

PERSPECTIVES OF NATURAL RESOURCE MANAGEMENT



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FOREWORD

The global community is at a crossroads, grappling with the interconnected crises of climate change, biodiversity loss, resource depletion, and the social and economic impacts that accompany them. Navigating these complex issues necessitates a profound understanding of the legal, ethical, and practical frameworks that govern our relationship with the natural world. It is within this context that in the forthcoming book titled 'Perspectives of Natural Resource Management' edited by Prof. (Dr.) V. K. Ahuja, Dr. Amol Deo Chavhan, and Dr. Kasturi Gakul, published by National Law University and Judicial Academy, Assam, an effort has been made to facilitate and address the critical questions of environmental sustainability, natural resources governance, and the legal structures that underpin them.

This book is the culmination of the tireless efforts of the scholars and practitioners of Environmental Studies, who have been at the forefront of environmental law and policy in India and across. Their commitment to the cause of environmental protection, sustainable development, and the preservation of our natural heritage is evident throughout this compendium of work. It reflects their dedication to the principles of equity, justice, and environmental ethics that are essential for safeguarding our planet's future.

As you delve into the chapters of this book, you will find a wealth of knowledge that transcends disciplinary boundaries and encompasses a wide array of perspectives on natural resources management. From the intricacies of legal frameworks to the on ground challenges faced by communities, this volume presents a holistic view of the subject, offering invaluable insights into the practical implementation of sustainable resource management.

The Editors along with the team at Centre for Environmental Law, Advocacy, and Research (CELAR), NLUJA, Assam, have admirably taken on the responsibility of producing a work, not only analysing existing laws and policies but also proposing innovative solutions for a more harmonious co-existence between humans and the natural world. This book has emphasized upon the importance of an interdisciplinary approach that incorporates legal, scientific, and ethical considerations to address the complex challenges in the domain of natural resource management.

As we embark on a journey through the pages of this book, I with great delight contribute this foreword and encourage readers from all walks of life — policymakers, legal scholars, environmental activists, students, and concerned citizens — to absorb the wisdom contained within this profound and insightful volume.

May this book serve as a beacon of knowledge and inspiration for all those who are dedicated to safeguarding our planet's most precious resources!


[Surya Kant]

PREFACE

In an age defined by burgeoning populations, rapid industrialization, and the ever-accelerating pace of technological advancement, the quest to balance human progress with environmental preservation has never been more critical. Our planet's natural resources are both the bedrock upon which societies are built and the finite wellspring from which they draw sustenance. Striking a harmonious equilibrium between harnessing these resources to fuel progress and conserving them to ensure a sustainable future is the defining challenge of our times.

The Centre for Environmental Law, Advocacy, and Research (CELAR) at the National Law University and Judicial Academy, Assam (NLUJA, Assam), has long stood as a bastion of knowledge and advocacy, committed to addressing this profound challenge. Founded with the overarching goal of promoting scholarship, research, and action in the field of environmental law and policy, CELAR has consistently demonstrated an unwavering dedication to nurturing a comprehensive understanding of the complex interplay between humans and their natural environment.

This book, bearing the imprimatur of CELAR, NLUJA, Assam, is a testament to the institution's commitment to advancing the discourse on Natural Resources Management. It is the result of a collaborative endeavour, wherein scholars and experts from diverse backgrounds and geographical regions have come together to contribute their unique perspectives, experiences, and insights. This compendium of chapters represents a profound exploration of a range of issues

critical to the discipline, from acid mining and e-waste management to India's pivotal role in the COP-26 global climate conference, technical barriers to trade and their intricate relationship with environmental concerns, the promising intersection of Artificial Intelligence and Natural Resource Management, and the delicate balance between tradition and hunting in local communities.

The state of our planet's natural resources is at a precipice. Humanity's unrelenting thirst for fossil fuels, minerals, and other finite resources, compounded by deforestation, overfishing, and the relentless expansion of urban landscapes, has placed immense strain on our planet's ecological systems. The consequences of our actions are now evident in the melting polar ice caps, the extinction of countless species, erratic and extreme weather patterns, and the ever-increasing frequency and severity of natural disasters.

Climate change, driven predominantly by the emission of greenhouse gases, is poised to disrupt the very fabric of our existence. The Paris Agreement of 2015 and the more recent COP-26 in Glasgow signify the global community's recognition of the perilous state of our environment. Yet, words on paper and pledges of intent are insufficient in the face of the immense challenge. What we need are actionable solutions and a comprehensive understanding of the multifaceted issues surrounding Natural Resources Management.

Natural Resources Management is not a domain that can be confined within the narrow boundaries of a single discipline. It requires an interdisciplinary perspective that intertwines scientific inquiry, legal frameworks, ethical considerations, and socio-economic analysis. This book, by design, captures this multifaceted approach, bringing together scholars, practitioners, and experts

from various domains to shed light on the intricate tapestry of Natural Resources Management.

Throughout the chapters of this book, readers will find an amalgamation of perspectives and approaches that collectively seek to unravel the complex challenges posed by our relationship with the environment. It is our hope that this diverse range of viewpoints will not only inform but also inspire, fostering a deeper appreciation for the intricate and often delicate balance that must be struck when managing our natural resources.

The importance of a robust legal framework for Natural Resources Management cannot be overstated. Laws and regulations serve as the bedrock upon which responsible resource utilization and conservation are built. The chapters in this book offer valuable insights into the legal aspects of Natural Resources Management, shedding light on the need for stringent regulations and the challenges of enforcement. These contributions explore how legal frameworks can adapt to emerging environmental issues, and how international agreements, such as the Paris Agreement and the Convention on Biological Diversity, influence domestic legislation and policies.

The intersection of law and environment is particularly evident in chapters that touch on India's commitments in COP-26 and the technical barriers to trade, examining how trade policies and international agreements can either support or undermine environmental goals. The legal implications of traditional hunting practices and the integration of Artificial Intelligence in resource management are also explored, highlighting the ever-evolving nature of environmental law.

The world is on the cusp of a technological revolution that has the potential to redefine the way we approach Natural Resources Management. Artificial Intelligence (AI) has shown promise in optimizing resource allocation, monitoring environmental changes, and predicting ecological trends. The chapter on the intersection of AI and Natural Resource Management delves into the possibilities and ethical considerations of this emerging field, offering a glimpse into the future of resource conservation.

However, technology is not the only frontier under scrutiny. The age-old practices and traditions of indigenous and local communities also play a vital role in resource management. Traditional hunting, as explored in one of the chapters, presents a fascinating case study where cultural heritage meets conservation imperatives. The delicate balance between preserving these traditions and safeguarding biodiversity underscores the complexity of the issues we face.

This collection of chapters is a clarion call to all stakeholders – from policymakers to environmental activists, from students to concerned citizens. Natural Resources Management is not a solitary endeavour, but a collective responsibility that demands a comprehensive and interdisciplinary approach. It is our hope that this book will serve as a valuable resource, guiding individuals and institutions alike in their quest for a more sustainable and harmonious coexistence between humans and the environment.

We believe that this scholarship is a testament to our unwavering commitment to advancing the understanding of Natural Resources Management and for bringing together a remarkable group of scholars and experts to contribute to this book. As we embark on this

intellectual journey, let us remember that we are all stewards of our planet's resources, and it is our collective responsibility to ensure that they are preserved for the well-being of current and future generations.

To quote Barack Obama:

“We are the first generation to feel the effect of climate change and the last generation who can do something about it.”

April, 2024

Editors

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DISCLAIMER

The authors carry whole and sole liability for statements written in their respective chapters. The Editors shall remain indemnified and shall not be held jointly and severally liable anyway.

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CONTENTS

Sl. No.	Chapter	Page Nos.
1.	Pending interdisciplinary agenda of contemporary environmental law <i>Jorge Isaac Torres Manrique and Magno Federici Gomes</i>	1
2.	National Resource Management and E-waste <i>Rakesh Kumar Dhar Dubey</i>	17
3.	Self-Government and PESA for Tribal <i>Sunny Suresh Kumar Hasani</i>	31
4.	Social Stock Exchange a public platform for effective Natural Resource Management <i>Shreyas Vyas</i>	51
5.	Exploring the Intersection of Artificial Intelligence, Natural Resource Management, and Competition Law in India: A Study of Emerging Trends and Challenges <i>Narender Kumar</i>	61
6.	Natural Resources Management with Respect to Medical and E-Waste <i>Rakesh Kumar Dhar Dubey and Tanmoy Majumder</i>	85

7. Building Tools for further Investigating Acid Mining Production: Intercomparison of Four Hydrological Model Versions through a Scoring Technique on the Niger River Basin, in West Africa
Salif Kone 105
8. Gauging the Efficacy of Laws in Mitigating Plastic Waste Pollution in India: A Comprehensive Scan through the Adequacy and Impression of Existing Legal Instruments
Kangkana Goswami 133
9. The natural resource management reflecting in ancient sanskrit anthologies with special reference to Manusamhita and the Kautiliyi Arthashastra
Kankana Goswami 159
10. Protection of Wildlife animals and traditional hunting practice of the Nagas in Nagaland: A legal perspective
Benchilo Odyuo 173
11. Inclusive Governance: Strengthening Public Participation in Natural Resource Management in India
Tushar Sharma 195
12. Learning from the best to avoid the worst: a critical legal evaluation of e-waste management from EU and India with emphasis on NE India
Sourabh Roy 225

13. Traditional Knowledge, Benefit Sharing and Biodiversity Conservation of North-East India 253
Riya Gulati
14. The Environmental Protection Dimensions of the TBT Agreement 273
Harsh Amrit
15. Environmental refugees: overlooked folks of climate change 307
*Neena Susan Babu
and Nimmy Maria Babu*
16. Natural Resource Management vis-à-vis India's commitment in COP-26 329
Krishna Kant Dwivedi
17. From Disparity to Harmony: Addressing North-South Environmental Trade Challenges 351
*Mainak Mukherjee
and Swaswata Das*
18. Journey of CITES From 1973-2023 383
Twinkle Deoraja

CHAPTER-1

PENDING INTERDISCIPLINARY AGENDA OF CONTEMPORARY ENVIRONMENTAL LAW

Jorge Isaac Torres Manrique*

Magno Federici Gomes**

1. Introduction

The protection of the environment is a point of utmost importance, given the worsening of threats and new threats, as recorded. While it is true that we acknowledge receipt of new technologies, upcoming technologies, and smarter technology, it is worrying that the great progress of technology has not contributed decisively to counteract in a significant way. The serious environmental situation of the world. In this issue, we unravel and develop, through its various aspects, the challenges that must be assumed to ensure a healthy environment, as well as the realization of the corresponding fundamental rights.

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2. By Way of Situational Diagnosis

The end of certainty, the existence of a strong relationship between science and law, the creation of disruptive technologies, the influence of social networks, the emergence of new subjects of law, the emergence of health, environmental and economic crises are the challenges of the post-agreement environmental issues.¹ The challenges of achieving a fully inclusive and environmentally sustainable development model obliges us to take an in-depth look at development styles in the light of the reality of the 21st century. In this new scenario, with growing inequality and increasing pressure on the environment and natural resources, coexisting with the emergence of new economic poles and powers, explosion of new technology, rapid urbanization, greater importance of regional integration spaces, policies and actions based on the holistic vision implied by sustainable development are needed to shape a better future for all.²

Consumerism: It seriously threatens the environment, since it imposes a way of behaviour aimed at consuming products that are harmful to the environment. However, it is also detrimental to the economy of consumers, as, it is also a matter of systematic, uncontrollable and unnecessary purchases.

Protection of new subjects of law: This, in the understanding that the legal and mainly constitutional

¹ Lucía Soto Rincón, Environmental Challenges of Today's Societies and the Responses of Environmental Law, EXTERNADO (Jan, 15, 2023), <https://medioambiente.uexternado.edu.co/desafios-ambientales-de-las-sociedades-actuales-y-las-respuestas-del-derecho-ambiental/>.

² Alicia Bárcena, The Challenge of Environmental Sustainability in Latin America and the Caribbean, CEPAL (Jan, 15, 2023), https://repositorio.cepal.org/bitstream/handle/11362/37791/LCM23_es.pdf.

recognition of new subjects of Law is not enough, we must aim at the materialization of the effective protection and safeguarding of new subjects of law.³

Transfer of environmental matters to the courts: We cannot lose sight of the fact that the environmental administrative intervention, either through prevention or sanction, is not enough to achieve the forcefulness, efficiency and efficacy that environmental care requires. In this sense, it is urgent that the cases concerning Environment be brought to the attention of the judiciary.⁴

Principle of greater celerity: However, the observance of a correct environmental protection policy also involves considering the principle of celerity. Since it is a question of taking actions due to the very important need that the case entails, the principle of greater speed must be recognized in administrative and judicial courts.

Legal innovations:

i) Legal design. Legal design is a human-centred approach that serves to facilitate legal problem-solving and promote innovation in this sector. It combines the legal expertise of the lawyer with the mindset and methodologies of the designer and the technological potential to create legal systems, services, processes, education and environments that are more useful, usable, understandable and attractive to all. It could be argued that legal design is an approach that seeks to

³ Lucía Soto Rincón, Environmental Challenges of Today's Societies and the Responses of Environmental Law, EXTERNADO (Jan, 15, 2023), <https://medioambiente.uexternado.edu.co/desafios-ambientales-de-las-sociedades-actuales-y-las-respuestas-del-derecho-ambiental/>.

⁴ *Id.*

understand where the crucial flaws exist in the system at the moment, to help make the creative leap, defining what a better system could be.⁵ For digital transformation and environment protection, we find easy-filling fields to avoid unnecessary printing, and wastage of paper and resources, creating 100% digital documents with all the legal validity needed to make them enforceable.⁶

ii) Green nudge: The terms nudge and strategic use are the most common, although the latter may also have other definitions, although when applied to environmental matters in procurement it means using public contracts to pursue environmentally desirable objectives, which makes it a genuine promotional activity or nudge. Transversality, however, is a concept, obviously directly related, but with a different meaning. Rather, it refers to the fact that the environmental issue cannot be limited to the mere object of the contract or to the fulfilment of certain requirements by the bidders, but, on the contrary, it must be present throughout the entire process and all the steps of the contracting process.⁷

New environmental principles⁸: The contemporary maelstrom, typical of the vicissitudes of new technologies

⁵ Marta Benedet, Legal Design: what it is and how it will change the profession, LEMONTECH (Jan, 15, 2023), <https://blog.lemontech.com/legal-design-que-es-y-como-cambiara-la-profesion/>.

⁶ Daniel Acosta, What is Legal Design, LEGALNOVA (Jan, 15, 2023), <https://legalnova.co/2021/04/05/que-es-legal-design/>.

⁷ Daniel Terrón Santos, The New Public Activity of Promotion: Green nudge in today's Public Procurement, REDALYC (Jan, 15, 2023), https://www.redalyc.org/journal/2815/2815_61305002/html/.

⁸ Claudio F Osses Garrido, Environmental Challenges in the New Constitution: The Proposal of the Environmental Law Center vis-à-vis the Constitutional Debate, (Jan, 15, 2023),

and scientific and technological development, also brings the corresponding aggiornamento in the various disciplines and sciences of human knowledge.

In addition, the current legal system, not only regional, is characterized by registering the Political Constitution as a new order of values, at the apex of the legal system, that is, the Constitutional State of Law.

In addition, it should also be considered that the Law in general is going through a stage of greater reflection and compromise, since we speak of principles, as opposed to previous times, when rights were the common place.

On the other hand, it is no secret that the environment is in an increasingly worrying situation. Therefore, the commitment and challenge of environmental justice becomes equally acute.

The fact is that contemporary environmental law is not sufficient or enough to meet the new demands of the current situation.

Therefore, the challenge of achieving a fully inclusive and environmentally sustainable development model obliges us to examine in depth the styles of development in the light of the reality of the 21st century.⁹

Therefore, we are of the opinion that it is imperative, very urgent, unavoidable; the recognition of the principles, which we propose below.

<http://www.derecho.uchile.cl/noticias/172877/desafios-ambientales-en-la-nueva-constitucion>.

⁹ Carlos De Miguel & Marcia Tavares, The Challenge of Environmental Sustainability in Latin America and the Caribbean, UN (Jan, 15, 2023), https://repositorio.cepal.org/bitstream/handle/11362/37791/LCM23_es.pdf.

Inclusion of additional rights: The constitutional development of environmental protection has meant the consecration of several environmental rights, among which the rights of access to information, participation and justice in environmental matters stand out. In this matter, the Escazú Agreement provides certain guidelines and standards that must be present in the constitutional debate.¹⁰

3. New Principles

In the first place, we have the principle that we have called the environment as a higher purpose. This is characterized by prevailing penalties and determination of responsibilities, whether of public or private officials. Although it is true that what is indicated in the second term is important, it is even more important to pay attention to what is specifically related to environmental preservation and care in the specific case.

Preventive principle: This principle is characterized by the advanced intuitiveness to anticipate what could become complicated or even irreparable in the environmental venue.

Precautionary principle: This is based on granting environmental protection in the face of eventual scenarios which have not yet been scientifically proven to generate environmental damage. The rationale is that when in doubt it is better to take safeguard actions, as a sort of presumption *juris tantum*, in favour of the protection of the environment.

¹⁰ Claudio F Osses Garrido, Environmental Challenges in the New Constitution: The Proposal of the Environmental Law Center vis-à-vis the Constitutional Debate, (Jan, 15, 2023), <http://www.derecho.uchile.cl/noticias/172877/desafios-ambientales-en-la-nueva-constitucion>.

Principle of sustainable development: In the present case, it must be understood that cultural progress in general cannot mean environmental impairment or affectation. Therefore, development should be understood jointly.

Principle of intergenerational equity: This principle establishes the obligation to take as a premise that the decisions taken must be focused on safeguarding the future. This is because the right to a healthy environment does not only belong to the current generation.

It is also necessary to take into consideration the principle of environmental justice: What must be considered in this respect, is at the same time, the principle of specialization. This, in as much as in principle, the creation and sufficient establishment of environmental courts is indispensable. But, furthermore, to consider that otherwise, that is, to have courts specialized in other matters hearing environmental law conflicts violates the fundamental rights of the parties to have a judiciary acquainted with environmental matters.

In addition, the principle of progressivity holds that State policies must be oriented in a systematic manner, in a continuous, sustained and gradually advancing protection and safeguard of the environment until the desired levels are reached. To this end, inter-institutional political will is essential.

Finally, the principle of non-regression, through which a minimum and non-negotiable level of environmental protection and safeguarding is recognized. But, at the same time, it maintains that there can be no regression in any way in the recognition of environmental regulations. This can also be understood in the light of

the principle of prohibition of reform for the worse. It is not only a matter of ensuring environmental protection, but also of guaranteeing the legal certainty of not returning to a lower or inferior level of protection than that in force.

4. Essential Interdisciplinary Scenario

Artificial intelligence: Artificial intelligence is an effective technological system for the application of sustainability in companies and for the fulfilment of some of the sustainable development objectives. Secondly, the tool with the greatest potential for the application of this artificial intelligence is data science, since it does not accumulate a large amount of data for analysis, but with little data it is possible to make predictions and solutions to sustainability problems. Some companies such as IBM, Accenture, Ecopetrol, Coca Cola, which are in the market already make use of some artificial intelligence tools to contribute to sustainability and this has generated economic, political and social benefits for the organizations that apply it. It can be said that the influence of the expansion of artificial intelligence in companies for the fulfilment of sustainability is of high impact. According to the theories reviewed, the application of machine learning and data analysis tools allow sustainability to become more tangible in organizations. Likewise, this application of AI allows not only to obtain social and environmental benefits but also economic benefits for the company and this is evidenced in the analysis of companies that have already applied AI in their processes.¹¹

¹¹ Sara Valentina Castañeda Murillo, Application of Artificial Intelligence for Sustainability in Organizations (Jan, 15, 2023), <https://repositorio.unbosque.edu.co/bitstream/handle/20.500.1249>

Codification: It is also essential to consider the approval of an International Environmental Code. This, with the objective of strengthening the protection and safeguarding of the environment. This will aid any specialized legal system, which does not only register a constitutional recognition but is approved by International Organisations as well.

Governance: This point becomes a first order budget, because in order to have a firsthand knowledge of the place of the facts, it is necessary to consult with the population living in the affected area or the area to be affected. This will provide valuable information to understand and address their specific environmental problems.

Better right to a healthy environment: Although it is true that there is the well-known constitutional recognition of the fundamental right to a healthy environment, we consider that it is also essential to recognize the constitutional recognition of the best right to a healthy environment. This, in as much as the analysis and public policies must be approached from the primacy of said right, above the other fundamental rights.

Training and awareness: That is, the implementation of State policies aimed at including in the different levels of education a subject on the importance and transcendence of environmental law.

Environmental displaced persons: The displacement of people due to climate change and the subsequent threat or violation of the human rights of the displaced

population, imposes pressing challenges for environmental law and for jurists. For such deliberations, there is a need to transform and advance the forging of complex legal forms that combine different levels, scales and institutes. It means to resignify the current legal forms based on individual rights and to build legal forms that contain the rights and aspirations of all (at the national-international, generational-intergenerational, human species-interspecies level), where life is the a priori of protection. For jurists, the challenge means proposing legal institutes that respond to the new realities, from ethical stances towards life, based on a change of values that promote solidarity with all forms of life, cooperation and interdependence. It also means promoting spaces for inter- and transdisciplinary encounters to seek solutions to the problem of the environmentally displaced. The challenge for policy and government agencies is to generate the necessary policies and mechanisms so that people at risk or in a situation of environmental displacement due to climate change are attended to in the first instance by government agencies and that they have sufficient legal mechanisms for access to environmental justice, such as access to information, participation in decisions and access to administrative or judicial instances.¹²

Environmental justice: To achieve environmental justice, a political system capable of offering full and effective democratic participation must be guaranteed.

¹² Valencia Hernández, Javier Gonzaga, Aguirre Fajardo, Alejandra María, Ríos Sarmiento, Melissa, Challenges of Environmental Justice and Access to Environmental Justice in Environmental Displacement Due to Effects Associated with Climate Change, Ucaldas (Jan, 15, 2023), <http://vip.ucaldas.edu.co/lunazul/index.php/english-version/91-coleccion-articulos-espanol/117-desafios-de-la-justicia-ambiental>.

This is not only to ensure the benefits and rights of the parties, but also to decide on the processes, whose costs and benefits will then be experienced and distributed, this means that within the concept of environmental justice lies the distributive dimension of the incentives and disadvantages, which brings the interaction in environmental issues, between different individuals and groups. The dialogue between different disciplines and actors that work hard to generate this type of changes, should focus or have as a challenge to define, in the different situations that arise and are related to environmental injustices, what should be understood by equity and justice, not only for the consequences that fall on those affected, but also for those who directly or indirectly use the natural resources, besides pondering the mechanisms that the countries or scenarios in which these cases occur, have to stimulate economic, political and citizen participation. In other words, to study which is the best way towards a fair outcome, which preserves and protects the fundamental rights of people, the environment in the long term and at the same time encourages sustainable development and legal, economic and political innovation, which is essential to address these new challenges.¹³

Interdisciplinarity: In this item we consider that environmental issues should not be seen only from the world of law. This is because it does not originate or culminate in juridical quarries. Therefore, it deserves to be seen also from disciplines and sciences other than law, such as sociology, sociology, economics, philosophy, among others.

¹³ *Id.*

Interinstitutionality: Likewise, the state and private vision is transcendental. But it must be assumed as dialoguing, cooperating, between them. This will result in the best possible way for the expected effective effects.

Reversing climate change: It is necessary to establish: i) An International Court with jurisdiction also in climate change, ii) The conversion of Public International Law into International Environmental Law, iii) The introduction of institutions that have not yet been considered, or that imply the consecration of new and better Universal Environmental principles.¹⁴

Hazardous polluting waste: In this regard, we bring up the case of damages caused by the export of hazardous waste from the United States to Mexico and for the purpose of holding the exporting company liable, it is feasible to apply the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) retroactively and objectively, since it was the generator of the hazardous substances and because the conditions under which the export took place allowed the realization of a potential damage that directly affects the territory, the atmosphere and the consumers of the exporting State.¹⁵

Forest loss in the Amazon: It is important that the State maintains the strategy of ensuring the protection of large areas of forests, mainly in indigenous territories under the mechanism of Conditional Direct Transfers (CDT), a payment system for indigenous peoples for their

¹⁴ Eduardo A Pigretti, Challenges of International Environmental Legislation for Domestic Enforcement. Experiences, AMAG (Jan, 15, 2023), <http://repositorio.amag.edu.pe/bitstream/handle/123456789/186/retos-legislacion-internacional.pdf?sequence=1&isAllowed=y>.

¹⁵ *Id.*

commitment to the conservation of their forests. But he also believes that there is a need to move towards more sustainable agriculture. Planning has to be aimed at this. We cannot continue to lose forests instead of having a more productive agriculture in the same areas that are already dedicated to this activity. There are two problems of deforestation in Peru: illegal logging and the change of land use to convert forests into farmland, a conversion that is often also surrounded by illegality.¹⁶

Artisanal mining: The proposal to formalize artisanal mining has been delayed for at least eight years. On December 29, two days before the end of 2020, the Ministry of Energy and Mines (MINEM) issued a Supreme Decree that again modified the deadlines for submitting the Environmental Management Instrument for the Formalization of Small Mining and Artisanal Mining Activities (IGAFOM), an indispensable requirement to advance in the formalization process. According to the MINEM decree, the deadline for the presentation of the IGAFOM was extended in some cases until April 30, 2021 and in others until July 31, 2021. This is an environmental management instrument; therefore, it must have the opinion of the Ministry of the Environment. When these deadlines are met, those who approved this extension will no longer be in place. We will have new authorities. And so, possibly, “it will be extended to infinity”, says Ipenza about this process initiated in 2012. Ipenza adds that we should not reach the bicentenary with informal mining in perpetuity.¹⁷

¹⁶ Yvette Sierra Praell, Peru's Environmental Challenges in 2021, MONGBAY (Jan, 15, 2023), <https://es.mongabay.com/2021/01/los-desafios-ambientales-para-el-peru-en-el-2021/>. 2021.

¹⁷ *Id.*

Urgent ratification of the Escazú Agreement: Six environmentalists were murdered during 2020 in Peru. The last of them was Jorge Muñoz Saavedra, who had disappeared on Saturday, December 19 after leaving home to go to the forest when he heard a chainsaw. Three days later, on December 22, his body was found in a trail in the Batán Grande sector, in Lambayeque. Muñoz Saavedra had received threats from mafias dedicated to the trafficking of forest species and the depredation of archaeological heritage. In the previous months, three indigenous leaders, a park ranger and an environmental defender had been murdered. Despite this situation, Peru did not ratify the Escazú Agreement, a regional treaty that promotes access to information, public participation and environmental justice in Latin America and the Caribbean. The document includes an article dedicated to human rights defenders in environmental matters. The Congress of La Republica shelved the agreement, even though Peru had been one of the first countries to sign it in September 2018. The Escazú Agreement must be insisted upon. It needs to be debated again in the new Congress. The Congress that is installed this year should address the Escazú Agreement and ratify it so that it becomes part of our internal policy. This is an important issue that should be addressed by the political parties in the electoral debate. Peru was one of the countries that promoted the Escazú Agreement to be binding. What remains is to continue raising awareness about the importance of the agreement. The greatest rejection was on the issue of environmental defenders and that is why we must disseminate more information.¹⁸

¹⁸ *Id.*

Marine conservation: By 2020, Peru should achieve the protection of 10% of its marine area according to the commitment adopted with the Convention on Biological Diversity, also known as the Aichi Targets. This commitment also requires ensuring the representativeness of all Peruvian marine ecosystems, taking into account the proposal to create marine areas of ecological or biological importance. However, this is probably one of the most complex challenges for Peru. The country has so far not exceeded 0.5% protection of its ocean, while the creation of new marine protected areas has been waiting for several years. The proposal for the Mar Tropical de Grau National Reserve and the Dorsal de Nasca National Reserve are the most advanced, but so far, they have not materialized. A Ministerial Resolution issued by the Ministry of Environment on December 29, 2020, extended by two months the term of the multi-sectoral working group responsible for compiling, analysing and systematizing the information for the establishment of the Nasca Ridge National Reserve. We have a debt with coastal marine protection, both the Grau Sea and the Nasca Ridge. What happened with the creation of these marine areas? In the conservation of marine ecosystems, we are doing very badly. We have not complied with the Aichi Targets and research for the conservation of coastal marine areas is still a priority.

This topic goes beyond the conservation and management of Peruvian marine resources. We must start thinking about a Ministry of Fisheries, which we lost in 2004. Why does agriculture have a ministry but fisheries does not? Marine management cannot continue to be a sub-chapter of the Ministry of Production, there is an absence of fisheries policy. What we have de facto is to produce fish for export. A holistic vision of the sector is required. The fight against illegal activities is also a

pending issue for 2021. There is a huge illegal fishing traffic in the country.¹⁹

5. Final Thoughts

The very urgent legal recognition of the environmental principles mentioned (preferably in the corresponding Code, since in some cases its jurisprudential recognition is not enough), also implies objective, concrete and timely actions, both at administrative and judicial levels. This, in as much as it would be of no value the materialization of the same, when in practice they simply do not turn out to be applied.

Consequently, we consider that more than a legislative modification or the aggravation of penalties for crimes against the environment, it is necessary to recognize new environmental legal principles, such as, for example, those developed in this paper. It also merits the training and awareness of the actors in the administration of environmental justice.

¹⁹ *Id.*

CHAPTER-2

NATIONAL RESOURCE MANAGEMENT AND E-WASTE

Rakesh Kumar Dhar Dubey*

1. Introduction

Human population growth and a need for comfortable lifestyles have led to a significant consumption of electronic goods leaving an impact on the planet's biogeochemical processes. Electronic waste, commonly known as e-waste, presents a dual challenge and a compelling business opportunity due to its escalating quantities and the presence of hazardous substances and valuable resources within it. As e-waste is made up of a variety of materials, including ceramics, polymers, metals, along with valuable alloys (Nandy, Fortunato, and Martins, 2022).¹ E-waste concerns necessitate comprehensive national resource management regulations that include the entire lifespan of medical and e-waste. E-waste refers to used electronics nearing

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¹ Nandy, S., Fortunato, E. and Martins, R., 2022. Green Economy and Waste Management: An Inevitable Plan for Materials Science. Progress in Natural Science: Materials International, 32(1), pp.1-9.

the end of their useful life, also known as electronic rubbish, escrap, or end-of-life electronics. These devices are usually razed donated, or recycled. The UN defines e-waste as devices that contain harmful compounds like mercury and pose major dangers to human and environmental health. Further the United Nations developed the Sustainable Development Goals (SDGs) in 2015 for all to promote a sustainable future by 2030. Waste management and recycling, particularly electronic waste (e-waste) are critical to achieving these objectives. Personal electronics consumption has expanded dramatically over last two decades, owing to the digital era and the demand for smart technology.

2. Annual Generation of E-Waste

Electronic rubbish, or e-waste, is a growing concern as well as a developing business potential due to the volume of e-waste generated consisting both dangerous and valuable components in it. Electronic garbage everywhere has now become a big issue. E-waste disposal is a rising global environmental and public health concern, electronic waste has become the world's fastest-increasing portion of the formal municipal waste stream. India's economic liberalization in the 1990s led to a thriving electronics industry, accompanied by a surge in e-waste. Preliminary estimates indicate that India generates 146,180 tons of e-waste annually, projected to exceed 8 lakh tones by 2012. Maharashtra, Andhra Pradesh, Tamil Nadu, and others are major contributors, with Mumbai, Delhi, and Bangalore leading in e-waste generation. Effective e-waste management is crucial for reducing environmental impact and promoting sustainability. In India, the Ministry of Environment and Forests (Mo.E.F.) regulates waste management, including e-waste. Guidelines exist, but specific laws addressing e-waste are lacking. Hazardous materials in e-waste are

covered by “The Hazardous and Waste Management Rules, 2008.” Further legislation is needed to address the e-waste problem comprehensively.

In China, electronic waste is regulated by the Administration of Control of Pollution caused by electronic information products since February 2006. Designers and manufacturers must adhere to national industrial standards, with penalties for noncompliance. The administration plays a crucial role in managing WEEE² (Waste Electrical and Electronic Equipment) and ensuring compliance. In the bustling Asia Pacific region, the electrical and electronics industry has flourished, fuelled by technology and market growth countries like Australia, China, India, Indonesia, and Malaysia are among the top e-waste producers in this region. Apart from hazardous materials like metals, pollutants, and plastics the value of precious metals in e-waste is estimated at USD 14 billion, with a significant portion remaining unrecovered.

However, these devices harbour harmful chemicals that pose risks to human health, the environment, and worsen the climate crisis. The increasing demand for electronic products has resulted in a surge of e-waste, a pressing challenge often neglected. Improper disposal releases toxins and depletes valuable metals. Urgent action is needed to address this issue and secure a sustainable future (Andeobu, Wibowo, and Grandhi, 2021).³ As per the report, 54 million metric tonnes

² Waste in compliance with the European Union Directive /EU, <https://www.sciencedirect.com/topics/computerscience/research-paper>

³ Andeobu, L., Wibowo, S. and Grandhi, S., 2021. A Systematic Review of E-waste Generation and Environmental Management of Asia Pacific Countries. *International Journal of Environmental Research and Public Health*, 18(17), p.9051.

abandoned devices as an e waste with a battery or plug, parts of computers and mobile phones - had been generated worldwide in 2019, it was with an increase of 9.2 Mt over the previous five years. Which is expected to grow at the rate of 30 percent more by 2030 upto 75 million metric tonnes. This is worth over \$62.5 billion, more than the GDP of most nations on this planet and only 20% of this is formally recycled.

Asia generated the greatest volume of e-waste in 2019 - some 24.9 Mt, followed by the Americas 13.1 Mt and Europe 12 Mt, while Africa and Oceania generated 2.9 Mt and 0.7 Mt respectively. Garam Bel⁴, Pucket and Smith⁵ had stated that these e-waste consist of a health and environmental hazards containing toxic compounds such as mercury, brominated flame retardants (BFR), or chlorofluorocarbons (CFCs). Nearly 80% of electronic waste ends up in landfills or is recycled informally, typically by hand in developing nations. As a result of this bad fate, many workers are exposed to a hazardous environment containing harmful and cancer-causing elements such as mercury, lead, and cadmium. These troubling findings emphasise the critical need to address the environmental and public health risks presented by improper e-waste disposal and uncontrolled recycling practices contaminate soil and underground water putting food supply systems and water resources at danger. Harming UN agencies have united their voices

⁴ Garam Bel, Carolien van Brunschot, Nick Easen, Vanessa Gray, Ruediger Kuehr, Athanasios Milios, Iyngararasan Mylvakanam, J. P. (2019). A New Circular Vision for Electronics: Time for a Global Reboot. World Economic Forum, January, 1–24. www.weforum.org

⁵ Puckett J, Smith T. 2002. Exporting Harm: The High-tech Trashing of Asia the Basel Action Network. Seattle⁷ Silicon Valley Toxics Coalition.

with the World Economic Forum, the Global Environment Facility, and the World Business Council for Sustainable Development. Together, they proclaim the urgent need for an audacious transformation of the existing electronics system. This alliance of formidable forces heralds a new era, where boundaries dissolve, and silos crumble united by a shared vision of sustainability, they stand shoulder to shoulder, weaving a tapestry of hope and resilience.⁶ In the hands of this united front, the possibilities are boundless. The future of electronics, once marred by its environmental footprint, now holds the promise of a greener, more prosperous tomorrow.

3. Recycling of E-Waste

Recycling E-waste is a global issue. Developed countries prioritize its management, while emerging nations like India face challenges due to socioeconomic factors, infrastructure limitations, and regulatory gaps. Recycling e-waste is profitable due to precious metals in PCBs, but high costs in developed nations lead to exporting e-waste to developing countries with cheap labour and weak environmental regulations.⁷ A country like Switzerland has a leading e-waste management system, recycling 11 kg of Waste Electrical and Electronic Equipment, WEEE per capita. A roadmap ahead requires having a developed and sustainable e-waste management system in India and other nations of the world, ensuring environmental

⁶ Khetriwal, D.S.; Kraeuchi, P.; Widmer, R. 2009. Producer Responsibility for E-waste Management: Key Issues for Consideration-Learning from the Swiss Experience. *J. Environ. Manag.* 9, 153–165.

⁷ Chatterjee, S., 2012. Sustainable Electronic Waste Management and Recycling Process. *American Journal of Environmental Engineering*, 2(1), pp.23-33.

and occupational safety.⁸ Even global recycling rates are extremely poor. A mere 35 percent of e-waste is formally reported as being adequately collected and recycled, even in the EU, which leads the world in e-waste recycling. The average amount recycle of e-waste worldwide is 20%, the remaining 80% goes unrecorded, with much of it ending up as garbage and being buried for generations ahead to suffer. Because of cheap labour costs and lax regulatory regimes, the informal e-waste businesses are growing faster in underdeveloped countries than in industrialised countries.⁹ Inadequate e-waste treatment has long-term consequences such as contaminated food, water, and environmental and human health degradation.

The rapid growth of the electrical and electronic industries has led to a significant increase in e-waste generation worldwide. According to Rajya Sabha's report (2011), informal sector recycling controls e-waste disposal in India, causing substantial environmental issues.¹⁰ Electrical and electronic equipment EEE is omnipresent in daily life, but when it becomes e-waste, effective processing is essential for material recovery, for the efficient use of renewable energy, and for lowering both environmental and health repercussions.¹¹

⁸ Wath, S.B., Vaidya, A.N., Dutt, P.S. and Chakrabarti, T., 2010. A Roadmap for Development of Sustainable E-waste Management System in India. *Science of the Total Environment*, 409(1), pp.19- 32.

⁹ Awasthi, A.K., Zeng, X. and Li, J., 2016. Environmental Pollution of Electronic Waste Recycling in India: A Critical Review. *Environmental Pollution*, 211, pp.259-270.

¹⁰ *Id.*

¹¹ Awasthi, A.K. and Li, J., 2017. Management of Electrical and Electronic Waste: A Comparative Evaluation of China and India. *Renewable and Sustainable Energy Reviews*, 76, pp.434-447.

The Global E-waste Statistics Partnership's third edition of the Global E-waste Monitor released in July 2020, detailed the insight of the global e-waste situation. The Global E-waste Statistics Partnership represents a significant milestone in understanding and tackling the global e-waste issue. A collaborative effort between leading organizations in the field, serves as a valuable resource for policymakers, researchers, and stakeholders involved in waste management and sustainability. By shedding light on the current state of e-waste, this report lays the foundation for informed decision-making and the implementation of effective strategies.

The magnitude and implications of the global e-waste crisis, providing a wealth of data, trends, and analysis and offers valuable insights into the potential benefits of recycling and proper e-waste management to promote sustainable consumption, raise awareness, and foster technological innovation that supports responsible electronic waste management.¹²

The Global E-waste Monitor is a collaborative effort between the International Telecommunication Union (ITU), the Sustainable Cycles (SCYCLE) Program hosted by the United Nations University (UNU) and the United Nations Institute for Training and Research (UNITAR), and the International Solid Waste Association (ISWA). This partnership aims to address the global e-waste crisis by providing comprehensive insights and promoting sustainable practices. The collaboration brings together diverse perspectives and industry knowledge to establish a reliable source of information on electronic waste. The partnership ensures the integration of international best practices and standards

¹² *Supra* 8.

in e-waste management and allows for continuous improvement through feedback and engagement with stakeholders. By joining forces, these organizations contribute to raising awareness, shaping policies, and driving positive change in worldwide.¹³ The International Telecommunication Union (ITU), the Sustainable Cycles (SCYCLE) Program, which is currently co-hosted by the United Nations University (UNU) and the United Nations Institute for Training and Research (UNITAR), and the International Solid Waste Association (ISWA) have collaborated to create the Global E-waste Monitor. In 2014 total 61 countries were member nations of ITU, 67 countries in 2017 and 78 countries in 2019. The ITU member states have a resolution to increase the number of membership of countries with e-waste laws around 97 nations, by the end of 2023. Implementing effective waste collecting systems, supporting sustainable waste segregation practices, building sufficient disposal and treatment infrastructure, and encouraging resource recovery by recycling and reusing valuable materials are all part of this.

Proper national resource management is critical for guaranteeing the long-term use and disposal of important resources while minimising environmental consequences. Because of the possible risks and quantity of resources, the management of electronic trash (e-waste) is very important.

4. Challenges and opportunities

E-waste management has become a top priority for both developed and developing nations, particularly those

¹³ *Supra* 8.

undergoing transition.¹⁴ According to 2007 joint research by Manufacturers Associations of Information Technology, (MAIT) and Gesellschaft für Internationale Zusammenarbeit,¹⁵ (GIZ) 3,32,979 metric tons of electronic garbage were generated in India. This comprised 2,75,000 MT of TVs, 56,324 MT of PCs, and 1,655 MT of mobile phones, 12,000 Kg of PCs. 7,000 Kg of TVs were processed as e-waste. In one of the surveys, India's PC ownership increased from 20 million in 2007 to 75 million in 2010, and 14 million mobile phones were replaced in 2007. (Chatterjee, 2012). Concerns about the future availability and supply of new materials for electronics and electrical devices have been highlighted as a result of technology's rapid development. Rising commodity prices have highlighted the risks associated with procuring these materials. However, electronic rubbish contains a multitude of valuable and scarce metals such as gold, platinum, cobalt, rare earth, and significant amounts of aluminium and tin. This presents an excellent opportunity to boost the recovery and utilisation of these resources.

