate in Agricultural Entomology from GB Pant University of Agri & Tech, Pantnagar, UK, India. He has good terms with farmers, and he serves them as an adviser for plant protection measures. Dr Hasan has received eleven awards from several societies for his outstanding contribution to the relevant discipline. He has 65 research papers, 35 books, 67 book chapters, 42 popular articles, 140 success stories, 3 Practical Manuals, 16 success stories and 48 delivered lectures in different seminars/symposia/conferences/workshops and seven radio talks. Dr Hasan stayed as the chief organizer for eleven international conferences with more than three thousand participants each and managed a team of about three hundred co-organizers each. He has also organized 551 training programs for farmers, rural youth and agricultural professionals with 20450 participants. In addition, he has conducted three skill development training programs of 200 hours each and 49 On-Farm Trials (OFT). Dr Hasan has a lifetime membership in 6 scientific societies. He is the Editor-in-Chief of the International Journal of Agricultural and Applied Sciences (IJAAS) and an Editorial board member for 5 scientific International Journals.



Dr. Sheetanshu Gupta is an Assistant Professor at, the Department of Biotechnology, Institute of Technology and Management, BKT, Lucknow, U.P. Dr. Gupta has more than 12 years of teaching experience has been working in Biochemistry, Molecular Biology & Biotechnology, and emphasizing Environmental Health and Climate Change from the last 12 years. He is an alumnus of G.B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand, India. He qualified CSIR and ICAR ARS NET in Life Sciences and Plant Biochemistry & Plant Physiology respectively. Dr. Gupta's academic qualifications, research experience, and expertise in biochemistry and biotechnology make him a valuable asset. With his passion for teaching and research, dedication to innovative farming techniques, and student advocacy, Dr. Gupta continues to contribute significantly to advancing agricultural and biochemical sciences.

Table of Contents

Preface	IV - V	
About the Editors	VI - VIII	
Table of Contents	IX - XI	
	Title of Chapters	Page No.
INTRODUCTION TO FOREST CONSERVATION AND MANAGEMENT		1 – 27
<i>Dr. Chandresh Kumar Singh, Dr. Tanu Shree Lakra, Dr. Wajid Hasan, Dr. Lalit Upadhyay and Dr. Sheetanshu Gupta</i>		
CLIMATE CHANGE AND ITS IMPACTS ON FORESTS		28 – 50
<i>Dr. Tanu Shree Lakra, Dr. Hasmukh N. Leua, Dr. Chandresh Kumar Singh, Dr. Sheetanshu Gupta and Dr. Wajid Hasan</i>		
BIODIVERSITY AND ECOSYSTEM SERVICES IN FOREST CONSERVATION		51 – 74
<i>Dr. Moinuddin, Dr. Tanu Shree Lakra, Dr. Wajid Hasan, Dr. Hasmukh N. Leua and Dr. Sheetanshu Gupta</i>		
FOREST MANAGEMENT STRATEGIES FOR CLIMATE RESILIENCE		75 – 96
<i>Dr. Makhan Singh Karada, Dr. Hasmukh N. Leua, Dr. Moinuddin and Dr. Chandresh Kumar Singh</i>		
PEST AND DISEASE MANAGEMENT IN CHANGING CLIMATES FOR FOREST CONSERVATION		97 – 126
<i>Dr. Chandresh Kumar Singh, Dr. Sheetanshu Gupta, Dr. Moinuddin, Dr. H.L. Chaudhary and Dr. Wajid Hasan</i>		
FIRE MANAGEMENT AND PREVENTION FOR FOREST CONSERVATION		127 – 148
<i>Dr. Tanu Shree Lakra, Dr. H. L. Chaudhary, Dr. Wajid Hasan and Dr. Sheetanshu Gupta</i>		

