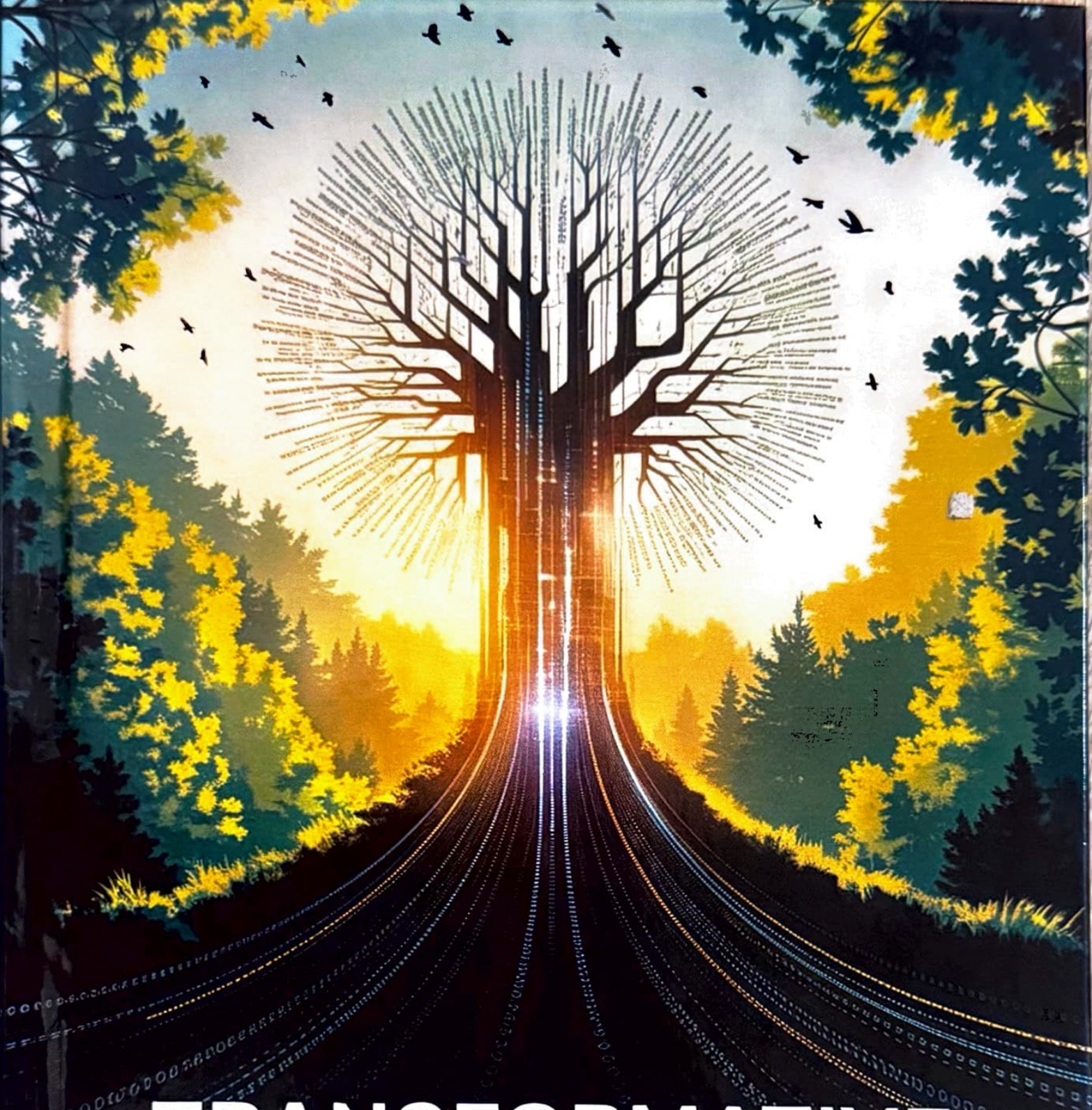

TRANSFORMATIVE TECHNOLOGIES

Role of Artificial Intelligence in Environmental Law

Dr. Manzoor Khan
Mridul Mishra
Areesha Aafreen
Khubaib Rehman

TRANSFORMATIVE TECHNOLOGIES: ROLE OF ARTIFICIAL INTELLIGENCE IN ENVIRONMENTAL LAW

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Preface

Every generation witnesses moments when the law is called upon to engage with forces that reshape society and its institutions. The Industrial Revolution transformed labour relations and property rights; the scientific and technological revolutions gave rise to new frameworks of intellectual property; and in our present century, the urgent concerns of environmental protection have demanded an entirely new field of jurisprudence. We now stand at yet another threshold, where Artificial Intelligence intersects with environmental law and governance.