¹⁴ Sharma, M., Joshi, S. and Kumar, A., 2020. Assessing Enablers of E-waste Management in Circular Economy Using DEMATEL Method: An Indian Perspective. *Environmental Science and Pollution Research*, 27(12), pp.13325-13338.

¹⁵ https://en.wikipedia.org/wiki/Deutsche_Gesellschaft_f%C3%BCr_Internationale_Zusammenarbeit



Endangered Elements from the Periodic Table

Source: ACS Green Chemistry Institute

Up to seven percent of the gold is estimated to be present in the e waste. The metal used in batteries, magnets and numerous other electronic components. Within the realm of electronic waste, the extraction of metals falls victim to an unwelcome reality-recovery rates are meagre at best. Cobalt, a prized element crucial for batteries in laptops, smartphones, and electric vehicles, bears the brunt of this dilemma. Despite the potential to recycle 95% of cobalt, current methods only manage a lacklustre 30% recovery rate. However, hope shines in the jurisdiction of recycled metals, where efficiency reigns supreme, demanding a mere fraction of the energy consumed by their virgin counterparts.

Mining e-waste, a process far gentler on the environment, releases a mere 20% of the carbon dioxide emissions per unit of gold compared to the arduous practices of traditional mining. A whispered secret to achieving sustainability lies within this delicate dance of resource extraction.

In the global energy consumption, the extraction of raw materials claims a significant slice, amounting to 7% of the total in 2015. This staggering realization beckons us to tread a different track a path illuminated by secondary raw materials. By embracing these reclaimed treasures within electronic goods, we inch ever closer to the aspirations outlined in the Paris Agreement on climate change. With refined e-waste recycling processes and an enthusiastic pursuit of maximum material recovery, to unlock the potential to transcend limitations, bolster resource efficiency, alleviate environmental burdens, and chart a course towards a future that thrives in sustainability's embrace.

The lithium-ion battery market is projected to reach \$100 billion by 2025, driven by rising demand from smartphones and electric vehicles. However, the global recycling rate for these batteries is only 42%. By 2025, the weight of lithium-ion batteries sold annually will increase five-fold to nearly 5 million tonnes. The disposal of used batteries poses a big challenge and as well as opportunity, with over 11 million tonnes forecasted by 2030. Efforts are underway to establish responsible recycling practices and create a sustainable value chain. Cobalt, a critical component in batteries, has complex supply chains, with two-thirds sourced from the Democratic Republic of the Congo, where challenges like child labour exist. The growing use of PV solar panels presents similar challenges and opportunities. Collaborative efforts and innovative solutions are essential to manage e-waste and nurture new end of life industries. Industrialization has increased the demand for heavy metals, depleting natural reserves. The generation of massive industrial waste poses environmental challenges, including contamination and health hazards. Improper disposition of e-waste endangers the environment and general population.

Metal recovery is another great opportunity, adopting reusable, re-manufacturable, and recyclable processes are essential. It's time to use contemporary technology that makes it possible to recover all valuable usable from e-waste in a sustainable and responsible manner.¹⁶

5. E waste Management as Sustainable Natural Resource

Equitable participation is crucial for successful e-waste management. Unorganised sectors focus on extracting precious metals from PCBs. Glass, plastic, and precious metals can all be manually extracted from e-waste. These materials are handled by traditional recycling techniques. PCBs and connectors should be recycled using certain methods. The unorganised sector crushes them, evaluates their worth as individuals, and sells them to organised recyclers. India grapples with a growing e-waste crisis. The key challenge lies in raising awareness about the environmental, social, and economic impacts of e-waste among the public, consumers, producers, institutions, policymakers, and legislators.¹⁷

There is a serious need to develop environmentally sustainable methods for e-waste recycling to reduce the waste being disposed of or sent to landfills. It is also important to extend the lifespan of precious materials in

¹⁶ Krishnan, S., Zulkapli, N.S., Kamyab, H., Taib, S.M., Din, M.F.B.M., Abd Majid, Z., Chaiprapat, S., Kenzo, I., Ichikawa, Y., Nasrullah, M. and Chelliapan, S., 2021. Current Technologies for Recovery of Metals from Industrial Wastes: An Overview. *Environmental Technology & Innovation*, 22, p.101525.

¹⁷ *Supra* 8.

various applications, minimize their loss, and reduce the use of natural resources in manufacturing processes.¹⁸

The producers have lacked of awareness about the extended producer responsibility (EPR) this encourages dangerous e-waste practices. Acid leaching, open incineration, and dumping are illegal operations that threaten the environment and human. A low-carbon, circular economy requires stakeholder awareness, changes in consumer behaviour, and global solutions (Murthy, and Ramakrishna, 2022. Around 71% population has adopted region specific E-waste regulations, 29% still lack awareness of a legislative framework for legal long-term E-waste management. A new Sustainable Development Goals SDG indicator for E-waste management has been introduced to measure progress over a 15-year period. It recognizes the potential risks and value associated with E-waste.

In line the Basel Convention is an international agreement to regulate environmentally sound management of hazardous and other waste disposal. Members have obligations to minimize hazardous waste generation, promote eco-friendly treatment and disposal, and prevent illegal dumping, to promote sustainable waste management, and safeguard human health. So, it is essential to embrace cutting-edge technologies and institute a unified legal framework, and aware the EPR, and to change the informal sector for better business prospects, and for environmental preservation and resource conservation, transparency, accountability, and traceability which are critical in the e-waste recycling chain.

¹⁸ Cayumil, R., Khanna, R., Rajarao, R., Mukherjee, P.S. and Sahajwalla, V., 2016. Concentration of Precious Metals During

CHAPTER-3

SELF-GOVERNMENT AND PESA FOR TRIBAL

Sunny Sureshkumar Hasani*

1. Introduction

After the arrival of the British in India, the objective study of tribal society got a boost. In the nineteenth century H. H. Risley, Dalton, O'Malley, Arnal, Russell, Thurston, Crookes, George Campbell collected general information about caste-power in India. Even today this work is going on and the study of the changes in the lives of tribal and their problems is of special importance. By the end of the nineteenth century, people in various fields sought information on primitive people for their own purposes. Of course, this study was somewhat limited. Since the twentieth century, anthropologists have focused on the study of tribal with an objective and specific scientific method. Even today the study of tribal and their changing lives is important for different reasons.

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In the tribal society which was deprived of all the development in the pre-independence period, it was natural to form a new perspective about its own development in the post-independence period. While drafting the constitution of the country, provisions were made for the development of Scheduled Castes and Tribes by adopting the welfare state. Accordingly, the central government and the state government have set up separate administrative structures for the development of tribal. An integral part of it is the 'Integrated Tribal Development Project'.¹

Many active social reformers contributed to the development of tribal society.² Many organizations at country, state and local level have contributed greatly to tribal development. The constitution has also made extensive provisions to stop the exploitation of tribal communities and achieve their overall development. In the post-independence period, various schemes are being implemented at various levels for the overall development of tribal. While developing tribal according to Panchsheel principles, Pandit Jawaharlal Nehru said that Panchsutras are actually the foundation for the sustainable development of this society. She says that tribal development should not be pressured by others, should accept tribal land and forest mandates, should avoid excessive intrusion of outsiders into tribal areas, should not impose more complicated administration on them than is reasonable. They should be developed through social and cultural institutions and most importantly, development of tribal should be based on the development of their character traits rather than the

¹ Govind Gare, Tribal Communities of Maharashtra (Continental Publications, Pune, 1st ed. 2000).

² Deepak Gaikwad, Nature and Direction of Tribal Movement (Sugawa Publications, Pune, 1st ed. 2005).

amount of money spent on development work. Pandit Jawaharlal Nehru's concept of tribal development is not a numerical target, but a relationship. The Indian Constitution has tried to protect them with the help of several clauses to protect them from the encroachment of other communities for their advancement as the tribal are a minority. A detailed review of the constitutional provisions for these tribal can be found in the second chapter. From the provision in the title of the Constitution, various provisions in total 17 articles were clarified. At the same time, a total of 16 articles were amended in the constitution for tribal. They are also tracked in this case. Apart from this, the readers have been given detailed information about the three laws made by the Centre and various laws made by the state of Maharashtra to protect the rights of tribal. They mainly include the Elimination of Waste Act 1976, Prevention of Atrocities to Scheduled Castes and Tribes Act, 1989, Scheduled Tribes and Other Traditional Forest Dwellers Act, 2006 (Forest Rights Act).

Only making constitutional provisions and laws will not lead to the development of tribal. So various government schemes must be prepared for it. A detailed arrangement of the various schemes of the Centre and the State Government for such tribal development can be seen in chapter three. It includes seventeen educational development plans, twenty-three economic development plans, seven other development related plans. Apart from this, arrangement regarding government special programs like employment, health, nutrition, food supply, rural sanitation.³

³ B. H. Mehta, *Tribal Welfare in History & Philosophy of Social Work* (Concept Publishing House, New Delhi, 1961).

In short, the formula of living nature's life is based on equality and compassion. If the advanced man in search of sustainable development wants to reach the pinnacle of happiness through happiness, contentment, health and peaceful life, there is no other teacher like nature. The tribal culture, which has lived in the bosom of that nature for thousands of years and preserved it, is in a sense a culture that provides guidelines for sustainable development. The motivation to study it with the eyes and the power to give the advanced society the path of sustainable development with future happiness, the effort to combine the sustainable values of the tribal way of life with advanced science and technology.⁴

2. Provisions of PESA Act

The Panchayat Extension (Scheduled Areas) Act, 1996 (PESA) came into force on 24 December 1996. Total 10 states of the country are covered under this Act. Among them- 1) Maharashtra 2) Gujarat 3) Andhra Pradesh 4) Madhya Pradesh 5) Jharkhand 6) Orissa 7) Chhattisgarh 8) Himachal Pradesh 9) Rajasthan 10) Telangana The PESA Act is applicable only to these states. Also, total 13 districts of Maharashtra state where this law applies - 1) Ahmednagar 2) Pune 3) Thane 4) Palghar 5) Dhule 6) Nandurbar 7) Nashik 8) Jalgaon 9) Amravati 10) Yavatmal 11) Nanded 12) Chandrapur 13) Gadchiroli.

Following are important provisions:

1. The concept of Village Gram Sabha or Village Gram Sabha was accepted. In the new notification, all persons in the electoral roll of a

⁴ Stephan Fuch, *Aboriginal Tribes & India* (Macmillan Company of India Ltd., New Delhi, 1973).

panchayat will be members of the Gram Sabha of that village.

2. If the people of that place want their settlement to be registered as a village, they can apply for the same on the demand of at least 50% of the voters.
3. It is recognized that the Panchayat is the Executive Committee of the Gram Panchayat and will function under the general control of the Gram Sabha.
4. (Section 5) It shall be mandatory for the Panchayat to obtain the approval of all the Gram Sabhas for the plans and projects for the village.
5. Gram Sabha which is made up of all the voters is bigger in authority than panchayat which is made up of representatives. This principle has been accepted.
6. It has also been stipulated that the Gram Sabha may form various standing committees to run its affairs and each committee shall have at least 50 per cent women.
7. The management of the natural resources such as water, forest, land and minerals within the area of the Gram Panchayat, which the Gram Sabha has the traditional right to protect and preserve, shall be a collective heritage.
8. The Gram Sabha will ensure that no land belonging to Scheduled Tribes is illegally transferred to non-tribal and will also review the land survey of the village.
9. According to this Act, the Gram Sabha will be able to have complete control over all drug related entities and will also control the moneylending business.

The above provisions have been made in the PESA Act.

Accordingly, as passed by the Maharashtra Legislature, after the consent of the Governor. The Act was enacted to provide self-governing powers to Panchayats in Scheduled Areas with effect from 19 December 1997. According to this Act, the following provisions of the Act have been amended.

1. Bombay Gram Panchayat Act 1958.
2. Maharashtra Zilla Parishad and Panchayat Committees Act 1961
3. Bombay Moneylenders Act 1943.
4. Maharashtra Industrial Development Act 1961.
5. Maharashtra Housing and Area Development Act 1976.
6. Bombay Liquor Prohibition Act 1949.
7. Maharashtra Irrigation Act 1976.

The said amendment act is an act that gives opportunity to the tribal to participate effectively in their development and empowers the directly representative body of the tribal people i.e. Gram Sabhas. The purpose of this act is only for the rights of tribal. It is not only to protect or preserve their culture but also to help them participate in the process of decision making and implementation monitoring and supervision of the scheme implemented at the village level. The Caste Verification Commission established under the Maharashtra Scheduled Castes, Scheduled Tribes, Exempt Castes, Nomadic Tribes, Other Backward Classes and Special Backward Classes (Certificate of Caste and Regulation of their Verification) Act, 2000 scrutinizes the application of the candidate for caste certificate and issues the caste certificate. Convenience concessions are given by the government accordingly. The act also provides for punishment for giving false caste certificate. The Act has restricted those who avail of concessions and opportunities by providing false caste certificates as caste certificates and

verifications become official. Due to this only the real tribal are getting the opportunity to benefit from all the schemes of the government. The objectives, fundamental rights and guiding principles of the Constitution of India have provided equal opportunities for development to all without any discrimination among individuals and treat them as equal before the law. However, women, children, dalits and tribal are still not free from social injustice. Devising comprehensive and sustainable development policies and effectively implementing them by removing the injustice done to them at different stages is a precondition of democratic governance.⁵

Against this backdrop, the right to equality under Articles 14, 15 and 16 of the Indian Constitution, the right to liberty under Articles 19 to 22, the right against exploitation under Article 23, the prohibition of practicing untouchability under Article 17 and the right to religious freedom under Article 25 and the constitutional provisions under Article 32 for the protection of all these articles. Efforts have been made to create social justice in Indian society through constitutional provisions such as right to redress. At the same time, according to Article 330 and Article 332, 334 (a), some seats are reserved for the Scheduled Castes and Tribes in the Lok Sabha and the State Legislature. According to Article 338 and 338C, there is a provision to appoint a National Commission for Scheduled Castes and Tribes. According to Article 339 and 340, regarding the measures to be taken by the State Government to alleviate the condition of the socially and educationally backward classes in India and the problems faced by

⁵ Bhabananda Mukharjee, *Structure & Kinship in Tribal India* (Minerva Associates, Calcutta, 1981).

them and what and how the grants should be given for that purpose.

The President may constitute a commission to make recommendations.

Article 19 to 22 of the Constitution has explained the freedom of the individual.

Freedoms like freedom of thought, peaceful association and freedom of occupation are guaranteed by the Constitution to the people of India. A neutral and independent judiciary has been created to nurture this freedom. At the same time, right to equality, right against exploitation, right to freedom of religion, right to culture and education and right to constitutional remedy etc. are included in Indian constitution. Considering all the above in relation to the tribal, it can be said that the government has tried to bring the tribal group, which has been neglected for hundreds of years, into the mainstream.

While preparing the constitution of India, the constitution makers have made special provisions in the original constitution to bring the tribal community which is very marginalized and ignored with other communities. These constitutional provisions have been helpful in bringing about transformation in the tribal society. The right to equality gave them the opportunity to get along with others. Due to the right of independence, the doors of advancement of tribal were opened.⁶

⁶ Manik Mane & A. A. Garhwal, *Sociology of Adivasis* (Vidya Prakashan, Nagpur, 1st ed. 2012).

Reservation of seats in the Lok Sabha State Legislative Assembly provided an opportunity for leadership and development of the marginalized sections. Due to reservation of jobs for tribal, the will to get education became stronger in this society. So tribal got the benefit of this opportunity. Therefore, it is seen that their progress has been greatly contributed. The provision of appointing a commission for the overall development of tribal has also proved to be useful.

The laws passed by the Central and State Governments have become the bedrock for the development of the tribal in order to benefit the tribal community from the broad provisions mentioned in the Constitution of India. Both the governments in accordance with the provisions of the constitution have passed laws related to elimination of vagrancy, prevention of atrocities, land rights, forest rights, clan occupation, etc., which have been helpful for the social and economic upliftment of the tribal. The Maharashtra Tribal Economic Reforms Act is helping to stop the generational exploitation and economic exploitation of tribal.

India has a very ancient and diverse tribal culture. There are about 700 tribal tribes in India. Out of them 45 tribes are found in Maharashtra. Each tribal tribe has its own customs, traditions and way of life. Tribal Gram Sabhas have been given special powers by Acts such as Panchayat (Extension of Scheduled Areas) Act 1996 and Forest Rights Act 2006 to enable tribal to preserve their culture, tradition and natural environment around them, forests, wildlife, secondary minerals, medicinal plants. For the development of tribal, the government has implemented a separate tribal implementation plan. Special funds are provided for the development of tribal areas through this scheme. The appropriation of which is mandatory only for the development of tribal. It is

necessary to decide the development activities through the Gram Sabha keeping in mind the specific development needs of the tribal tribes in such a way that the culture, customs, traditions and ways of living can be preserved.

In exercise of the power vested in Clause 5, Sub-Clause (1) of Schedule 5 of the Constitution of India, the Hon'ble Governor has issued notification under various Acts dated 30th October, 2014. It has been amended by the Maharashtra Gram Panchayat Act (III) 1959. A decision has been taken in the meeting held on April 9, 2015 to take action accordingly. It has approved the scheme of providing 5% of the total provision of tribal *upyojana* to gram panchayats in scheduled areas of the state every year (5% direct fund to gram panchayats in *pesa* areas).

3. Self-Government and PESA for Tribals

The Panchayat Extension to the Scheduled Areas Act was enacted in 1996. The purpose of bringing this law is to promote self-governance by Gram Sabha for the people living in Scheduled Areas or Tribal Areas. This Act provides the tribal community with the right to self-governance or self-governance based on their own system. This Act empowers the Gram Sabha to approve development plans and play an important role in regulating all social sectors. Under this law, the tribal get the right to properly enjoy the resources of the forest. The scope of this Act and its implementing legislation is wide. The provisions mentioned in Part IX of the Constitution regarding Panchayats are applicable in this section. However, this Act has made some special provisions in it.

The main objective of the PESA Act is to preserve the traditions and customs of the tribal and to give them the

right to self-governance. In this, each village under Gram Panchayat is called as Gram Sabha. Has the right to hold Gram Sabha. Whose name is in the voter list is a member of Gram Sabha. They have the right to vote. Today, the country which has abundant natural resources and water resources is going to be rich and prosperous. Therefore, it is our duty to maintain the biodiversity of our village intact. ⁷

After the 73rd Constitutional Amendment in 1993, the Gram Sabha has been given a constitutional provision by amending Article 243 of the Constitution. However, there was no clarity on making these provisions for areas in Schedule V. Schedule V of the Constitution covers tribal areas in 10 states of the country. These ten states include Andhra Pradesh, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, Rajasthan and Telangana. These states are included in the Fifth Schedule. This area is predominantly tribal area. The provisions of Part IX are also applicable to these parts.

The demand for these provisions to be applied to the Scheduled Areas was started by the people of the tribal areas since 1994. A committee was constituted under the leadership of the then MP Dilip Singh Bhuria and the committee submitted its report in 1994 at the end of the study. In 1995, the Government of India agreed to accept it. This is a very important step taken in terms of self-governance of the tribal. This provision applies to the tribal villages of the areas included in the fifth schedule and thus helps their rights to remain intact. Against this

⁷ Tukaram Jadhav, Maharashtra Annual 2015 (The Unique Academy Publication, Pune, 2015).

backdrop, the PESA Act was enacted on 24 December 1996.

4. Ninth Part of the Constitution:

- 1) In the ninth part of the constitution, there are many provisions in Article 243, which includes Gram Sabha, establishment of Panchayats (three-tier Panchayat structure), structure of Panchayats. Reservation of Panchayats has provisions regarding reservation of scheduled castes, tribal women etc. Powers etc. include tax structure, power to levy taxes, establishment of finance commission, audit, panchayat elections, etc. Also, Part A of this includes provision for Municipalities and Nagar Panchayats.
- 2) These provisions are applicable under the PESA Act, however there are some special provisions. Let us see the special provisions made in these laws. The main objective of this Act is to preserve the traditions and customs of the tribal and to give them the right to self-governance. In this, each village under Gram Panchayat is called as Gram Sabha. Has the right to hold Gram Sabha. Whose names are in the voter list, he is a member of Gram Sabha. They have the right to vote.
 - Every Gram Sabha can preserve its traditional cultural heritage.
 - Every Gram Sabha can take up planning programs and projects with regard to its social and economic development.
 - Can implement programs and projects at Gram Panchayat level and do at village level.
 - A special provision may prescribe and implement special programs for the alleviation of poverty in such villages.

5. Status in Maharashtra:

In Maharashtra, in 2014, an Act was enacted and along with that Act, the implementation of Pesa Act has been started in the state. The Governor has declared the scheduled areas in 13 districts of the state and this law has been implemented in the *Gram Panchayats* there. 59 talukas in 13 districts of Maharashtra are covered under this Act including 2803 gram panchayats and 6304 PESA villages. District Names: *Pune, Thane, Palghar, Nashik, Nagar, Jalgaon, Dhule, Nandurbar, Nanded, Amravati, Yavatmal, Chandrapur, Gadchiroli*. It has 59 talukas. Some of them all in the district

Talukas are included while certain Panchayats within some Talukas are included.

Rules of PESA Act: The rules of this Act have been prepared in the year 2014.

Availability of Funds: 5 percent of the total planned funds of tribal department has been earmarked for PESA panchayats.

6. Environment conservation through tribal culture:

If you look at it, the reason why the forests in Maharashtra are intact in the tribal areas and what is left is in these tribal areas is clearly evident because of the tribal culture. In fact, the livelihood of tribal is dependent on the natural resource wealth.⁸ Therefore, they are fully aware that if the natural resource wealth here is kept intact, our life becomes easier. So, scratching it is basically not their culture. It is part of

⁸ Shaunak Kulkarni, *Tribals of Maharashtra* (Diamond Publications, Pune, 1st ed. 2009).

their culture to take as much as they need from the forest and try to keep it intact. Such widespread ideologies are prevalent in tribal society.⁹

All the government agencies thought that tribal should be brought into the mainstream. Let us take them on the path of development. But if we learn their customs by going with them, we realize that they are in the mainstream and not us. No hoarding, no criminal tendencies, no tendency to steal from nature, and their lifestyles are in harmony with nature. These important things are to be learned from them and hence all these customs need to be preserved otherwise it will be impossible to transfer them to the next generation and hence the importance of this PESA law is highlighted.

7. Funds

While utilizing this fund, it is expected to be spent on the following items on priority basis.

1) Infrastructure, 2) Implementation of Forest Rights Act and PESA Act, 3) Health, Sanitation, Education and 4) Forestry, Wildlife Conservation, Water Conservation, Forest Floor, Wildlife Tourism and Forest Livelihoods 25% each of the available funds.

8. How Many Rights Does This Law Give to Tribal?

In the scheduled areas where the Gram Sabha will be held, the Panchayati Raj system will have to work to prevent soil erosion and to store water in that area. All this will be done through the Agriculture Department. When the Gram Sabha is held for the land record of the

⁹ P. K. Kulkarni, *Sociology of Dalits and Tribals* (Diamond Publications, Pune, 1st ed. 2012).

tribal areas, the map will be given to the tribal in that financial year. If this is the case, they will easily get the map of Khasra and will not have to go round the tehsil for this.

The people who come under the ambit of this law will be given facilities related to land in the same area. For example, the Gram Sabha will pass the proposal and send it to the patwari for any matter related to the villages or lands. Patwari will improve it. Tribal will not be able to change the land use of their lands. If they want to do so, they have to inform Gram Sabha about it. If their land goes to a non-tribal, they have the right to get it back. In this way, through the Pesa law, tribal will have more rights regarding their land. The powers of Gram Sabha will also increase

If someone's land is being auctioned in their area, it will be given to the tribal. Not only this, the Gram Sabha will be empowered to give the land mortgaged to the tribal. Apart from this, the Gram Sabha will have the power of water management.

If tribal land is taken for construction of a project like a highway, the permission of the Gram Sabha will be most important. For this the Deputy Collector level officials will discuss before the Gram Sabhas of that area. Land will be taken after their recommendation. In such cases, the tribal cannot be cheated, this has been considered in the PESA Act.

This fund will be made available in proportion to the population of Gram Panchayats in PESA area. For this, Gram Sabha Kosha will have a separate bank account. The funds will be disbursed by the government to the Gram Sabha Kosha account of each Gram Panchayat directly through the bank. Due to this, the fund will be

collected at the beginning of the year, so it can be used in a planned manner for the development of our village during the year. This fund is to be used in proportion to the population of the villages, padas and *wadas* under our Gram Panchayat. So, no one will be deprived of development with equal benefits for all.

Gram Panchayats must unanimously decide the works to be taken up from the funds received in the Gram Sabha. Therefore, decisions can be taken quickly through Gram Sabha and its implementation can be done with equal speed. The “Gram Sabha Kosh Samiti” of your village will spend the funds with the approval of the Gram Sabha. The selection of the work done by the Gram Sabha means that the selected work will be deemed to have been given administrative approval. Development works within Rs 3 lakh will also not require separate technical approval. The approval of the authorized officer is required only if there is a development work costing more than three lakhs.

The Gram Sabha has got the freedom to use the funds received by the village. But at the same time, it cannot be forgotten that the Gram Sabha also has a great responsibility to use the funds properly. For this, it is mandatory for the Gram Sabha to prepare the annual planning plan of the restricted fund and approve the annual plan in the Gram Sabha held on 1st May every year. While preparing the plan, it is necessary to consider the villagers of village, *pade, wadya*.

While taking up the development works from this direct bond fund received by the village, apart from the usual works which can be done under other schemes, some different and special works which are required by the village can be done. Therefore, the village will be able to become self-sufficient by having an all-round and

balanced development of the village. While choosing the development works you need to consider the following points carefully.

To increase employment in the village, it is necessary to pay attention to how skill development, employment development and income growth will take place. Public facilities e.g. Rice Mill, Grain Bank etc. Activities can be implemented. Services provided in health, education, nutrition can be strengthened.

Communication and telecommunication services can be strengthened. Small ponds, secondary minerals, forest produce etc. can be managed. Tourism development activities can be implemented. Additional facilities or necessary personnel can be provided in remote areas. Publicly available resources can be conserved and managed. Public forest rights activities can be implemented. It is possible to repair and revive the facilities that were previously available in the village but not repaired. Steps can be taken to empower Gram Panchayat and Gram Sabha.

It is also necessary to avoid spending on the following items.

Individual benefit plans cannot be implemented.

- a) The benefit received by the village under other schemes cannot be spent on schemes.
- b) Care must be taken that more than 40% of the expenditure is not spent on infrastructure or any other construction.
- c) Construction of internal roads connecting houses should be avoided.
- d) Arch or beautification of the entrance of the village cannot be spent unnecessarily.

- e) This fund should not be used to celebrate religious festivals, ceremonies or celebrations.
- f) This fund cannot be used for payment of electricity or any debt of Gram Panchayat.
- g) These funds should not be used to fulfil the various tax collection objectives of the village.
- h) Spending should not be spent on issues other than tribal development.

According to the needs of the restricted funds received by the PESA Gram Panchayats, contractual employees can be appointed by the resolution of the Gram Sabha to help in the village development work. Various committees of the village will cooperate in the development of the village. According to the demand of the Gram Sabha, the engineers and technical persons of the administrative departments will also provide technical guidance to the village. Every year, the works done from the restricted funds of the village, the inspection of the expenditure and the accounting should be done by the village itself. For that it is mandatory to record its complete information in the register of Gram Panchayat and announce it on the notice board. This will create an atmosphere of trust towards each other in the village and help everyone to participate wholeheartedly in the development of the village.

9. Conclusion

PESA is related to the Adivasis in the Scheduled Areas and the main formula of this Act is to preserve and protect the culture, customs and traditions of the Adivasis and to strengthen the self-governance system of the Adivasis through Gram Sabha. In short, there is a provision that the citizens of tribal areas can plan the socio-economic development of the village themselves in their right to self-governance. Apart from this, planning

of secondary minerals can be done by the tribal community through the planning of water resources there. Each village or pada is here called a Gram Sabha and this Gram Sabha is given its development and planning powers. In one sense, the decision to make a big change in this has been taken under this law. The Scheduled Area in the ten states mentioned above is all tribal belt and is covered by hill ranges. So, people can implement it in areas like palaces etc. The problems of each settlement are different and similarly the traditional customs of the tribal are different and they have been given autonomy in that regard. After the Gram Sabha takes that decision, it is obligatory on the panchayat to implement it.

India is a developing country. India has a lot of diversity. A society as diverse as the Indian society is found in very few countries in the world today. The diversity of Indians in terms of race, language, religion, caste-tribe, physical culture etc. has been the subject of research of sociologists and anthropologists. Compared to today's seemingly practically advanced and large societies, some societies are found to be small in size, undeveloped and in the early stages of cultural development. And tribal society is such a societal group.

In the 73rd Amendment of the Indian Constitution, a three-tier Panchayati Raj system was introduced in the country. After this amendment it was realized that the requirements of Scheduled Areas especially Tribal Areas were not taken into consideration in its provisions. The Panchayats (Extension to Scheduled Areas) Act, 1996 (PESA Act) was enacted to meet this deficiency by relying on Part-IX of the Constitution which exempted Panchayats from making special provisions for women and Scheduled Castes and Tribes.

CHAPTER-4

SOCIAL STOCK EXCHANGE A PUBLIC PLATFORM FOR EFFECTIVE NATURAL RESOURCE MANAGEMENT

Dr. Shreyas Vyas*

1. Introduction

The 21st century is a century wherein human beings have been progressing a rapid rate, but whenever there are rapid events or changes occurring, there are certain side effects as well. With the rapid development, its effects have started causing threat to human existence. So, one such issue which threatens human existence is the climate change and resultantly, there rises the need of natural resource management. The issue of natural resource management is now talking of the world. The need of natural resource management is constantly growing among countries in different ways and means. It is pertinent to note that natural resource management can be considered as the process to resolve problems created due to greediness of human being. So is essential to note and put forward that this man- made problem

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should resolved by the humans and the solution lie in natural resource management.

So, this chapter focuses on the concept of natural resource management and how it is can be put to work with help of Social Stock Exchange (hereinafter referred as SSE). The first part discusses as to whether the concept of SSE could be used in domains where the question of raising financial resources for natural resource management are required. Additionally, it is essential to understand that the scheme of natural resource management shall be different for different places so, if there is requirement of incorporating local entities who will be working for natural resource management and if there is requirement of finances, it could be raised with help of SSE. The second part studies the existing systems which will help in raising finances for natural resource management. It also deals with the comparative aspect of social stock exchange in other jurisdictions. Then author also explains as to how SSE can help in raising capital for natural resource management. It also looks as to whether there are any existing systems which are helping to raise finance to work on area of natural resource management, and if yes then till what level they are working.

It also analyses if the structure of social stock exchange is well equipped to work in area of natural resource management and if not then what/how rules are be made or removed or improvised.

2. Concept of Social Stock Exchange (SSE)

In the process of resolving problem relating to climate change there is a pressing need of ideas to be taken or be inspired from local conditions, thus, solving the problem locally. Therefore, one of the ideas which is now been

considered as solution to problem of lack of financial support in these local ideas comes from the SSE. For easy understanding, SSE is a platform/meeting place of social organizations and social investors (institutional and individual), the investor is one investing in entities.

The SSE and operates similarly like a regular stock exchange wherein there is facilitation of listing, trading and settlement of securities. However, the difference with SSE and a regular stock exchange is that in this stock exchange the trading is not just done for solely a profit and loss status and listed entities have to show that their work is having social and environmental impact, along with financial reporting. In toto SSE gives/provides a platform to provide capital to those entities that have the motto of social and environmental service and on another hand, it gives investors an opportunity to invest to resolve socio-economic problems which are providing some financial returns as well.

SSE was been created in various jurisdictions like Singapore, UK, Brazil Canada etc. and it was observed initially that all the stock exchanges will come up with major benefits and milestones like SSE as it can help in improving market accessibility for all those social enterprises which face restrictions in funding. Moreover, platforms like these will help in establishing accountability in system and once the entire process is streamlined it will help in safeguarding the investors' interest holistically. Thirdly, promoting transparency between investors and investees fosters collaboration towards a shared vision and mission. Fourthly, if investors utilize SSE (Social Stock Exchanges), a continuous and diverse flow of financing becomes available, mitigating the risk of fund shortages and abrupt project closures. Fifthly, a clear mission and vision instigates healthy competition amongst the impact

issuers, propelling them towards achieving their respective objectives. Moreover, this also alleviates the burden on the government. Ultimately, SSE facilitates streamlined and accountable investment of foreign funds from bilateral and multilateral agencies, thus, reducing fraudulent activities and dubious transactions associated with NGOs and social assistance organizations.

If we observe the concept of SSE, we realise it is not a new idea. It already exists in various countries such as Brazil, Portugal, South Africa, Jamaica, UK, Canada, and Singapore. Though, the functioning and scope of SSE differ across these jurisdictions. In some places, it serves as a meeting point for investors and social enterprises, in others, it operates as a crowd funding platform, while in some cases; it functions as a platform for investors to support enterprises that create social impact.

In India, the Hon'ble Finance Minister, during her 2019-20 budget speech, announced the intention to establish an SSE. The objective behind this initiative was to bring the capital markets closer to the general public and address social welfare goals, including inclusive growth and financial inclusion. The proposal was to create an electronic fundraising platform, a social stock exchange, under the regulatory oversight of the Securities and Exchange Board of India (SEBI). The platform would facilitate the listing of social enterprises and voluntary organizations that work towards social welfare objectives, enabling them to raise capital through equity, debt, or units similar to a mutual fund.

In the case of India's SSE model, a platform based on the concept of donation will be established, where these donations will be linked to security instruments. This segment will operate separately within the existing stock exchanges. The entities eligible for listing on SSEs will be

referred to as Social Enterprises (SEs), which can be either for-profit enterprises (FPEs) or not-for-profit organizations (NPOs). As of the time of writing this research paper, the National Stock Exchange (NSE) is preparing to launch SSE as a distinct segment on the stock exchange.

SEBI, the regulatory authority for securities markets in India, has formulated detailed rules for SSE. These rules have been incorporated into various laws such as the ICDR Regulations 2018 (Issue of Capital and Disclosure Requirements) and the LODR Regulations 2018 (Listing Obligations and Disclosure Requirements), in addition to other rules and instructions that have been issued. It can be considered that significant progress has been made under the supervision of SEBI in terms of preparing for SSE on the ground level. Therefore, in the next part of the research paper, the discussion will focus on how SSE can contribute to natural resource management.

3. Natural Resource Management

Natural resource management is the practice of managing the use and conservation of natural resources such as land, water, air, minerals, forests, and wildlife. It is an important part of environmental stewardship and sustainability. Natural resource management is a complex process that requires knowledge of the environment, ecology, and economics.

Natural resource management involves developing strategies and policies to ensure the sustainable use of natural resources. It also includes the management of the land, water, air, and wildlife resources. Natural resource management plans are created to improve the management and protection of natural resources. These

plans are used to guide how to best use and conserve resources while minimizing environmental impacts.

Natural resource management includes activities such as conservation, reclamation, and restoration of land, water, and other resources. Conservation activities are focused on protecting and preserving resources for future generations. Reclamation activities are focused on restoring damaged ecosystems and creating new habitats. Restoration activities are focused on restoring damaged ecosystems and bringing back biodiversity.

Natural resource management also involves the management of resources for economic and social benefits. This includes activities such as land use planning, resource extraction, and recreational activities. Land use planning involves making decisions about how the land will be used and what type of development can occur. Resource extraction involves extracting resources from the land such as minerals and timber. Recreational activities involve activities such as hunting, fishing, camping, and hiking.

Natural resource management is an important part of environmental stewardship and sustainability. It is a complex process that requires knowledge of the environment, ecology, and economics. Natural resource management plans are created to ensure the sustainable use and conservation of natural resources. These plans are used to guide how to best use and conserve resources while minimizing environmental impacts. Natural resources management activities such as conservation, reclamation, and restoration can help protect and preserve natural resources for future generations

4. Natural Resource Management and SSE

The north-eastern states of India, comprising Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura, are characterized by their unique ecological and cultural heritage. It is essential to understand that the north-eastern states of India are endowed with rich natural resources and extraordinary biodiversity, making them significant for the country's ecological balance. However, managing these resources sustainably poses several challenges due to inadequate infrastructure, limited financial resources, and poor governance. In recent years, the concept of a Social Stock Exchange (SSE) has gained traction, offering a potential solution to address these challenges. This part of chapter explores the importance of natural resource management in the Northeast, identifies the specific challenges it faces, and examines how the implementation of a Social Stock Exchange can promote sustainable practices and support the region's overall development.

It is observed that there is huge significance of Natural Resource Management in the Northeast. The reason is very simple as these states are home to dense forests, mighty rivers, diverse flora and fauna, and valuable mineral reserves. The sustainable management of these natural resources is essential for preserving biodiversity, supporting local livelihoods, and promoting socio-economic development in the region.

It is pertinent to note that the North Eastern states face several challenges in effectively managing its natural resources. Inadequate infrastructure, including road connectivity and power supply, hampers resource extraction and transportation. Limited financial resources restrict investment in sustainable development

projects and conservation initiatives. Furthermore, weak governance and regulatory frameworks often lead to exploitation, illegal activities, and inadequate enforcement of environmental laws. Addressing these challenges requires innovative approaches that prioritize sustainable practices and leverage available resources efficiently.

To resolve these issues SSE can be used as a platform that facilitates impact investment in enterprises and projects that generate social and environmental benefits alongside financial returns. SSEs can provide a regulated marketplace where investors can support initiatives addressing social and environmental challenges. If there is listing and trading securities, SSEs will enable social enterprises and organizations focused on natural resource management to access capital, enhancing their capacity for positive change. With the proper Implementation of Social Stock Exchange, it can significantly benefit natural resource management in the Northeast. SSEs can attract impact investors and provide a platform for enterprises and initiatives that promote sustainable development, biodiversity conservation, and community empowerment. For example, SSEs can facilitate investment in eco-tourism ventures, organic farming initiatives, renewable energy projects, sustainable forestry practices, and watershed management programs.

In furtherance with that SSEs will also encourage collaboration among stakeholders, including government agencies, non-governmental organizations (NGOs), and local communities. By fostering partnerships, SSE will also enable the sharing of knowledge, resources, and best practices, leading to more effective natural resource management. The transparency and accountability offered by SSEs also help build trust among investors,

ensuring that their funds are utilized for sustainable development projects. It is to note that efficient natural resource management in the north-eastern states of India is crucial for sustainable development, biodiversity conservation, and the well-being of local communities. The implementation of a Social Stock Exchange can play a transformative role in addressing the region's challenges. By attracting impact investment, promoting collaboration, and fostering transparency, SSEs can enable the funding and support needed for enterprises and initiatives focused on sustainable practices and natural resource management. Harnessing the power of SSEs in the Northeast will pave the way for a brighter and more an affluent future.

5. Conclusion

In conclusion, effective natural resource management is essential for promoting sustainable development, conserving biodiversity, and improving the well-being of local communities in the north-eastern states of India. The utilization of a Social Stock Exchange (SSE) can play a pivotal role in addressing the region's challenges. SSEs have the capacity to attract impact investors and establish a platform for enterprises and initiatives that prioritize sustainable practices and natural resource management. Through the mobilization of capital, facilitation of collaboration among stakeholders, and promotion of transparency, SSEs can contribute to the financing and execution of projects focused on sustainable development, thus fostering the overall growth and prosperity of the north-eastern states. Integrating SSEs with natural resource management initiatives offers immense potential to generate positive social and environmental impacts in the region.

CHAPTER-5

EXPLORING THE INTERSECTION OF ARTIFICIAL INTELLIGENCE, NATURAL RESOURCE MANAGEMENT AND COMPETITION LAW IN INDIA: A STUDY OF EMERGING TRENDS AND CHALLENGES

Narender Kumar*

1. Introduction

The intersection of AI, NRM, and Competition Law in India is crucial because it addresses the economic, social, and environmental challenges of AI and NRM in the context of a growing market economy.¹ The increasing use of AI in NRM raises concerns about market competition, privacy, and data protection, as well as the sustainability of the use of natural resources.² The integration of AI, NRM, and competition law in India is

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¹Song, M., Fisher, R. and Kwoh, Y., Technological Challenges of Green Innovation and Sustainable Resource Management with Large Scale data, 144 *Technological Forecasting and Social Change* 361-368 (2019).

²Jayden Khakurel et. al, *The Rise of Artificial Intelligence Under the Lens of Sustainability* 6(4) *Technologies* 100 (2018).

important because it helps to balance the benefits of AI in NRM with the need to protect consumer interests, the environment, and competition in the market. Similarly, the competition law also aims to promote competition and prevent anti-competitive practices for ensuring that consumers have access to goods and services at fair prices and promote the efficiency of resources in terms of allocative, productive, and dynamic under the proviso of section 3 (3) of the Competition Act, 2002. And, additionally, it ensures that no businesses or individuals will enter into any agreements that will misuse their dominant position as defined by section 4 of the Act or have a materially negative impact on competition in India. This Act expands the threshold restrictions and governs mergers and combinations under Sections 5 and 6 of the Act, and it demonstrates ongoing oversight by the Competition Commission of India. (hereinafter 'CCI'). It shows constant supervision by the CCI.³ However, AI-integrated business operations are shaking up the norms of industries and the rules of competition globally.⁴ The rapid pace of change and data processing capabilities of AI can create a hindrance for those trying to exercise market power through dominance, making it essential to abolish practices that appear to be harmful to market competitiveness.⁵ The issues relating to NRM also have become major challenges before CCI despite its separate area, as highlighted in the McBratney case, where one of the major causes of competition between tribal and state

³CCI, Regulation of Combinations (Section 5 & 6) (May 9, 2023), <https://www.cci.gov.in/regulation-of-combination> (last visited on May 1, 2023).