CARBON SEQUESTRATION AND CLIMATE MITIGATION IN FOREST CONSERVATION AND MANAGEMENT	149 – 170
<i>Dr. Tanu Shree Lakra, Dr. Wajid Hasan, Dr Balkrishna Sopan Bhople, Dr Khurshid Alam and Dr. Sheetanshu Gupta</i>	
RESTORATION ECOLOGY AND POST-DISTURBANCE RECOVERY FOR CONSERVATION OF FOREST	171 – 191
<i>Dr. Hasmukh N. Leua, Dr. Wajid Hasan, Dr. Lalit Upadhyay, Dr. Tanu Shree Lakra and Dr. Dharendra Kumar</i>	
INTERNATIONAL PERSPECTIVES ON FOREST CONSERVATION	192 – 209
<i>Dr. H. L. Chaudhary, Dr. Sheetanshu Gupta, Dr. Wajid Hasan and Dr. Chandresh Kumar Singh</i>	
URBAN ECOLOGY AND SUSTAINABLE CITIES FOR FOREST CONSERVATION	210 – 228
<i>Dr. Dharendra Kumar, Dr. Hasmukh N. Leua, Dr. H. L. Chaudhary and Dr. Wajid Hasan</i>	
CONSERVATION GENETICS AND SPECIES RECOVERY IN FOREST CONSERVATION MANAGEMENT	229 – 248
<i>Dr. Hasmukh N. Leua, Dr. H. L. Chaudhary, Dr. Wajid Hasan and Dr. Sheetanshu Gupta</i>	
WETLAND RESTORATION AND CONSERVATION IN FOREST MANAGEMENT	249 – 272
<i>Dr. Chandresh Kumar Singh, Dr. Sheetanshu Gupta, Dr. Tanu Shree Lakra, Dr. Wajid Hasan and Dr. Makhan Singh Karada</i>	
POLICY FRAMEWORKS FOR CLIMATE-RESPONSIVE FOREST CONSERVATION	273 – 287
<i>Dr. H. L. Chaudhary, Dr. Moinuddin, Dr. Tanu Shree Lakra, Dr. Wajid Hasan and Dr. Sheetanshu Gupta</i>	
ECONOMIC VALUATION OF CLIMATE-RESILIENT FOREST ECOSYSTEM	288 – 301
<i>Dr. Sheetanshu Gupta, Dr. Hasmukh N. Leua, Dr. Wajid Hasan, Dr. H. L. Chaudhary and Dr. Dharendra Kumar</i>	

FUTURE DIRECTIONS IN FOREST CONSERVATION AND MANAGEMENT 302 – 315

Dr. Wajid Hasan, Dr. Tanu Shree Lakra, Dr. Sheetanshu Gupta, Dr. Makhan Singh Karada and Dr. Chandresh Kumar Singh

ABOUT THE BOOK

The book "Forest Conservation and Management in Global Climate Stress" is a comprehensive exploration of the intricate relationship between forests, climate change, and conservation practices. Each chapter delves into specific facets of this dynamic interaction, offering insights into the challenges faced and the strategies employed to ensure the resilience and sustainability of forest ecosystems. From the profound impacts of climate change on forest biodiversity and ecosystem services to the intricacies of managing pests, diseases, and wildfires in changing climates, the book provides a thorough examination of the complexities inherent in forest conservation efforts.

Moreover, the book offers a global perspective on forest conservation, examining international collaborations, policy frameworks, and economic considerations. From the restoration of degraded forest ecosystems to the integration of green spaces into urban environments, the diverse array of topics covered underscores the multifaceted nature of forest conservation and management in the face of climate change. By providing a comprehensive overview of current challenges, best practices, and future directions, "Forest Conservation and Management in Global Climate Stress" serves as a valuable resource for researchers, policymakers, and practitioners striving to safeguard the world's forests in an era of unprecedented environmental change.



India | UAE | Nigeria | Uzbekistan | Montenegro | Iraq | Egypt | Thailand | Uganda | Philippines | Indonesia

Empyrean Publishing House || www.empyreanpublishinghouse.com || info@empyreanpublishinghouse.com