Artificial Intelligence, no longer a matter of theoretical pursuit, has become an instrument of remarkable influence. Its capacity to analyse complex data, to predict environmental hazards with precision, and to assist in the judicious management of natural resources holds immense promise. Yet, alongside this promise, there emerge equally compelling concerns. How shall legal frameworks adapt to the autonomy of algorithms and machines? In what manner can intellectual property regimes both encourage innovation and secure equitable access to sustainable technologies? And above all, how may we ensure that AI is harnessed not merely for efficiency, but in the service of justice, inclusivity, and ecological stewardship?

It is to these questions that this volume, *Transformative Technologies: Role of Artificial Intelligence in Environmental Law*, is devoted. The chapters presented here embody a range of scholarly engagements of doctrinal, comparative, ethical, and policy-oriented studies. While distinct in their approaches, they collectively affirm the necessity of rethinking law in light of technological transformation.

The Environmental Law Society of the Faculty of Law, Integral University, undertook this endeavour with the conviction that meaningful discourse must bridge law, technology, and sustainability. This book would not have been possible without the

thoughtful contributions of our authors, who approached the subject with both rigour and imagination. We express our gratitude to Book Rivers for their valuable support in bringing this volume to publication, and to our colleagues and students whose encouragement sustained the project at every stage.

It is our hope that this book will serve as a resource for jurists, policymakers, researchers, and practitioners alike. If it succeeds in stimulating reflection, fostering debate, and inspiring further scholarship in this critical field, it will have fulfilled its purpose.

With earnest hope for its service to scholarship and society,
We remain,

The Editors

Dr. Manzoor Khan
Mr. Mridul Mishra
Ms. Areesha Aafreen
Mr. Khubaib Rehman

Acknowledgement

No scholarly endeavour is the work of its editors alone. This volume, *Transformative Technologies: Role of Artificial Intelligence in Environmental Law*, has come into being through the generosity, guidance, and labour of many to whom we owe our profound gratitude.

We record, first, our sincere appreciation to **Prof. (Dr.) Naseem Ahmad, Dean, Faculty of Law, Integral University**, whose recommendation, encouragement, and wise counsel provided both the impetus and the direction for this undertaking. His steadfast support has been invaluable in bringing this work to completion.

We acknowledge with equal gratitude the **Faculty of Law, Integral University**, for nurturing an environment where serious scholarship is fostered, and the **Environmental Law Society**, together with its dedicated members, whose commitment and enthusiasm have been the living force behind this project.

Our thanks are due to the contributing authors, whose erudition and diligence animate these pages, and to the reviewers and well-wishers whose discerning comments have enriched the quality of the work. We further extend our appreciation to **Book Rivers**, our publishing partner, whose professionalism and cooperation have ensured that this collective endeavour may reach a wider community of readers.

Lastly, we are indebted to our colleagues and students, whose encouragement and goodwill sustained us throughout the course of this enterprise. To each person and institution that has aided, whether directly or indirectly, in the fruition of this volume, we extend our deepest gratitude.

It is with humility and respect that we place on record these acknowledgements.

—The Editors

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Chapter – 5

Ai Technologies For Pollution Detection and Remediation Efforts

Aqeel Ahmad Khan[1] & Dr. Uzma[2]

Abstract

The escalating challenges of environmental pollution demand innovative and sustainable solutions beyond traditional monitoring and remediation methods. Artificial Intelligence (AI) technologies have emerged as transformative tools in detecting, predicting, and mitigating pollution across air, water, and soil ecosystems. By leveraging advanced algorithms, machine learning models, and sensor-based data integration, AI enables real-time monitoring, precise source identification, and predictive analytics for environmental risks. Moreover, AI-powered robotics and autonomous systems are increasingly being deployed in pollution remediation efforts, such as waste segregation, water purification, and soil restoration. This paper critically examines the role of AI in environmental protection, highlighting its applications in pollution detection and remediation. It also explores case studies, opportunities, and ethical challenges associated with deploying AI-driven solutions. The findings suggest that while AI offers significant potential to revolutionize environmental management, its effective implementation requires robust infrastructure, interdisciplinary collaboration, and responsible governance frameworks.

Keywords : Artificial Intelligence (AI); Pollution Detection; Environmental Remediation; Machine Learning; Predictive

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