⁴Vasanth Rajasekaran Harshvardhan Korada, Big data. Revamping Competition Policy for the AI Era (Mar. 2023), <https://www.thehindubusinessline.com/business-laws/revamping-competition-policy-for-the-ai-era/article66660773.ece> (last visited on May 1, 2023).

⁵*Supra note 1 at 1.*

governments was over jurisdiction. This has led to conflicts over resource management, particularly in areas where tribes have traditional rights. The approach was on exploitation and development regarding water resources rather than management.⁶ This has led to the overuse and depletion of water resources, which can have negative effects on economic growth and development. Accordingly, an urgent need for better management of natural resources was recognized.

The commission also identifies the importance of sustainable development and environmental concerns in competition assessment,⁷ and its framework has the flexibility to account for sustainable development and climate change, with "environmental friendliness" being an essential aspect of competition evaluation. However, there are challenges in measuring long-term benefits and gains in competition assessment, which may obstruct sustainability aspects. It is also noticed that even though Indian companies are adopting Environmental, Social, and Governance (hereinafter 'ESG') frameworks to attract higher investments and valuations, the collaboration between competitors to achieve broader ESG goals may be considered anti-competitive behaviour by the CCI.⁸ The current competition law framework

⁶ Disa Sjöblom, Ajay Rai, *Natural Resource Management in India* (Feb. 2003), available at: <https://cdn.sida.se/publications/files/sida2187en-natural-resource-management-in-india-2003-2007.pdf> (last visited on May 1, 2023).

⁷ KR Srivats, *Competition law fit to assess sustainability, climate action* (Dec. 6, 2022), <https://www.thehindubusinessline.com/economy/competition-law-fit-to-assess-sustainability-climate-action/article66229745.ece>

⁸ Rohan Arora, Shivek Sahai Endlaw, *Is Indian Competition Law ESG-Ready?* (Mar. 13, 2023), <https://www.barandbench.com/columns/is-indian-competition-law-esg-ready> (last visited on May 1, 2023).

lacks guidance on ESG collaborations, but several provisions can be interpreted to facilitate such collaborations. Nevertheless, relying on efficiency defences for ESG-related collaborations under the existing regime poses three challenges, including the lack of precedent and guidance in India, which may hinder ESG interests.

The present Chapter examines the rapidly evolving intersection of these three areas and focused on the risk associated with these technologies on consumer interests, fair competition, and the environment. It assesses the major encounters and chances offered by them and emphasizes the discussion of the policy and regulatory implications of these trends and experiments.

2. Literature Review

The study seeks to synthesize existing research and information on these areas, where AI has been widely researched and studied, with a growing body of literature on the potential benefits and risks of this expertise. In the context of NRM, AI has been shown to have significant potential to improve resource allocation, enhance decision-making, and increase efficiency in resource management processes. For example, AI can be used to improve land use planning, predict water scarcity, and enhance food security, among other applications.⁹ However, the integration of AI into NRM systems and practices also raises important legal and regulatory issues including data privacy.¹⁰ In addition,

⁹ Besada, H. and Werner, K., 2015. An Assessment of the Effects of Africa's Water Crisis on Food Security and Management, *International Journal of Water Resources Development* 31(1), pp.120-133.

¹⁰ Andrew Smith, *Using Artificial Intelligence and Algorithms* (Apr. 8, 2020), <https://www.ftc.gov/business-guidance/blog/2020/04/using-artificial-intelligence-and-algorithms> (last visited on May 10, 2023).

competition law has been shown to play a critical role in shaping the use of AI in NRM, by ensuring that these technologies are used in a manner that protects the consumer, market, and other stakeholders.¹¹ In India, the competition law framework has been evolving to reflect the unique experiments and chances modelled by AI and NRM. Hence, there is a need for further exploration to observe the inferences of AI and NRM for competition law, and to develop a comprehensive framework for policymaking and regulation in these areas.¹² The study is unique and is an attempt to explore the legal issues connecting AI and NRM with competition law enforcement, and investigate the application of the recent Competition (Amendment) Act, 2023 on them in India.

3. Constitutional Dimension

The Constitution of India lays down the foundation for the functioning of the Indian state and provides a framework for the protection of fundamental rights and duties of citizens. Several provisions in the Constitution are relevant to this study including the Preamble which is an introductory statement and outlines the guiding principles and philosophy of the Constitution.¹³ It describes, India as a sovereign, socialist, secular, and democratic republic that seeks to uphold justice, liberty,

¹¹ Aileen Aditi Sundardas, The Impact of Artificial Intelligence on Competition Regulation, (Nov. 19 2020), <https://thedigitalfuture.in/2020/11/19/the-impact-of-artificial-intelligence-on-competition-regulation/>

¹² Sameer Gupta and Sankalp Udgata, Rethinking the Contours of Competition Law: The AI Perspective (Aug. 28, 2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3444343 (last visited on May 10, 2023).

¹³ Sanjay Rawat, The Preamble of India or Indian Constitution (Dec. 9, 2021), <https://sociallawstoday.com/the-preamble-of-india-or-indian-constitution/> (last visited on May 1, 2023).

equality, and fraternity for all its people. The Supreme Court has also interpreted it as a guiding principle. To support the idea of social justice and democracy, the competition law also ensures equal participation, fair dealing, and liberty of consumers and competitors to deal with the relevant market. Article 14 ensures equality before the law and the equal protection of the laws to all citizens, and is relevant to their intersection with each other, as it highlights the need to safeguard that AI and NRM are used in a manner that protects consumer interests and promotes fair competition. Article 19(1) (g) guarantees the right to transmit on any trade or business, and it has been widely interpreted by the courts to include the protection of the environment.¹⁴ The right to live in a healthy environment, freedom of speech and expression, right to equality, right to livelihood, right to know, and freedom to carry trade and business are all fundamental rights that protect the environment. The Apex Courts have taken a wide interpretation of Article 21 regarding the environment. This helped in safeguarding the environment under these fundamental rights.¹⁵ And, also guarantees the right to life and personal liberty to all citizens and is often invoked in cases relating to privacy and data protection, which nowadays is a major challenge before enforcement agencies. In addition, Article 47 of Part IV (The Directive Principles of State Policy i.e. 'DPSP') mandates upon the State to improve public health, the level of nutrition, the standard of living of its people, and the use of AI and

¹⁴ Oishika Banerji, Fundamental Rights for Environment Protection Through the Lens of Judicial Precedents (Nov. 15, 2021), <https://blog.ipleaders.in/fundamental-rights-for-environment-protection-through-the-lens-of-judicial-precedents/> (last visited on May 1, 2023).

¹⁵ Indian Council for Enviro Legal Action v. Union of India and others, AIR 1999 Cal 15.

NRM seem very significant in improving the above-mentioned goals. Article 48-A requires the State to protect and improve the environment, and to have compassion for living creatures. This is now a day done by using AI and NRM in a manner that protects the environment and ensures the sustainable use of natural resources. Article 51-A lays down the fundamental duties of citizens, including the duty to protect and improve the natural environment, and to have compassion for living creatures. This highlights the role of citizens in ensuring the accountable and ecological practice of AI and NRM for the welfare of society. In brief, the Constitution of India provides a framework for the protection of fundamental rights and duties of citizens and lays down the foundation for the functioning of the Indian state, which is proven relevant to protecting consumer interests, the environment, and promotes fair competition.

It is also important to notice here that there are no specific constitutional provisions relating to AI in India. However, the Right to Privacy has been declared a Fundamental Right protected under the Indian Constitution by the Supreme Court in 2017, which has implications for the use of AI in collecting and processing personal data.¹⁶ The use of AI in the judiciary is being explored, with a focus on cost-effective solutions for lawyers and reducing the burden on the judiciary.¹⁷ It is important that the use of AI in the judiciary aligns with

¹⁶ Yashi, *Artificial Intelligence and Laws in India* (2023), <https://legalserviceindia.com/legal/article-8171-artificial-intelligence-and-laws-in-india.html> (last visited on May 11, 2023).

¹⁷ Vidushi Marda, *Artificial Intelligence Policy in India: A Framework for Engaging the Limits of Data-driven Decision-making* (Oct. 15, 2018), <https://royalsocietypublishing.org/doi/10.1098/rsta.2018.0087> (last visited on May 11, 2023).

constitutional morality and is governed by appropriate regulations.¹⁸ Additionally, the Indian government and industries are taking initiatives to uplift the skill of manpower with AI technology. But, due to the lack of specific laws for data protection, it has become an important concern and invites various challenges of competition law enforcement in India.

4. Overview of Artificial Intelligence (AI), Natural Resource Management (NRM), and Competition Law in India

AI has been recognized as a significant tool in solving various challenges faced by India, including NRM. However, it is essential to understand the role of AI in the market, which operates in to avoid anti-competitive practices. The use of AI, Big Data, the Internet of Things (IoT), and Machine Learning (ML) has grown tremendously in recent years, and the business is predictable to extend an appraisal of \$266.92 billion by 2027.¹⁹ This growth has raised concerns about the abuse of dominance by a few companies dominating the industry. The use of AI can facilitate horizontal collusion and other anti-competitive tactics, posing potential threats to competition. This calls for competition authorities to protect end-users from such practices. Businesses looking to control the market through dominance have difficulties due to the quick pace of scientific innovation. Additionally, the use of AI may raise concerns about data protection regulations as

¹⁸Gyaaneshwar Joshi, Artificial Intelligence and Constitutional Morality: the Complementary Elements (Oct. 7, 2021), <https://blog.iplayers.in/artificial-intelligence-constitutional-morality-complementary-elements/> (last visited on May 11 2023).

¹⁹ Manasvi Pawaria, 10 Biggest AI Trends in 2021 to Watch Out for (May 26, 2021), <https://fireflies.ai/blog/biggest-ai-trends-in-2021> (last visited on May 1, 2023).

digital players offer new and customized services with massive data collecting and processing.²⁰ Hence, it is important to have a brief overview of AI, NRM, and Competition Law in India.

5. Overview of AI

The term AI describes the creation of computer systems that can do activities that ordinarily require human intelligence, such as recognition of speech, perception of images, decision-making, and language translation.²¹ Large volumes of data and algorithms are used through the development phase of AI systems to assist them to grow and change over time. There are two main types of AI: weak or restricted which develops to carry out specific activities, and strong or general, which can carry out any intellectual work that a human can. Multiple sectors, including banking, healthcare, transportation, and manufacturing, are being altered by the growing use of AI. But the emergence of AI also brings up economic and social problems like loss of employment, secrecy, and responsibility. AI research is a rapidly growing field, with advances in machine learning and natural language processing leading to the development of more sophisticated and capable AI systems. However, it is crucial to think about the ethical ramifications and make sure that the technology is developed and utilized properly. The future of AI holds immense promise for enhancing our lives by managing natural resources.

²⁰ *Ibid.*

²¹ Nicole Laskowski, Definition Artificial Intelligence (AI) (Mar. 2023), <https://www.techtarget.com/search-ente-rpri-se-ai/definition/AI-Artificial-Intelligence> (last visited on May 12, 2023).

Hence, AI has become a valuable tool in NRM and sustainability.²² The creation of decision- and problem-solving expert systems has cleared the path for the application of AI in the sector. AI is being used in various ways, including: (i) predicting and managing natural disasters, (ii) monitoring and managing wildlife populations, and (iii) modelling animal populations and environmental interactions. The use of it in NRM is expected to play a significant role in enhancing conservation and sustainability efforts around the world. Dr. Liang's talk, "The Future of AI in Natural Resource Management- the Self-Learning Forest Growth Model," highlighted the potential of AI in managing forest resources.²³

6. Overview of NRM

NRM is the term for the ethical and sustainable use of resources like lands, water, wildlife, and forests. NRM aims to guarantee that these resources are preserved and exploited in a way that benefits both the present and forthcoming generations. This involves balancing economic, social, and environmental aspects which requires a holistic approach that considers the interconnections between different resources and the impact of human activities on the environment. It involves a wide range of activities, including the conservation and protection of ecosystems and wildlife, managing land use for agriculture and other purposes,

²² Brainpool.ai, Artificial Intelligence (AI) in Natural Resource Management (May 2017), <https://brainpool.ai/ai-in-natural-resource-management> (last visited on May 11, 2023).

²³ USDA, Future of AI in Natural Resource Management: Self-Learning Forest Growth Model (Apr. 28, 2023), <https://www.fs.usda.gov/es/node/720497699> (last visited on May 2, 2023).

regulating the use of water resources, and reducing waste and pollution.

Growing awareness of the value of NRM in tackling the issues of global warming, habitat loss, and dwindling biodiversity has emerged in recent years. The role of NRM has become increasingly important in ensuring the maintainable usage of means and the safety of the environment for future generations. This requires close collaboration between government agencies, businesses, communities, and environmental organizations. In addition, sustainability and competition law have become increasingly relevant in recent years, where competition law authorities are taking sustainability issues into account when enforcing it.²⁴

This means that companies that engage in anti-competitive behaviour, and negatively impact sustainability may face legal action. Additionally, this law can be used to support sustainability efforts by allowing measures that are aimed at achieving sustainability to counterbalance any anti-competitive effects.²⁵ Accordingly, competition law and policy can also play an important role in promoting sustainable business practices in India.

It is also important to note here that competition law in India does not directly ensure NRM and sustainability. However, it indirectly promotes sustainability by preventing anti-competitive practices that can harm the environment and by encouraging fair competition among

²⁴ OECD, Sustainability and Competition (Feb., 2021), <https://www.oecd.org/daf/competition/sustainability-and-competition.htm> (last visited on May 1, 2023).

²⁵ Malinauskaite, Jurgita, Competition Law and Sustainability: EU and National Perspectives, 13(5) Journal of European Competition Law & Practice 336-348 (2022).

businesses that operate in resource-intensive industries. Moreover, it can support environmental objectives by promoting innovation, which can lead to more sustainable production processes and products. Ultimately, a sustainable future in India requires the adoption of an ecosystem approach to conservation that emphasizes the links between human and natural systems, prioritization tools to identify key locations for conservation, and cooperation between government, businesses, and civil society.²⁶

7. Overview of Competition Law in India

Competition Law refers to the legal framework that governs competition in the market, and promotes competition, prevents anti-competitive practices, such as monopolies and collusions, which can harm consumers and stifle innovation. It is ruled by the Competition Act of 2002, which establishes the Competition Commission of India (hereinafter 'CCI') as the primary authority responsible for enforcing competition law. This Act covers a wide range of practices, including abuse of dominance, anti-competitive agreements, and merger control. Additionally, it stipulates penalties for people and businesses found to have engaged in anti-competitive behaviour (hence referred to as "AAEC") that has had or is expected to have a significant negative impact on competition in India. The Act of 2002 has several important provisions which govern commercial competition, replacing the Monopolies and Restrictive Trade Practices Act of 1969 (hereinafter 'MRTP'). The Act controls three anti-competitive behaviours: mergers and acquisitions, abuse of dominant positions, and anti-competitive agreements under sections 3, 4, 5 and 6

²⁶ *Supra note 7 at 1.*

respectively. The Act aims to protect free and fair competition, prevent monopolies, and safeguard consumer interests. Anti-competitive agreements are prohibited and classified as horizontal and vertical agreements under sections 3(3) (i.e. rule of per se) and 3(4) (i.e. rule of reason) of the Act, and the abuse of a dominant position is also prohibited under section 4 of the Act with remedies provided by the commission. It is an important tool for promoting a fair and competitive market, protecting the interests of consumers, and ensuring that businesses operate transparently and responsibly. This ensures the effective enforcement of competition law for maintaining the growth and development of the economy and for maintaining a level playing field for businesses.

The CCI, being a statutory body was established to govern and enforce the Competition Act. The Central Government selects the Chairperson and up to six other members of the Commission. The Commission is required by law, following the Preamble and Section 18 of the Act, to put an end to practices that harm competition, to encourage and preserve it, to protect consumer interests, and to guarantee other participant's freedom of trade in Indian markets. It is also mandated to voice its view to governmental or statutory authorities on issues about the competition to advocate for better knowledge of competition law and play a crucial role in assessing the competition concerns, the responsibilities, and obligations of dominant players in the digital market.²⁷ Additionally, it has taken attempts to recognize

²⁷ Jyoti Jindgar Bhanot, Antitrust Enforcement In Digital Markets : CCI Experience (2020), [https:// Competition Cooperation. Eu/Wp-Content/ Uploads/2020/01/Session-Ii-Antitrust-Enforcement-In-Digital-Markets-Cci-Experience-Ms-Jyoti-Jindgar-Cci.Pdf](https://Competition.Cooperation.Eu/Wp-Content/Uploads/2020/01/Session-Ii-Antitrust-Enforcement-In-Digital-Markets-Cci-Experience-Ms-Jyoti-Jindgar-Cci.Pdf) (last visited on May 2, 2023).

the dominant firms in digital markets that may harm how competitors behave and has assessed issues such as net neutrality, leveraging network effects, and data collection leading to the accumulation of market power to determine the course of tech scrutiny in India.²⁸

It is enacted to regulate business practices and prevent appreciable adverse effects on competition. The CCI enforces and administers the act, and has powers to investigate anti-competitive practices and conduct “dawn raids” for investigations. The act is based on the “effects doctrine” and grants the CCI extraterritorial jurisdiction. In addition, this Act regulates anti-competitive agreements between competitors and between enterprises at different stages of the production chain. To support it, the Director General (DG) has wide investigative powers, including the ability to conduct dawn raids and seize company documents and electronic devices. The enforcement process involves investigating alleged anticompetitive practices, issuing show-cause notices, and conducting hearings. And, if the party is found guilty under the Act, the CCI can impose civil penalties for companies that breach its provisions, including a monetary penalty of up to 10% of the enterprise’s turnover.²⁹ The Act also provides for individual liability for contraventions. Despite, this there are many areas in which the existing law seems less

²⁸Nisha Kaur Uberoi, Key Developments in India (Nov. 25, 2022), <https://globalcompetitionreview.com/guide/digital-markets-guide/second-edition/article/key-developments-in-india> (last visited on May 2, 2023).

²⁹Kumar, N., Leniency regimes in BRICS Nations: Lessons for India, 8(1) International Journal of Public Law and Policy, 52-67 (2022).

effective and requires some modifications for an effective enforcement mechanism.³⁰

Therefore, the Competition (Amendment) Act, of 2023, has been recently passed by the Indian Parliament to amend the Competition Act, of 2002, and introduce new regulations for transaction of value-based mergers and acquisitions, widening the scope of entities that can be held liable for anti-competitive agreements, and decriminalizes certain offences. The key provisions include the creation of a new category of competition offenses for anti-competitive behaviour by dominant players, the introduction of a new system for expedited resolution of competition disputes, and the establishment of a fast-track process for the approval of certain mergers and acquisitions. It also aims to increase the powers of the CCI, which is the primary authority and responsible for enforcing competition law by granting it additional powers to investigate anti-competitive practices and imposing tougher penalties for individuals and firms found to have engaged in anti-competitive behaviour. It is an important step in strengthening the competition framework and aimed at ensuring that this law remains effective and relevant in a rapidly changing market environment.

The Act also includes provisions for settling examinations into an agreement having a negative impact and abuse of economic strength, therefore it introduces a “Green channel” for certain combinations unlikely to obtain significant adverse effects on competition. The Act specifies a 3-year window for filing information with the CCI and requires a deposit of 25%

³⁰Saini, J.S. and Kumar, N., Issues Pertaining to Growth of Digital Economy: An Arduous Challenge Before CCI, 20(4) Journal of Public Affairs, e2301 (2020).

of any imposed sum before an appeal may be taken before the “National Company Law Appellate Tribunal” (hereinafter ‘NCLAT’). Furthermore, the Act has increased the deal value threshold to INR 2000 crore, reduced the time frame for approval of combinations to 150 days, and expanded the definition of “relevant market”³¹ and “control”.³² In very brief, it plays a significant role in ensuring healthy competition in the online or offline market for both businesses and consumers in India.

8. The Intersection of AI, NRM, and Competition Law

The intersection of AI, NRM, and Competition Law is crucial for addressing the economic, social, and environmental challenges in the context of a growing market economy. In these fields, the usage of AI skills has the potential to improve resource utilization, enhance sustainability, and reduce waste. It also ensures consumer protection, the environment, and competition in the market. However, it also raises concerns about market competition, privacy, and data protection, as well as the sustainability of the use of natural resources. Further, many experts including Dhanendra Kumar and Jyoti Jindgar Bhanot (Secretary, CCI) also emphasized that for a secure, reliable, and pleasant future, sustainable development must support the two essential components of creativity and competition, which support and stimulate economic development. According to her opinion, while sustainability aims are urgently needed, antitrust conformity is also crucial. The competition

³¹ Manisha Singh and Shivi Gupta, India: Analysing the Changes Introduced by the Competition (Amendment) Act, 2023 (Apr. 26, 2023), <https://www.mondaq.com/india/cartels-monopolies/1308206/analysing-the-changes-introduced-by-the-competition-amendment-act-2023> (last visited on May 3, 2023).

³² *Supra* note 28 at 11.

agencies' problem is to strike a balance between these incompatible goals. In addition, climate change, greenwashing, increasing pollution, and other environmental issues have also become major problems before CCI, and require important attention and modifications in the existing law. For that purpose, India is also committed to enhancing the use of clean energy, promoting green energy, renewable energy, and many more which are predictable to raise the investment scale and employment opportunities in India.³³

9. Emerging Trends in The Use of AI in NRM in India

AI is progressively being used in NRM in India, and several emerging trends are shaping the application of AI in this field.³⁴ These trends are:

- Predictive modelling and forecasting: where AI is being used to develop predictive models and forecasts for various aspects of NRM, such as crop yield predictions, water management, and weather forecasting. This is helping to improve decision-making and resource allocation in the sector.
- Remote sensing and satellite imaging: AI-powered remote sensing and satellite imaging are being used to collect data on the state of the environment, including land use patterns, soil moisture, and deforestation. This information is helping to inform NRM decisions and policies.

³³ CCI INDIA, Environment and Climate Change (2023), <https://www.cciindia.org/env.html> (last visited on May 6, 2023).

³⁴ Priya Rani et. al, Artificial Intelligence Solutions Enabling Sustainable Agriculture: A Bibliometric Analysis (Jun. 9, 2022), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0268989> (last visited on May 11, 2023).

- Natural resource mapping and monitoring: AI is being used to create maps of natural resources and monitor their use, distribution, and quality. This information is helping to inform decisions on resource allocation and conservation.³⁵
- Ecosystem analysis: AI is being used to analyse ecosystems, including their structure, function, and health, to inform NRM decisions and policies.³⁶
- Predictive maintenance: AI is being used to predict equipment failures and maintenance requirements in the NRM sector, helping to reduce downtime and costs.
- Biodiversity conservation: AI is being used to support biodiversity conservation, such as monitoring and protecting endangered species and habitats, and tracking illegal trade in wildlife and other resources.

These emerging trends highlight the increasing importance of AI in NRM in India, and its potential to help in addressing some of the key challenges facing the sector, such as climate change, habitat loss, and declining biodiversity. This shows a direct connection with the degradation of natural resources and requires serious efforts regarding the optimum and conscious use of them by all including the businesses and other

³⁵ Peter Rodericks Oisebe, GIS and Natural Resource Management (Oct. 15, 2012), <https://www.gislounge.com/gis-and-natural-resource-management/> (last visited on May 11, 2023).

³⁶ Bernd Carsten Stahl, AI Ecosystems for Human Flourishing: The Recommendations, Artificial Intelligence for a Better Future: An Ecosystem Perspective on the Ethics of AI and Emerging Digital Technologies, 91-115 (2021).

stakeholders.³⁷ However, it is important to ensure that the use of AI in NRM is balanced with the need to protect the environment, consumer interests, and fair competition in the market.

10. Competition Law Implications for AI and NRM

The use of AI in NRM has an inference for competition law in India which seeks to promote competition and prevent anti-competitive practices and harm to consumers, businesses, and the economy.

The use of AI in NRM raises several competition law concerns, including;

- **Market dominance:** AI technologies have the potential to create or reinforce market dominance by certain firms or individuals, leading to anti-competitive practices such as price fixing, product tying, and exclusionary conduct.³⁸
- **Data protection and privacy:** AI technologies rely on vast amounts of data, and the management of this data is crucial for ensuring competition and protecting consumer interests. Competition law requires that data is collected, processed, and used transparently and responsibly.³⁹
- **Innovation and investment:** The use of AI in NRM has the potential to drive innovation and investment in the sector, but it also raises

³⁷ Cleaver, F., 2002. Reinventing Institutions: Bricolage and the Social Embeddedness of Natural Resource Management. *The European Journal of Development Research*, 14(2), pp.11-30.

³⁸Burton and Ding Jun Toh, Digital Dominance and Social Media Platforms: Are Competition Authorities Up to the Task? 54(4) *IIC Int Rev Ind Prop Copyright Law*. 527-572 (2023).

³⁹ *Supra note 13 at 4.*

concerns about the allocation of investment and the distribution of the benefits of innovation. Competition law seeks to ensure that the benefits of innovation and investment are distributed fairly and that consumers have access to goods and services at fair prices.⁴⁰

- Mergers and acquisitions: The use of AI in NRM has the potential to create synergies and efficiencies through mergers and acquisitions, but it also raises concerns about market concentration and the potential for anti-competitive practices. Competition law seeks to ensure that mergers and acquisitions do not lead to a concentration of market power that would harm consumers and competition in the market.⁴¹

In brief, competition law has a crucial role to play in ensuring that the use of AI in NRM is balanced with the need to defend customer welfare, the environment, and reasonable rivalry in the market. And, therefore, the new Competition (Amendment) Act, of 2023 introduced several initiatives to meet upcoming challenges, but still, there are some areas where the application of this law seems less effective or ineffective, and have become a major concern before the CCI.

⁴⁰ Davide Strusani and Georges Vivien Hounbonon, *The Role of Artificial Intelligence in Supporting Development in Emerging Markets*, (2019), <https://www.ifc.org/wps/wcm/connect/32e54505-3bfb-4198-b939-e1e8847715f1/EMCompass-Note-69-Role-of-AI-in-EMs.pdf?MOD=AJPERES&CVID=mNdPiNf>

⁴¹ Kęstutis Peleckis, *Determining the Level of Market Concentration in the Construction Sector—Case of Application of the HHI Index*, 14(2) *Sustainability* 779 (2022).

Despite these challenges, the intersection of AI, NRM, and Competition Law in India also presents several opportunities, including:

- Improving resource management: AI has the potential to improve resource management by providing better information and decision-support tools, leading to more efficient use of resources and better environmental outcomes.⁴²
- Driving innovation: AI has the potential to drive innovation and investment in the NRM sector, leading to the development of new and improved products and services that benefit consumers and the environment.⁴³
- Enhancing competitiveness: Competition law has the potential to enhance competitiveness in the NRM sector by promoting fair competition, encouraging innovation, and protecting consumer interests.⁴⁴
- Protecting the environment: Competition law can play a crucial role in protecting the environment by ensuring that the use of AI in NRM is balanced

⁴² Bhumika Dutta, What is the Role of AI in Human Resource Management? (Oct. 16, 2021), <https://www.analyticssteps.com/blogs/what-role-ai-human-resource-management> (last visited on May 11, 2023).

⁴³ World Economic Forum, How artificial Intelligence can help us Prepare for Climate Adaptation (Nov 8, 2022), <https://www.weforum.org/agenda/2022/11/how-artificial-intelligence-can-prepare-us-for-climate-adaptation/>.

⁴⁴ UNCTD, The Role of Competition Policy in Promoting Sustainable and Inclusive Growth (Apr. 27, 2015), https://unctad.org/system/files/official-document/tdrbpconf8d6_en.pdf (last visited on May 10, 2023).

with the need to protect the environment and conserve natural resources.⁴⁵

In short, these intersections are important and seem effective to ensure that these technologies are used sensibly that protects consumer interests, the environment, and fair competition in the market.

11. Conclusion and recommendations for policy and practice

This study presents a complex and dynamic landscape of emerging trends, challenges, and opportunities relating to AI, NRM, and Competition Law and how these fields influence consumers, businesses, and the environment under the competition law in India. Due to rapid economic growth, increasing population, climate change, and degradation of resources, everyone is shifting towards the use of AI in NRM including Big Tech companies and other stakeholders.⁴⁶ This have become a subject matter before the National Competition Law Authority, and require continuous supervision for ensuring sustainable development. This helps in making more efficient use of resources managed most efficiently and sustainably possible. AI is proving to be a powerful tool for managing India's resources such as water, soil, land, and other natural resources, which can help India maximize the potential of its natural resources while minimizing the environmental impact.

This result of the study also reveals that the Competition Act 2002 seems less effective, and has not exhaustively

⁴⁵ UNEP, How Artificial Intelligence is Helping Tackle Environmental Challenges (Nov.7,2022), [https:// www .unep. org news -and-stories/story/how-artificial-intelligence-helping-tackle-environmental-challenges](https://www.unep.org/news-and-stories/story/how-artificial-intelligence-helping-tackle-environmental-challenges) (last visited on May 10, 2023).

⁴⁶ *Supra note 43 at 15.*

covered all such areas including AI and NRM, sustainable development, data protection, climate change, and cryptocurrency investment. The new Competition (Amendment) Act, of 2023 appears very effective in improving competition law enforcement, but at the same time, it gives an impression of ineffectively dealing with the above-mentioned areas and needs to be defined properly or exhaustively so that everyone could appreciate their implications, and become more conscious.

Based on the study, the author recommends the following recommendations for policy-making and future implications of this area in India:

- Development of a comprehensive data privacy and protection framework: This framework should ensure that data is collected, processed, and used evidently and reliably while balancing the needs of innovation, competition, and consumer protection.
- Encouragement of innovation and investment in AI for NRM: The government should promote investment in AI for NRM and provide a supportive environment for innovation in this sector.
- Development of competition law framework for AI and NRM: Competition law should be updated to reflect the unique challenges and opportunities posed by AI and NRM, and to ensure that these technologies are used in a manner that protects consumer interests, the environment, and fair competition in the market.
- Promotion of multidisciplinary approaches to AI and NRM: There should be a multidisciplinary effort, involving experts from a range of fields, including law, technology, and environmental science.

- Collaboration between government, industry, and academic stakeholders: A collaborative approach is essential to ensure that the benefits of AI and NRM are realized while addressing the challenges and risks posed by these technologies.

In the end, it is essential to make more efforts regarding these issues reliably that protect consumer interests, the environment, and fair competition in the market. The author has observed that the Government of India is continuously making various efforts and requires individual consumers, competitors, and other stakeholders to be more conscious regarding the optimum use of resources and to promote efficiency.

CHAPTER-6

NATURAL RESOURCES MANAGEMENT WITH RESPECT TO MEDICAL AND E- WASTE

Rakesh Kumar Dhar Dubey*
Tanmoy Majumder**

1. Introduction

Waste electrical and electronic equipment can have an adverse influence on the environment and human health when incorrectly disposed of. Additionally, the growth of the electronic sector depends on the exploitation of some naturally occurring resources, some of which are getting harder to come by. Recycling is an alternative in this case when trying to recover commercially valuable commodities like metals, which are plentiful in used electrical and electronic equipment.¹ As opposed to that, medical waste has the potential to be hazardous since it might include pathogenic agents. As consequently,

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¹ Tamires Augustin Silveira, E. C. (2019). E-waste Management and the Conservation of Geochemical Scarce Resources. E-waste Recycling and Management, 179–200.

medical waste management requires that organizations make decisions and carry out a wide range of actions to lower health risks.² According to Jade Megan Chisholm a link between the healthcare system, decision-makers, and stakeholders in the development of health policies and programmes can be formed by policies, potential advice, and solutions related to sustainability and medical waste management that can assist decision-makers in developing strategies for sustainability by using eco-friendly technologies for effective medical waste treatment and disposal methods. The amount of medical waste rises along with the demand for healthcare facilities.³ To reduce threats to both occupational and public health, a structured system of healthcare waste management is necessary.⁴ The management of natural resources, their extraction, use, and the introduction of the waste produced by exploitation are all subject to strict regulations required for the sustainable development of humanity. Medical waste is constantly growing in volume and has numerous implications across a range of industries. Due to its effects on human health as well as the environment, economy, and society, waste continues to be a complex issue for human society. Medical waste in particular must be handled carefully since it has a harmful impact on both the environment and the health of the community.⁵ Highly hazardous substances

² E. Insa a, M. Z. (2010). Critical Review of Medical Waste Legislation in Spain. *Resources, Conservation and Recycling*, 1048-1059.

³ Jade Megan Chisholm, R. Z. (2021). Sustainable Waste Management of Medical Waste in African Developing Countries: A Narrative Review. *Waste Management & Research*, 1149-1163.

⁴ Joshi, H. D. (2013). Health Care Waste Management Practice in Nepal. *Journal of Nepal Health Research Council.*, 102-108.

⁵ Costel Bucătaru, D. S.-E. (2021). The Implications and Effects of Medical Waste on Development of Sustainable Society—A Brief Review of the Literature. *Sustainability*.

comprise a significant amount of healthcare waste. Poor waste management in the healthcare industry can pose major dangers to both human and environmental health.

Asian developing nations are heavily populated, and some of them have limited resources. These nations frequently don't manage medical waste in a proper manner. Lack of training courses in waste management breeds ignorance among employees and handlers, which results in dangerous waste handling and poses various health hazards.⁶ The spread of diseases including Hepatitis B, C, and E, dengue, and HIV through infected sharps that have not been properly managed is one of the potential adverse effects of biomedical wastes. The disposal of untreated biomedical waste results in the multiplication and mutation of pathogenic microbial populations in municipal waste, which causes physical injury and health hazards.⁷ According to Ziyuan Liu it has become a top priority for all levels of government health and environmental protection ministries to increase the effectiveness of the transmission and treatment of medical waste.⁸

The phrase “e-waste” refers to electrical and/or electronic equipment that has been discarded by its original users because it is obsolete, damaged, or broken. E-waste is often classified as hazardous waste due to the heavy

⁶ Bilal Ahmed Khan, L. C. (2019). Healthcare Waste Management in Asian Developing Countries: A Mini Review. *Waste Management & Research: The Journal for a Sustainable Circular Economy*, 863-875.

⁷ Sandip Chakraborty, B. V. (2014). Biomedical Waste Management. *Advances in Animal and Veterinary Sciences*, 67-72.

⁸ Ziyuan Liu, T. L. (2021). Research on Optimization of Healthcare Waste Management System Based on Green Governance Principle in the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*.

metals (Hg, Cd, Pb, etc.), brominated flame retardants (BFRs), and other potentially hazardous substances present in e-waste, which can seriously endanger both human and environmental health if treated improperly.⁹ The fastest-growing category of solid trash is now e-waste. E-waste is categorised as hazardous waste and, if not properly disposed of, might be dangerous to the environment and human health. To minimise the dumping of this toxic waste type into landfill sites, alternatives such as exporting, landfilling, and recycling based on various economic, social, technical, and environmental criteria are of interest.¹⁰ Handling of biological and e-waste has received special attention. Regarding this unique sort of waste management, provisions of the 2016 solid waste management (SWM) regulations have been emphasized.¹¹

2. Review of Literature

In both rich and developing nations, biomedical waste materials are enduring waste materials that are steadily growing in volume and complexity. Poorly managed medical waste management practices can have a negative impact on both the environment and human health. Systems for collecting and processing medical waste, including dumpsters and containers for separate

⁹ Kaya, M. (2016). Recovery of Metals and Nonmetals from Electronic Waste by Physical and Chemical Recycling Processes. *Waste Management*, 64-90.

¹⁰ Badreya Gharib Khamis Mohammed Alblooshi, S. Z. (2022). Sustainable Management of Electronic Waste: Empirical Evidences from a Stakeholders' Perspective. *Business Strategy and the Environment*, 1856-1874

¹¹ Subhadeep Biswas, A. N. (2023). Smart Cities and Associated Solid Waste, Biomedical Waste, E-Waste Issues, and Management. *Urban Environment and Smart Cities in Asian Countries*, 263-281.

trash, are typically in deplorable conditions.¹² Due to the significant health burdens brought on by improper practices, such as exposure to infectious agents and poisonous substances, the necessity for proper healthcare waste management has been gradually gaining prominence.¹³ MIT has been demonstrated that improper treatment of medical waste has detrimental consequences on the environment, including wildlife, water quality, and the high potential for disease transmission. When deciding on the best method for disposal, decisions on how to store and transport this type of waste must consider factors like contamination and pollution in addition to the expense of disposal.¹⁴ The management of healthcare waste necessitates an ongoing, comprehensive strategy involving number of partners. The capacity of waste management systems to meet the issue is a challenge for governments, particularly in developing nations.¹⁵ Three essential components of sustainable health care are quality care for patients, fiscal responsibility in budgeting, and reducing the impact on the environment. Pollution is recognized as a challenging health issue. Lowering the daily consumption of energy and materials is necessary to reduce healthcare pollution. In the end, limiting the use of energy and materials for medical care is necessary

¹² Veronica E. Manga, O. T. (2011). Health Care Waste Management in Cameroon: A Case Study from the Southwestern Region. *Resources, Conservation & Recycling*, 108-116.

¹³ A. Prem Ananth, V. P. (2010). Healthcare Waste Management in Asia. *Waste Management*, 154-161.

¹⁴ *Supra* note at 2.

¹⁵ Nouf Sahal Alharbi, J. H. (2021). Toward Sustainable Environmental Management of Healthcare Waste: A Holistic Perspective. *Sustainability*, 5280.

to maintain healthy ecosystems.¹⁶ (Andrew Jameton, 2002). The need to transition from the idea of “waste management” to one of sustainable resource use decision-making, including techniques for waste minimization at the source and recycling, is a significant obstacle to be overcome.¹⁷

While the adoption of the new paradigm may result in a dramatic advancement in technology, decision-makers must be adequately supported in their consideration, appreciation, and adoption of such integrated resource and waste systems by a sufficient supply of easily accessible information on the system's design, available technologies, and their effects.¹⁸ Electrical and electronic equipment is increasingly needed in society, which is driving up the amount of outdated EEE that ends up in landfills. Due to its unsustainable methods of gathering, treating, and disposing of E-waste, this has produced significant hazards to our environment and the health of living things. The formal sectors lack the infrastructure, equipment, and knowledge necessary to collect and treat the growing amount of electronic trash in an environmentally responsible way.¹⁹ As the current COVID crisis has shown, the frightening scenario surrounding the unrestrained growth of waste items like plastic and electronic waste poses serious risks to

¹⁶ Andrew Jameton, C. M. (2002). Toward Sustainable Health-care Services: Principles, Challenges, and a Process. *International Journal of Sustainability in Higher Education*, 113-127.

¹⁷ T.L. Tudor, C. N. (2005). Healthcare Waste Management: A Case Study from the National Health Service in Cornwall, United Kingdom. *Waste Management*, 606-615.

¹⁸ G.P.J Dijkema, M. R. (2000). A New Paradigm for Waste Management. *Waste Management*, 633-638.

¹⁹ Venkatesha Murthy, S. R. (2022). A Review on Global E-Waste Management: Urban Mining Towards a Sustainable Future and Circular Economy. *Sustainability*, 647.

human health, the health of wildlife, and the environment. These risks eventually have an impact on society and economic systems.²⁰ The majority of affluent nations have access to potentially useful technology for managing e-waste as well as the necessary technical know-how and system boundaries. The situation is different in developing nations, nevertheless, because of a number of difficulties and a dearth of pertinent policies.²¹ The presence of poisonous and hazardous materials in e-waste equipment caught the attention of the nation's waste management organisations since these materials are dangerous wherever they are found in uncontrolled conditions because they damage human health and the environment. Due to apparent considerations, environmental sound management is only partially implemented and moving extremely slowly. The formal recyclers have established extensive e-waste treatment facilities, but they are insufficient given the amount of e-waste produced in the nation as 95% of it is being handled hazardously by informal recyclers.²²

3. Overview of Medical Waste

Health care waste is any waste produced by a hospital, research centre, or laboratory as a result of different medical procedures. The majority of health care wastes—75–80%—are general wastes and non-hazardous; the remaining 10–25%—which is referred to as biomedical waste—are hazardous. Medical waste includes the

²⁰ *Supra note at 11.*

²¹ Shashi Arya, S. K. (2020). E-waste in India at a Glance: Current Trends, Regulations, Challenges and Management Strategies. *Journal of Cleaner Production*, 271, 122707.

