



# Green Intelligence

Artificial Intelligence and Remote Sensing for Climate  
Change Mitigation and Ecosystem Conservation

Sushil Kumar  
Beena Kumari  
*Editors*

● DeepScience  
,

# **Green Intelligence: Artificial Intelligence and Remote Sensing for Climate Change Mitigation and Ecosystem Conservation**

**Sushil Kumar**

Department of Botany, KKPG College Etawah, 206001, India

**Beena Kumari**

Department of Botany, Hindu College, Moradabad 244001, India



**DeepScience**

*Published, marketed, and distributed by:*

Deep Science Publishing, 2025  
USA | UK | India | Turkey  
Reg. No. MH-33-0523625  
[www.deepscienceresearch.com](http://www.deepscienceresearch.com)  
[editor@deepscienceresearch.com](mailto:editor@deepscienceresearch.com)  
WhatsApp: +91 7977171947

ISBN: 978-93-7185-814-4

E-ISBN: 978-93-7185-343-9

<https://doi.org/10.70593/978-93-7185-343-9>

Copyright © Dr. Sushil Kumar, Prof. (Dr.) Beena Kumari, 2025.

**Citation:** Kumar, S. & Kumari, B. (Eds.). (2025). *Green Intelligence: Artificial Intelligence and Remote Sensing for Climate Change Mitigation and Ecosystem Conservation*. Deep Science Publishing.  
<https://doi.org/10.70593/978-93-7185-343-9>

This book is published online under a fully open access program and is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0). This open access license allows third parties to copy and redistribute the material in any medium or format, provided that proper attribution is given to the author(s) and the published source. The publishers, authors, and editors are not responsible for errors or omissions, or for any consequences arising from the application of the information presented in this book, and make no warranty, express or implied, regarding the content of this publication. Although the publisher, authors, and editors have made every effort to ensure that the content is not misleading or false, they do not represent or warrant that the information-particularly regarding verification by third parties-has been verified. The publisher is neutral with regard to jurisdictional claims in published maps and institutional affiliations. The authors and publishers have made every effort to contact all copyright holders of the material reproduced in this publication and apologize to anyone we may have been unable to reach. If any copyright material has not been acknowledged, please write to us so we can correct it in a future reprint.

# Preface

Currently, straddling what many refer to as the human-influenced epoch of "the Anthropocene" we are in a unique place where two paths are advanced. The first is a way toward transitioning to an under-explored territory of ecological decline where biodiversity vanishes, such cataclysmic weather events leave cities uninhabitable and our food system has morphed into untenable distribution chains. On the other is a once-in-a-generation chance at transformation, using artificial intelligence (AI) not to simply lessen ecological damage but to regenerate and re-envision our kinship with earth.

Yet it seemed critical that an immediate response be provided, which is why we offer this book *Green Intelligence: Artificial Intelligence and Remote Sensing for Climate Change Mitigation and Ecosystem Conservation*. It compiles new discoveries, analytic frameworks and models for understanding, thinking about, organising and deploying AI to help accelerate the emergence of planetary intelligence and enable the application of prudential judgement in navigating this next geologic epoch. Sustainable, or what we can call Green Intelligence as DfMA is not simply the next generation of High-Tech interventions. This is about developing technologies that resonate with natural rhythms, which are vigilant, adaptive, and look ahead instead of backwards.

Organized into thirteen interdisciplinary chapters, the book explores how AI and its subfields have evolved to tackle a growing list of environmental challenges; from The Rise of Green Intelligence where Earth observation data by geospatial technologies together with artificial intelligence algorithms are utilized in unlocking secrets hidden within complex earth and planetary systems, thereby holding potential promise for enhancing sustainability on-the-ground, to applied chapters on real-world applications on remote sensing, biodiversity conservation, smart agriculture, urban sustainability and climate forecasting. We delve into the frontlines of AI-powered cities (*Urban Ecosystems and AI-Driven Cities*), and reflect on the promise and pitfalls of integrating Indigenous knowledge systems (*Indigenous Knowledge Meets Artificial Intelligence*) and citizen science initiatives into AI ecosystems.

At its core, this book also confronts vital questions: Can AI truly align with ecological ethics? What are the risks of algorithmic biases in environmental contexts? How do we ensure AI systems remain accountable, inclusive, and regenerative?

Green Intelligence is written for a diverse readership scientist, environmentalists, data practitioners, educators, policymakers, and students who are

seeking not only answers but also inspiration. It aims to foster an informed dialogue at the intersection of technology, ecology, and society.

The final chapters imagine the road ahead: from designing symbiotic AI technologies that work with, rather than against, nature, to building frameworks for governance and policy in the green tech revolution. The concluding vision *Towards a Regenerative Intelligence* calls for a future in which artificial intelligence serves not as a tool of domination, but as a companion in the co-evolution of sustainable and just ecosystems.

We hope this book is a stepping-stone to inspire deeper exploration, collaboration and ethical innovation for life on earth.

Dr. Sushil Kumar  
Prof. (Dr.) Beena Kumari

# Table of Contents

**Chapter 1: The Rise of Green Intelligence: Smart Solutions for a Sustainable Planet .....1**

**Chapter 2: AI-Powered Digital Eyes: Transforming Remote Sensing into Predictive Environmental Intelligence .....15**

**Chapter 3: AI for Biodiversity Conservation: Harnessing Artificial Intelligence to Monitor, Protect, and Restore Life on Earth .....28**

**Chapter 4: Precision Agriculture Meets AI: The Role of Smart Sensors in Ecosystem Stewardship .....46**

**Chapter 5: Artificial Intelligence and the Greening of Cities: Towards Eco-Smart Urban Ecosystems .....71**

**Chapter 6: Shadows of Green Intelligence: Ethical and Ecological Dilemmas of AI .....90**

**Chapter 7: Citizen Science Meets Eco-AI: Empowering Local Communities and Global Networks for a Thriving Planet .....104**

**Chapter 8: Indigenous Knowledge Meets Artificial Intelligence: Bridging Ancient Wisdom and Modern Technology for Ecological Sustainability .....122**

**Chapter 9: Climate Modeling and Forecasting with AI: Revolutionizing Environmental Predictions .....140**

**Chapter 10: Future Frontiers in Symbiotic Technology: Integrating AI, Eco-Innovation, and Planetary Ethics for a Thriving Biosphere.....161**

**Chapter 11: Beyond Smart Cities: Leveraging Artificial Intelligence to Build Ecologically Resilient and Sustainable Urban Environments .....178**

**Chapter 12: Policy, Governance, and the Green Tech Revolution in the Context of AI and Environmental Sustainability .....196**

**Chapter 13: Balancing Innovation and Nature: Ethical and Ecological Risks of AI in a Green World.....214**

**Chapter 14: Towards a Regenerative Intelligence: Reimagining AI for Ecological Harmony.....233**