²² Mahesh C. Vats, S. K. (2014). Status of E-Waste in India - A Review. *International Journal of Innovative Research in Science, Engineering and Technology*, 3, 16917-16931.

various types of biomedical wastes related to medical use. These are as follows: Pathological waste (human tissues such as limbs, organs, fetuses, blood and other body fluids). Infectious waste (soiled surgical dressing, swab material in contact with persons or animals suffering from infectious diseases, waste from isolation wards, cultures or stocks of infectious agents from laboratory, dialysis equipment, apparatus and disposable gowns, aprons, gloves, towels, etc.). Sharps (any item that can cut or puncture such as needles, scalpels, blades, saws, nails, broken glass, etc.). Pharmaceutical waste (drugs, vaccines, cytotoxic drugs and chemicals returned from wards, outdated drugs, etc.). Chemical waste (any discarded solid, liquid or gaseous chemicals from laboratories, cleaning, disinfection, etc. hazardous chemicals that are corrosive, flammable, reactive, genotoxic, etc. nonhazardous chemicals such as inorganic salts, buffer chemicals, amino acids, sugars, etc.). Aerosols and pressurized containers Radioactive waste. In light of the fact that hospitals, nursing homes, maternity homes, pathological laboratories, dentists, private medical practitioners, etc. produce biomedical waste all across the nation, it takes relevance.

4. Disposal of Biomedical Waste:

Segregation: The systematic segregation of waste is the first step towards efficient disposal. The majority of the time, infected and non-infectious wastes are not separated at the source and are instead transported to the burning facility in a very filthy manner. Therefore, the system for collecting, moving, and disposing of biomedical waste is not scientifically planned.

Categories for Segregation: These are included in the below Table and have been established by the government in accordance with Schedule 1 of the

Biomedical Waste (Management and Handling) Rules, 1998, released by the Ministry of Environment and Forest.

Option	Waste category	Treatment and disposal
Category No. 1	Human anatomical waste (human tissues, organs, body parts)	Incineration /deep burial
Category No. 2	Animal waste (Animal tissues, organs, body parts carcasses, bleeding parts, fluids, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospital, animal house)	Incineration ² /deep burial
Category No. 3	Microbiology and biotechnology waste (Waste from laboratory cultures, stocks or specimens of microorganisms, human and animal cell culture used in incineration ² research and infectious agents from research and industrial laboratories, waste from production of biologicals, toxins, dishes and devices and for transfer of cultures)	Local autoclaving/ microwave/ live or attenuated vaccines
Category No. 4	Waste sharps (Needles, syringes, scalpels, blades, glass, etc. that may cause puncture Disinfection (chemical treatment@/ and cuts. This includes both used and unused sharps)	autoclaving/ microwave and mutilation/shredding)

Category No. 5	Discarded medicines and cytotoxic drugs (Wastes comprising of outdated, contaminated and Incineration@ destruction and drugs discarded medicines)	disposal in secured landfills
Category No. 6	Soiled waste (Items contaminated with blood, and fluids including cotton, dressings, soiled plaster casts, linen, beddings, other material microwaving contaminated with blood)	Incineration@ autoclaving
Category No. 7	Solid waste (wastes generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets, etc.)	Disinfection by chemical treatment@ autoclaving/microwaving and mutilation/shredding
Category No. 8	Liquid waste (Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	Disinfection by chemical treatment and discharge into drains
Category No. 9	Incineration ash (Ash from incineration of any biomedical waste)	Disposal in municipal landfill
Category No. 10	Chemical used in production of biologicals, chemicals used in disinfection, as insecticides, etc.	Chemical treatment@@ and discharge into drains for liquids and secured landfill for solids

Electromagnetic waves that penetrate or enter materials are known as microwaves. When molecules in a mass are exposed to microwave energy, the vibration that results in heat leads to disinfection.²³ The method of autoclaving is sterilizing objects using steam under high pressure, typically used in operating rooms and microbiology labs to sterilise instruments and linen.²⁴ Incineration is a technique for turning waste into inert mineral residue and gases by burning combustible material at high temperatures under carefully regulated conditions.²⁵

Colour Coding Scheme: According to the inherent danger and the method of disposal, segregation serves as a tool to aid in the essential disposal of waste. After segregation, every item of waste must be kept in containers with corresponding colours. The table provides the recommended colour coding scheme:

Colour coding and type of container for disposal of biomedical wastes			
Colour coding	Type of container	Waste category	Treatment options as per schedule I
Yellow	Plastic bag	Cat. 1, Cat. 2, and Cat.3, Cat. 6	Incineration/ deep burial
Red	Disinfected container/ plastic bag	Cat. 3, Cat. 6, Cat. 7	²⁶ Autoclaving/ Microwaving/ Chemical Treatment

²³ Sakharkar, B. (2009). Principles of Hospital Administration and Planning. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.

²⁴ Sharma, V. (1993). A study of the Disposal Hospital Waste in Rural. Journal of the Academy of Hospital Adm, 5.

²⁵ Anand RC, S. S. (2000). Hospital Waste Management. A Holistic Approach. New Delhi: Jaypee Brothers Medical Publishers.

Blue/White translucent	Plastic bag/puncture proof container	Cat. 4, Cat. 7.	Autoclaving/ Microwaving/ Chemical Treatment and Destruction/ Shredding
Black	Plastic bag	Cat. 5 and Cat. 9 and Cat. 10 (solid)	Disposal in secured landfill

Storage: Medical waste must be stored locally until a significant and sufficient amount has gathered to justify treatment or transfer to the site of disposal. Small waste generators frequently need interim storage at a Common Area Facility (CAF) because they may not be able to treat their own biowaste in treatment plants, which would likely be too expensive for smaller nursing homes and hospitals and possibly not be environmentally friendly. The transportation of biowaste to a CAF or the treatment facility would require a specialised van, preferably one with air conditioning. Sufficient quantity of carts Vans with regular schedules are required to make sure that the trash is not left on the property for more than 12 hours, as that would give the bacteria enough time to proliferate and maybe mutate, negating the very objective of stopping the spread of hospital-acquired illnesses. Untreated biomedical waste should never be kept for longer than 48 hours. Before the waste is taken to the CAF, it is ideal to separate it and treat or sterilise the infectious waste. The spread of nosocomial and hospital acquired infections may not be stopped if this is not done, as the conversion of infected waste to nonharmful waste does not occur.

The Treatment Approaches for Hospital Waste: In order to make hazardous waste less dangerous or non-hazardous, it must undergo a process known as

treatment. Waste is transformed through treatment, which may or may not result in volume reduction. Every waste treatment technology has benefits and drawbacks, and no single technique can be used to treat every kind of waste. Treatment is therefore dependent on the type of waste, the availability of environmentally safe, economically feasible, and technically sound technology, as well as public acceptance.

The following is a very quick description of various treatment options:

- **Incineration:** This process is only utilised for garbage that cannot be dumped in landfills, has more than 60% combustible matter and less than 5% non-combustible solids. Less than 30% moisture should be present. It is an oxidation process at a high temperature.
- **Chemical Disinfection:** This methods is primarily used to clean up sewage from hospitals or liquid waste. A few different kinds of solid waste might potentially work for this.
- **Microwave:** Most bacteria are destroyed by microwave radiation at a frequency of 2450 MHz and a wave length of 12.24 cm.
- **Steam Sterilisation or Autoclaving:** Only certain kinds of infectious waste are appropriate for steam sterilisation or autoclaving. It cannot be used for anatomical waste, animal corpses, or chemical or pharmaceutical waste.

5. Methods Suitable For Various Waste Types:

Sharps Wastes: These are disposed of in the safety pit after being treated for 30 minutes with a 1% hypochlorite solution.

- **Infectious Wastes:** To dispose of infectious waste, incineration is the best option. Autoclaving to make garbage non-infectious, followed by residential landfill disposal. If properly diluted, small volumes of bodily fluids can be disposed away in the regular sewerage system.
- **Cytotoxic Waste:** Due to its extreme toxicity, incineration utilising high-temperature combustion is the preferred method of disposal. Once properly diluted, low cytotoxic waste concentrations can be disposed of through the drainage system.
- **Chemical Waste:** Due to hazardous fumes, mercury waste cannot be incinerated. Not to be discarded through the wastewater system. The dental sector frequently employs mercury. Corrosion may result from the disposal of chemical waste in sewage systems.

Radioactive Waste: Under the conditions outlined by state law, radioactive waste may be disposed of by incineration, sanitary landfill at a location that has been permitted, or by the sewerage system. Account must be taken of the potential for radioactive gas during combustion.

Plastic Wastes: Incinerating them could release harmful gases. Reduction through compacting, with potential landfill.

Food Waste: Food waste should be ground or pulped before being disposed of in the sewer system or incinerated.

6. Overview of E-Waste

When used electronics reach the end of their useful lives and are discarded, donated, or given to a recycler, they are referred to as “e-waste”, “electronic waste”, “e-scrap” and “end-of-life electronics”. According to the UN, e-waste is any product that has been abandoned that has a battery or socket and contains poisonous and dangerous materials, such as mercury, that can seriously endanger both human and environmental health. According to the UN, 7.6 kilograms of electronic waste would be produced annually by each person on Earth in 2021, totalling a staggering 57.4 million tonnes. Only 17.4% of this electronic waste, which is made up of both dangerous and valuable items, will be noted as having been correctly gathered, handled, and recycled. There are numerous efforts made to address this expanding issue, but none of them can be truly successful without the active involvement and appropriate education of consumers. E-waste can be harmful, is not biodegradable, and builds up in the land, air, water, and other living things in the environment. Toxic substances are released into the environment when methods like open-air burning and acid baths are employed to recover valuable elements from electronic components. Along with high levels of contaminants like lead, mercury, beryllium, thallium, cadmium, and arsenic, these practises can also expose workers to polychlorinated biphenyls (PCBs) and brominated flame retardants (BFRs), which have been linked to irreversible health effects like cancer, miscarriages, neurological damage, and lower IQs. A class of chlorinated organic compounds known as polychlorinated biphenyls (PCBs) is employed for a range of industrial and commercial uses. Polychlorinated biphenyl is a collective name for

several related chemical compounds.²⁷ Organ bromine chemicals known as brominated flame retardants (BFRs) have an inhibitory influence on combustion chemistry and tend to make things less flammable. About 19.7% of the market for commercially available chemical flame retardants is made up of brominated products. They work well in applications involving plastic and textiles, such as those in electronics, apparel, and furniture.²⁸ As per *Anjani R.K. Gollakota* electronic and electrical equipment (EEE) has significantly impacted the economy and has become an essential component of daily life. Increased demand, cutting-edge technology, and high dependency led to an unthinkable use of EEE.²⁹ However, these technological advancements decreased the EEE's useful life, leading to enormous amounts of waste electrical and electronic equipment (WEEE). Globally, Oceania produces 17.3 kilogrammes per inhabitant, followed by Europe with 16.6 kilogrammes, America with 11.6 kilogrammes, Asia with 4.2 kilogrammes, and Africa with 1.9 kilogrammes. According to Yong some hazardous wastes produced by the electrical and electronic sectors, including heavy metal sludge, can be used as an alternative fuel for the cement industry. The residue that results from this process can be used as a raw material to make cement.³⁰ Despite the advantages for the economy and the

²⁷ Glenn W. Johnson, J. F. (1964). 10 - Polychlorinated Biphenyls. Academic Press.

²⁸ Wit, C. A. (2002). An Overview of Brominated Flame Retardants in the Environment. *Chemosphere*, 583-624.

²⁹ Anjani R.K. Gollakota, S. G.-M. (2020). Inconsistencies of E-waste Management in Developing Nations – Facts and Plausible Solutions. *Journal of Environmental Management*, 261.

³⁰ Yong, Y. H. (2019). Barriers and Critical Success Factors Towards Sustainable Hazardous Waste Management in Electronic Industries – A Review. *IOP Conference Series: Materials Science and Engineering*, 1-9.

environment, industry-wide efforts to manage hazardous waste are still only somewhat effective.

7. Disposal of E-waste:

According to M. C. Vats in underdeveloped nations, there is not enough technological infrastructure to handle the large amounts of e-waste.³¹ More than 90% of e-waste is handled by informal organisations using crude and rudimentary processes, which is the main cause of worry. Any successful E-waste management project must take into account the public's disposal habits, awareness, and perception (Anwasha Borthakur, 2018). One of the most critical pollution issues in the world today is the disposal of electronic devices or "e-waste". The presence of numerous dangerous compounds in e-waste could harm the environment and threaten human health if disposal techniques are not properly handled. To manage e-waste, particularly in industrialised nations, a number of methodologies have been developed. These include Life Cycle Assessment (LCA)³² Material Flow Analysis (MFA), Multi Criteria Analysis (MCA), and Extended Producer Responsibility (EPR). A life cycle assessment is a method used to evaluate the effects on the environment and the resources utilised over the course of a product's life cycle, from the acquisition of raw materials through the production and usage stages to waste management.³³ Environmental damage might result from the direct disposal of electronic waste. An efficient regulatory framework is required to monitor exports, proper labeling, and the recycling of e-waste (Lin Wei, 2012). The system for

³¹ *Supra note at 21.*

³² Göran Finnveden, M. Z. (2009). Recent Developments in Life Cycle Assessment. *Journal of Environmental Management*, 1-21.

³³ *Id.*

managing e-waste is complicated in India due to the complex nature of its varied socio-economic, cultural, and other connected ramifications that affect customers' disposal behaviour and awareness. This has caused a serious problem in managing e-waste in India due to a lack of proper infrastructure facilities and procedures for its disposal and recycling. According to Santhanam Needhidasan (2014) e-waste is typically produced by both the recycling and worldwide deportation of these items. Due to the dearth of organized e-waste recycling facilities, India mostly relies on the unorganized industry. Over 95% of the nation's e-waste is disposed of and processed in the majority of the country's urban slums, where unskilled workers do risky tasks without personal safety precautions and protective equipment, risking not only their health but also the environment. Many technical solutions exist for managing e-waste, but before they can be implemented in the management system, it is necessary to develop the necessary legal framework, collecting system, logistics, and labour (Kishore, 2010). Toxic e-waste imports must be prohibited in developing nations. Increased customs fees on e-waste are necessary. Domestic laws must be strengthened and enforced; anyone breaking the law should face fines or prosecution. In order to accredit processing companies that adhere to predetermined legal, technological, and environmental standards, it should establish a global industry organisation. The UN has to take a lot more action to address the e-waste problem. It ought to promote the exchange of processing and recycling know-how between industrialised and underdeveloped countries. It should establish a global e-waste disposal fund to which manufacturers and exporting nations would make a contribution for each item they sell (Zhaohua Wang, 2016).

8. Conclusion

One of the world's most serious environmental challenges is the toxic nature of medical as well as e-waste. The issue is getting worse due to the rising volume of medical and e-waste brought on by a lack of knowledge and the necessary skills. There is an urgent need to develop a preventive strategy with respect to the health risks of handling waste among these employees in India. Because a huge number of people are engaged in the crude dismantling of medical and e-waste for their living. There is an urgent need for improvement in the management of medical and e-waste, which includes technological advancement, institutional setup, operational plan, and protective protocol for employees engaged in e-waste disposal. Most importantly public education about this newly emerging problem poses a risk to the environment and public health. An efficient regulatory framework is required to monitor exports, proper labelling, and the recycling of e-waste.

CHAPTER-7

BUILDING TOOLS FOR FURTHER INVESTIGATING ACID MINING PRODUCTION: INTERCOMPARISON OF FOUR HYDROLOGICAL MODEL VERSIONS THROUGH A SCORING TECHNIQUE ON THE NIGER RIVER BASIN, IN WEST AFRICA

Salif Koné*

1. Abstract

We modify a framework to model time series of discharges, on 16 watersheds of the Niger River and its tributaries, over 1901-2020. This framework is built from a French hydrological model – Genie Rural with 2 parameters at Monthly time step – GR2M. The first parameter, X1, concerns the input variables. This parameter is applied to the rainfall and the evapotranspiration data; its reciprocal, $1/X1$, is applied to the Soil's Water Holding Capacity data (assimilated to reservoir height). The second parameter, X2, is applied to the time series of discharges, which is the output

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variable in modelling. Modifications lead to a new model version called SimulHyd, which stands for Simulation of Hydrological systems. A weighting rule on grids is inserted into the framework to create a gridded variant of semi-distributed modelling from a lumped model. Following a World Meteorological Organization's goal, we develop a scoring technique for intercomparisons of model versions on both one single and several catchments. Over the 16 watersheds, a three-model intercomparison shows the preponderance of SimulHyd semi distributed (with 117.83 out of 192 total scoring-points, equivalent to 61.37%) over both GR2M non-distributed (with 61.33 scoring-points, or 31.94%) and GR2M semi-distributed (with 12.83 scoring-points, or 6.68%).

2. Introduction

Hydrological modelling aims at producing diverse gridded simulation variables during each time step and on different spatial scales. It folds in two major approaches: physical-based modelling¹ and conceptual modelling² with reservoirs.³ Between both major approaches, a range of other mixed approaches exists, such as: analogic modelling, mathematical modelling, and statistical or stochastic modelling from probability theories.

¹ Beven K. Changing Ideas in Hydrology - The Case of Physically-Based Models. *J Hydrol.* 1989;105(1-2).

² Edijatno, Michel C. Un Modèle Pluie-débit Journalier à trois Paramètres. *La Houille Blanche.* 1989;75(2).

³ Hughes D, Birkinshaw S, Parkin G. A Method to Include Reservoir Operations in Catchment Hydrological Models Using SHETRAN. *Environ Model Software.* 2021;138.

In addition, hydrological models are distributed on two major pole structures: some are lumped⁴ and some others are distributed⁵. Hybrid structures like semi-distributed and semi-lumped are common in literature; for instance, applied a likely semi-distributed modelling in the Free State of Saxony (USA)⁶ in using the model “BROOK90 (R version)”. However, made another classification⁷. They discriminated mathematical models and systematic models. Performing intercomparison investigations and developing efficiency criteria are ways to make a methodical selection of models or model versions for a selected project.⁸

2.1. A succinct timeline on hydrological modelling

A World Meteorological Organization’s report⁹, in 1975, indicated the need to develop objective criteria of models’ performances that can be applied in comparing one or several models both on a same catchment and on several

⁴ Martina MLV, Todini E, Liu Z. Preserving the Dominant Physical Processes in a Lumped Hydrological Model. *J Hydrol.* 2011;399(1–2).

⁵ Zhu D, Wang G, Ren Q, Ilyas AM. Hydrological Evaluation of Hourly Merged Satellite–station Precipitation Product in the Mountainous Basin of China Using a Distributed Hydrological Model. *Meteorol Appl.* 2020;27(2).

Jadidoleslam N, Mantilla R KW. Data Assimilation of Satellite-Based Soil Moisture into a Distributed Hydrological Model for Streamflow Predictions. *Hydrol*

Available from: <https://www.mdpi.com/2306-5338/8/1/52>

⁶ Luong TT, Pöschmann J, Vorobevskii I, Wiemann S, Kronenberg R BC. Pseudo-Spatially-Distributed Modeling of Water Balance Components in the Free State of Saxony. *Hydrol* [

Available from: 781 <https://www.mdpi.com/2306-5338/7/4/84>

⁷ Pandi D, Kothandaraman S KM. Hydrological Models: A Review. *Int J Hydrol Sci Technol.* 2021;12(3):223–42.

⁸ Clarke RT. Issues of Experimental Design for Comparing the Performance of Hydrologic Models. *Water Resour Res.* 2008;44(1).

⁹ WMO. Intercomparison of Conceptual Models Used in Operational Hydrological Forecasting. Operational Hydrology Report No. 7, WMO No. 429. 1975.

catchments at once.¹⁰ In 1983, made propositions to improve rainfall-runoff model in Australia.¹¹ Five years afterward, Pilgrim et al.¹² assembled problems of rainfall-runoff modelling.

In 1994, presented “CELMOD5 - a semi-distributed cell model¹³ for conversion of rainfall into runoff in semi-arid watersheds”. Three years later, presented a “distributed Rainfall / Runoff” hydrological modelling in the watershed of Guadiana (in South of Portugal).¹⁴ In 2000, Hernandez et al was interested in “land cover and rainfall spatial variability” impact on runoff response.¹⁵ Two year later, published works on the Nakambe River in establishing the climatic and anthropogenic impacts on the flow regime,¹⁶ and exposed “An alternative IUH” (instantaneous unit hydrograph) “for the hydrological lumped models”¹⁷. The following year, paved the way to investigate, in West Africa, the outcome of hydrological

¹⁰ Garrick M, Cunnane C, Nash JE. A Criterion of Efficiency for Rainfall-runoff Models. *J Hydrol.* 1978;36(3-4).

¹¹ Sukvanachaikul Y, Lauranson Em. Improved Rainfall-Runoff Model For Semi-Arid Regions. In: National Conference Publication - Institution of Engineers, Australia. 1983.

¹² Pilgrim DH, Chapman TG, Doran DG, Pilgrim H, Chapman G., Problems of Rainfall-runoff Modelling in Arid and Semiarid Regions *Hydrological Sciences Journal* 1988;3344(8).

¹³ Karnieli AM, Diskin MH, Lane LJ. CELMOD5 - A Semi-distributed Cell Model for Conversion of Rainfall into Runoff in Semi-arid Watersheds. *J Hydrol.* 1994;157(1-4).

¹⁴ Gomes F, Lacerda M, Duarte ML, Almeida JA. Hydrological Modelling of Distributed Rainfall / Runoff in the Watershed of Guadiana. In 1997.

¹⁵ Hernandez M, Miller SN, Goodrich DC, Goff BF, Kepner WG, Edmonds CM, et al. Modeling Runoff Response to Land Cover and Rainfall Spatial Variability in Semi-arid Watersheds. *Environ Monit Assess.* 2000;64(1).

¹⁶ Mahe G, Dray A, Patuere JE, Cres A, Kone F, Manga M, et al. Climatic and Anthropogenic Impacts on the Flow Regime of the Nakambe River in Burkina Faso. *Iahs-Aish Publ.* 2002;(274).

¹⁷ Szymkiewicz R. An Alternative IUH for the Hydrological Lumped Models. *J Hydrol.* 2002;259(1-4).

modelling¹⁸ receiving some distributed input data.¹⁹ In 2004, theoretically compared a lumped and two semi-distributed model versions using Nash criterion to assess efficiency.²⁰ A year later presented works on surface water estimates through hydrological modelling using a French hydrologic model – Genie Rural with 2 parameters at Monthly time step – GR2M.²¹ In 2006, published works on assessment of climatic scenarios through hydrological modelling.²²

Pursuing research undertook by,²³ we developed an intercomparison through a scoring technique on model versions that stem from each other (Kone²⁴). Further

¹⁸ Andréassian V, Oddos A, Michel C, Anctil F, Perrin C, Loumagne C. Impact of Spatial Aggregation of Inputs and Parameters on the Efficiency of Rainfall-runoff models: A Theoretical Study Using Chimera Watersheds. *Water Resour Res.* 2004;40(5).

¹⁹ Paturel JE, Ouedraogo M, Mahe G, Servat E, Dezetter A, Ardoin S. The influence of Distributed Input Data on the Hydrological Modelling of Monthly River Flow Regimes in West Africa. *Hydrol Sci J.* 2003;48(6).

²⁰ Nash JE, Sutcliffe J V. River Flow Forecasting Through Conceptual Models Part I - A Discussion of Principles. *J Hydrol.* 1970;10(3).

²¹ Kabouya M, Michel C. Estimation Des Ressources in eau Superficiellement Aux Pas de Temps Mensuel et Annuel, Application à un Pays Semi-aride. *Rev des Sci l'eau.* 2005;4(4).

²² Ardoin-Bardin S, Dezetter A, Servat E, Dieulin C, Casenave L, Niel H, et al. Application of Climatic Scenarios in Hydrological Modelling: Using GCMs outputs. In: *Iahs-Aish Publication.* 2006.

²³ Paturel JE, Ouedraogo M, Mahe G, Servat E, Dezetter A, Ardoin S. The Influence of Distributed Input Data on the Hydrological Modelling of Monthly River Flow Regimes in West Africa. *Hydrol Sci J.* 2003;48(6).

²⁴ Koné S. Comparison Entre une Modélisation Semi-globale et Une Modélisation Global, Université Montpellier 2; 2007.

https://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers17-05/010041817.pdf

worked on how embedding available versions of a model to produce a single optimal model version.²⁵

Relatively to succeeded in presenting the “fuse: an R package for ensemble Hydrological Modelling”²⁶ meanwhile and presented an “assemble of GR model”²⁷ under the packages airGR²⁸ and airGRteaching²⁹. Further, published their results obtained through using airGR packages,³⁰ while explored machine learning to assess hydrologic model performances in 2022.³¹

2.2. From Perspectives to Problem Statement

While theoretically compared a lumped model and two semi-distributed model versions,³² Yao et al. compared distributed and lumped hydrological models similarly to Santos et al.³³. Theses authors used criteria other than a

²⁵ Dezetter A, Girard S, Paturel JE, Mahé G, Ardoin-Bardin S, Servat E. Simulation of Runoff in West Africa: Is There a Single Data-model Combination that Produces the Best Simulation Results? *J Hydrol.* 2008;354(1-4).

²⁶ Vitolo C, Wells P, Dobias M, Buytaert W. Fuse: An R Package for Ensemble Hydrological Modelling. *J Open Source Software.* 2016;1(8).

²⁷ Coron L, Thirel G, Delaigue O, Perrin C, Andréassian V. The Suite of Lumped GR Hydrological Models in an R Package. *Environ Model Software.* 2017;94.

²⁸ Coron L., O. D, G. T, C. P, C. M, V. A, et al. Package ‘ AirGR .’ Report. 2019.

²⁹ Delaigue O, Thirel G, Coron L, Brigode P. AirGR and AirGR Teaching: Two Open-Source Tools for Rainfall-Runoff Modelling and Teaching Hydrology. In 2018.

³⁰ Oueldkaddour FZE, Wariaghli F, Brirhet H, Yahyaoui A. Hydrological Modelling of Rainfall-runoff of the Semi-arid Aguibat Ezziar Watershed Through the GR4J Model. *Limnol Rev.* 2021;21(3).

³¹ Rozos E, Dimitriadis P, Bellos V. Machine Learning in Assessing the Performance of Hydrological Models. *Hydrology.* 2021;

³² Yao H, Hashino M, Terakawa A, Suzuki T. Comparison of Distributed and Lumped Hydrological Models. *Proc Hydraul Eng.* 1998;42.

³³ Dos Santos FM, De Oliveira RP, Mauad FF. Lumped Versus Distributed Hydrological Modeling of the Jacaré-Guaçu Basin, Brazil. *J Environ Eng.* 2018;144(8).

scoring technique.³⁴ Askew³⁵ previously performed hydrological model intercomparison studies following recommendations of the World Meteorological Organization;³⁶ however, neither they scarcely explored a scoring technique specifically on model versions that stem from each other nor had a same gridded semi-distribution structure as presented in this article.

Comparative analyses on hydrological models are widely performed since the WMO's 1975 statement on model performances.³⁷ In 2022, undertook comparative studies between lumped and semi-distributed models through conceptual hydrological modelling.³⁸ Three years earlier, performed a comparison of hydrological simulations using synthetic rainfall data³⁹ includes an approach called "event scale",⁴⁰ which has inspired in constructing

³⁴ Refsgaard JC, Knudsen J. Operational Validation and Intercomparison of Different Types of Hydrological Models. *Water Resour Res.* 1996;32(7).

³⁵ Askew AJ. Real-time Intercomparison of Hydrological Models. *New Dir Surf Water Model Proc Symp 3RD Sci Assem Int Assoc. Hydrol Sci Balt.* 1989;(181)).

³⁶ Okiria E, Okazawa H, Noda K, Kobayashi Y, Suzuki S, Yamazaki Y. A Comparative Evaluation of Lumped and Semi-Distributed Conceptual Hydrological Models: Does Model Complexity Enhance Hydrograph Prediction? *Hydrology.* 2022;

³⁷ WMO. Intercomparison of Conceptual Models Used in Operational Hydrological Forecasting. *Operational Hydrology Report No. 7, WMO No. 429.* 1975.

³⁸ Okiria E, Okazawa H, Noda K, Kobayashi Y, Suzuki S, Yamazaki Y. A Comparative Evaluation of Lumped and Semi-Distributed Conceptual Hydrological Models: Does Model Complexity Enhance Hydrograph Prediction? *Hydrology.* 2022;

³⁹ Fang ZN, Shultz MJ, Wienhold KJ, Zhang J, Gao S. Case Study: Comparative Analysis of Hydrologic Simulations with Areal-Averaging of Moving Rainfall. *Hydrology [Internet].* 2019;6(1). Available from: <https://www.mdpi.com/2306-5338/6/1/12>

⁴⁰ Koné S. Apport de la Géostatistique à la Modélisation Hydrologique: Étude de Bassins Hydrologiques en Zone Soudano-Sahélienne [Internet]. Institut Supérieur de Formation et de Recherche Appliquée,

a comparison method of multiple models through criteria that involved a Monte Carlo simulation.⁴¹

We previously used a French hydrological model – Genie Rural with 2 parameters at Monthly time step – GR2M to develop a gridded semi-distributed version of a lumped model, which leads to model version intercomparison issue.^{42 43} Using the GR2M model, four model variants were generated through two approaches. First, we modify GR2M to produce a three-input variable model – instead of two – (called SimulHyd, which stands for Simulation of Hydrological systems). Second, we change a lumped model version to produce a gridded semi-distributed model version. GR2M is a hydrological model developed by Edijatno [2] and further by Kabouya & Michel⁴⁴ from French laboratories, while SimulHyd model is our variant of GR2M. Hence, the assessment of the four model versions must be performed on the studied catchments. These model versions, which derive from each other, are GR2M non-distributed (lumped form), SimulHyd non-

ISFRA-USJPB, Bamako- Mali; 2015. Available from: <https://theses.hal.science/tel-01166018>

⁴¹ Haruna A, Garambois P-A, Roux H, Javelle P, Jay-Allemand M. Does Flash Flood Model Performance Increase with Complexity? Signature and Sensitivity-Based Comparison of Conceptual and Process-Oriented Models on French Mediterranean Cases. *Hydrology* [Internet]. 2022;9(8). Available from: <https://www.mdpi.com/2306-5338/9/8/141>

⁴² Ardoin-Bardin S, Dezetter A, Servat E, Dieulin C, Casenave L, Niel H, et al. Application of Climatic Scenarios in Hydrological Modelling: Using GCMs Outputs. In: *Iahs-Aish Publication*. 2006.

⁴³ Koné S. Comparaison Entre une Modélisation Semi-globale et une Modélisation Global, Université Montpellier 2; 2007. https://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers17-05/010041817.pdf

⁴⁴ Kabouya M, Michel C. Estimation des Ressources en eau Superficiellement Aux Pas de Temps Mensuel et Annuel, Application à un Pays Semi-aride. *Rev des Sci l'eau*. 2005;4(4).

distributed, GR2M semi-distributed (lumped form), and SimulHyd semi-distributed.

Appropriating the previously mentioned World Meteorological Organization's target⁴⁵ leads to establish an intercomparison method suitable to approaches that consists of varying a single model to obtain four or more different model versions.⁴⁶ Moreover, this established intercomparison method allows to manage cases where an equifinality occurred between models when calculating conventional criteria, such as Nash criterion⁴⁷. Diverse aspects of hydrological modelling have been subject to comparison or intercomparison studies.⁴⁸ Compared modelling through statistical regressions for forecasting baseflow, while performed comparison in post-process stages working on streamflow.⁴⁹ In Gosling et al.⁵⁰, comparison was about climate change scenarios through varying temperature,

⁴⁵ Intercomparison of Conceptual Models Used in Operational Hydrological Forecasting. Operational Hydrology Report No. 7, WMO No. 429. 1975.

⁴⁶ Koné S. Apport de la Géostatistique à la Modélisation Hydrologique: Étude de Bassins Hydrologiques en Zone Soudano-Sahélienne. Institut Supérieur de Formation et de Recherche Appliquée, ISFRA-USJPB, Bamako- Mali; 2015.

<https://theses.hal.science/tel-01166018>

⁴⁷ Nash JE, Sutcliffe J V. River Flow Forecasting Through Conceptual Models part I - A Discussion of Principles. *J Hydrol.* 1970;10(3).

⁴⁸ Zhang J, Zhang Y, Song J, Cheng L, Gan R, Shi X, et al. Comparing Hydrological Modelling, Linear and Multilevel Regression Approaches for Predicting Baseflow Index for 596 Catchments Across Australia. *Hydrol Earth Syst Sci.* 2017;

⁴⁹ Biondi D, Todini E. Comparing Hydrological Postprocessors Including Ensemble Predictions into Full Predictive Probability Distribution of Streamflow. *Water Resour Res.* 2018;54(12).

⁵⁰ Gosling SN, Zaherpour J, Mount NJ, Hattermann FF, Dankers R, Arheimer B, et al. A Comparison of Changes in River Runoff from Multiple Global and catchment-scale hydrological models under Global Warming Scenarios of 1 °C, 2 °C and 3 °C. *Clim Change.* 2017;141(3).

whereas in⁵¹ the intercomparison concerned model robustness relative to streamflow forecasting. An intercomparison between “a lumped model and a distributed model” was performed by Liu et al.⁵² while regional scale hydrological models were under intercomparison a year later – with a target to assess climate change impacts.⁵³ Authors like Sittner et al.⁵⁴ and Cavadias G⁵⁵ furthermore performed hydrological models intercomparison studies according to WMO recommendations, as previously stated. Applied a multi-criterion validation to a semi-distributed conceptual model⁵⁶ while undertook comparative studies of two hydrological models in the northwestern part of Algeria.⁵⁷

Our investigation is about how comparing the performance of hydrological model versions on one single or multiple catchments at once; these versions specifically derive from each other.

⁵¹ Loganathan P, Mahindrakar AB. Intercomparing the Robustness of Machine Learning Models in Simulation and Forecasting of Streamflow. *J Water Clim Chang*. 2021;12(5).

⁵² Liu G, He Z, Luan Z, Qi S. Intercomparison of a Lumped Model and A Distributed Model for Streamflow Simulation in the Naoli River Watershed, Northeast China. *Water (Switzerland)*. 2018;10(8).

⁵³ Krysanova V, Vetter T, Eisner S, Huang S, Pechlivanidis I, Strauch M, et al. Intercomparison of Regional-scale Hydrological Models and Climate Change Impacts Projected for 12 Large River Basins Worldwide - A Synthesis. *Environ Res Lett*. 2017;12(10).

⁵⁴ Sittner WT. WMO Project on Intercomparison of Conceptual Models Used in Hydrological Forecasting. *Hydrol Sci Bull*. 1976;21(1).

⁵⁵ Cavadias G, Morin G. The Combination of Simulated Discharge of Hydrological Models: Application to WMO Intercomparison of Conceptual Models of Snowmelt Runoff. *Nord Hydrol*. 1986;17(1).

⁵⁶ Ambroise B, Perrin JL, Reutenauer D. Multicriterion Validation of a Semidistributed Conceptual Model of the Water Cycle in the Fecht Catchment (Vosges Massif, France). *Water Resour Res*. 1995;31(6).

⁵⁷ Zennaki A, Baba-Hamed K, Bouanani A. Étude Comparative Des Modèles Hydrologiques Conceptuels Globaux GR Et Gardénia Appliqués Au Bassin Versant De L'oued Boukiou (Nord-Ouest Algérien). *Tech Sci Méthodes*. 2021;(12).

Results from these model versions are so close that intercomparison methods from literature – which use commonly known criteria – detect scarcely no difference between them. We hence develop a scoring technique in intercomparing model versions that stem from each other.

3. Materials and Methods

3.1. Watersheds and Data

This study focuses on the Niger River basin starting from Guinea downward to the hydrometric station of *Koulikoro* in Mali, covering some 15 other hydrometric stations (Figure 1 and Table 1); its drainage area at this station is 120 603 km². This basin spreads geographically from the Fouta Djallon forested Highlands in Guinea, and the hilly Northwestern Côte d'Ivoire, to the forested savannah plains of the Southwest of Mali. This basin connects the population from these countries both economically and culturally. The Climatic Research Units (CRU) published variable indexes in matrix 360.latx720.long under the designation *cru_ts3.20* – the current version is *cru_ts4.06* (see online at the British Atmospheric Data Center - BADC). Using the R programming language, we extracted the rainfall data on the grids 0.5x0.5 degree and built a precipitation database called *PluieCRU*. Similarly, we built an evapotranspiration database called *EtpCRU*. The SIEREM database also supplies similar Precipitation data called *PluieIRD*. As reported by Boyer et al⁵⁸, SIEREM stands for *Système d'Informations Environnementales sur les Ressources en Eaux et leur Modélisation*.

⁵⁸ Boyer JF, Dieulin C, Rouche N, Cres A, Servat E, Paturol JE, et al. Sierem: An Environmental Information System for Water Resources. In: Iahs-Aish Publication. 2006.

We extracted the soil's Water Holding Capacity (WHC) from SIEREM database in using raster's attribute tables; nevertheless,⁵⁹ handles soils data differently. The IRD's codification is used to identify watershed outlets as illustrated on the Table 1. This table concerns the set of 16 time series of discharges selected on the Niger River and its tributaries. In 1986, Brunet et al.⁶⁰ previously published a part of these pre-cited time series on the Niger River.

A visualization capability, included in airGR packages, permits to draw the Figure 2 that shows hydro-meteorological and hydrometric time series at the hydrometric station of *Koulikoro*. Analyses based on the Table 1 and Figure 2 corroborate a previous remark from literature: the year 1970 is a turning-point in West Africa as dropping occurred in precipitation since this year up to around 1993.

3.2. Models

GR2M model went through diverse modification propositions leading to different formulations⁶¹ without changing its anagram that stands for Genie Rural with 2 parameters running at monthly time step. It was developed inside INRA – Institute National de Recherche Appliqué in French language, which was previously

⁵⁹ Feki M, Ravazzani G, Barontini S, Ceppi A, Mancini M. A Comparative Assessment of the Estimates of The Saturated Hydraulic Conductivity of two Anthropogenic Soils and their Impact on Hydrological Model Simulations. *Soil Water Res.* 2020;15(3).

⁶⁰ Brunet-Moret Y, Chaperon P, Lamagat JP, Molinier M. Monographie Hydrologique du Fleuve Niger. Tome I: Niger Superieur. Tome II: Cuvette Lacustre et Niger Moyen. (Hydrological Monogr Niger River Vol 1 Up Niger Vol II Lacustrine Basin Middle Niger. 1986;

⁶¹ Perrin C. Vers une Amélioration d'un Modèle Global Pluie-débit au Travers D'une Approach Comparative. *La Houille Blanche.* 2002;88(6-7).

known as CEMAGREF - *Centre d'Étude du Mechanism Agricole et du Génie Rural des Eaux et Forêts* in French language. *Edijatno* formulation of GR2M [2], implemented by the laboratory Hydro Sciences Montpellier is used in this work along with a new version called *SimulHyd*.

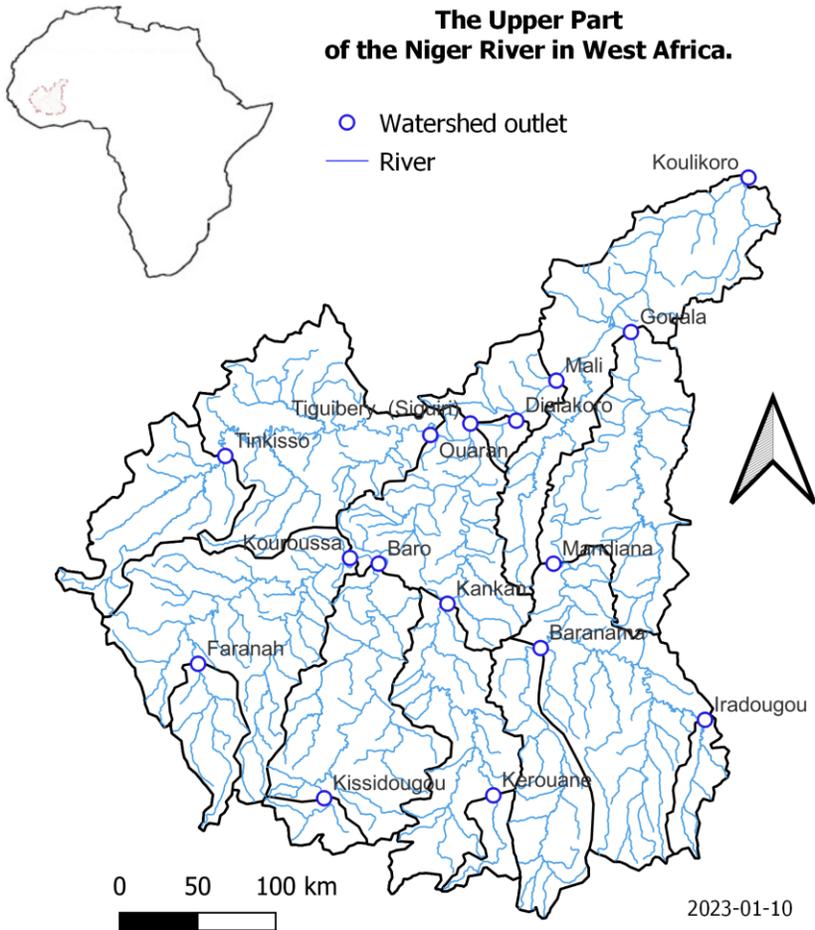


Figure 1: Maps of 16 watersheds on the Niger River, in West Africa (Boyer et al; Koné). The rivers order is decided

in SIG software, the main river being the first. Only the first three order of rivers are drawn on the map.

GR2M is a conceptual framework with two reservoirs (called Soil reservoir and Gravity reservoir) and its functioning is like a funnel that receives water in its superior part and loses it in outflow through its bottom part. Previously, the initial filling up of the first reservoir (Soil reservoir) was fixed to a constant value depending on the world region (e.g., $A=200$ in France) and expressed in millimetres. In the version of Edijatno, GR2M is a model with two parameters ($X1$, $X2$), with a constant A , and with two entry data, the rainfall, and the evapotranspiration. Further, works undertaken at the laboratory Hydro Sciences Montpellier drove to the proposition of a physical quantity in replacement of the constant A . This quantity noted WHC in further works characterizes the capacity of soil to holding water. WHC is thus considered as a third entry data of the GR2M model. Enlarging the influence of the first parameter to the three-input data (rainfall, evapotranspiration, Water Holding Capacity), leads to meaningful improvements in hydrological modelling with GR2M. We built a new model version in applying the reciprocal of the first parameter to the Soil reservoir. The constant A is hence replaced by the term $(1/X1)$, WHC, which leads to the proposition of a new version of GR2M named SimulHyd (Simulation of Hydrological Systems). We explain a weighting rule of different grid influences supporting a semi-distributed modelling structure.

3.3. Semi-globality - a gridded variant of semi-distributed modelling - and weighting factor

This paper adopts the term (gridded) semi-distributed modelling to designate a modified spatial process introduced in lumped modelling – This distribution on

grids were earlier called as semi-globality at Hydro Sciences Montpellier – a French laboratory. Therefore, our semi-distributed models produce gridded intermediary output data on grids: it turns lumped models to semi-distributed models with gridded intermediary output. studied three model structures that are “lumped Approach”, “[Semi-distributed Approach]” and “[Semi lumped Approach]”; the lasts produce simulation output data on meshes in using distributed input. We, therefore, modify the last concept of these authors to produce intermediary output data on grids – mimicking a distributed modelling.

3.4. Intercomparison Method – A Proposed Scoring Technique

The intercomparison template structure on (Table 2) and the simulation protocol are thoroughly exposed in in thesis (p.61-63n, in French). 12 scoring-points are available for competing model versions on a single watershed, and this number is multiplied according to the number of the watersheds on which intercomparison is undertaken.

4. Results and discussion

4.1. Table approach in intercomparison results ‘presentation – a proposition

In decreasing order (from the best), we classify models in terms of the less sensitive to samples (Kone et al., 2023)⁶²: SimulHyd Semi-Distributed (as the first

⁶² Koné S, Mahé G, Bamba F, Paturel J E, Dezetter A, & Servat E (2023). Building Tools for Further Investigating Acid Mining Production: Intercomparison of Four Hydrological Model Versions through a Scoring Technique on the Niger River Basin, in West Africa. *Envi Scie Res & Rev*, 6(4), 566-594

qualified through a set of two three-model intercomparisons); *SimulHyd* Non-Distributed (as the second qualified through a three-model intercomparison). Finally, GR2M Semi-Distributed (the third qualified through a two-model intercomparison) and GR2M Non-Distributed (the fourth).

4.2. Sum-up results on the 16 watersheds (a Totalizing approach)

The totalizing approach consists in performing the intercomparison of the four model versions on the studied 16 watersheds at once. Globally, intercomparison results through our scoring technique leads to, both in terms of high efficiency and in terms of low sensitivity (to samples), the following ordering from the best to the worse model version, on the studied 16 watersheds on the Niger River and some of its tributaries. *SimulHyd* Non-Distributed ranks first, *SimulHyd* Semi-Distributed second, GR2M Non-Distributed third and GR2M Semi-Distributed last (Figure 2).

When intercomparing models on the single *Koulikoro* watershed (the largest one), the precedent ordering is respected in terms of model efficiency but not in term of les sensitivity to samples. Hence, both the ranking of *SimulHyd* Non-Distributed versus *SimulHyd* Semi-Distributed and the ranking of GR2M non-distributed versus GR2M Semi-Distributed are respectively interchanged. We hence enhance the accuracy of the conceptual framework GR2M in proposing a set of two model versions *SimulHyd* Non-Distributed and *SimulHyd* Semi-Distributed.

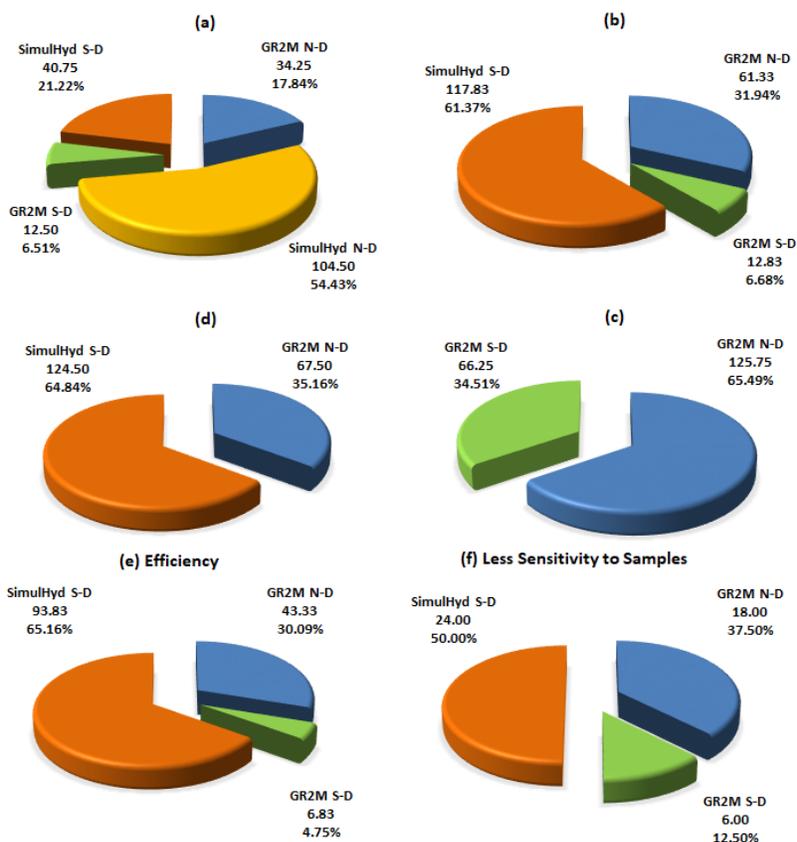


Figure 2: Intercomparison results (totalizing approach) on 16 watersheds of the Niger River.

Clockwise, the first graph (top left, a) permits to discriminate SimulHyd Non-Distributed as the most efficient model against the three others (it obtains more than 50% out of the $16 \times 12 = 192$ points). The second graph (top right, b) shows SimulHyd Semi-Distributed in the winning position over the two other models (it also wins more than 50% out of the $16 \times 12 = 192$ points of the three-model intercomparison); eventually the first 2-model intercomparison (middle right, c) exhibits the predominance of GR2M Non-Distributed over GR2M Semi-Distributed (125.75 points against 66.25 points). The second 2-model intercomparison (middle left, d) shows which percent SimulHyd Semi-Distributed excels over GR2M Non-Distributed, it gains 64.84% out of the 192 points (against 35.16%). The last row dissects the 3-model intercomparison (on top right) in terms of both efficiency (e) and less sensitivity to samples (f).

4.3. Basin approach in intercomparison results presentation.

Kone et al. (2023)⁶³ thoroughly demonstrate the importance of a third approach using figures and an intercomparison map.

4.4. Developed Scoring technique in relation to methods in literature

The present scoring technique performs intercomparison in assigning scoring-points to models based on differences of calculated efficiency criteria, such as Nash criterion. The technique has a bias component for assessing efficiency and a variance component for assessing sensitivity to samples. Models are commonly assessed based on these two components; however, Baroni et al.⁶⁴ compared distributed models in just analysing their sensitivity to “evapotranspiration and soil moisture at different soil depths” when observing their “models agree in the simulated river discharge”.

The bias component of our scoring technique is based on differences of criteria calculated using runoff simulation whereas its variance component is based on the difference of both model parameters and Nash criterion obtained between two calibration periods.

⁶³ Koné S, Mahé G, Bamba F, Paturel J E, Dezetter A, & Servat E (2023). Building Tools for further Investigating Acid Mining Production: Intercomparison of Four Hydrological Model Versions through a Scoring Technique on the Niger River Basin, in West Africa. *Envi Scie Res & Rev*, 6(4), 566-594

⁶⁴ Baroni G, Schalge B, Rakovec O, Kumar R, Schüller L, Samaniego L, et al. A Comprehensive Distributed Hydrological Modeling Intercomparison to Support Process Representation and Data Collection Strategies. *Water Resour Res*. 2019;

However, Garavaglia et al.⁶⁵ suggested analysing more than one output data in comparing model structures.

The literature scarcely elucidates both concepts investigated in this paper: the intercomparison between gridded semi-distributed modelling, as we have developed it, and the interchangeability of set of parameters between model versions. Therefore, critics are in the next sub-section.

4.5. Critique about the developed scoring technique

The developed scoring technique tends to give equal weight to large and small differences between models in terms of calculation of existing performance criteria, such as Nash criterion and robustness calculation. Therefore, the proposed method produces scoring-points that bring semi-quantitative information relative to a set of models involved in an intercomparison process. Moreover, scoring-points won by a model could change when varying the number of models in the competition: it is thus a relative method as the results depend on the selected set of models to be intercompared.

However, regional projects that imply hydrological modelling adequate models or model versions for reaching optimum results could require the developed intercomparison method to choose the in a study area.

⁶⁵ Garavaglia F, Le Lay M, Gottardi F, Garçon R, Gailhard J, Paquet E, et al. Impact of Model Structure on Flow Simulation and Hydrological Realism: From a Lumped to a Semi-distributed Approach. *Hydrol Earth Syst Sci.* 2017;21(8).

4.6. Parameterized SimulHyd semi-distributed on the Niger River Basin

In West Africa, a rainfall drop occurred around 1970 that is considered as a turning point⁶⁶ ⁶⁷. Kone⁶⁸ considered a time span before this date as a reference period in the hydro-system functioning. The period 1907-1970 is thus a reference period on which calibrated parameters are given. At the Koulikoro hydrometric station on the Niger River, we obtained $X1 = 0.575025$ and $X2 = 0.533399$ as the calibrated parameters of the SimulHyd non-distributed model over 1907-1970.

The set of parameters ($X1$, $X2$) is injected in SimulHyd semi-distributed model to illustrate both the interchangeability of parameters between model versions and the use of this parameterized model on a third period (1996-2018). Simulated runoff on the table 1 are obtained using the parameterized SimulHyd semi-distributed. The parameterization uses the calibrated parameters from its lumped version on a reference period.

As a way forward in gridded semi-distribution modelling, in West Africa, we build a parameterized SimulHyd semi-distributed model in replacing its parameters by the set

⁶⁶ Ardoin-Bardin, S., Dezetter, A., Servat, E., Dieulin, C., Casenave, L., Niel, H., ... & Mahe, G. (2006). Application of Climatic Scenarios in Hydrological Modelling: Using GCMs Outputs. *Climate Variability and Change: Hydrological Impacts*, 436-441.

⁶⁷ Koné, S. (2007). Master' s thesis (DEA) : "comparison Entreune Modélisation Semiglobal Etune Modélisation Globale". Université Montpellier II, (2006-2007).

⁶⁸ Koné, S. (2015). Apport de la Géostatistique à la Modélisation Hydrologique: Etude de Bassins Hydrologiques en Zone Soudano-Sahélienne (Doctoral dissertation, Institut Supérieur de Formation et de Recherche Appliquée, ISFRA-USJPB, Bamako-Mali).

of parameters from its lumped version, at the hydrometric station of Koulikoro, on the Niger River in West Africa.

Simulation results from the parameterized SimulHyd semi-distributed lead to runoff data in Table 1. Moreover, the parameterization uses the calibrated parameters from the SimulHyd lumped version calibrated on a reference period (preferably before 1970 in West Africa).

Table 1 demonstrates that discharge time series (runoff) were affected by the dropping occurred in precipitation (rainfall) around 1970, in West Africa: precipitation dropping varies between 7% and 12 % while runoff dropping stresses between 8% and 26% % (Table 1, column A). These remarks are consistent with previous results from literature.

Mahé et al.⁶⁹ demonstrated the non-linearity of rainfall-runoff relation by analyzing the groundwater depletion curves. Their results led to conclude that the diminution of groundwater resources affects the baseflow contribution to discharge at hydrometric stations.

Table 1: Parameterized SimulHyd semi-distributed on 16 watersheds. The parameterization uses the calibrated parameters from the SimulHyd lumped version calibrated on a reference period (preferably before 1970 in West Africa). The A column shows the variation of simulated runoff between both periods (before and after 1970). The B column shows the variation of simulated runoff at a hydrometric station compared with the one at Koulikoro

⁶⁹ Mahe G, Lienou G, Descroix L, Bamba F, Paturol JE, Laraque A, et al. The Rivers of Africa: Witness of Climate Change and Human Impact on the Environment. Hydrol Process. 2013;27(15).

station on the reference period (ideally before 1970) while the column C concerns the period ideally after 1970 up to 2020.

Hydro metri c Statio ns	Are a in Km ²	Runoff simulations through SimulHyd semi-distributed using parameters (X1, X2) of its lumped version (calibrated on a first period)					Statistics on simulated Runoff: variation (A) and compared with Koulikoro (B and C)			
		Parameters and Modulus				Modulus on a		A [%]	B [%]]	C [%]
		On a reference period ideally before 1970				period after 1970 and up to 2020				
Nu mbe r of year s in refe renc e peri od	X1	X2	First sim ulat ed Run off [mm]	Nu mber of year s in the sele cte d peri od	Seco nd sim ulat ed Run off [mm]					
Bana nkoro	73 45 8	10	0.60 117 4	0.60 3419	30	40	26	- 1 3	- 1 1	- 3
Baran ama	66 08	8	0.47 847 9	0.57 0661	40	40	37	- 7	1 8	37

Baro	13 10 8	21	0.63 403 3	0.63 1035	55	50	45	- 1 8	6 2	67
Dialakoro	70 59 1	14	0.62 651 3	0.56 7465	40	50	31	- 2 3	1 8	14
Faranah	31 78	12	0.58 631 3	0.58 5309	55	40	50	- 8	6 0	87
Gouala	33 07 5	10	0.77 653 2	0.42 3431 9	59	50	51	- 1 4	7 4	89
Iradoougou	18 24	6	0.28 600 0	0.48 4884	42	50	39	- 7	2 4	44
Kankan	10 08 0	21	0.60 202 1	0.67 0842	59	50	48	- 1 9	7 4	78
Kerouane	14 23	8	0.66 316 8	0.75 5662	75	40	79	5	1 2 1	19 3
Kissidougou	14 00	11	0.79 541 4	0.58 1290 2	90	50	76	- 1 6	1 6 5	18 1
Koulikoro***	12 06 03	21	0.59 493 4	0.52 1148	34	50	27	- 2 1	0	0
Kourossa	17 20 1	21	0.51 997 3	0.56 5106	39	50	29	- 2 6	1 5	7
Mandi ana	21 95 2	14	0.52 375 6	0.56 1184	38	50	31	- 1 8	1 2	15

Ouaran	19 77 7	14	0.52 057 1	0.50 3660	29	50	22	- 2 4	- 1 5	- 19
Siguiry	71 06 4	17	0.63 236 7	0.56 9243	42	50	33	- 2 1	2 4	22
Tinkisso	65 69	13	0.53 510 8	0.57 4188	35	50	26	- 2 6	3	-4

4.7. Gridded data generated from SimulHyd semi-distributed – their potential implication in extractive industries in West Africa

Economic mining ores are becoming deeper and are being confronted on water issues from surface runoff water as well as from groundwater flow around the world. We introduce this problematic in investigating its surface runoff aspect and its other aspects would need further investigation, in West Africa. Gridded maps are intermediary produced when running SimulHyd model in its semi-distributed version at the hydrometric station of Koulikoro (in calibration phase), over 1907-2018, on the Niger River. Modelling input are mainly hydroclimate data (precipitation and evapotranspiration) from climate research unit and are partially explained in Harris et al.⁷⁰

⁷⁰ Harris I, Osborn TJ, Jones P, Lister D. Version 4 of the CRU TS Monthly High-resolution Gridded Multivariate Climate Dataset. Sci Data. 2020;7(1).

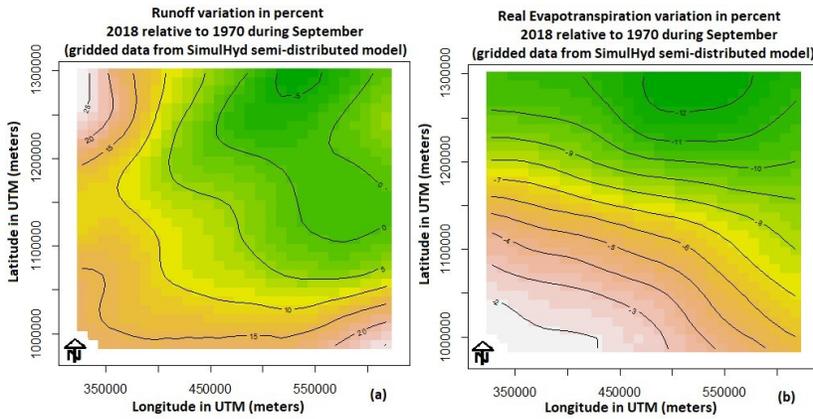


Figure 3: Relative variation of runoff (a) and the relative reduction of real evapotranspiration during September when comparing 2018 to 1970.

Runoff and real evapotranspiration are thus modelling output both during September 2018 and during September 1970. We use 48 simulated runoff values (on 0.5-degree x 0.5-degree grid) to generate maps through interpolation processes between 1046 spatial nodes. Furthermore, such information on runoff permits informing about mining acid evolution and environmental pollutions.

Results corroborate that surface runoff increased on a major part of the study area when considering September 2018 relatively to September 1970. The 48 grids (0.5-degree x 0.5 degree) in consideration on Figure 10 belong partially to other basins. Therefore, a protocol would be further needed to average runoff information on a specific grid when different simulations at different hydrometric stations concerned the same grid.

We present on the Figure 3 both the relative variation of runoff (a) and the relative variation of real evapotranspiration (b) during September when comparing year 2018 to year 1970 (as a reference). Both

relative variations are mapped around 957 spatial nodes. The Figure 3 allows assessing climate change between these two periods separated by 48 years.

5. Conclusion

This paper confirms a new efficient model version (*SimulHyd* – Simulation of Hydrological systems) on the Niger River and its tributaries. It proposes and validates an intercomparison method in hydrological modelling as targeted by the World Meteorological Organization since 1975. Our method is a scoring technique that integrates harmoniously previous known model performance criteria and provides a unique score of performance, for a specific model version in relation to others. It is an intercomparison method for comparing models on both a single watershed and on several watersheds at once.

Two leveled groups of components characterize this scoring technique that sum up to 12 scoring-points on each watershed: an accentuated bias component with nine scores and a variance component with three scores. On 16 watersheds, results show the preponderance of *SimulHyd* semi-distributed (with 117.83 out of 192 score-points, equivalent to 61.37%) over both GR2M lumped non-distributed (with 61.33 out of 192 score-points, equivalent to 31.94%) and GR2M semi-distributed (with 12.83 out of 192 score-points, equivalent to 6.68%). Specifically, the watershed at *Koulikoro* hydrometric station (on the Niger River) should better be investigated and accordingly to the study objectives, in using *SimulHyd* non-distributed for producing and completing runoff chronological data gaps and in using *SimulHyd* Semi-Distributed for environmental and hydroclimate variability assessments. The study leads further to model parameters interchangeability possibilities using the above-

mentioned four model versions.

The parameterized *SimulHyd* semi-distributed is recommended for investigating future scenario through using output from climate simulation models. Its simulation results permit to corroborate the non-linearity in rainfall-runoff relation in West Africa as precipitation dropping is around 10% while runoff decreasing is around 17%.

This work enriches the literature in methodologies that are reproducible and adaptable on other models and in other geographical contexts.

Figure 4: Relative variation of runoff (a) and the relative reduction of real evapotranspiration during September when comparing 2018 to 1970.

CHAPTER-8

GAUGING THE EFFICACY OF LAWS IN MITIGATING PLASTIC WASTE POLLUTION IN INDIA: A COMPREHENSIVE SCAN THROUGH THE ADEQUACY AND IMPRESSION OF EXISTING LEGAL INSTRUMENTS

Kangkana Goswami*

1. Introduction

The prejudice of Plastic waste pollution is a pervasive global crisis today. This ubiquitous peril of plastic contamination has been plaguing the planet to an appalling level and is now, morphing into an apprehensive apocalypse. With a whopping 350 million tons of trash generated globally¹ per year, only 9% of it is getting recycled according to OCED (The Organization for

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¹ Jayali Wavhal, India's Plastic Menace! Only 30% Of India's 3.4 Million Tones of Annual Plastic Waste Is Recycled, The Logical Indian, <https://thelogicalindian.com/trending/only-30-of-countrys-34-mt-of-annual-plastic-waste-is-recycled-report-39813>, (Aug 25, 2023, 9:20PM).

Economic Cooperation and Development) reports.² This plastic mess congesting waterways, burying beaches, obstructing ground water, piling up into non-degradable garbage heaps, and making its way into human and animal consumption, is now being taken cognizance of globally and India too has confirmed to the urgencies of galvanizing the garbage management.³ In a recent research, the World Economic Forum has indicated that there will be considerable increase in the volume of plastic production and consumption, and therefore a surge in emission of 'global warming gas' by 2050.⁴ This is where, the need for a stringent Anti-Plastic regime derives worth and importance. In strong consonance with such significance, whistle-blowing the crusade for an Anti-Plastic Legal framework while assessing and re-assessing its practical feasibility, efficiency and adequacy is the clarion call of the day.

The weaponry of 'Judicial Activism' has been instrumental in invoking paradigm shift in the legal handling of various socio-political-economic challenges along with inducing bonafide changes and improvements in the same. In continued pursuance of such objectives, exhaustive research and judicious reporting in the

2 Oecd Global Plastic Outlook, Plastic Pollution is Growing Relentlessly as Waste Management and Recycling Fall Short, Says OECD, <https://www.oecd.org/environment/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm> (Last visited aug 25,2023,9.40pm).

³ Ramesh Ilangovan, Will India Need a Landfill the Size of Bengaluru? The Wire, <https://thewire.in/environment/landfill-solid-waste-cpcb> (Aug 25,2023, 9:50PM).

⁴ World Economic Forum, The New Plastics Economy; Rethinking the Future of Plastics [www://efaidnbmnnnibpcajpcgclefindmkaj/https://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf](http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf) (last visited Aug 26,2023,12.00AM)

relevant field can bell the cat for the concerned stakeholders to wake and act. It is also important to note, that a preliminary investigation into the existing literatures reveal that there has been very less research in the area of 'pre-requisites of an anti-plastic legal regime', and therefore, a research gap. Hence, this paper is an attempt to investigate into the feasible legal pre-requisites to tackle 'plastic' menace and construct the edifice towards a stringent anti-plastic regime.

This study on the quintessence of an anti-plastic regime is of utmost relevance and significance in the contemporary global environmental discourse, as plastic waste today, is choking the planet. Time and again administrative mandates have been framed against the misuse of single-use-plastic. But due to a plethora of reasons including lack of awareness, grey areas in terms of scientific alternatives, absence of budget-friendly substitutes, and un-availability of non-hazardous way of treatment of existing plastic trash, the call against plastic has not seen complete accomplishment. This study therefore intents to make humble attempts towards consolidating all scattered information available, introspecting into the constraints and foraying into the possible legal solutions to the problem at hand.

The objectives therefore, are to identify at the first place the environmental threats pertaining to 'Plastic Pollution', with an exhaustive study into the different forms of plastic pollution in different medium. This is followed by an in-depth scrutiny of the existing practices, consumer and corporate behaviour, political will, legislative and administrative impact, and institutional capacity building in addressing the threats practically

and identify the grey areas.⁵The rationale of this project therefore lies in bridging the inter-sectorial gaps in the process of creating concrete research backed base towards understanding the menace of plastic and sorting out ways to contain and address it.

The striking paradox that first came to the notice of the researcher is that even after being backed by international and national legal intervention in the area of plastic pollution and environmental deterioration, the awareness, consciousness and individual and collective adoption of responsibility from stakeholders across sectors has been an area of ironical void.

Also, laws, regulations, administrative mandates and cautions have not been able to bridge the gap between theory and practice and has eventually led to an irrevocable, irreversible and irretrievable divorce between environmental protection and sustainability. This study therefore is centered on understanding the cause of lethargy in terms of addressing a situation as grave as the 'plastic menace' and initiating a thought towards an all-round pursuance of an anti -plastic legal regime.

2. The plastic prejudice: Understanding the manifold impact of plastic pollution on natural resources.

Plastic is one of the world most unmanageable major toxic pollutant. Plastic, though is an incredibly useful material because of its durability, is the major cause of environmental concern because of its toxic composition

⁵ UNIDO, 'Recycling of Plastics in Indian Perspective' [www://efaidnbmnnnibpcajpcgclefindmkaj/https://www.unido.org/sites/default/files/files/2018-11/Plenary%20%20-%20Plastics%20-%20Mohanty.pdf](http://efaidnbmnnnibpcajpcgclefindmkaj/https://www.unido.org/sites/default/files/files/2018-11/Plenary%20%20-%20Plastics%20-%20Mohanty.pdf) (last visited Aug 26, 2023, 1.00AM).

and non-biodegradability. What adds to the major cause of concern is the dumps of heterogeneous unsegregated plastic waste that leads to release of greenhouse gases from the landfills. The plethora of prejudices that comes with plastic abundance can be clubbed under several heads.

- Unmanageable Toxic Trash in Municipal Waste Dumps: Land/Ground Water/Air Pollution:
- Plastic discarded is more disastrous than plastic in use. Plastic, as a matter of fact takes more than 400 years to decompose. According to a study by Environmental Protection Agency, as plastic is only 50 years old, every piece of plastic that was ever made and dumped in US still exist.⁶ Along with single use plastic, plastic used for packaging that are dumped in trash dumps and landfills cause serious harm as the toxic remnants from plastic seep into ground water and affect the quality of soil and ground water for years to come.⁷
- Assessing the veracity of micro-plastic pollution in water bodies
- Plastic move around the world. Plastic trash can be easily carried by rivers and thrown into sea beds and coastal areas. When plastic trash is dumped in marine bodies and oceans, the whirling currents, the wave impact and the wind break down plastic into small particles and micro

⁶ Ocean Literacy Portal, Ocean Plastic Pollution an Overview: data and statistics, [oceanliteracy.unesco.org/plastic-pollution-ocean/#:~:text=plastic%20pollution%3a%20key%20facts&text=the%20epa%20\(environmental%20protection%20agency,becomes%20micro%20plastics%2c%20without%20fully%20degrading.](https://oceanliteracy.unesco.org/plastic-pollution-ocean/#:~:text=plastic%20pollution%3a%20key%20facts&text=the%20epa%20(environmental%20protection%20agency,becomes%20micro%20plastics%2c%20without%20fully%20degrading.)

⁷ Okunola A Alabi et al., Public and Environmental Health Effects of Plastic Wastes Disposal: A Review, 5 Journal of Toxicology and Risk Assessment (2019).

plastics, increasing their tendency of further spread, making them further unmanageable⁸. Plastic micro-fibers are abundant in the Himalayas, the Ocean islands, beaches, deltas, coastal, literal and marine openings and even in municipal drinking water systems.⁹

- Such is the dimension of adversity, that these micro-plastics cannot be collected, easily identified, segregated, treated, recycled or even reintegrated. They easily penetrate into ground water channels, mix with soil, seep into water channels, blend with eatables, churn into air, and even can change in shape, size and structure due to biological process such as aggregation of organic material or bio-fouling. Micro-Plastic fibers settled as sediments in the aquatic ecosystem with higher density and toxicity potential may be poisonous to the aquatic flora and fauna. This environmental plastic can also easily leach toxic additives or concentrate toxins already in the environment, making them bioavailable again for direct or indirect human exposure. Dangerously enough several plastics, such as Polystyrene (PS), Polyvinyl Chloride (PVC) or Polyethylene Terephthalate (PET) have higher specific gravity in comparison to water, resulting in higher settling rates of this forms of plastic as residues and sediments. It is prominently due to

⁸ Albert A. Koelmans et. al., Microplastics in Freshwaters and Drinking Water: Critical Review and Assessment of Data Quality. Water Research, 155 (2019).

⁹ European Parliament's Committee on Petitions, the Environmental Impacts of Plastics and Micro-plastics Use: EU and National Measures.

[www://efaidnbmnnnibpcajpcgclefindmkaj/https://www.europarl.europa.eu/RegData/etudes/STUD/2020/658279/IPOLSTU\(2020\)658279_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2020/658279/IPOLSTU(2020)658279_EN.pdf) (last visited Aug 26,2023, 1.15 AM).

these reasons that among Plastic debris, micro plastic and Nano plastic trash concentration have gained greater attentions when the fate and potential of plastic pollution is assessed in aquatic contamination scale.

- To add to the woes, humans consume these abundant fragments of plastic almost every day, daily. It is these micro-plastic fibres that are ingested into the human body, causing exponential increase in variety of health problems including reproductive harm, obesity, organ problems, development delays in children, malignant tissue formations and even cancer.
- **Consequential impact of plastic contamination on human health:** Plastic, along with the additives used in plastic have toxic and carcinogenic substances. Studies reveal that more than 170 chemicals used for development of plastic products have direct impact on human health including neurological, gastrointestinal and respiratory damages. Rampant use of plastic as single-use facilities and food packaging cause ingestion and/or inhalation of large amount of these toxic substances leading to impairment of nervous systems, genetic irregularities, endocrine disruptions, leukemia, metabolic irregularities and other acute and chronic syndromes.¹⁰
- The nuances of Plastic trash management also involve exposure to toxic releases. The technical processes like pyrolysis, incineration etc. lead to rampant and extensive release of noxious gases,

¹⁰ Ciel, Plastic and Human Health: A Lifecycle Approach to Plastic Pollution, <https://www.ciel.org/project-update/plastic-and-human-health-a-lifecycle-approach-to-plastic-pollution/> (last visited aug 26,2023, 3.00am).

poisonous substances and toxic metals into the air, soil and marine channels. Adding dimensions to the gravity of the problem, fly ash, volatile emissions from treatment plants and furnaces, slag in a burn pile permeate to environment in the vicinity, accumulate in soil, ground water, and water bodies and eventually end up entering the human body through agricultural food, air and water.

- Inadequacy of legal norms and means to secure transparency of information in terms of the chemicals used in production of plastic materials leads to failure in proper assessment of its contamination quotient. This in turn impairs the competency of customers to make informed and responsible choices and regulators to monitor and impose adequate safeguards.
- Impact on Food Chain: Trophic Transfer/ Bio-Accumulation
- Plastic impact the ecosystem by tempering with the food chain. Plastic trash in the form of micro-plastic, and toxic leaching of plastic disturb even the world's tiniest organism. Micro-organisms like plankton gets poisoned due to plastic ingestion, in turn also infecting the larger animals when these planktons are consumed by these animals.¹¹ In scientific terms, this phenomenon is called 'trophic transfer' of micro-plastics.¹²

¹¹ <https://www.conserve-energy-future.com/causes-effects-solutions-of-plastic-pollution.php>, (last visited Aug. 26, 2023, 3.00am).

¹² Plastic Soup Foundation, Plastic in Food Chain, <https://www.plasticsoupfoundation.org/en/plastic-problem/plastic-affect-animals/plastic-food-chain/#:~:text=Plastic%20in%20the%20food%20chain,a%20process%20called%20bio%2Daccumulation> (last visited Aug 26, 2023, 3.00AM).

- Bio-accumulation of plastic pollutants is another dangerous phenomenon. Plastic binds and blends with environmental pollutants. These pollutants, when they enter the food chain, also carry with them the blended toxic components which then gets accumulated in animal fat and tissue. Plastic, thus breaks the natural balance.

3. Contemporary Scenario of Plastic Waste Pollution in India:

According to an upsetting report published by a Swiss based research agency, 'Environmental Action', India is registered among the top 12 countries producing more than 50 percent of the mis-managed plastic of the world in a year.¹³ Projecting disturbing predictions on the sidelines of the 'Plastic Overshoot Day', the Swiss organization stated that on January 6, 2023, the amount of waste generated by India outweighed its management capacity on the scale of its Mismanaged Waste Index (MWI).¹⁴ This humongous stack of accumulated plastic trash in the form of municipal agglomerations, commercial residues, medical disposables, industrial scrap and sanitary waste is contaminating landfills, poisoning water bodies and fouling air with toxic leachate and noxious post-treatment fumes.

¹³ Environmental Action, Plastic Overshoot Day 2023 Report. [www://efaidnbmnnnibpcajpcgicfindmkaj/https://plasticovershoot.earth/wp-content/uploads/2023/06/EA_POD_report_2023_Expanded_V3.pdf](http://www.efaidnbmnnnibpcajpcgicfindmkaj/https://plasticovershoot.earth/wp-content/uploads/2023/06/EA_POD_report_2023_Expanded_V3.pdf) (last visited Sep 1, 2023).

¹⁴ Kiran Pandey, India Among the 12 Countries Responsible for 52% of the World's Mismanaged Plastic Waste: Report, Down To Earth (Sep 1, 2023, 11.29 AM) <https://www.downtoearth.org.in/news/waste/india-among-the-12-countries-responsible-for-52-of-the-world-s-mismanaged-plastic-waste-report-90927>.

The UNEP has specifically pointed out the marine plastic litter crisis in India has reached an irretrievable stage and heaps of sediments of micro-plastic make their way to the coastal waters and others marine bodies through creeks, estuaries, brooks and rivers¹⁵. In this regard, the quantity of plastic dump on wetlands is also an important area to be introspected upon. The *Basai* wetland in Gurugram¹⁶, the Ramsar site of *Nalsarovar* in Gujrat¹⁷, the *Surajpur* Urban wetland in Noida, the *Deepor Beel* Ramsar wetland¹⁸ in Assam etc. are just to name a few, wherein rampant plastic disposal practices have converted these water-bodies into ballooning plastic dump-yards. In *Krishna Das K V v. State of Kerala* the National Green Tribunal asserted that the National Wetland Authority should take cognizance of the deteriorating state of the *Ashtamudi* wetland and *Vambanad-Kol* Ramsar wetlands in Kerela reeling under unmanageable plastic pollution¹⁹. The alarming situation in Ashwani Khud wetland of Shimla is another instance where the National Green Tribunal has taken sou-moto cognizance of the matter in public interest.²⁰

¹⁵ Asish Kumar Chauhan, Plastic Waste Woes: A Primer on India's Marine Litter Problem, Down To Earth (Sep 1, 2023, 11.29 AM), <https://www.downtoearth.org.in/blog/pollution/plastic-waste-woes-a-primer-on-india-s-marine-litter-problem-87059>.

¹⁶ Times of India, Plastic Bomb at Gurugram Wetland, <https://timesofindia.indiatimes.com/city/gurgaon/plastic-bomb-at-gurgaon-wetland/articleshow/64514402.cms> (last visited Sep 1, 2023).

¹⁷ Times of India, Nalsarovar, A Plastic Swamp, <https://timesofindia.indiatimes.com/city/ahmedabad/nalsarovar-a-plastic-swamp/articleshow/18359311.cms> (last visited Sep 1, 2023).

¹⁸ Dr. Diptimoni Baroah et al., Efficacy of Legal Institutions in Protecting Assam's Ramsar Site: Assessing Waste Pollution in Deepor Beel through The Legal Lens, 7 *Nlualpr*, 55, 55-89 (2022).

¹⁹ *Krishna Das K V v. State of Kerala*, Original Application No. 147/2022

²⁰ Court on its own Motion v. State of Himachal Pradesh & Ors., Original Application No. 446 of 2018.

The courts in India including the Supreme Court and the National Green Tribunal have utilized opportunities in the form of Judicial adjudication, Judicial review and Judicial activism to make corrective interventions in the area of administrative handling of solid waste management. In the landmark Judgement of *Dr. Wadhwa v. Union of India*, the Supreme Court ruled that the municipal bodies cannot plead 'non-availability of funds' as a genuine excuse for non-performance or neglect of duty²¹. Again, in *DK. Joshi v. C.S State of UP*, the Supreme Court directed the State Government of Uttar Pradesh to form a monitoring committee for inspecting the waste management handling of public authorities of the State²². Such instances point towards the inefficacy of laws in enforcing the real-time execution of the stipulated mandates on ground, in letter and spirit.

4. India's Plot Against Plastic Waste Pollution: Initiatives So Far and Cause of Concern

The common narrative reiterates that pledge against plastic is vague and bogus and that getting rid of existing plastic trash is too humongous an idea to be conceived. This is where the quest for the pre-requisite for an anti-plastic regime gets provoked in the minds of scientists, environmentalists, Policy makers, economists and legislators.

The Government has been phrasing and re-phrasing anti-plastic laws, mandates and bans for years now. 'The Environment (Protection) Act of 1986'²³ was the first

²¹ Dr. B.L Wadhwa v. Union of India, 1996 SCC (2) 594.

²² DK. Joshi v. C.S State of UP, AIR 2000 SC 384.

²³ The Environment (Protection) Act, 1986, No. 10, Acts of the Parliament, 1986 (India).

major regulatory legislation articulated by the Indian government, containing provisions for enabling the Central government to regulate all forms of waste including plastic waste. This was followed by a series of specific regulations targeted towards addressing the plastic prejudice in the country.

From its first ‘The Plastic (Manufacture, Sale and Usage) Rules’ in 1999²⁴, ‘The Plastics (Manufacture, Usage and Waste Management) Rules’ in 2009²⁵, The Plastic Waste (Management and Handling) Rules in 2011²⁶, The Plastic Waste Management Rules in 2016²⁷...to the recently drafted ‘The Plastic Waste Management (Amendment) Rules, 2022’, there is no dearth of rules and subsequent amendments in the aforesaid area²⁸. In addition to these specific plastic waste regulations, rules like ‘The Hazardous Wastes (Management & Handling) Rules, 1989²⁹’, (amended in 2000) also cover plastic wastes.

Managing plastic pollution also has a direct connect towards implementing and honouring India’s national

²⁴ India Kanoon, Plastic (Manufacture, Sale and Usage) Rules, 1999, [https://indiankanoon.org/doc/186523748/#:~:text=\(1\)%20No%20person%20shall%20manufacture,thickness%20specified%20in%20rule%208](https://indiankanoon.org/doc/186523748/#:~:text=(1)%20No%20person%20shall%20manufacture,thickness%20specified%20in%20rule%208) (last visited Sep 1, 2023).

²⁵ INDIA ENVIRONMENT PORTAL, The Plastics (Manufacture, Usage and Waste Management) Rules, 2009, <http://www.indiaenvironmentportal.org.in/content/287617/the-plastics-manufacture-usage-and-waste-management-rules-2009-draft-notification/> (last visited Sep 1, 2023).

²⁶ INDIA WATER PORTAL, The Plastic Waste (Management and Handling) Rules, 2011, <https://www.indiawaterportal.org/articles/plastic-waste-management-and-handling-rules-2011> (last visited Sep 1, 2023).

²⁷ CPCB, Plastic Waste Management Rules, 2016, <https://cpcb.nic.in/rules-4/> (last visited Aug 27, 2023).

²⁸ CPCB, Plastic Waste Management (Amendment) Rules, 2022, <https://cpcb.nic.in/rules-4/> (last visited Aug 27, 2023).

²⁹ CPCB, THE Hazardous Wastes (Management & Handling) Rules, 1989, <https://cpcb.nic.in/rules/> (last visited Sep 1, 2023).

commitment to the 'Paris Climate Treaty'³⁰ and the 'Sustainable Development Goals' specifically SDG 6³¹ and SDG 12³², exerting thrust towards creating a congenial environment for uncontaminated urban life.³³

These rules and mandates however never saw the light of the day owing to multiple reasons. It all starts with mudslinging between the Centre and the State, where the States assert that they have placed on record administrative mandates against plastic waste mismanagement, but there is nothing more concrete and sustainable on the part of the Central Government to go about it further. The Centre on the other hand depends on feebly empowered agencies like the CPCB and the State Pollution Control Boards (SPCB) to enforce it. These agencies are already fighting a losing battle owing to constraints like low staff strength, or multiplicity of task, lack of coordination among related agencies or low motivation and accountability among the staff.

Very often the government has been compelled to give in to the pressure exerted by the plastic industry and lobby groups. The Government at a point has to take cognizance of the fact that the plastic industry remains critical to the economy of the country. The government has to acknowledge that, legislating big businesses to

³⁰ CPCB, Plastic Waste Management (Amendment) Rules, 2022, <https://cpcb.nic.in/rules-4/> (last visited Aug 27, 2023).

³¹ UNEP and Sustainable Development; Goal 6: Clean Water and Sanitation, <https://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-6/> (last visited Sep 1, 2023).

³² UN, SDG Goal 12: Ensure Sustainable Consumption and Production Pattern, <https://sdgs.un.org/goals/goal12/> (last visited Sep 1, 2023).

³³ United Nations Climate Action, Nations Agree to End Plastic Pollution <https://www.un.org/en/climatechange/nations-agree-end-plastic-pollution> (last visited Sep 1, 2023).

reduce their utility of unnecessary plastic and innovate alternatives can be a solution, but that has to pass through the crest and troughs of contention and concord between the government and the business houses.

Moving further, when it comes to dealing with the existing plastic trash, a lot can be learnt from Sweden. Known as one of the world's best recycling nations, Sweden, is following the policy of 'No Plastic Ban, Instead More Plastic Recycling.' The incinerators of Sweden have transformed its trash to treasure³⁴. The country has consumed and exhausted its plastic to an extent where it is now banking on trash from other nations to continue its operation. This ambitious operation however goes for a toss when it comes to real time operation in India, as trash in India is not segregated at source and getting the public fully aware, conscious, and holistically operative is a herculean task at hand.

Therefore, tougher environmental standards for plastic products and insisting on the use of recyclable plastic only, coupled with religious application of 'polluter pay principle' and 'extended producer responsibility' might at-least pull a brake on the explicit irresponsibility businesses and households exhibit.

V. The New Phase-wise approach: 'The Plastic Waste Management (Amendment) Rules, 2021' and 'The Plastic Waste Management (Amendment) Rules, 2022'.

In its recent move to phase-out high littering single use plastic and check unmanaged polythene waste, the

³⁴ Sweden Sverige, Sweden is Aiming for Zero Waste; That Means a Commitment to Change our Everyday Lives, <https://sweden.se/climate/sustainability/swedish-recycling-and-beyond> (last visited Sep 1, 2023).

Ministry of Environment, Forest and Climate Change has articulated the 'Plastic Waste Management (Amendment) Rules 2021'³⁵ and the guidelines on 'Extended Producer's Responsibility' through the Plastic Waste Management (Amendment) Rules 2022.³⁶

The curtain-raiser of the 2021 Rules began with specifically imposing the increase of thickness of plastic from 50micron to 120 micron, with an intent to improve the scenario collection of plastic bags to encourage their reuse and contribute to the zero-waste paradigm.

In the 2022 Rules, 'Extended Producer's Responsibility (EPR)' that draws inspiration from the core principles of 'Polluter pay' and 'Precautionary Principle' imposes onus on the manufacturer or the producer to take responsibility for the 'end-of-life' stage of their products and contribute to circular economy by re-use of recycled post-consumer trash remnants. Through EPR, the producers engage in post-use collection and recycle of their products under an organized and closely monitored system. The Rules also stipulate that non fulfilment of EPR obligations attract penal sanctions stipulating a fine up-to Rs 100,000 or a jail term up-to 5 years.

These set of new regulatory measures, if not dragged under the carpet, can prove to be game changer for the first time because of its phased approach and an attempt towards a regularized plastic waste management system. However, drawbacks like the exclusion of the informal sector, inadequacy of an accurate and organized

³⁵ Ministry of Environment, Forest and Climate Change, The Plastic Waste Management (Amendment) Rules 2021, <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1745433> (last visited Aug 25,2023).

³⁶ Plastic Waste Management (Amendment) Rules 2022, supra note 16.

mechanism of waste disposal and absence of third-party auditing and monitoring mechanism may make the entire process cumbersome and futile³⁷. Non-involvement of inter-ministerial participation might also dilute all efforts as there are ample chances that, ousting inter-ministerial dialogue might also carry with it, the risk of disregarding or under-estimating the inter-disciplinary challenges. This is where the acceleration of the new mandate might stumble again only to either get relaxed or diluted in due course of execution.

5. The Legal Angle: What it is and what it ought to be?

A critical analysis of 'The Solid Waste Management Rules 2016' and 'The Plastic Waste Management Rules 2016 and the amendments thereof, reveal a host of grey areas that needs introspection.

- Clause 4 of 'The Solid Waste Management Rules, 2016' (hereinafter SWMR) clearly requires that Waste Generators shall segregate waste into bio-Degradable/ non-Bio-degradable and hazardous waste and store them separately. These instructions were never realized except in a few hospitals where waste is separated to segregate medical waste and food waste³⁸.

³⁷ Sonal Verma , Pragma Mishra, India: July 1, 2022 – End To Plastic Menace In India?, MONDAQ, (Aug 26,2023, 2.59 AM), <https://www.mondaq.com/india/waste-management/1207968/july-1-2022--end-to-plastic-menace-in-india#:~:text=Major%20Drawbacks%20of%20the%20guidelines&text=3.2%20Lack%20of%20Supply%20Chain,reliable%20reporting%20and%20monitoring%20mechanism.>

³⁸ CPCB, Duties of Waste Generators, Clause 4, Solid Waste Management Rules 2016, [www://efaidnbmnnnibpcajpcglclefindmkaj/https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf](http://www.efaidnbmnnnibpcajpcglclefindmkaj/https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf) (last visited Aug 25,2023).

- Clause 4 also talks about wrapping of sanitary waste in secured wrappers³⁹ by the waste generators. These secured sanitary waste wrappers are to be provided by the product producers. However, in practice, sanitary product producers have never come up with providing disposal wrappers along with their products⁴⁰.
- Clause 6 of the SWMR 2016 states that all resident welfare and market associations shall facilitate collection of segregated waste in separate streams. The clause also mentions that “as far as possible” biodegradable waste shall be processed and disposed off within individual premise to ensure waste reduction and minimization of waste going to the landfill. ⁴¹Under Clause 11, the Secretary-in-charge, Urban Development⁴², should emphasize on waste reduction. Now, the problem with this clause is the phrase ‘as far as possible’ which reduces the gravity of the mandate and makes it an optional choice for the waste generators to treat their bio-degradable waste locally within their own premise. Also, there is no monitoring measure on the part of the concerned authority to monitor such mandates at such minute level or any penal sanction to reprimand defaulters. All of these actually dilutes the

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ CPCB, Solid Waste Management Rules 2016, Clause 6, https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf (last visited Aug 25,2023).

⁴² CPCB, Clause 11, Duties of the Secretary-in-charge, Urban Development in the States and Union Territories, Solid Waste Management Rules 2016, https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf (last visited Aug 25,2023).

purpose of such specifications and restricts them to mere theory without real-time accomplishment.

- Clause 11(j) of the SWMR 2016 also talks about establishment of separate landfills for sanitary Waste.⁴³ Such Facilities have not come up yet. Also, there is no concept of segregation of sanitary waste.
- **Extended Producer’s Responsibility:** ‘The Plastic Waste Management Rules 2016’ and its subsequent amendment in 2022, has mandated primary responsibility of collecting back the Plastic waste generated due to their product. This rule is also applicable Producers, Importers and Brand owners who introduce product in the market.⁴⁴ As such even though solid waste management and plastic waste management collectively fall within the purview of Urban Local Bodies, the angle of ensuring financial sustainability of the service and revenue generation for the Urban Local Bodies is quintessential for uninterrupted continuation of motivated endeavours. In doing so producers, importers and manufacturers should establish concrete coordination with the state authorities in devising out a financial mechanism to incentivize

⁴³ CPCB, Solid Waste Management Rules 2016, Clause 11 (j): Facilitate establishment of common regional sanitary land fill for a group of cities and towns falling within a distance of 50 km (or more) from the regional facility on a cost sharing basis and ensure professional management of such sanitary landfills, https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf (last visited Aug 25,2023).

⁴⁴ CPCB, Clause 15, Solid Waste (Management) Rules,2016, Duties and Responsibilities of Local Authorities and Village Panchayats of Census Towns and Urban Agglomerations., https://cpcb.nic.in/uploads/MSW/SWM_2016.pdf (last visited Aug 25,2023).

the process of collection of plastic. The government will need to leverage finances in mechanisms that allow segregation and collection and adopt strategies which confirm with socio-economic development of the informal sector and transform plastic waste management from a challenge to an opportunity.

- Under Clause 15 of 'The Solid Waste Management Rules 2016', it is the duty of the local authorities to facilitate formation of Self Help Groups, provide Identity cards, and encourage integration in solid waste management including door to door collection of waste.⁴⁵ To add on, while ensuring door to door waste collection, the Urban Local Bodies (ULB) and agents should also impose that the households and market associations segregate waste, in absence of which the ULB will not collect unsegregated waste. Such measure will pressurize the waste generators towards source segregation of waste.
- In the year 2018, 'The Plastic Waste Management Rules, 2016' was amended. This amendment removed Sec.15 of the 2016 rules which dealt with 'pricing of plastic bags', wherein vendors making plastic bags were mandated to register with local bodies and pay a fee of Rs. 48,000 annually. Such omission indicate nexus with industry lobbyist.
- Sec.4(iv) and Sec.4(iv) of 'The Wetlands (Conservation and Management) Rules, 2017' strictly prohibit dumping of municipal solid waste (including plastic waste) in the vicinity or periphery of wetlands and wetland vicinity⁴⁶.

⁴⁵ *Id.*

⁴⁶ The Wetland (Conservation and Management) Rules, 2017, <https://www.forests.tn.gov.in/tnforest/app/webroot/img/document/>

However, rampant practices of dumping of municipal plastic trash continue in wetlands all over India. The examples of the East Kolkata Wetlands in West Bengal⁴⁷, the Varthur, Bellandur and Agara in Karnataka⁴⁸ the Wular lake, the Kreento-Chandhara wetland and the Hokersar Wetlands and in the State of Jammu & Kashmir⁴⁹ etc. are just to cite a few examples where the judiciary has made active injunctive interventions.

6. Conclusion and Suggestions: Carving The Way Forward

The centripetal idea to device out a strategy for a sustainable plastic waste management pre-requisite a feasible (legal–scientific-economic-ecofriendly) infrastructure to tackle the ‘plastic’ menace. A venture into an exhaustive study in terms of understanding the problem and the various facets of the crisis like gauging the causes of concern, scrutinizing environmental friendliness of plastic alternatives, examining the economic feasibility of ‘Plastic ban’ and inspecting the scientific and environmental congruence of legacy- waste treatment processes, suggest carving an all-round doable way forward.

The policy formulation in terms of the way forwards needs an inclusive outreach, engaging stakeholders from all sectors and ministries to effectively go about

legislations/02.%20wetlands-rules-2017.pdf (last visited Sep 1, 2023).

⁴⁷ Subhas Datta V. State of West Bengal & Ors, O.A No. 33/2014/EZ (India).

⁴⁸ The National Green Tribunal in the matter of Court on its own Motion v. State of Karnataka, O.A. No. 125 of 2017, (India).

⁴⁹ Raja Muzzaffar Bhat v. U.T. of Jammu & Kashmir, O.A No. 351/2019, (India).

eliminating the current plastic waste menace at the first place and then reducing future plastic footprints from daily national life. The host of activities due should adhere to scientific conformity along with creating a common consensus among other lobbyist to sacrifice certain conveniences and look for alternatives. After identification of core problematic areas and the common bone of contentions, the next call is to formulate ways to minimize the fissures and bridge gaps to make ends meet.

A plethora of potential suggestions in the legal framework to facilitate an economically viable, scientifically workable and socially feasible consolidated outcome may be clubbed as under:

- Addressing the menace of plastic pollution requires espousing legal outlines to ensure not just 'precautionary principles' in terms of managing plastic waste but also other pro-active angles like adequate access to information regarding the chemical substances used in production of various forms of plastic. Solutions must subscribe to transparency, inclusive partaking, and awareness about 'right to remedy'. The judicial mechanisms of 'polluters pay principle⁵⁰' and 'precautionary principles' should be aptly applied in a way that is practically impactful.
- The first and foremost pre-requisite is to identify the most problematic type of plastic, the most problematic form of mismanagement and the most problematic prejudices that they are currently

⁵⁰ Indian Council for Enviro-Legal Action v. Union of India, 1996 SCC (3) 212.

causing and will exacerbate or intensify in future if they are not targeted and addressed in the legislative articulations.

- The second in the flow-chart is to research exhaustively and have a minute understanding on the impact of their phase-out on different sectors, industries, on daily discourses, on the economy, on employment and job sector and on allied industries dependent on plastic industry. Such comprehensive understanding on the ramifications is necessary as formulations of laws should address these issues for reaching a practically viable outcome.
- Plastic manufacturing companies should be strictly mandated to be transparent about the use of the type of chemical, and the type of process used in the manufacture of varieties of plastic products, especially single use plastic products. The manufacturers should put in public domain all relevant information related to the manufacture of the type of plastic they produce, so as to enable regulators to make full evaluation and assessment of the legitimacy of the chemicals they use, and develop adequate safeguards so that, chemicals and processes detrimental to health and environments are phased out as much as possible. This will also help consumers to make informed choices.
- The 'EPR model' needs more detailing with transparency at local levels so as to achieve real-time mapping of plastic producers and quantum of plastic demand and supply, in order to formulate a tangible and realistic EPR target. Municipalities at state level may also contribute towards making the EPR targets more realistic by adopting the good practices and successful models

implemented in certain states. To cite an example, in Goa the municipalities have tied up with local dairies to pay back residents and consumers a specified amount for returning washed and empty plastic milk bags at local dairy booths⁵¹. The municipalities have also tied up with Tetra-pack companies for buy- back of empty packs.

- Even though solid waste management and plastic waste management collectively fall within the purview of ULBs, the angle of ensuring financial sustainability of the service and revenue generation for the ULBs is quintessential for uninterrupted continuation of motivated endeavours. In doing so Producers, Importers and Manufacturers should establish concrete coordination with the state authorities in devising out a financial mechanism to incentivize the process of collection of plastic. The law should mandate governments to pump in funds in mechanisms that allow segregation and collection and adopt strategies which confirm with socio-economic development of the informal sector and transform plastic waste management from a challenge to an opportunity.
- Greed for convenience and monetary profit even at the cost of environmental prejudice, half-hearted awareness of corporate social responsibilities, lack of a real-time political will, and flouting of managerial ethics are also areas of serious concern as pointed out by observers. These prejudices needs addressing, first in terms of

⁵¹ Saurabh Kumar Sarma, Using Reverse Logistics for Better Solid Waste Management in India; Towards Sustainable Environment and Business, Academia.Edu (Sep 1,2023, 1.05Am) https://www.academia.edu/42040252/Reverse_Logistics_for_a_better_Sustainable_Business_and_Environment,

awareness creation, memorandum of understandings and then in terms of penal and legal sanctions.

- **Creating financial sustainability:**⁵² The introduction of the GST in 2017 abolished and subsumed variety of environment related cesses like the Swachh Bharat Cess, the Water Cess and the Clean Energy Cess etc. The Swachh Bharat Cess specifically was parked in the consolidated fund of India and the proceeds of this cess were used in waste management system including imparting education and information. The chapter of solid waste management is still yearning for government attention and funding. In such situation the importance of levying a user fee to ensure sustainability of services related to solid waste management is crucial.

The Swachh Bharat Cess concretized the concept of 'Polluter Pay Principle' and also channelized a formal way of collection of user fee. Municipalities, barring a few, are still seen grappling for funds to address issues relating to Solid Waste Management. The need of the hour is to mandate the channelling of funds efficiently to the municipalities for ensuring capacity building and smooth functioning⁵³.

- Change in consumption pattern is the key to reduce plastic footprint. Instead of targeting all single-use plastic products at once, most

⁵² The Wire, Why Take Away the Cess Meant to Clean India's Mess, <https://thewire.in/economy/swachh-bharat-cess-budget-2018>, (last visited Aug. 29, 2023).

⁵³ The Hindu Business Line, From Cess to Environmental Mess, <https://www.thehindubusinessline.com/opinion/from-cess-to-environmental-mess/article9838688.ece>, (last visited Aug. 29, 2023).

countries have prioritized what they will ban or phase out in phase-wise manner. This possibly helps consumers and manufacturers get used to changing consumption patterns, changing habits and therefore changing market behaviour.

- The law should stipulate adoption of circular economy that entails creating a cost-effective after-use plastic ecosystem to maximize value and eliminate waste by exploring the recycle and reuse business model.
- All stakeholders involved in the process, government, manufacturers, industrialists, scientists, environmentalists, doctors, lawyers, citizens and commoners, economists, retailers, consumers etc. should be identified, involved and brought to the discussion table to device out an effective legal formulation.
- Incentives and alternatives: For manufacturers, industrialists and lobbyist to come out of narrow shackles and re-visit their business, the key is 'Incentives'. Encouraging adoption of eco-friendly alternatives can be instigated by support-initiatives like economic incentives, tax rebates, reduction of import taxes on raw materials used to make alternatives, adding research and development funds, technology incubation, roping in NGO and voluntary organizations or additional support and assistance, public-private partnership etc. In this regard alternative job creation like revamping the plastic recycling industry, creating jobs in plastic recycling sector and infusing funds into environmental projects or local recycling projects might also initiate drastic changes.
- Study, research and work towards ending uncertainties, ambiguousness and grey areas that

undermine the real time execution of solutions should be carried based on practical assessment of the entire scheme of things. The challenges in the form of known and unknown adversities can only be reduced by bridging the knowledge gaps. As such an Anti-plastic regime must be grounded, examined and re-examined on the basis of exhaustive inter-sectorial study, research and observation.

In broader perspectives the deterrent methodologies of legal application should be brought into force for the issue to be cornered from all angles. The multiple dimensions including production, distribution, marketing, industry lobbying, importing, consumer behaviour, disposal behaviour, post disposal practices, management discourses, scientific nod to supposed solutions like incineration ,plastic to fuel transformation, bio-plastic substitution , all of these should be legally and scientifically scrutinized .The administrative lethargy and political nexus are two important dimensions to be equally chased through judicial monitoring and remedial measures. If administrative measure are not deterrent, punitive or retributive enough the judiciary should step in to invoke the provisions of judicial activism and legal surveillance to set examples like in several other environmental perspectives like the Ganga Pollution case⁵⁴, Ban on smoking in public places Case (Murli S. Deora Case), The Taz Trapezium Case⁵⁵, and the Public Trust doctrine Case⁵⁶ to name a few.

⁵⁴ MC Mehta v. Union of India, AIR 1988 SC 1037

⁵⁵ MC Mehta v. Union of India, 1987 AIR 1086

⁵⁶ MC Mehta v. Kamal Nath, (1997) 1 SCC 388

CHAPTER-9

THE NATURAL RESOURCE MANAGEMENT REFLECTING IN ANCIENT SANSKRIT ANTHOLOGIES, WITH SPECIAL REFERENCE TO MANUSAMHITA AND THE KAUTILYIYA ARTHASHASTRA

Kankana Goswami*

1. Introduction

Gift of nature towards the development of human civilization is unique. As a part of nature, human being has been exercising several resources in their accounts. Since the changing of time assimilating with the modern attitude, human beings are exploiting the nature for their well-being in different way of management. Such attitude, on one hand, has led to chaos in between the developmental growth of human being and on the other hand, decreasing of natural resources. Human being by nature is a tremendous source of cultivating knowledge, resulting which they are keeping in a climax position in nature among all other creatures. It has a loop hole in

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respect of management. Human beings use nature deliberately that lead to the threatening of the survival of other poor natural wild life in the long run. So, there needs to be the management of nature which were thought by the composer of *Manusamhita* and *Arthashastra*. Therefore, rules of management were framed to regulate for the well-being of the human being and the nature too.

2. Need And Justification

Manusamhita itself is an ancient document which deals with the human social conduct. On the other hand, *Arthashastra* is a framed rules to determine the duties of a king and his direction to be followed by the countryman in an order mode. It discusses revenues, social justice and the management of natural resources. The ancient people had a great belief of the *Manusamhita* and the *Arthashastra* in a cooperative manner with the ruler and the rulings. The kings of the-then period had these documents as a handbook to run the country smoothly. The king was believed to be the god of the all natures. He had to look after his subjects and the nature without derogating its flow of plentiful supplies. Each element of the nature had a right to focus itself in their own course. The king had realised it so that it was imperative to look after all these under the rules. The subjects could not utilise the nature in their own zeal, but it was moulded by the king's rule. So, there is to be required to discuss the *Manusamhita* and the *Arthashastra* in the light of Natural Resource Management.

To conserve the nature, both the ancient anthologies have a separate weightage in respect of surveillance on the use of natural resources. The nature produces and it compensates the day-to-day needs of the human beings

from its products. Nevertheless, the resources may vanish if it is not regulated and controlled by the law. The rulers thought about the balanced use of natural resources by the subjects. The discussion about the use and regulating these resources will show how the ancient people had emphasised on the management of nature and its resources, that is still referential in the present era.

Natural resources are essential part of development of human progress. The present human status rests upon the contribution of nature from the time immemorial. So, natural resources must be used judiciously with a view “to live and let live”. Our ancient anthologies had emphasised on the restoration of nature, which is depicted in the *Manusamhita* and the *Arthashastra*. The management of natural resources prevalent in ancient time is still relevant in the present-day context too.

3. Review of Related Literature

Several Indian scriptures have widely discussed in their anthologies about the environment and human needs, and how natural resources had helped the human beings to run their livelihood comfortably. This has been discussed in this chapter. The Vedas are the first written documents on the natural resource management. For example- *Saramā-Paṇi Samvāda* (*R.v.* 10/108), *Darśapūṇamāsa* (*Y.v.* 1st chapter) etc.

The great epics Ramayana and the Mahabharata are one of the remarkable documents on the management of the environment. They have mentioned about social distribution of product, which is accumulated in the treasury of the king. So, the king’s epithet is *Shasthaangshi-bhaaka* (one who get 6 parts from the income of different productive groups). It has been

interestingly mentioned that the fruit of Tapasya of the yogis even went to the king in the proportionate to 1/6 in terms of fraction (see *Abhigyana shakuntalam*), even being non-material products.

The Puranas dealt with the ancient rulers of the country in gratifying the king for their oblation towards the learned people as well as the subject of the country with their victory over a country. The several rivers (*Karatoya, Ganga, Brahmaputra*), lakes (*Pushkar, Manas sarovar, Parashuram Kunda*), mountains and hills (*Kailash, Vindya, Chitrakut*), forests (*Nandan, Himalayan range*) have been treated as the holy resources of livelihood.

4. Natural Resource Management in Manusamhita

The gist of the all Vedas in respect of directive principles of *Manusamhita* or *Manusmriti* is praised priorly as-

“Vedārthopanibandhrittwat prādhānyam hi manoh smriteh |

Manvārtha Viparita ya sa smritirna prashasyate ||

- Vrihaspati Samhita.

It means to derive any critical issues in the Vedas, the *Manusmriti* is weighted with priority. It is considered that the rules are framed by the Sage Manu for the well-being of the human being. *Manusmriti* provided guided rules for the needs of the human society to run smoothly. The book also discussed about polity, economy, social justice, religious deeds etc.

The whole book is found as a narrative text, preached by Sage Manu to his immediate disciple Sage Bhrigu; so, it is known as Bhrigu Samhita too. The critical thoughts of

the *Manusamhita* are simplified by *Medhatithi*. Very recent commentary on this text, connoted by *Kulluka Bhatta* in the name of '*Manvartha-Muktavali*' is highly noteworthy document at present. The original manuscript comprises 12 chapters. Each chapter has discussed different issues related with the human day-to-day activities such as home, village, town, market, central road, guest house, school, king's administrative directives, internal and external treaties, social justice, rules on dealing with environmental segment etc. When any contradiction arises among each other statements of Smritis, the final decision rests upon the statement of Manu –

“Yat kinchin-manuravadat tad-bheshajam”

The ancient Indian scriptures have declared the all-natural substances both visible and invisible are bearing Godly supernatural/ embodiment virtue. So, the nature is worshiped for its Godly elements. Water is one of the five great elements, thus the supreme God Vishnu as Narayana due to his flourishing source is water.¹ According to *Manusamhita*, the supreme God had segregated all movable and immovable natural resources in accordance with their virtue.

Food is an essential part of living being. Food habit is also one of the major factors that effects the management of natural resources. The management of food chain leads to the conservation of world's species, for example the extinction of *Sideroxylon grandiflorum* tree is caused due to the extinction of Dodo bird. Manu has mentioned the directive principles regarding the several types of food habits which are assigned as to what ought to be

¹ *Āpo Nārā Iti Proktā Āpo Vai Narasūnavah |Tā Yadasyāyanam Pūrvam Tena Nārāyaṇaḥ Smṛtaḥ* ,*Manusmṛiti* 1/10.

eaten or what ought not to be eaten, subject to their nature of living-style and availability. Such type of managerial deeds is acclaimed to Manu, regarding the management of the natural resources which is the most ancient thought that was revealed by him many years ago. The scavengers and carnivorous are strictly prohibited to eat. Again, bearing of five cloved- creatures are also non-eatable². Empathetically the creatures who eat grass as a primary food are accepted as eatable except cows³. In ancient time, the killing and the eating of the migratory birds were prohibited, which is still relevant in the world context at present. Those who did not abide by these prohibitions had to face the consequences related to them. The unnecessary slaughtering of animals for self- satiety was regarded as an offence⁴.

The author Manu had guided with lots of atonement or penance principles for the harms made by the human beings to the nature willingly or non- willingly, so that the awareness could be spread to the present and future generations. In case of natural resource management, spreading awareness is also an effective tool to protect the natural resources and environment. Manusamhita says that the householders tend to commit violence even against their will by using the following things: stove, grinder, broom, mortar and pestle and water urn. It is impossible not to use these things during life time, so it has been prescribed for the householder to perform

²Na Bhak Ṣayedeka Carāna Jñātā Mśca ..Pañca Nakheṣvāhur Anuṣṭrāṃścaika Todataḥ, Ib. 5/17,18.

³ Prokṣitaṃ Bhakṣayen Prāṇānāmeva Cātyaye , Ib. 5/27.

⁴ Yāvanti Paṣuromāni Janmani ,& Yo'himsakāni Sukhamedhate ,Ib. 5/38, 45.

Pancha Mahayagnyas daily as an atonement⁵. As per *Bhuta yagnya* out of the five *Mahayagnyas*, the householder should offer food to the creatures (animals, birds etc.)⁶.

The purification of land was prime agenda in all aspects of their day-to-day activities. So, the management of land in respect of customization for using any work is necessary in nature⁷. In regard, to water management, the nature of pollution free water was depicted as the water body consumed by cows, free from dirt, underground water which is well suited in smell, taste and liquidity etc. and was pure⁸. People of that time formed ponds for water conservation as a part of sacrificial works⁹. Excreta, urine, spit, garbage, blood, and poison etc., were not be shed in water as it would contaminate water body and the environment and affect human health¹⁰. The person who destroys the pond should be punished with death or should be drowned in water. If the person who was guilty, admitted to his mistake, he was punished with monetary penalty¹¹.

The state system of ancient times was run by centralizing the king and declaring the king as the all- powerful. For this reason, the kings were to be justice loving, restrained and of generous personality for the benefit of the subjects and for the prosperity of the state. That's why the ancient anthologies used to highlight that the king was considered to be endowed with divine qualities

⁵ Pañca Sūnā Gṛhasthasya ... Pratyahaṃ Gṛhamedhinām, *Ib.* 3/68,69.

⁶ Balirbhauto , *Ib.* 3/70.

⁷ Āpaḥ ŚuddhāGandhavarṇarasānvitāḥ ,*Ib.* 5/126.

⁸ Makṣikā Vipruṣaśchāyā Gauraśvaḥ..... Medhyāni Nirdiśet ,*Ib.* 5/131

⁹ Vāridastṛptimāpnoti Dipadaścakṣuruttamam ,*Ib.* 4/229

¹⁰ *Ib.* 4/56

¹¹ *Ib.* 4/56

and the embodied form of natural energies¹². The king represented Agni, Vayu, Sun, Moon, Yama, Kubera, Varuna and Indra through his influence¹³. The king had to live in such a country, which was surrounded by forests, the land was expanded and full of greenery and wealth, there was abundance of water and the environment must be beautiful, residence of decent people with no diseases¹⁴. Six types of forts were mentioned where six types of creatures could protect themselves. The first one was Dhanurdurga for deers, Mahidurga for mouses, Jaladurga for aquatic creatures, Vrikshyadurga for monkeys, Nridurga is for humans, Parvatdurga for the mountain people belonging to the race of deities¹⁵. Even in the tax system of monarchy at that time, 16% of total profit from the production of natural resources, was given to the ruler as tax¹⁶. Along with the wild animals, there were also provisions for special care for domesticated animals and punishment for those who tortured them. The animals with injuries, lameness, sickness could not be used as vehicles¹⁷. To determine the boundaries of the villages, large trees such as banyan, teak, Samar, Saal, taal and other trees were planted for border mark. Ponds, wells, lakes, springs, temples etc. were to be built in between the border places so that people can use them and the border remains safe and protected¹⁸. The culprit was punished in proportion to the violence or loss caused for misusing all the medicinal plants, trees, creepers and other plants etc¹⁹. Different types of penalties have been prescribed for

¹² Arājake Hi Loke'smin ... Nirhr̥tya Śāśvatīḥ ,*Ib.* 7/3,4

¹³ *Ib.* 7/7

¹⁴ *Ib.* 7/69

¹⁵ Arājake Hi Loke'smin ... Nirhr̥tya Śāśvatīḥ ,*Ib.* 7/72

¹⁶ *Ib.* 7/131,132

¹⁷ Nāvinīṭairbhajed ... Vāladhivirūpitaiḥ ,*Ib.* 4/67

¹⁸ *Ib.* 8/245,247

¹⁹ Tvagbhedakaḥ ... Pravāsyastvasthibhedakaḥ ,*Ib.* 8/284

stealing or damaging natural resources such as trees-plants, animals and other substances²⁰. Selling of ponds, garden etc., stealing grains, animals, eradicating medicinal herbs, cutting green trees for fuel, etc. are designated by the term “*Upapatak*”²¹. Various sins such as killing of animals, eradication of trees and loss of other natural resources have been prescribed with different atonements.

Manusmriti is a surprising treasure of ancient knowledge which inculcates unique balance of natural resources management, thousands of years ago which is still relevant.

5. Natural Resource Management in *Arthashastra*

The *Arthashastra* of *Kautilya* is widely known as Indian anthology which deals with ancient Indian Polity and Economy in an outstanding resourcing document. This book is the only authentic document based on political rules and scriptures which flourished during the time of Maurya empire, 3rd century BCE. *Arthashastra* is most relevant even in the present context towards governing a country with the help of economical profound strategies. The term *Arthashastra* has its own perspective of defining the meaning. *Kautilya* delineates the meaning of *Arthashastra* as follows- the knowledge by which the methods of economic values or the human habitation on earth or lands are gained and its observances has been

²⁰ *Ib.* 8/323-330

²¹ *Ib.* 11/59-66

mentioned, is called *Arthashastra*²². It is divided into 15 *Adhikaranas*, 150 *Adhyayas*, and many *prakaranas*.

Apart from polity and economics, the author Kautilya had also made focus on environment, conservation and management of natural resources of the Mauryan period. The directive principles, rules and regulations for utilization, management, safeguarding the natural resources (both flora and fauna) are finely described in the mentioned book, as to make the country prosperous and well- developed from all sides.

Elaborating on the soil erosion legislation, it was stated there was legislation by which infertile lands were granted for cultivation or desolated lands were provided animal grazing²³. The planned residence for king was also surrounded by natural resources. It was stated that-

“A forest as extensive as the above, provided with only one entrance rendered inaccessible by the construction of ditches all round, with plantations of delicious fruit trees, bushes, bowers, and thornless trees, with an expansive lake of water full of harmless animals, and with tigers (vyāla), beasts of prey (mārgāyuka), male and female elephants, young elephants, and bisons—all deprived of their claws and teeth—shall be formed for the king's sports”²⁴.

For production of substances marked as forest resources, arrangements were made to set up work-houses for forest and its substances with the

²² Manuṣyāṇaṃ Vṛttirarthaḥ ... śāstramarthaśāstramiti ,Arthashastra 15/1/1,2,3.

²³ Akṛṣyāṇaṃ bhūmau paśubhyo vivitāni prayacchet ,Ib. 2/2/1

²⁴ Tāvanmātramekadvāraṃ khātaguptaṃ bhūmivaśena vā niveśayet ,Ib 2/2/3,4

establishment of the people dependent on forests²⁵. To conserve the forest of elephants, the forest dwellers were to protect such forest in the outskirts. Forest guards had to protect elephants by recognizing all types of borders and places. There were rules for death penalty against those who killed elephants²⁶. People were also appointed to know the nature of wild elephants. They used to keep records of the elephants living in different ways such as those who lived in herds, walked alone, hurdles, leader, tusker, mad, babies and freed from bondage etc.²⁷ The *Kupyadhyaksha* had to ensure that the forest substances were to be gathered from the forest by the forest guards. Tax had to be paid for cutting trees and if anyone skipped it, then those were fined with monetary penalty²⁸.

Kautilya has explained the numerical value of rainfall in agricultural management in *Arthashastra*. The amount of rain should be 16 *Dronas* for the cultivation of dry lands. Where rainfall was in sufficient quantity, 1.5 *Drona* of the previous amount was favourable to agriculture.²⁹ According to the need, farming was to be done either in less water or in more water.³⁰

Animals such deer, birds, fish, other animals etc, which belonged to the sanctuary, king had given assurance that if any kind of bondage, killing or trauma was caused to them by anyone, then it would be taken as punishable offence. Slaughtering of fish and birds was not in vogue and violence and bondage of them would lead to

²⁵ Kupyapradīṣṭānāṃ ca dravyavanāpāśrayāḥ ,*Ib.* 2/2/5

²⁶ *Ib.* 2/2/6,7,8

²⁷ Yūthacaramekacaram ca nibandhena vidyuh ,*Ib.* 2/2/11

²⁸ *Ib.* 2/17/1-3

²⁹ ṣoḍaśadroṇaṃ jāṅgalānāṃ ca kālataḥ ,*Ib.* 2/24/5

³⁰ Tataḥ prabhūtodakamalpodakaṃ vā sasyaṃ vāpayet ,*Ib.* 2/24/11

monetary penalty and the punishment was double in case of deer and other animals. Law provided to leave one out of six portions of birds and deer caught alive from the sanctuary³¹. It was everyone's duty to protect the wild creatures living both in the land and water, birds etc. from being hurt by any calamity. In case of violation, one had to face the consequences of being punished³².

Establishing grounds for animals to gaze in between two villages and the rule of getting rid of the fear of thieves and beasts in the dense forests had also been mentioned³³. Such places where there was drought or lack of water, wells, dams and puddles etc. were to be built for storage of water. Along with this, flower and fruit gardens were also to be formed³⁴.

In this anthology, the different types of disasters, damages caused from it, disaster management etc. have been explained in detail. The king had to protect the country from 8 types of providential calamities like- fire, water, disease, famine, rats, wild animals, snakes and demons³⁵.

Kautilya's *Arthashastra* had not only stressed upon the governance of state, but also equally has given the importance to conservation of natural resources and its management aiming to build up a bridge in between the human consumption and the natural resource production for a balanced environmental harmony.

³¹ Tataḥ prabhūtodakamalpodakaṃ vā sasyaṃ vāpayet, *Ib.* 2/26/1,2,4

³² Sāmudrahastyaśvapuruṣavṛṣagarda ... sāhasadaṇḍaḥ, *Ib.* 2/26/5,6

³³ *Ib.* 2/34/6,7

³⁴ Anudake kūpasetubandhotsān sthāpayetpuṣpaphalavātāṃśca, *Ib.* 2/34/8

³⁵ Daivānyaṣṭau ... tebhyo janapadaṃ rakṣet, *Ib.* 4/3/1,2

6. Conclusion

The natural cycling process is the lifeline of world. The conservation of this cycle is hampered by human being which is reflecting in the rapid reducing of natural resources, and has affected the fate of the world existence. Our ancient treasures appeal to the world is based on the scientific management process that cannot be ignored even being in I.T. era. It is the statement and conclusive direction towards the sustainable future world. The thoughts of conservation of nature during the ancient period envisioned towards the future need on sustainability.

CHAPTER-10

PROTECTION OF WILDLIFE ANIMALS AND TRADITIONAL HUNTING PRACTICE OF THE NAGAS IN NAGALAND: A LEGAL PERSPECTIVE

Benchilo Odyuo*

1. Introduction

Legal pluralism in the Naga society is quite a unique one. The co-existence of Naga customary laws, the state laws and the central law within the Naga society also sets an example of a peaceful modern village. Nonetheless, legal pluralism has its own demerits and one of them is the conflict between two legal systems and the struggle to decide the question as to which system shall prevail over the other and the confusion as to which law should be followed. Customary law plays a vital role in the Naga society that people often confuse to differentiate the tradition from customary law.

Historically, Naga is an ethnic nationality comprising different sub-ethnic groups, settled in different parts of northeast India and Myanmar. Though the very term

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“Naga” is contested by some as it is not of primordial origin, Naga is a group of sub-ethnic communities residing in a contiguous area with shared historical and similar cultural attributes. This chapter is confined to the Nagas of Nagaland state. There are 16 recognised Naga tribes in the state of Nagaland. All tribes have their own customary practices though they are all similar. Most of the Naga population is Christian, (a religion which was brought by the American missionaries in the 19th century).¹ Naga customs and tradition and the practice of foreign religion co-exist in harmony with the contemporary Naga society and the preservation of customs and traditional practice are of paramount importance in the cultural, economic and political life of the Nagas. One can witness this from the hornbill festival of the Nagas. Hornbill festival which is also known as the festival of festivals where all the Naga tribes come together and celebrate their culture and proudly demonstrate their traditional practices at Kisama heritage village which is in the Kohima district of Nagaland.² The festival is organised by the state government and it is held every year in the month of December. The festival is a platform to promote and preserve their culture.³ It is also a platform where traditional arts, crafts, etc., are displayed. During this festival, traditional activities like folkdance, folksongs, sports, games, etc, are demonstrated by the different Naga tribes. However, besides the traditional activities, there are also instances in recent times where wild

¹ History of NBCC, <https://www.nbcc-nagaland.org/history/> (Feb. 21, 2023, 3:20 PM)

² Hornbill Festival, About Hornbill Festival, <https://www.hornbillfestival.com/about-hornbill-festival> (Mar. 20, 2023, 6:00 PM).

³ Ankit Oberoi, The Mojo of Nagaland Culture- Culture Diversity of Nagaland, <https://www.holidify.com/pages/nagaland-culture-162.html> (Mar. 23, 2023, 9:30 PM).

animal meat were sold at high price during the festival and some people are also seen selling a dead hornbill for Rs 700 for their livelihood in Kohima.⁴ In the present Chapter the author has made an attempt to discuss the customary practices of hunting in Nagaland, examine the role played by the community in the conservation of wildlife animals and also deals with the important provisions of the Wildlife (Protection) Act 1972 related to the prohibition of hunting.

Nagaland is known not only as the falcon capital of the world but also known for its strong historical warrior background.⁵ In retrospect, Nagas were a completely independent ethnic group satisfied with and solely dependent on agriculture and the natural resources available within the region, the reason being that there was no outside interference or interaction, especially prior to the emergence of the British and American missionaries in Naga region, moreover, the region was covered with intense forests and thus the region was considered “abode” of different and unique wildlife. Most part of these forests are controlled by tribal communities or individuals.⁶ Therefore, contemplating the historical scenario of the Nagas, hunting was one of the sources of food and a survival technique. As stated earlier, hunting was a source of income for a big Naga family. Taking the example of the personal experience of the author, for a big Naga family having the least source of income, killing

⁴ Nagaland post, Open Sale of Hornbill BIRD Despite Ban, 30/11/18, <https://nagalandpost.com/index.php/open-sale-of-hornbill-bird-despite-ban/> (Mar. 24, 7:10 PM).

⁵ *Supra note 4.*

⁶ Kallol Dey, Nagaland Hunts For a Way out of its Bloody Tradition, Shows Some Success, the Indian Express, 29/04/2018, <https://indianexpress.com/article/north-east-india/nagaland/nagaland-hunts-for-a-way-out-of-its-bloody-tradition-shows-some-success-5153875/> (Mar. 24, 8:20 PM).

wildlife was a source of income to provide education to the children because the price of wildlife animal meat was much costly than the market meat available at the market and one can earn handsome money from it. Despite the high price, the demand for wild meat is high even in the present days. Wild meat is so special that a person who gets to eat wild animal meat is considered lucky.

Some animals like leopards, tiger, etc., are dangerous to human life and the state government and District Magistrates have the power to destroy or confine such dangerous animals which endanger human life.⁷ A hunter who gets to kill big animals like a leopard can proudly narrate about his hunting skill and how he kills such animal,⁸ mostly in circumstances where such animal is dangerous to human life. But a mere fear of animals that could endanger human life is not enough reason to kill and that this kind of rarely available animal is protected in Schedule I of the 1972 Act.⁹ Besides, wild meat is used like a material gift to special person or someone holding a high position to impress or build a good relationship. Body parts such as horn, tail, skin, etc of the dead wildlife are used as a showpiece or home décor. Hunting is also a hobby for many Naga men in contemporary society. Growing up watching elders hunt wild animals and bragging about the killing of wildlife with pride has somehow influenced the young generation. There are sixteen administrative districts and 17 major tribes in Nagaland at present¹⁰ and almost all

⁷ Indian Penal Code, 1860, Sec. 133 (1) (f)

⁸ *Op. cit.*

⁹ The Wildlife (Protection) Act, 1972, Sch. 1

¹⁰ Official State Portal, Government of Nagaland, Nagaland Profile, <https://nagaland.gov.in/pages/nagaland-profile> (Mar. 22, 2023, 9:00 PM)

the tribes have their own special modus operandi of hunting.

The Wildlife (Protection) Act, 1972 is a legal framework of the Central government for the protection of endangered wild animals, etc. Wild animals have been defined in the Act as “any animal” that is found in nature which includes the animals mentioned in different schedules of the act.¹¹ The Act also defines wildlife under section 2(37) as any animal which forms part of any habitat. There are lists of wild animals in the Act that are listed in the four different schedules to be protected. Moreover, the Act provides sections for the protection of plants, wildlife animals, etc. However, the present chapter emphasizes only on the provisions related to wildlife animals and their protection.

Under the Act, the State Government is authorised to constitute a Wildlife Advisory Board that shall consist of several members who will perform as an advisor to the State Government in certain matters.¹² It is the duty of the board to give advice to the State Government in matters pertaining to the declaration of any areas as a sanctuary, conservation and protection of wildlife, balancing between the needs of tribals and conservation of wildlife, etc. Further, chapter three of the Act deals with the hunting of wild animals, its prohibition and permission. Under this chapter hunting is prohibited except with the permission of the appropriate and competent authority that is empowered by the Act to grant permission. As per the definition of the Act of 1972, hunting includes driving, causing injury to wild animals, birds, etc. It also includes killing, capturing,

¹¹ The Wildlife (Protection) Act, 1972, s. 2(36)

¹² The Wildlife (Protection) Act, 1972, s. 6.

etc. any wild animal.¹³ Also, in chapter four, the declaration of areas as sanctuaries, national parks, etc. by the State Government is provided. With the advice of the Wildlife Advisory Board, the State Government declares any area to be a sanctuary or national park for the development or protection of wildlife.¹⁴ The Central Government also have the power to declare areas as a sanctuary or national park but with the condition that such areas should be transferred by the state government after fulfilling the conditions¹⁵ provided, such area must be under the control of the state.¹⁶ In addition, the Central government also has the power under chapter 4A to constitute Central Zoo Authority to perform the functions stated in Section 38C and other functions related to Zoo. Chapter 5 and 5A of the Act respectively provide for the trade or commerce of wild animals and the prohibition of trade or commerce of scheduled animals which will be discussed in the proceeding headings. Measures for the prevention and detection of offences¹⁷ are discussed in the Act along with the punishment for the violation of any provisions of the Act. As mentioned earlier, Schedule I to Schedule IV provides the lists of animals protected under this Act.

Besides the Wildlife (Protection) Act, 1972, the Constitution of India also provides provisions for the protection and the safeguarding of wildlife under Fundamental Duty and Directive Principles of State Policy. It is the Fundamental Duty of every citizen of India to protect and improve wildlife.¹⁸ Further, under

¹³ *Ibid* s. 2 (16)

¹⁴ *Ibid* s. 18, s. 26A and s. 35

¹⁵ The Wildlife (Protection) Act, 1972, s. 18 and s. 35.

¹⁶ The Wildlife (Protection) Act, 1972, s. 38.

¹⁷ The Wildlife (Protection) Act, 1972, s. 38.

¹⁸ The Constitution of India, 1950, art. 51A(g).

article 48A, the State is authorised to make laws for the protection and the safeguard of the wildlife.¹⁹ Prior to the 42nd amendment, the power to make laws related to the protection of wild animals was only with the state, however, the amendment included the words “protection of wild animals and birds” in entry 17A of List III (concurrent list). Parliament can also enact laws on the same subject. Considering the protection and conservation of wildlife, the Supreme Court of India has made observations in several cases related to wildlife protection. In *T. N. Godavarman Thirumpad vs. Union of India*,²⁰ the Supreme Court observed:

“...ecocentrism is nature-centred where humans are part of nature and non-humans have intrinsic value.”

Further, in *Centre for Environmental Law, World Wide Fund-India v. Union of India & Ors.*,²¹ it was observed:

“We, as human beings, have a duty to prevent the species from going extinct and have to advocate for effective species protection regimes.”

2. Traditional Hunting of The Nagas and The Loss of Wildlife

In the Naga society, traditionally a good hunter is praised and considered a warrior because hunting, for the Nagas, is a part of economic, social and cultural life. Apparently, it was not just a source of food and income but it also had paramount importance in their life. In the pristine Naga society, prior permission was not required to hunt wildlife species. In the present scenario, without reasonable grounds one cannot kill any wild animals

¹⁹ Amended by the Constitution (42nd Amendment) Act 1976.

²⁰ (2012)3 SCC 277.

²¹ (2013) 8 SCC 234.

that are specified in the parliamentary law. Though this is a way forward to protecting and preserving wildlife, the chaos between the long practice of hunting and the recent law has created injustice to innocent people who believe in traditional practice that it is a part of their life and who are not aware of the state law. Apparently, there is a lack of awareness about the importance and protection of endangered wildlife conservation.

In contemporary times, hunting is still a social, cultural and economic way of life in parts of Nagaland and it is considered to be a sacred practice. In fact, it is so sacred that a night before the hunter goes hunting, a hunter abstains from alcohol, sexual activities, any negative comments about hunting or weapons to be used for hunting. Each Naga tribe has its distinct customs and practices. The Nagas has a unique method of hunting. The weapons used by the Nagas for hunting are snares that are made up of bamboo, cane and rope traps, pitfalls, guns (though the gun was unknown initially), etc. This traditional method of hunting is still prevalent in contemporary society though modern methods are eventually replacing it. Hunting is a male-centric practice whether it is an individual or in a group and there is no age limit for hunting. Traditionally, any male member of a community who is capable of hunting can participate in group hunting though they do not actively take part in hunting big and dangerous animals. Hunting can be practiced by individuals or in a group. Mostly, group hunting is for the purpose of capturing dangerous animals and village feasts. In the case of group hunting, the elder member of the group would first say a prayer for blessing and safety of the members, then the hunter members are directed to different directions leading by experts who can identify the footsteps of the animals. If an animal is killed, the head of the animal goes to the hunter who killed the animal. In the case of individual

hunting, mostly an expert who can track the animals and predict the climate, go for a hunt. Hunted animal is shared among the family members, relatives and the members of the community. Head of the animal is given to the eldest kinship or the priest (pastor) for more blessings in future.²²

Usually, hunting is practiced during the winter season. Traditional hunting rules are almost the same among the tribes. Weapons used for hunting are also the same. There are different traditional traps that are made up of bamboo and rope. For example, bird traps are used to catch small birds, land traps are used to catch all sizes of animals and pitfalls are used mostly to catch animals alive.²³ Among the Lotha Naga tribe, a hunter abstains from attending events, especially marriage parties because it is a bad omen that may lead to unsuccessful hunting. Among Nagas, the Angami tribe is also known for its profound hunting skills. Hunting of rare animals like tigers were not encouraged. Some tribes even consider tigers as brothers. But other tribes like Ao Naga regarded tiger to be enemy of human beings as it destroyed their field and domestic animals and thus tigers were hunted down but they avoid eating meat of it.²⁴

Household consumption and selling are some of the reasons for hunting in Nagaland. Selling of Amur falcon,

²² Thejavikho Chase, Traditional Hunting Practices Among the Angami Nagas, Sahapedia, 09 May 2019, <https://www.sahapedia.org/traditional-hunting-practices-among-angami-nagas-0> (accessed May 01, 2023, 8:10 PM).

²³ *Op. cit. chase.*

²⁴ Akiyala imchen & P.P. Joglekar, Traditional Animal Hunting Practices Among AO Nagas: A Case Study of Mangmetong Village, Nagaland, *Journal of Multidisciplinary Studies in Archaeology*, October 2015, P. 509-511

a migratory bird, is one example.²⁵ Initially, when amur falcon migrated to Nagaland in 2012, the villagers of *Pangti* village²⁶ started killing 15,000 amur falcons a day.²⁷ Millions of amur falcons were killed for consumption and selling in *Changtongya* village as well²⁸. A hunter can earn thousands of rupees by killing and selling the bird.²⁹ Further, in 2020 during the lockdown, there was an incident where hunters killed endangered wild animals and bragged about it in a video which went viral. The hunters in that incident killed different types of deer, Indian civet, etc.³⁰ Again in a recent incident a hornbill was tortured and killed. The culprits in this incident were arrested under the Wildlife (Protection) Act.³¹ At hornbill festival, people were seen openly selling

²⁵ Bhupathy, S., Ramesh Kumar, S., Thirumalainathan, P., Paramanandham, J. and Chang Lemba. 2013. Wildlife exploitation: a market survey in Nagaland, North-eastern India. *Tropical Conservation Science* Vol. 6(2):241-253. www.tropicalconservationscience.org (accessed May 14 2023, 3:30 PM).

²⁶ Village under Wokha District, Nagaland, <https://www.census2011.co.in/data/village/267467-pangti-nagaland.html> (accessed May 13 2023, 01:10 PM).

²⁷ Migrating amur falcons protected where they were once hunted in a Nagaland village, first post, 22 november 2018, <https://www.firstpost.com/tech/science/migrating-amur-falcons-protected-where-they-were-once-hunted-in-a-nagaland-village-5599871.html> (accessed May 13 2023, 03:03 PM).

²⁸ Village Under Mokokchung District, Nagaland, <https://www.census2011.co.in/data/town/801453-changtongya-nagaland.html> (accessed May 11 2023, 7:12 PM)

²⁹ Panger jamir PCCF & Head of Forest Force Kohima, Nagaland, The Journey of Amur Falcon in Nagaland, the Morung Express, 24th November 2016, <https://morungexpress.com/journey-amur-falcon-nagaland> (accessed May 12 2023, 8:20 PM).

³⁰ Nagaland: After videos of wildlife hunting go viral, police on lookout for culprits, the northeast today, 20th April 2020, <https://thenortheasttoday.com/states/nagaland/nagaland-after-videos-of-wildlife-hunting-go-viral-police/cid2530896.htm> (accessed May 12 2023, 3: 50 PM).

³¹ Great Indian Hornbill tortured and killed in Nagaland, the Economic Times, 16th June 2022,

wild meat despite the restrictions.³² All these practices lead to the loss of endangered wild animals.

In the present scenario, the Wildlife (Protection) Act, 1972 is applicable to the state of Nagaland. Under section 18 and section 26A of the Act, the State government is empowered to declare any area as a sanctuary for the protection and development of wildlife. Sanctuary is defined in section 2(26). It is an area declared under several sections by the government as a wildlife sanctuary. Sanctuaries are managed by the chief wildlife warden and maintained under his control. At present there are only one national park and three wildlife sanctuaries in Nagaland for the protection and conservation of wildlife.³³

With the emergence of new methods and techniques, traditional methods of hunting have become obsolete. Sharing of meat is no longer prevalent. People rather use it for monetary gain. Moreover, because of the modernization and alternate sources available, the young generation are not interested in learning hunting techniques. Education also played an important role especially in urban areas. There are also other sources of food. But that is not the case in villages because most of the Naga population resides in villages. In fact, the identity of a Naga is linked with his or her village and the

<https://economictimes.indiatimes.com/news/new-updates/great-indian-hornbill-tortured-and-killed-in-nagaland/articleshow/92248644.cms> (accessed May 12 2023, 5:00 PM).

³² H. Chishi, Wild Meat Sale at Hornbill Fest, the Telegraph Online, 08th December 2016, <https://www.telegraphindia.com/north-east/wild-meat-sale-at-hornbill-fest/cid/1402983> (accessed May 12 2023, 7:23 PM).

³³ Department of Environment, Forest & Climate Change, Government of Nagaland, <https://forest.nagaland.gov.in/status-of-forests/> (accessed May 01, 2023, 10:15 PM).

elders who are well-skilled tend to keep up the traditional practice of hunting.

3. Community-Led Initiatives in The Legal Implementation of Wildlife Protection in Nagaland

Apart from the central law, there are some communities that play an important role in the conservation and preservation of wildlife. Here are some of the instances where initiatives were taken by the State Government as well as communities in the conservation of some endangered species. The residents of Khonoma village which was once known for fierce hunting skills have made history by proposing a ban on the hunting of wildlife.³⁴ This is a community-led initiative with the aim to preserve wildlife species. Moreover, traditionally some animals like nycticebus are not killed because killing such animals is considered taboo and the belief is still prevalent.

Recently two villages of the Lotha tribe under Wokha district proposed a ban on the hunting of wildlife. There was a joint statement by the village councils of Phiro village and *Totsu* village warning the people about the consequences of the violation of the ban. The penalty for the violation of a ban was imposed with Rs 20,000 fine and seizure of weapons.³⁵ In another instance, in compliance with the Wildlife (Protection) Act 1972, the Deputy Commissioner of *Kiphiri* district issued an order prohibiting the trading and hunting of wildlife within the

³⁴ *Op. cit.* 24.

³⁵ NE Now News, Wildlife Hunting Banned by Two Villages in Nagaland, 04/10/2022, <https://nenow.in/north-east-news/nagaland/wildlife-hunting-banned-villages-nagaland.html> (accessed May 2 2023, 5:20 PM)

jurisdiction of the district. The order was issued to protect the wildlife. The punishment for the violation of the order was imposed as per the provision of the Act.³⁶

State government and non-governmental organisation are also taking initiatives in protecting wild animals and birds by rewarding those who protect amur falcon.³⁷ In 2020, the Deputy Commissioner of *Longleng* in *Longleng* district notified for the protection of amur falcon under the parliamentary law, the Wildlife (Protection) Act, 1972. It was notified that killing and selling of the bird would result in rigorous imprisonment or fine as per the Act.³⁸ Village councils play an important role in the conservation of wildlife species. In some villages, the areas where birds were roasted are declared as Community Conservation Reserves. To conserve the bird, the forest department of Nagaland state also took the initiative and *Pangti* village Amur Roosting Association was formed to protect and conserve amur falcon.³⁹

In 2012, an awareness campaign was held to “save the hornbill from extinction” and an online petition was initiated on the same. People appreciated the initiatives and the campaign received public support.⁴⁰ *Khonoma*

³⁶ Net Northeast Today, Nagaland: Trading & Hunting of Wild Animals/Birds Banned in Kiphire District, 06/04/2022, <https://www.northeasttoday.in/2022/04/06/nagaland-trading-hunting-of-wild-animals-birds-banned-in-kiphire-district/> (accessed May 2 2023, 6:06 PM)

³⁷ Op. cit. 30

³⁸ Nagaland: DC Longleng Cautions on Hunting of Amur Falcon, the Morung Express, 17th November 2020, <https://morungexpress.com/nagaland-dc-longleng-cautions-on-hunting-of-amur-falcons> (accessed May 13 2023 4:40 PM)

³⁹ Op.cit. jamir

⁴⁰ ‘Save the Hornbill From Extinction’ Petition, the Morung Express, 10th December 2011, <https://morungexpress.com/save-hornbill-extinction-petition> (accessed May 12 2023 10:01 PM).

village⁴¹ which was once known for its impeccable hunting skills took a community-led initiative to protect and conserve wildlife that are inhabited in the areas covered by the village. The village elders and *Khonoma* youth organisation joined hands and asked the villagers to lay down the weapons that are used for hunting.⁴²

4. The Wild Life (Protection) Act, 1972 and its Amendment Act, 2022

The Wildlife (Protection) Act, 1972 was enacted by the Central Government to protect wildlife fauna and flora. The Act has sixty-six sections, seven chapters and six schedules. Some schedules were inserted through amendment.⁴³ The Act was enacted by the Central Government with the aim to protect animals, plants and birds. The act has been amended several times. The latest amendment is the Wildlife (Protection) Amendment act, 2022. The 2022 amendment has replaced some words in the Principal Act. The Act was amended to protect, manage and conserve wildlife. It came into force on 1st April, 2023. In the Principal Act, there are certain authorities like Directors, Chief wildlife warden and other officers that are appointed by the Central Government and State Government (in case of delegation of power of Chief Wildlife Warden) for the performance of duties and powers that are obligated by the Act.⁴⁴ There is also an advisory board that is constituted by the State

⁴¹ Village under Kohima District, Nagaland, <https://www.censusindia.co.in/villages/khonoma-population-kohima-nagaland-268287> (accessed May 12 2023 6:15 PM).

⁴² Tanushree Singh, Photos: How A Village of Hunter-Warriors in Nagaland Laid Down Arms to Save the Environment, scroll.in, 09th September 2016, <https://scroll.in/article/815569/photos-how-an-ace-hunter-in-nagaland-became-a-conservationist-and-urged-a-village-to-lay-down-arms> (accessed May 11 2023 8:16 PM).

⁴³ Schedule VI was inserted by Act 44 of 1991.

⁴⁴ *Op. cit.* 1972, s.3 and s. 4.

Government or Administrator in Union territory to give advice to the State Government in matters related to the selection and declaration of places as sanctuaries, national parks, etc., in policies for the protection and conservation of wildlife. It is the duty of the board to give advice to the state government in taking measures to bring harmony between the requirements of the tribal society and protection and conservation of wildlife simultaneously.

Provision for the prohibition of hunting is provided in section 9 of the Act with the exception that if there is special reason then hunting of wild animals may be permitted. The killing of wild animals that are specified in the schedules of the Act is an offense if it is done without taking permission from the appropriate authority. Wildlife animals that are protected by the Act are mentioned in the schedules. However, the wild animals that are protected under the Act can also be killed in certain circumstances. Under chapter three of the Principal Act there are provisions which deal with wild animals, the hunting of which are prohibited or permitted. There are certain areas where hunting is permitted in special circumstances and for special purposes. As per section 11 of the Act, hunting any wild animal that are specified in the Schedules of the Act is permitted if the conditions are fulfilled. Sub-clause (a) of clause 1 of section 11 states that if any wild animal is dangerous to human life or if the specified animal is suffering from incurable disease or is disabled then hunting may be permitted by the chief wildlife warden. The section provides that the chief wildlife warden may permit any person to hunt such an animal and make an order in written stating the reason for the permission. Therefore, hunting of wild animals specified in the schedule, one may be permitted only in circumstances where the animal becomes a danger to human life,

disabled or has an incurable disease. Further, in sub-clause (b) permission to hunt any wild animal that is specified in schedules II, III and IV is provided. Under this sub-clause, the danger caused by the animal is extended to property. It states that if any wild animal is dangerous to human life or the property then the warden may permit any person to hunt such animal by making an order in writing. Moreover, killing any animal does not amount to offence if it is done in private defence.⁴⁵

In addition to the permission granted under section 11, section 12 also permits hunting for special reasons. With payment of fees, the warden may grant permission to any person to hunt any specified wild animals for educational purposes, scientific research, management and other purposes. However, the permission granted under section 11 and section 12 or the licence issued for the purpose of killing wild animals may be cancelled or suspended under section 13 by giving reasonable opportunity to be heard. But there should be sufficient reasons for the cancellation or suspension of the licence. The authority cancelling or suspending the licence should record the reason in writing.

5. Conservation and Protection of Wildlife Animals

There are different approaches for the conservation and protection of wildlife animals, some of them are the preservation of wild animal species, habitat preservation, captive breeding of the wild animals that are going to be extinct, making common people aware about the importance of conservation by educating them, etc. Some of the reasons why wildlife animals should be protected is that wildlife animals have a scientific value, ecological

⁴⁵ *Op. cit.* S. 11 (2).

value, etc. It can be used for academic purposes, etc. Destroying wildlife animals leads to extinction which ultimately creates an imbalance ecosystem.

The 1972 Act provides provisions empowering the government to establish parks and sanctuaries for the conservation and protection of wildlife animals. Specifically in chapter four, the state government may declare areas as sanctuaries and national parks and such declared areas should have adequate ecological, natural, etc. significance for the conservation and propagation of wildlife.⁴⁶ As per the Act, the areas that have been declared as sanctuary are protected and no person is permitted to enter unless permission is granted under section 28. The measures taken under section 27 are to prevent the commission of the offence and to protect the wildlife animals. Further, section 29 prevents destruction and exploitation of any wildlife from the area that has been declared a sanctuary by the government with exceptions that if the state government is satisfied that such destruction and exploitation is necessary to enhance management and improvement of wildlife then permission may be granted by Chief Wildlife warden.⁴⁷ To protect wildlife, injurious substances such as chemicals, any explosive substances that may cause injure or endanger wildlife are also prohibited in the Act.⁴⁸ Under section 38, the central government is also empowered to declare area, if the State Government leases that area to Central Government and after the conditions in section 18 are fulfilled, as a sanctuary or national park. Moreover, under Chapter IV A, the Central Government shall constitute central zoo authority to perform

⁴⁶ *Op. cit.* S. 18 (35).

⁴⁷ The Wildlife (Protection) Act, 1972.

⁴⁸ *Op. cit.* S. 32.

functions such as identifying endangered wild animals, ensuring the maintenance of book of endangered species of wild animals.⁴⁹

6. Prohibition of Trade and Commerce of Wildlife Animals

Chapter 5A of the Wildlife (Protection) Act specifically deals with the prohibition of trade and commerce of scheduled animals. Schedule animals is defined in section 49A as an animal that is specified in Schedule I and Schedule II. Specifically, under section 49B, manufacturing and dealing of scheduled animal articles is prohibited. The section prohibits the business that manufactures animal articles or trophies, deals in meat, captive animals, etc., that are protected by the Act. No person shall be permitted to carry on business related to any scheduled animal. Further, clause (b) sub-section (1) provides that no person shall serve scheduled animal meat in any hotel and restaurant in exchange of payment or as a part of business. However, a corporation or a society may be exempted from sub-section (1) and (2) for the purpose of export and the exemption must be published in the official gazette. A corporation or a society must be controlled or owned by the Central Government or registered under the Societies Registration Act, 1860. In case of society, the Central Government must be satisfied that the exemption is for the benefit and in the interest of the public.⁵⁰

Unless a license is granted to the person by the appropriate authority no person shall be permitted to deal with animal articles or trophies or meat, etc., that are derived from wild animals. Nonetheless, the rights of

⁴⁹ *Op. cit.* S. 38C (d), (g).

⁵⁰ *Op.cit.* S. 49B (3).

the license holder are limited. The restriction is imposed on the receiver and purchaser of wild animals or meat derived from such animals. Acquiring meat of wild animals or any article, trophies, etc., derived from scheduled animals is permitted only from the authorized person who owns a licence.⁵¹ Purchase of meat or article or trophy from a person other than the authorized person is a violation of section 49. Transportation of wildlife is also restricted under section 48A. As per the section, acceptance of wild animals for the purpose of transportation is restricted unless prior permission is granted by the authority. Further, without the permission of the competent authority, the license holder cannot possess and capture or purchase wild animals, meat of wild animals, animal article or trophies.⁵² It is the duty of the license holder to maintain record of his dealing and submit it to the authorities mentioned in section 47.

7. Measure for the Prevention and Detection of Offences

There are different measures provided in the Act for the prevention and detection of offence against wildlife. Chapter six of the 1972 Act specifically deals with the prevention and detection of offence. Section 50 provides provisions related to the power of entry of any premises, search of articles or meat of wild animals, arrest and detention of any person who commits offence against the Act. The section empowers the Director or other authorised officer to inspect and seize wild animals, animal articles, meat, etc. If such officers have reasonable grounds that a person has committed offence and violated provisions of the Act then he has the power

⁵¹ The Wildlife (Protection) Act, 1972, s.49.

⁵² The Wildlife (Protection) Act, 1972, s.48

to order such person to produce any captive animal or wild animal or meat of such animal that is in his possession or control for the purpose of inspection. Clause (b) of section 50 provides power to appropriate authority to stop any vehicle or vessel in order to search baggage or things that are in his possession and he is suspected to possess wild animals or animal articles, etc. The section also empowers the officer to enter any land or premise in order to search or inquire and seize any particles like traps, tools, weapons, etc. that are used to commit offence against the Act. The authority has the power to seize such particles unless the person is ready to appear before him and show cause why he should not be arrested and detained. If any person fails to produce a licence or permit that is required to produce, the authority has the power to arrest and detain him without warrant unless he is ready to appear on summons and produce his address and name. A detainee or things seized by the authority shall be produced before a magistrate who has jurisdiction to deal with according to procedural law. Moreover, the authority who has seized wildlife animal particles mentioned in sub-section (1) may authorise any person to custody of such particles and produce them before the magistrate if required. Sub-section (5) provides that a person will be held guilty for failing to produce anything which he is required to produce. Further, a person is bound by this Act to assist officers, empowered by the Act to deal with offence committed, in the detection or prevention and apprehending an offender.⁵³ An assistant director of wildlife preservation or wildlife warden is empowered to issue a search warrant and summon witnesses and order any person to produce documents or any material object, etc. for the purpose of investigation and such documents

⁵³ The Wildlife (Protection) Act, 1972, s. 50 (7).

or object and the evidence recorded under sub-section (8) shall be admissible in the court.⁵⁴

Under section 51 penalty is imposed on any person who violates any provisions of the Act. Misuse of power by any authorised officer is also a punishable offence under section 53. The section states that any person who is empowered by the Wildlife (Protection) Act to exercise power shall be punished with imprisonment or fine or both for unnecessary seizure of property. It is the duty of the court to take cognizance when the complaint is received from the director of wildlife preservation, chief wildlife warden, other officers, etc.⁵⁵ The burden of proof lies on the accused who is suspected to be in possession of any captive animal, meat or animal article and until the contrary is proved, he is presumed to be in unlawful possession of such objects.⁵⁶ When an offence is committed by a company, the company including every person who was responsible for the company's business shall be held liable for violation of the Act.⁵⁷

8. Conclusion

Living organisms are interconnected and the significant role they play in the ecosystem requires them to be protected from extinction. Protection of wildlife should not only be the paramount importance but maintenance of natural habitat and food chain should also be the goal for the preservation and conservation of wildlife animals.⁵⁸ Therefore, in order to maintain the balance of

⁵⁴ *Ibid* s.50 (9).

⁵⁵ The Wildlife (Protection) Act, 1972, s. 55.

⁵⁶ *Id.* s. 57

⁵⁷ *Id.* s. 58

⁵⁸ Wildlife conservation and its importance, Unacademy centre, <https://unacademy.com/content/cbse-class-11/study-material/geography/wildlife-conservation-and->

the ecosystem, awareness campaigns for the conservation of wildlife should be conducted very often in states like Nagaland where hunting is encouraged traditionally. State government must also establish as many sanctuaries, zoos, natural parks, etc., as possible for the purpose of conservation of wildlife. State government should frame stringent laws on conservation of the endangered wild animals and criminalise the killing, torturing, selling, transportation, etc of endangered wild animals. The efforts made by national or international organisations to protect wild animals should be considered seriously so that future generations can enjoy a balanced ecosystem.⁵⁹

itsimportance/#:~:text=Wildlife%20Conservation%20can%20be%20defined,food%20chain%20and%20ecosystem%20balance. (accessed May 14 2023 7:14 PM).

⁵⁹ Wildlife Conservation, Education, National Geography, <https://education.nationalgeographic.org/resource/wildlife-conservation/> (accessed May 14 2023 8:10 PM).

CHAPTER-11

INCLUSIVE GOVERNANCE: STRENGTHENING PUBLIC PARTICIPATION IN NATURAL RESOURCE MANAGEMENT IN INDIA

Tushar Sharma*

1. Introduction

Managing India's natural resources comes with its own set of unique predicaments, including resource exhaustion, disagreements pertaining to resource access, and unsustainable exploitation of resources. To rectify these challenges, a more integrative governance approach, that calls upon every stakeholder to partake in the decision-making procedures, is of the essence. It is this very research paper's aim to delve into the notion of integrative governance and its function in amplifying public involvement in natural resource management. This study will shed light on successful exemplars of integrative governance, such as community-driven resource management, collaborative forest management, and joint governance of oceanic resources. Additionally, it will scrutinise the impediments and constraints of

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integrative governance, with a keen eye on power distribution, resource conflicts, and the influence of foreign actors. We will attempt to comprehend the varying perspectives of diverse actors regarding the efficacy of integrative governance in facilitating sustainable natural resource management. Moreover, the article presents beneficial guidance and recommendations for policymakers, civil society organisations, and other key participants. These insights aim at encouraging cooperative governance and strengthening the participation of the public in managing natural resources. To sum up, the essence of this research underscores the importance of inclusive governance as a critical component in managing natural resources sustainably. The investigation also indicates that efficient public engagement can indeed lead to enhanced results for human society and our environment.

The present study delves into the intricate interplay between inclusive governance and natural resource management within the Indian context. Beginning with a comprehensive snapshot of the historical backdrop, the present situation of resources, and the pre-existing policies in India, the research further includes case studies accentuating community-led resource management, participatory forest management, and marine resource co-management. Various perspectives on inclusive governance, as seen through the lens of government bodies, civil society organizations, and local communities, are also explored in the study. Challenges like power dynamics, conflicts over resources, and external influences are identified. Lastly, the research puts forth some practical recommendations to boost inclusive governance, encompassing policy changes, strategies to enhance public involvement, and potential areas for future exploration.

2. Natural Resource Management in India: An Overview

The management of natural resources in India has seen significant changes over the years, with its roots embedded deep in ancient practices and the British colonial era. The legal structure regulating NRM has adapted to the socio-economic and political transitions, along with the rising awareness of environmental issues. Consequently, managing natural resources has become a crucial focus area within India's legal and regulatory setup. All these issues have widespread repercussions on our happiness, economic progress, and environmental health. This is why it is essential to comprehend thoroughly the existing protocols and processes concerning natural resource management in India. Our nation's NRM legal structure encompasses an assortment of laws, policies, and organisational techniques aimed at monitoring and preserving natural resources. Moreover, our very own Indian Constitution underlines the obligation of the state to shield the environment and protect natural resources for the present and future generations. In particular, the 73rd and 74th Constitutional Amendments have decentralized the governance of natural resources, allowing local self-governments to play a more significant role in NRM.¹

- Historical Context and Evolution

The history of natural resource management in India is rich yet intricate. The transition from colonial rule to independence heavily influenced

¹Sida2187en-Natural-Resource-Management-in-India-2003-2007.Pdf <<https://cdn.sida.se/publications/files/sida2187en-natural-resource-management-in-india-2003-2007.pdf>> accessed 17 June 2023.

the historical context of NRM in India. Post-independence, we saw a shift towards more centralized management practices. But the country also witnessed a clash between economic development goals and environmental sustainability needs due to rapid industrialization and population growth. A significant change towards sustainable management of natural resources is undeniably required. India, a country abundant in biodiversity, spanning immense forests, a variety of marine ecosystems, and plentiful mineral resources, finds itself threatened by excessive exploitation, the annihilation of habitats, pollution and the overarching problem of climate change. The country's existing policies and mechanisms reflect an ongoing struggle to balance conservation and development needs.²

- Current State of Natural Resources in India

Managing the vast natural resources in India demands a comprehensive legal analysis due to its complexities. Despite making considerable progress in resource conservation and management, India is facing severe challenges regarding sustainable resource utilization. Issues like land degradation, deforestation, air and water pollution, and biodiversity loss signify the enormous pressures on natural resources due to rapid industrialization, population growth, and inadequate implementation of environmental laws. Moreover, the intersectionality of socio-economic factors complicates the legal landscape of natural

² 'India - Natural Resources, Mining, and Manufacturing Industries | Britannica' <<https://www.britannica.com/place/India/Resources-and-power>> accessed 17 June 2023.

resource management. While laws and regulations exist, their enforcement and adherence often falter, leading to resource mismanagement. Disparities in the distribution and access to resources further highlight issues of equity and social justice in India's natural resource governance. Therefore, the current state of natural resources in India underlines the urgent need for robust, effective, and inclusive legal frameworks that can address the multi-faceted challenges of sustainable resource management.³

- Case Studies of Inclusive Governance in Natural Resource Management in India

The examination of inclusive governance in India's natural resource management necessitates an in-depth analysis of several salient case studies. This exploration provides empirical evidence and offers a nuanced understanding of the practical implementation of inclusive governance principles. Firstly, an investigation into community-led resource management reveals the legal implications and outcomes of decentralized decision-making. It scrutinizes how local communities, endowed with traditional knowledge and a direct stake in resource preservation, can legally manage and conserve their resources effectively. Secondly, the study delves into the domain of participatory forest management. This entails an analysis of legislative frameworks such as the Forest Rights Act, which empowers local communities to manage forest resources. It appraises the role of Joint Forest

³Sida2187en-Natural-Resource-Management-in-India-2003-2007.Pdf (n 1).

Management Committees, evaluating their legal constitution, effectiveness, and areas of improvement, thereby contributing to a broader discourse on forest law and policy in India. Lastly, the co-management of marine resources is examined, exploring how legal mechanisms can foster cooperation among local communities, government bodies, and other stakeholders. This study provides an understanding of the legal intricacies and implications of shared resource governance, especially in the context of India's marine conservation laws and policies. These case studies collectively offer valuable insights into the legal dimensions of inclusive governance in India's natural resource management, underlining the potential of participatory models in resource conservation.⁴

- Community-led Resource Management

In the quest for effective natural resource management, inclusive governance approaches have come to the forefront, particularly in India. This research investigates the empirical applicability of such paradigms, shedding light on select case studies where inclusive governance has been successfully integrated into resource management practices. The focus of this discourse is on community-led resource management. In the sphere of natural resource management, the community-led resource management model has emerged as a viable strategy to incorporate local voices and ensure fair resource allocation. This

⁴ S Joshie and others, 'Decentralization of Natural Resource Governance—a Case Study from an Indian Village'.

approach pivots on the principle of inclusive governance, valuing the profound understanding and traditional knowledge held by local communities about their natural resources. One of the prominent instances of community-led resource management in India is witnessed in the forest sector. Community Forest Management has been adopted in various regions across the country, where local communities are entrusted with the stewardship of their forests. This approach not only fosters sustainable forest management but also facilitates social equity, local empowerment, and livelihood security. The success of the Mendha-Lekha village in the Gadchiroli district of Maharashtra underscores the effectiveness of this model. The residents, predominantly from the Gond tribe, have managed to assert their rights over their ancestral forest lands, ensuring sustainable management and conservation. The village became the first in India to receive a community forest resource right title under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. This legal recognition has empowered the community to judiciously use and manage their natural resources, thereby achieving a balance between conservation and development.⁵

- Participatory Forest Management

In the discourse of environmental law and policy, the practice of participatory forest management in India emerges as a quintessential case study of

⁵ 'IUCN CEESP Natural Resource Governance Framework Working Group | IUCN' <<https://www.iucn.org/our-union/commissions/group/iucn-ceesp-natural-resource-governance-framework-working-group>> accessed 17 June 2023.

inclusive governance. PFM, as a legal and policy framework, embodies a paradigm shift from state-centric control to a more inclusive, community-driven approach towards forest conservation and utilization. Under the operative legal instruments like the Forest Rights Act, 2006, and various state-specific forest laws, the rights and interests of indigenous communities and local forest dwellers are recognized and protected. The legal model facilitates their active involvement in the governance of forest resources, thereby operationalizing the principles of sustainable use and intergenerational equity. The PFM model, with Joint Forest Management Committees and Community Forest Resource Management at its core, epitomizes the intersection of law, governance, and environmental management. The recognition of traditional knowledge, local customs, and practices under these legal frameworks highlights the role of law as a facilitator of sustainable resource management. Critically, the experience of PFM in India underscores the pivotal role of law in promoting participatory governance. It underlines the indispensability of considering local realities and socio-cultural dynamics while framing laws and policies for natural resource management, thus making the discourse on environmental justice more inclusive and effective.⁶

- Co-management of Marine Resources

This segment of the research paper delves into the exploration of inclusive governance through the

⁶ Manish Tiwary, *Participatory Forest Policies and Politics in India: Joint Forest Management Institutions in Jharkhand and West Bengal* (Routledge 2019).

lens of a particular case study, focusing on the co-management of marine resources in India. This is an instrumental element in understanding the practical implications and operationalization of inclusive governance within the context of natural resource management. In the sphere of marine resources, co-management signifies a collaborative governance structure where both government agencies and community stakeholders hold the reins of authority and responsibility together. This framework is gaining traction in India, primarily due to the urgent need for the sustainable use and preservation of marine resources and the acceptance of the priceless insights and contribution of local communities. A participatory approach, including active contributions from fishing communities, NGOs, and governmental bodies, is integral to the co-management model. This model builds upon the principle of inclusive decision-making, upholding the rights of local communities on the resources they heavily depend upon for their survival. Not only does it consider their concerns and viewpoints while drafting and implementing policies, but it also demonstrates its effectiveness through promising results in certain areas. This model has notably excelled in promoting eco-friendly fishing practices, protecting marine life diversity, and ensuring equitable distribution of marine resources. However, this path of shared management is not devoid of challenges. Legal and institutional frameworks underpinning co-management in India are often complex, involving different government departments with overlapping authority and conflicting objectives. Additionally, there could be significant power imbalances between government

agencies and local communities, leading to disproportionate participation and benefits. Overall, the case study of co-management of marine resources in India provides valuable insights into the potentials and challenges of inclusive governance in natural resource management. Further legal research and policy reform are required to address these challenges and promote more effective and equitable co-management arrangements.⁷

3. Perspectives on Inclusive Governance in Natural Resource Management

The analysis delves into the multitudinous perspectives encompassing the concept of inclusive governance in natural resource management. This is undertaken through a rigorous examination of viewpoints from three critical stakeholders in this arena. Firstly, we elucidate the standpoints of government agencies and policymakers, whose regulatory and legislative purview is instrumental in shaping the contours of inclusive governance. The discourse investigates the extent to which they incorporate diverse opinions, their understanding of public participation, and the provisions they have institutionalized to facilitate such inclusivity within the ambit of natural resource management. Secondly, we turn our attention to civil society organizations, often regarded as the vanguards of public interest. These organizations, through their role as intermediaries between the state and the public, have crucial insights into the practicalities and obstacles of

⁷ Brooke Campbell and Quentin Hanich, 'Principles and Practice for the Equitable Governance of Transboundary Natural Resources: Cross-Cutting Lessons for Marine Fisheries Management' (2015) 14 *Maritime Studies*.

actualizing inclusive governance. Lastly, we delve into the perspectives of local communities and resource users. As the direct beneficiaries and often the most impacted by the policies of natural resource management, their experiences, insights, and aspirations are pivotal to understanding the real-world implications of inclusive governance.⁸

- Thoughts from Government Bodies and Policymakers

The standpoint of government bodies and policymakers on inclusive governance in natural resource management is pivotal. It shapes the policy framework and regulatory guidelines that set the boundaries of public involvement. The core of inclusive governance is anchored in the tenets of administrative law, which espouses transparency, accountability, and participation. The underlying philosophy is that the use and conservation of natural resources shouldn't be the state's sole prerogative, but a collective responsibility with the citizens. As caretakers of public resources, government bodies typically see inclusive governance as a requisite strategy for sustainable resource management. In this context, inclusivity is seen as a way to ensure that policies and strategies reflect and address the socio-economic conditions of the varied stakeholders, particularly the underserved and vulnerable sections. Yet, these agencies may also voice worries about the practical aspects of inclusive

⁸ William Blomquist, 'Multi-Level Governance and Natural Resource Management: The Challenges of Complexity, Diversity, and Uncertainty', *Institutions and Sustainability; Essays in Honour of Konrad Hagedorn* (2009).

governance, like potential conflicts of interest, the struggle to balance competing demands, and the requirement for technical expertise in intricate areas of natural resource management. On the flip side, those in charge of making policies usually concentrate on building legislative and regulatory frameworks that promote inclusive governance. Their usual challenge is to craft policies that not only meet global standards but are also flexible enough to suit national and local situations. So, it's essential for these policy makers to convert the theoretical concept of inclusive governance into practical policy guidelines, you know. To construct strong frameworks for inclusive governance, policymakers must interact with principles of environmental law, human rights law, and administrative law. This cross-disciplinary interaction will aid in establishing legal tools that encourage public involvement, reinforce transparency, and guarantee accountability in natural resource management.⁹

- Perspectives from Civil Society Organizations

Non-governmental associations play a pivotal role in championing democratic management of natural resources. These associations, being separate from government and commercial entities, are ideally positioned to amplify the voices of under-represented communities and ensure their participation in decision-making processes. The beliefs of these non-governmental associations about democratic management are deeply rooted

⁹ 'India - Natural Resources, Mining, and Manufacturing Industries | Britannica' (n 2).

in their commitment to societal fairness and ecological sustainability. They underline the importance of a community-led approach, where local communities are more than just passive receivers - they are key contributors in maintaining and conserving natural resources. These organisations advocate that this approach fosters a sense of ownership, enhances the resilience of the community, and encourages environment-friendly practices. They openly express the need for legal and structural frameworks that encourage democratic governance. They stress that legal recognition and protection of community rights over natural resources are key to preventing misuse and deprivation. Non-governmental associations also support institutional mechanisms that facilitate dialogue, negotiation, and resolution of conflicts among different stakeholders. Moreover, they provide invaluable insights into the hurdles to democratic governance. They identify the power imbalance between local communities and other major stakeholders, such as government authorities and corporations, as a significant hurdle. CSOs also caution against tokenistic participation, where local communities are involved in consultations or meetings but their inputs and concerns are not genuinely considered or incorporated into decision-making. They emphasize the need for meaningful participation, where local communities have a substantial say in decision-making and can hold other stakeholders accountable.¹⁰

¹⁰ Joshie and others (n 4).

- Perspectives of Local Communities and Resource Users

In the discourse surrounding inclusive governance in natural resource management, the perspectives of local communities and resource users are indispensable, given their primary role as stakeholders and direct beneficiaries of these resources. They provide a unique, grassroots perspective that is inherently tied to their socio-economic conditions, cultural values, and local ecological knowledge. In the legal academic lexicon, their rights to access, use, and manage these resources are often emphasized under the umbrella of customary law, communal rights, or indigenous peoples' rights. The articulation of their perspectives elucidates the intricacies of their lived experiences and the practical implications of governance mechanisms. Their voices often bring to the fore the dynamics of power relations, issues of representation and equity, and potential conflicts with other stakeholders. Moreover, their insights contribute to an understanding of the effectiveness, or lack thereof, of existing legal frameworks, regulations, and institutional arrangements in safeguarding their rights, promoting sustainable use of resources, and ensuring their active participation in decision-making processes. Therefore, the incorporation of local communities' perspectives is not only legally and ethically imperative, but also crucial in the quest for crafting effective, equitable,

and culturally sensitive strategies for inclusive governance in natural resource management.¹¹

4. Challenges and Limitations of Inclusive Governance

Within the purview of inclusive governance, certain impediments and constraints, of both structural and systemic nature, are discernible. Primarily, issues related to power dynamics and representation pose a significant challenge. The stratified nature of power can often render the inclusive governance model asymmetrical, thereby impeding balanced participation. The pertinent question that surfaces is whether all stakeholders, especially marginalized groups, are afforded equitable representation and decision-making authority in the governance of natural resources. Secondly, conflicts over resources, arising from competing interests and claims, are an inescapable reality of shared resource management. These conflicts often breed discord and can potentially jeopardize the efficacy of inclusive governance. Hence, a robust mechanism for conflict resolution, built upon principles of equity and justice, is indispensable for the operational success of this governance model. Lastly, the role of external actors and influences cannot be disregarded. International actors, non-governmental organizations, or corporate entities often wield considerable influence over resource management. While their involvement can bring expertise and resources, it can also introduce elements of power imbalance and conflict, thereby complicating the governance process. Hence, managing these external

¹¹ 'IUCN CEESP Natural Resource Governance Framework Working Group | IUCN' (n 5).

influences is a critical aspect of ensuring effective inclusive governance.¹²

- Issues of Power and Representation

The application of inclusive governance within the context of natural resource management is often confronted with several challenges, notably issues pertaining to power dynamics and representation. Firstly, the asymmetry of power in decision-making processes often leads to marginalization of certain groups, particularly those who are most dependent on these resources for their livelihood. This power differential tends to favour elites or more influential parties, thereby stifling the voices and interests of less influential stakeholders. The imbalance can perpetuate structural inequalities and hinder the very essence of inclusive governance - that of ensuring equal participation of all stakeholders in decision-making. Secondly, the issue of representation is intrinsically linked to the power dynamics. Who represents whom and how accurately their interests are represented in the decision-making processes is central to inclusive governance. However, in practice, representation is often skewed due to various factors such as social hierarchies, educational and economic disparities, and entrenched patriarchal norms. For instance, vulnerable groups like indigenous communities or women may be underrepresented or misrepresented in these processes. Additionally, representation is not just about numbers, but also about the quality and impact of the representation. Tokenistic

¹² Blomquist (n 8).

representation that does not lead to meaningful influence in decision-making can be as problematic as non-representation. Further, the complex nature of power dynamics and representation issues often means that these challenges are not easily resolvable through simple policy measures. They demand a deep understanding of the socio-political context and require interventions at multiple levels to ensure that the principle of inclusiveness is not reduced to mere rhetoric. The mechanisms for power redistribution and ensuring adequate representation need to be robust and should be coupled with capacity building measures to equip the marginalized stakeholders with skills to effectively participate in governance processes. Therefore, while inclusive governance is a laudable goal in the realm of natural resource management, its practical implementation warrants a critical examination of power structures and representation mechanisms to ensure true and effective inclusivity.¹³

- Resource Conflicts and Their Resolution

Resource conflicts, intrinsically tied to issues of governance, power, and entitlement, represent one of the central challenges to the actualization of inclusive governance in natural resource management. These conflicts emerge when multiple stakeholders, with divergent interests and varying degrees of power and influence, vie for the

¹³ 'Chapter 7: Risk Management and Decision Making in Relation to Sustainable Development — Special Report on Climate Change and Land' <<https://www.ipcc.ch/srccl/chapter/chapter-7/>> accessed 17 June 2023.

same natural resources. In the Indian context, such disputes often surface between local communities, corporations, and government entities, complicating the establishment of sustainable resource management practices. Legal resolution of resource conflicts necessitates a nuanced understanding of the complex interplay of socio-economic, cultural, and political factors influencing these disputes. A lack of clarity and consensus regarding resource rights and entitlements often catalyses these conflicts. Hence, a robust legal framework that clearly articulates resource rights, recognizing traditional and customary rights of indigenous communities, can be instrumental in pre-empting and mitigating such conflicts. The conflict resolution process ideally should be advanced using collaborative and comprehensive methods that emphasize conversation, compromise, and agreement. Alternative Dispute Resolution techniques like discussion, mediation, and arbitration can provide fairer, more inclusive, and efficient routes for resolving disagreements compared to traditional lawsuits. These techniques empower communities by strengthening their voices and promoting an equal opportunity platform. Additionally, it's crucial that the legal resolution procedure is mindful of the power imbalances prevalent in resource conflicts. The ability of less privileged communities to effectively participate in resolution procedures is frequently undermined due to their limited resources, understanding, and authority. Therefore, initiatives for legal assistance and capacity enhancement, along with attempts to guarantee transparency and responsibility in the

resolution procedure, are essential for a fairer and just result.¹⁴

- Significance of Outside Players and Their Influence

It's important to delve into the impact of outside players and their sway, particularly in the realm of comprehensive governance in the management of natural resources. Such external participants could be a medley of distinct bodies like international associations, NGOs, multinational firms, and foreign administrations to name a few. They often exert substantial clout and control, drawing the blueprint of natural resource administration, especially in developing nations such as India. From a judicial standpoint, the involvement of these players adds a new tier of complexity to the governing structure. To begin with, the judicial tools and accords which are generally part of these entities' involvement call for meticulous examination. The provisions of these agreements can have deep-seated implications for resource access, rights of exploitation, and sharing of benefits. For example, trade accords or global conventions may mould the regulatory framework for resource mining, potentially resulting in a clash of norms between international and domestic legal systems.

Next, the power interplay between these external players and local stakeholders calls for serious scrutiny. It is imperative for judicial structures to make sure that the

¹⁴ Stefan Ehrhart and Ulrich Schraml, 'Adaptive Co-Management of Conservation Conflicts – An Interactional Experiment in the Context of German National Parks' (2018) 4 Heliyon e00890.

involvement of these external entities does not escalate disparities or sideline vulnerable groups. The issue of representation and voice in decision-making becomes extremely crucial at this point. The principle of Free, Prior, and Informed Consent, recognised by international law, is a significant tool to protect the rights of indigenous and local communities. Lastly, the role of these outside participants can also encompass providing technical proficiency and capacity building. While such contributions are extremely useful, it's important to make sure that these interventions are in sync with the needs and priorities of the local communities and do not belittle local knowledge systems.¹⁵

5. Recommendations for Strengthening Inclusive Governance

In the context of managing natural resources, this study proposes some recommendations to enhance inclusive governance. These suggestions include policy changes, ways to boost public involvement, and potential areas for future research. Firstly, lawmakers and governing bodies should give serious thought to executing policies that nurture inclusive governance. Essentially, this would involve creating legal rules that acknowledge and safeguard the rights of local communities and overlooked groups when it comes to decision-making processes related to managing natural resources. The aim of legislative changes should be to empower these stakeholders and make sure they are actively involved in resource governance. Furthermore, these policy changes should encourage openness, responsibility, and the fair

¹⁵ Hildy Teegen, Jonathan Doh and Sushil Vachani, 'The Importance of Nongovernmental Organizations (Ngos) in Global Governance and Value Creation: An International Business Research Agenda' (2004) 35 *Journal of International Business Studies* 463.

sharing of benefits accrued from natural resources. Strong monitoring and enforcement systems need to be set up to assure adherence to principles of inclusive governance. Secondly, we should embrace strategies to boost public involvement, so as to involve a range of stakeholders in decision-making procedures. It is important to educate local communities about their rights and duties in managing resources. Initiatives to build capacity, like training programmes and workshops, can provide community members with the essential knowledge and skills to actively participate in governance processes. Also, mechanisms that encourage participation, such as public consultations, deliberative forums, and joint planning, should become a standard practice, facilitating informed and inclusive decision-making. Lastly, pinpointing potential areas for future research is key to enriching the comprehension and application of inclusive governance in managing natural resources. Research could explore novel methods and effective practices to enhance public involvement and ensure the sustainable management of resources. Comparative studies that assess the efficiency of various governance models in different ecological and socio-cultural scenarios can provide invaluable insights. In addition, research into the socio-economic effects of inclusive governance, and the part played by technology and digital platforms in encouraging participation, could propel the field forward. By following these recommendations, lawmakers, civil society groups, and other stakeholders can promote inclusive governance, thereby reinforcing public involvement in managing natural resources in India. Such steps could lead to more sustainable and fair results, benefiting both communities and the environment.¹⁶

¹⁶ Global Affairs Canada, 'Action Area Policy: Inclusive Governance'

- Policy Recommendations

The aim of these recommendations is to address observed obstacles and encourage constructive involvement of stakeholders in the decision-making journey. Here's a quick rundown of the proposed policy guidelines:

i. Legislative Revisions: We must prioritise the establishment of thorough legislations that distinctly acknowledge and defend the rights of local communities and vulnerable groups in controlling natural resources. This endeavour would work towards laying a robust legal foundation for inclusive administrative structures, ensuring the rights of every stakeholder involved are protected.¹⁷

ii. Strengthening Village Leadership: It's impossible to stress enough the importance of enhancing local self-leadership. This process implies bestowing authority and decision-making powers on local groups like the village committees or gram panchayats, and community-focused organisations. The realisation of this goal can be made possible by equipping these entities with plentiful resources, technical assistance, and programs designed to enhance their abilities. Further, steps must be put in place to ensure the active participation of those often overlooked such as women, the underprivileged, and other underserved sections of society in these governance frameworks.¹⁸

(GAC, 21 February 2017) <https://www.international.gc.ca/world-monde/issues_development-enjeux_developpement/priorities-priorites/fiap_inclusive_governance-paif_governance_inclusive.aspx?lang=eng> accessed 17 June 2023.

¹⁷ *ibid.*

¹⁸ Joshie and others (n 4).

iii. Boosting Transparency and Information Accessibility: Instituting systems that ensure transparency and facilitate access to information is crucial for effective public involvement. This can be realised by establishing and implementing robust mechanisms to divulge details pertaining to natural resource management, such as resource distribution, utilisation, and decision-making procedures. The adoption of technology, like internet portals and mobile applications, can simplify information retrieval and foster responsibility.¹⁹

iv. Ways to Resolve Disputes: Establishing proficient and equitable methods for solving disagreements pertaining to the management of natural resources is vital to sustain social accord and progressive development. We can incorporate alternate dispute resolution methods like mediation and arbitration into our governing structure to timely and collectively address these disputes. It's essential that these methods are easy to access, open, and respect cultural sensitivities, ensuring the inclusion of all parties engaged in the dispute.

v. Encouraging Cooperative Alliances: It is imperative to cultivate alliances among government bodies, non-government organizations, and local communities to boost collaborative decision-making and mutual accountability. These alliances can be officially established through formal agreements like MOUs (Memorandums of Understanding) and co-management contracts, fostering the amalgamation of resources, skills, and knowledge. Such concerted efforts can

¹⁹ Canada (n 16).

stimulate innovative strategies, augment coordination, and enhance efficiency in managing natural resources.²⁰

vi. Augmenting Skills and Cognizance: Successful execution of comprehensive governance mandates enhancement of abilities of all participants involved. This involves educational programs, workshops, and awareness drives intended to enrich the comprehension of comprehensive governance principles, sustainable resource management approaches, and the various roles and responsibilities of different stakeholders. Skill enhancement initiatives should be directed at government officers, community heads, non-government organizations, and local communities, assuring their active engagement and informed decision-making.²¹

vii. Evaluation and Monitoring: Instituting strong evaluation and monitoring systems is vital to gauge the effectiveness of comprehensive governance practices and pinpoint areas of improvement. Regular inspection of participatory processes, resource usage, and impacts on local communities and the environment will assist in identifying deficiencies and ensuring responsibility. The insights from these evaluations can guide policy amendments and provide fact-based suggestions for reinforcing comprehensive governance. It is crucial to understand that these policy suggestions should be holistically executed, keeping in mind the interlinked nature of natural resource management and governance procedures. Moreover, their implementation should be

²⁰3_4_partner_management__may_20_2007.Pdf

<https://awsassets.panda.org/downloads/3_4_partner_management__may_20_2007.pdf> accessed 17 June 2023.

²¹ 'Sustainability | Free Full-Text | Sustainable Development Goals (SDGs) as a Framework for Corporate Social Responsibility (CSR)' <<https://www.mdpi.com/2071-1050/14/3/1222>> accessed 17 June 2023.

backed by adequate resources, organizational backing, and political dedication to ensure their efficiency and enduring sustainability.²²

- **Strategies for Enhancing Public Participation**

Active involvement of people is a vital component in the all-embracing management of natural resources. It creates a space where all parties concerned can partake in the decision-making process, boosting openness, responsibility and authenticity. Now, how do we enhance this public involvement? A myriad of strategies can be used to ensure every diverse viewpoint and interest is adequately represented.

- i. Access to Information:** Ensuring that relevant and accurate information is accessible to the public is crucial for effective participation. Governments and resource management agencies should adopt measures to proactively disclose information about natural resources, policies, and decision-making processes. This includes providing public access to data, reports, environmental impact assessments, and other relevant.²³
- ii. Capacity Building:** It's of utmost importance to bolster the capability of involved parties so they can actively partake in making decisions - a key component for fruitful public involvement. This can be realised via dedicated training courses,

²² Rornald Muhumuza Kananura and others, 'Participatory Monitoring and Evaluation Approaches That Influence Decision-Making: Lessons from a Maternal and Newborn Study in Eastern Uganda' (2017) 15 Health Research Policy and Systems 107.

²³ 'Raising Awareness through Public Outreach Campaigns' (SDG Accountability Portal) <<https://www.sdgaccountability.org/working-with-informal-processes/raising-awareness-through-public-outreach-campaigns/>> accessed 17 June 2023.

informative workshops, and spreading awareness through various campaigns. The focus of such initiatives should be to heighten the understanding of the participants on subjects like managing natural resources, the nuances of legal structures, and technical intricacies. Additionally, these programs must equip them with critical skills needed for analysing data, making valuable contributions to debates, and standing up for their rights.²⁴

iii. Participatory Platforms: The establishment of interactive, inclusive spaces is pivotal in fostering relationships between various parties involved. These arenas can manifest in diverse ways - town-hall meetings, interactive sessions with stakeholders, round-table conversations involving multiple parties, or even locality-specific forums. These offer the occasion for individuals involved to voice their apprehensions, disseminate local wisdom, and take part in the decision-making proceedings. There's a vital need for these platforms to foster inclusivity, maintain transparency, and be approachable by all. This includes those who are often sidelined, as well as people with scarce resources. We should strive to guarantee representation from a wide array of backgrounds, incorporating females, indigenous societies, and local resources utilisers.²⁵

iv. Collaborative Partnerships: When government bodies join hands with civil society groups and the folks in our local communities, they create an environment where everyone can have a say in the

²⁴ 'Chapter 7: Risk Management and Decision Making in Relation to Sustainable Development — Special Report on Climate Change and Land' (n 13).

²⁵ Kananura and others (n 22).

decisions that affect their lives. This togetherness brings in a wealth of resources, wisdom and expertise, ensuring that choices made are rooted in broader understanding and inclusion. This form of collaboration can take shape through the establishment of joint oversight committees, co-management contracts or shared governance arrangements. For such alliances to flourish, they must be grounded on a solid foundation of trust, mutual regard, and aligned goals. This approach ensures that everyone involved has a worthwhile role to play, thus leading to more effective management of resources.²⁶

v. Overhauling Legal and Policy Structures: It's vital to examine and remodel the existing laws, regulations, and policies to nurture an environment that encourages public involvement. The legal systems should specifically acknowledge the entitlement of stakeholders to partake in decision-making procedures related to the management of natural resources. These systems should also incorporate provisions enabling stakeholders to question decisions and pursue legal remedies in the event of breaches. Modifications should ensure that the decision-making procedures are clear, wide-ranging, and responsible. Moreover, policies should facilitate the incorporation of indigenous knowledge and conventional methods into resource management strategies.²⁷

vi. Propagating Awareness and Reaching Out: It's crucial to raise consciousness about the significance of public involvement and the advantages it offers in order to gather backing and stimulate active

²⁶ Tiwary (n 6).

²⁷ Canada (n 16).

participation. Outreach programs can be implemented via diverse channels, such as public promotions, media involvement, and educational drives. These attempts should be geared towards fostering a culture of participation, accentuating successful examples, and displaying the positive results of inclusive administration. Public consciousness initiatives should aim to connect with diverse segments of society, encompassing rural dwellers, the younger generation, and marginalized groups.²⁸

6. Conclusion

In this study, we delved into the idea of inclusive governance and its impact on amplifying public involvement in the management of natural resources in India. We delved into the historical backdrop, the present condition of natural resources, and the prevailing policies in India. We also scrutinised case studies involving community-driven resource management, participatory forest management, and joint management of marine resources. Viewpoints on inclusive governance were obtained from various sources including government bodies and policymakers, non-governmental organisations, as well as local communities and resource users. Furthermore, we recognised the hurdles and restrictions of inclusive governance, such as issues concerning power and representation, the resolution of resource disputes, and the influence of external actors. Lastly, we furnished recommendations to fortify inclusive governance, covering policy suggestions, strategies to boost public involvement, and prospective areas for further investigation. The historical backdrop and

²⁸ 'Raising Awareness Through Public Outreach Campaigns' (n 23).

progression of natural resource management in India cast light on the complicated dynamics and diverse elements that have moulded the current situation. It is clear that India's natural resources are faced with significant challenges like depletion, disagreements over access, and unsustainable use. In response, inclusive governance has emerged as an essential method to effectively address these problems. The analysed case studies showcased successful inclusive governance models in India. The favourable outcomes of involving local communities and resource users in decision-making were highlighted. Community-driven initiatives demonstrated the possibility of sustainable resource management, emphasising local community participation and empowerment. Participatory forest management played a vital role in enhancing forest conservation and the livelihood of forest-reliant communities. Likewise, the joint management of marine resources cultivated collaboration amongst local communities, government bodies, and other stakeholders, leading to improved marine ecosystem health and betterment of coastal communities. Insights garnered from the viewpoints of various players in inclusive governance were invaluable. Government bodies and policymakers acknowledged the significance of public participation and the need for inclusive decision-making in natural resource management. Non-governmental organisations played a crucial role in advocating for inclusive governance and facilitating the involvement of marginalised communities. Local communities and resource users expressed a desire for more involvement and decision-making power regarding natural resource management. Nevertheless, despite the potential advantages of inclusive governance, numerous challenges and limitations persist. Issues of power and representation continue to be substantial obstacles to achieving true inclusivity. Power imbalances

often affect decision-making processes, leading to the marginalisation and exclusion of certain groups. The resolution of resource disputes requires effective dialogue, negotiation, and dispute resolution mechanisms. The influence of external factors such as multinational corporations and international organisations can both create opportunities and pose challenges for inclusive governance. In an endeavour to bolster participatory governance in the sphere of India's natural resource management, we can put forth numerous suggestions. These encompass the essentiality for exhaustive laws that expressly endorse participatory governance, recognising the entitlements of local communities and those who utilise these resources. It's crucial to set guidelines that guarantee the inclusion of disadvantaged groups in decision-making mechanisms. Tactics to magnify public engagement should be inclusive of raising awareness, nurturing skills, and cultivating collaborations among involved parties. Distributed governance, coupled with the strengthening of local establishments, can also augment inclusive decision-making. More in-depth study is also indispensable, especially concerning the merging of conventional knowledge systems, the role of gender in inclusive governance, and the effect of such governance on ecosystem services. To encapsulate, inclusive governance assumes a significant role in the sustainable management of natural resources in India. The investigation revealed that potent public involvement can lead to superior outcomes for both humans and the environment. The case studies and perspectives evaluated in this study provide insightful learnings into the advantages and obstacles of inclusive governance.

CHAPTER-12

LEARNING FROM THE BEST TO AVOID THE WORST: A CRITICAL LEGAL EVALUATION OF E-WASTE MANAGEMENT FROM EU AND INDIA WITH EMPHASIS ON NORTH EAST INDIA

Sourabh Roy *

1. Introduction

The growth of E-Waste has become a derisive problem in the environmental governance of various developing countries including India. The reason behind this lies in the growth of the country's purchasing capacity and rise in urbanisation and consumerism. They have also escalated the surge for electric appliances' demand like laptops, smart-phones, tablets, etc. among the proportionately growing population. Such factors have encouraged the increasing scale of obsolescence in the usage of electrical and electronic equipment (EEE). Consequently, India has been finding itself among the largest sources of E-Waste generators in the world.

* Advocate

This problem would lead to long term and irreparable consequences in the realm of environmental protection and public health, if gone unchecked. Especially in a situation acknowledging inadequate infrastructural facilities and inefficient enforcement of regulations calling for an environmentally sound way of managing such wastes. Regulations in E-Waste management is also necessary from the public health perspective as waste electrical and electronic equipment (WEEE) consist of hazardous substances like cadmium, lead, mercury, etc., all of which are detrimental in nature.

E-Waste regulation in India is in nascent stages since its inception in 2011 although its framework has undergone amendments in 2016 and 2018. Yet, the regulation of E-Waste management in the European Union (EU) is comparatively advanced. The discussions in Europe had gone on for a decade to have the issues related to E-Wastes addressed through policy measures which were backed by scientifically based procedures for having them recycled and disposed. This led to formulation of the in 2003 Directives on WEEE and Restriction of Hazardous Substances (RoHS), which was the law of Europe pertaining to collecting, recycling and recovering the mentioned categories of WEEE.

E-Waste rules in India has developed at its own pace concerning various practices which could be observed on a chronological understanding of the rules from 2011 to 2018 amendments. For example, the 2011 rules did not have any provision for collection of WEEE under Extended Producer Responsibility (EPR) on a target based approach. This gap was filled in by the 2016 rules where phase-wise collection target for E-Wastes was provided but its implication was silent for those producers who had recently started sales operations as

per the ambit of the rules. This was also answered by the 2018 amendments.

However, it is beneficial to critically evaluate the existing Indian laws pertaining to E-Wastes in comparison to the E-Waste management provided by the European model as EU has spearheaded the E-Waste regulations since the beginning. Therefore, the aim of this study is to indulge in a comparative analysis of the European and Indian frameworks pertaining to E-Waste management. The scope of this study remains restricted to the examination of all the relevant directives, regulations and guidelines along with case laws pertaining to E-Waste and its management in both jurisdictions.

This Chapter seeks to delve into the development of E-Waste regulations in Europe and draw the importance of two uniquely European initiatives, EPR and Reduction of Hazardous Substances (RoHS) as these concepts have had a significant influence in shaping the regulations concerning E-Wastes across various jurisdictions. It highlights a biographical and legal account on the evolution of E-Waste rules in India alongside pointing out how each successive rules have gradually addressed the lacuna left by its predecessors due to both policy and judicial interventions. Emphasis is also to be placed on E-Waste management in North East India considering the discourse taking place in the national level. The Chapter also presents an analysis from the practices of both jurisdictions alongside charting out certain recommendations which could be taken into consideration by the policy-makers to improve E-Waste governance in the Indian context.

This study would be helpful to spot the loopholes in the Indian framework and present adequate measures in filling these gaps. For instance, conceptual clarity still

lacks in issues related but not limited to, certain aspects of involving unorganised sectors in management of E-Waste and effective enforcement of the regulations on field. The study also undertakes the approach of a doctrinal research to attempt the assessment of the strengths and weaknesses presented by both systems. This would benefit a clearer understanding of the needs that are required to be met by the Indian framework rather than undergoing a simplistic adaptation from the EU provisions.

2. E-Waste management in Europe

Early stages of E-Waste management

European regulations concerning E-Waste had not come into the picture in isolation. Its inception can be traced back to the “Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal” and the time when it came to effect in 1992.¹ As the trade in hazardous waste among signatories was banned by the Basel Convention, various State parties enacted laws at their municipal levels to prohibit the import and export of such wastes.² The EU Commission had also enacted the Waste Shipment Regulation (WSR), in this context, in 1993 whereby exporting hazardous E-Wastes to the countries outside the Organization for Economic Co-operation and Development (OECD) was prohibited.³ Hence, it became necessary for the EU to develop a framework for E-Waste regulation, to avoid the

¹ The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989.

² *Id.*

³ European Council Regulation 259/93 on the supervision and control of shipments of waste within, into and out of the European Community (1993).

problem of over-flowing E-Wastes and limited capacity of landfills.

Era of WEEE and RoHS Directives

The EU brought into legislation the WEEE Directive⁴ and the RoHS Directive⁵, almost after a decade, to address their E-Waste problem by aiming to increase the rate of recycling WEEE that has been generated domestically. The former directive called for producers of EEE to exercise responsibility for having E-Wastes recovered and recycled within the ambit of Extended Producer Responsibility (EPR). The latter placed emphasis on reducing the use of hazardous substances and using environmentally sound substances in their place by having the design and packaging of the product changed. EPR was an ambitious arrangement within the framework. It is regarded to be a strategy for protection of the environment by meeting the objective of reducing a product's impact on the environment, by holding the concerned manufacturer responsible for the product's end-of-life cycle alongside emphasising on its take-back, recycling and final disposal.⁶

WEEE Directive

The EU had amended the WEEE Directive in 2012 to bring uniform regulations in the management of E-

⁴ European Council Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE)(2003).

⁵ European Council Directive 2002/95/EC of 27 January 2003 On The Restriction of The Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) (2003).

⁶ UNEP, I E-Waste: Inventory Assessment Manual, (2007) available at <wedocs.unep.org/bitstream/handle/20.500.11822/7857/EWasteManual_Vol1.pdf?sequence=3&isAllowed=y>(last visited on Dec 3, 2021).

Wastes among its member-states.⁷ Alongside being a broad-ranging regulation for procedures dealing with collecting WEEE other than its recycling and recovery, the directive stresses on WEEE to be collected in a methodical and segregated manner.⁸ This would result in a better output in the recycling process to yield reusable E-Waste materials.⁹ The WEEE Directive, in a way, guides the member-states to incentivize the management of E-Wastes among producers¹⁰ by encouraging EEE designs and production which makes it financially and/or physically viable for dismantling and recycling process.¹¹ Such policy measures complements the principle of EPR where the life cycle of a product at the post-consumer stage is under the responsibility of a producer including its collection and recycling.¹² It is interesting to note the directions provided to the member-states to ensure that disposal of WEEE is segregated from other municipal solid wastes, which also facilitates their appropriate treatment.¹³

In addition to collection, recycling and dismantling measures for the treatment of the EEE at the concerned facility involves de-contamination, shredding, resource-recovery or disposal-preparation. It should be made sure that such processes are done in accordance with the “best available treatment” which calls for all fluids under Annex VII to be removed and certain components to be

⁷ European Council Directive 2012/19/EU of 4 July 2012 on waste electrical and electronic equipment (WEEE), (2012).

⁸ *Id.*, art. 6.

⁹ Rashmi Anoop Patil and Seeram Ramakrishna, “A comprehensive analysis of E-Waste legislation worldwide” 27 *Environmental Science and Pollution Research* 14415(2020).

¹⁰ *Supra* note 7, art. 3(f)(i).

¹¹ *Supra* note 7, art. 4.

¹² *Id.*, art. 5(5).

¹³ *Id.*, art. 5(1).

collected and recovered as per the technical requirements in Annex VIII.¹⁴ Although the WEEE Directive mandates the producer to be responsible for the E-Wastes generated from his/ her products, the producer is given the option of meeting this mandate either by individually taking up the task or by being a part of a collective scheme.¹⁵ The Directive also provides for improved and ambitious recovery target of E-Wastes with the intention of securing the environmentally sound treatment of WEEE and is aptly reported, so that environmental degradation, loss of valuable recovered resources and inconsistent data-sets could be avoided.¹⁶

Member-states are required to have a register of producers within their jurisdictions where EEE producers have to register themselves and report pertinent information regarding volume of sales along with volume of products which are collected and recovered in such registers.¹⁷ This measure is also beneficial in inspecting and monitoring the compliance of the Directive in order to ensure its appropriate implementation.¹⁸ WEEE Directive has been formulated on the basis of 'precautionary principle' so that preventive action against environmental degradation could be adequately taken. This is better exemplified by the power provided to the EU Commission to exercise delegated acts to adapt to progress in scientific and technical field.¹⁹

¹⁴*Id.*, art. 8.

¹⁵*Id.*, art. 12(3).

¹⁶*Supra* note 7, art. 11.

¹⁷*Id.*, art. 16.

¹⁸*Id.*, art. 23.

¹⁹*Id.*, art. 19.

Nonetheless, the Directive also follows the ‘polluter pays’ principle while deciding on the management of historical wastes i.e. WEEE from products that were or had already been in the market on 13 August 2005, which was again placed on the producers.²⁰ They were financially responsible for it and such responsibility was proportionately divided among them as per the market share of the concerned WEEE.²¹ In this manner, the expenses related to disposal and treatment of WEEE could even be included within the price of a product which would reflect the environmental outcome that a product has and thus, avoids the externalisation of such costs on the environment. Such costs also inform the purchaser about their role in the environmentally sound management of WEEE pertaining to their collection, treatment and disposal.²²

RoHS Directive

The RoHS Directive intended to solve the issues of toxicity in E-Wastes arising from use of hazardous substances. Such standards and certification are necessary from the perspective of manufacturing facilities. It has also been further amended by the EU in 2011.²³ It brought restrictions on the use of certain heavy metals as mentioned in Annex II which are hazardous while manufacturing certain categories of EEE like cadmium particularly alongside mercury, lead, hexavalent chromium, poly-brominated biphenyls (PBB) and poly-brominated diphenyl ethers (PBDE).²⁴ Such a

²⁰*Id.*, art. 12(4).

²¹*Id.*

²²*Supra* note 7, art. 14.

²³ European Council Directive 2011/65/EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)(2011).

²⁴*Id.*, art. 4.

measure is considered to reduce the risks related to health and environment and also seeks the replacement of such substances with environment-friendly alternatives.

However, this list of restricted substances is not exhaustive and is subject to review which shall be based on the scientific facts available and bearing the precautionary principle in mind.²⁵ However, exemption from such restrictions are permitted in cases where the substitution of such materials would not be viable from a scientific and technical perspective or where such substitution causes an adverse impact on health and environment which overrides its purposive benefits.²⁶ The Directive makes it mandatory to comply with the CE marking requirements for products, which would indicate its conformity with health, safety and environmental protection standards.²⁷

It is encouraging to see that the RoHS Directive provides for consultation among its stakeholders like EEE producers, recyclers, treatment facility operators, environmental groups and the employees and consumer associations, concerning the amendments to exempt the application of hazardous substances from restrictions.²⁸ The RoHS Directive had again been amended in 2015 for the purposes of amending Annex II to include additional four substances to its existing list of restricted substances such as Bis(2-Ethylhexyl) phthalate (DEHP),

²⁵*Id.*, art. 6(1).

²⁶*Id.*, art. 5(1)(a).

²⁷*Supra* note 7, art. 7(c).

²⁸*Id.*, art. 5(7).

Benzyl butyl phthalate (BBP), Dibutyl phthalate (DBP) and Di isobutyl phthalate (DIBP).²⁹

3. E-Waste management in India

E-Waste regulations in India before enforcement of specialized regulations

The Indian framework concerning E-Waste management has been patchy given the fact that there was no comprehensive regulation for E-Wastes till 2010, neither at the central nor at the state level.³⁰ Therefore, it is important to briefly highlight the scenario before the E-Waste (Management and Handling) Rules came into effect in 2012. The Environment (Protection) Act of 1986 had played an important role for E-Waste management as it had not only provided a broad definition of hazardous wastes³¹ but it had also empowered the Central Government to frame rules pertaining to environmental pollution.³² In pursuance of this, the Hazardous Waste (Management and Handling) Rules were brought in 1989 but it was silent concerning E-Wastes. The Supreme Court of India had also directed the Central Government to notify rules pertaining to various hazardous wastes as per its order dated 14 October, 2003.³³ Hence, the Hazardous Waste Rules were further amended in 2003 to bring it in consonance with

²⁹European Commission Delegated Directive 2015/863 of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances (2015).

³⁰ Umesh Kumar and D.N. Singh, "E - Waste Management through Regulations" 3(2) International Journal of Engineering Inventions 12(2013).

³¹The Environment (Protection) Act, 1986 (Act 29 of 1986), s. 2(e).

³²*Id.*, s. 6.

³³Research Foundation for Science, Technology and Natural Resource Policy v. Union of India and Ors.(2005) 13 SCC 186.

the Basel Convention whereby provisions regarding E-Waste in the context of import and export were talked about initially.³⁴ As a result, the initiative to establish several hazardous waste disposal facilities was also taken by the state governments.

Concrete discussions regarding E-Waste management had been introduced with the Hazardous Wastes (Management, Handling and Transboundary) Rules of 2008 which had superseded the earlier rules. The Rules of 2008 consisted of directions for managing and handling hazardous wastes inclusive of WEEE.³⁵ Registration with the Central Pollution Control Board (CPCB) is mandated for those intending to recycle, reprocess or handle WEEE. The units involved with E-Wastes need to have facilities which functioned in an environmentally sound manner to recover valuable resources from such wastes.

The growing problem regarding E-Waste had pushed the CPCB to do an assessment of E-Waste management and handling which resulted in the 'Guidelines for Environmentally Sound Management of E-Waste' in 2008.³⁶ The application of these guidelines was limited to not only generators, collectors, transporters, dismantlers and recyclers but also to those stakeholders who handled E-Wastes, without placing any restrictions on the scalability of their operation. This document had

³⁴The Hazardous Wastes (Management and Handling) R.s, 1989, r. 11.

³⁵The Hazardous Wastes (Management, Handling and Transboundary Movement) R.s, 2008, Schd. IV.

³⁶ Central Pollution Control Board, Guidelines for Environmentally Sound Management of E-Waste(2008) available at <www.yumpu.com/en/document/view/6274477/guidelines-for-environmentally-sound-management-of-E-Waste>(last visited on Nov. 29, 2021).

emphatically talked about the producers' responsibility and its voluntary application, for the entirety of the product's life cycle by the means of taking back, recycling and ensuring its disposal. In another sense, this had formed the crux of EPR in India. The guidelines had also opted for technologies which are environmentally sustainable in recycling E-Waste and made provisions for reducing the use of hazardous substances in the EEE manufacturing.³⁷

Although WEEE had been brought within the ambit of the Hazardous Wastes Rules of 2008, it had been recognised, way back in 2005, that an exclusive framework for the management of E-Waste was a necessity when a Private Member's Bill on E-Waste (Handling and Disposal) Bill of 2005 was brought up for discussion in Rajya Sabha i.e. the Upper House of the Parliament.³⁸The Bill comprised notable provisions for the disposal of E-Waste alongside municipal wastes. Nonetheless, the said Bill could not muster the necessary support for its passage and had finally lapsed in July 2010 when the term of the concerned Member of Parliament, who had introduced this Bill, had expired.³⁹

4. E-Waste frameworks in India

E-Waste (Management and Handling) Rules, 2011

All these efforts and developments contributed to the enactment of a comprehensive regulation for managing WEEE in the form of the E-Waste (Management and Handling) Rules of 2011. The 2011 Rules were applicable

³⁷*Id.*

³⁸Rajya Sabha Secretariat Research Unit, E-Waste in India, (2011) available at <rajyasabha.nic.in/rsnew/publication_electronic/E-Waste_in_india.pdf> (last visited on Dec.10, 2021).

³⁹*Supra note 38.*

to the stakeholders concerned with the application of these Rules like the producer, consumer or bulk consumer, collection centre, dismantler and recycler dealing with EEE as provided in Schedule I.⁴⁰ However, micro-scale and small-scale industries as per Micro, Small and Medium Enterprises Development Act of 2006 were exempted from the application of these Rules.⁴¹ The mechanism for collection for E-Waste seeks for collection centres to be set up by a producer, any person, agency or even an association but mandates receiving authorization from the relevant State Pollution Control Board (SPCB) for this.⁴²

It is important for producers to receive authorization from SPCB or Pollution Control Committee (PCC, in the case of Union Territories) for having EPR implemented in an effective manner that channelizes E-Waste to dismantlers and recycler who are already registered.⁴³ Creating awareness concerning mechanisms for disposal among consumers by providing for the usage of symbols to prevent E-Waste from being dropped in garbage bins has been recognised as a highlighting feature of the Rules.⁴⁴ It is also observed that all the stakeholders in the management-chain are required to get separate authorizations and looking at the influence of SPCB and PCC, even separate authorization for functioning in each state is required.⁴⁵ For example, collection centres were required to obtain authorisation from the SPCB or PCC and make sure that they had

⁴⁰The E-Waste (Management and Handling) Rules, 2011, r. 2.

⁴¹*Id.*, r. 2(b).

⁴²*Id.*, r. 9.

⁴³*Id.*, r. 4(2).

⁴⁴*Supra* note 43., r. 4.

⁴⁵*Id.*, r. 9.

stored the waste collected in a secured way before it was dispatched to the dismantlers or recyclers.⁴⁶

Similarly, registration with the SPCB or PCC was mandatory for the dismantlers and they had the responsibility of seeing that neither environment nor health was adversely affected during the process of dismantling while also ensuring that dismantled wastes were sent to recycling facilities for recovery of materials.⁴⁷ Recyclers are also required to register themselves with the SPCB or PCC in order to operate and dispose the dismantled waster in a hazardous waste treatment storage disposal facility.⁴⁸The 2011 Rules places on obligations for bulk consumers and provides several categories of such consumers that would come within its ambit, keeping in mind that bulk consumers of EEE are a large generator of E-Wastes.⁴⁹

It also regulates RoHS at the manufacturing stage of new EEE products so that they would not contain such hazardous substances exceeding the prescribed limits.⁵⁰ With regards to non-compliance of the 2011 Rules, the Pollution Control authorities have been provided with the power to cancel authorisation of the non-compliant entity. In addition to this, the penalty and punishment for non-compliance as provided under the Environmental (Protection) Act of 1986 is also applicable, given that it is the parent legislation of the concerned Rules.⁵¹ Hence, not only would a penalty up to Rs 1 lakh be imposed on an offender, but the offender could also be sentenced to

⁴⁶*Id.*, r. 5.

⁴⁷*Id.*, r. 7.

⁴⁸*Id.*, r. 8.

⁴⁹*Id.*, r. 6.

⁵⁰*Id.*, r. 13.

⁵¹*Supra* note 31, ss. 6, 8 and 25.

an imprisonment term for a period extending up to five years.⁵²

E-Waste (Management) Rules, 2016

The 2011 Rules, despite being the first comprehensive E-Waste regulation in India, does not address many issues such as collection-targets for implementing EPR, obligation of manufacturer and state-governments in E-Waste management or even liability of damages, among other things. However, several of such gaps were answered by the E-Waste (Management) Rules of 2016 which had superseded the 2011 Rules. Various other stakeholders are brought within the ambit of E-Waste management such as manufacturer, dealer, refurbisher and Producer Responsibility Organization (PRO).⁵³ The application of the Rules has been extended to components, consumables, spares and parts of EEE as well.⁵⁴

PRO is an important measure from the 2016 Rules as such professional organisations are given collective or individual authorization and finances by producers to carry the responsibility of collecting and channelizing E-Wastes in an environmentally sound manner, from the post-consumer stages of their products.⁵⁵ The involvement of PRO along with setting up of E-Waste exchanges, e-retailer, Deposit Refund Scheme, etc. as ancillary channels not only provides flexibility to the producers for implementing EPR but also checks the channelization of E-Wastes in an effective manner.⁵⁶ This

⁵²*Id.*, s. 15.

⁵³The E-Waste (Management) Rules, 2016, r. 2.

⁵⁴*Id.*

⁵⁵*Id.*, r. 3(dd).

⁵⁶*Supra* note 53., r. 5(d).

also removes the requirement for collection centres to be authorized as collection of E-Wastes becomes the sole responsibility of the producer under EPR.⁵⁷

The 2016 Rules, additionally, provide for the responsibilities of manufacturers, refurbishes and dealers. Both manufacturers⁵⁸ and refurbishes⁵⁹ but not dealers have to receive a one-time authorization from the SPCB, while also collecting and channelizing E-Wastes. Nevertheless, dealers have to also collect E-Wastes if such a responsibility exists on behalf of the producer, by providing a box or demarcated area to the consumer for depositing E-Waste.⁶⁰ If there is a take-back system or Deposit Refund Scheme in existence by the producer, then the dealer must refund such amount to the depositor of the E-Waste.⁶¹ The 2016 Rules also seek for bulk consumers to file annual returns⁶² alongside laying down provision for liability by imposing financial penalties⁶³, to ensure satisfactory compliance mechanism and implementation of the regulations. Another objective that can be seen from the Rules concerns the procedure for seeking and grant of authorisation.⁶⁴ It gives the impression that, unlike being a mere procedural formality, such uniform mechanisms would ensure the duties imposed on these authorised entities would be strictly enforced.

⁵⁷ Rupali Sharma and Shahzar Hussain, "E-Waste Management in India", Mondaq, April 26, 2018, available at <www.mondaq.com/india/waste-management/695996/E-Waste-management-in-india>(last visited on Nov. 9, 2021).

⁵⁸*Supra note 53, r. 4.*

⁵⁹*Id.*, r. 8.

⁶⁰*Id.*, r. 7(1).

⁶¹*Id.*, r. 7(2).

⁶²*Id.*, r. 9(4).

⁶³*Id.*, r. 21(2).

⁶⁴*Id.*, r. 13.

Policy measures to engage the unorganized sector by formalizing it within the E-Waste framework, can be observed in the responsibilities of the State Government⁶⁵ (to ensure safety, health and skill development of workers involved in dismantling and recycling activities) and Urban Local Bodies⁶⁶ (to collect and channelize orphan products to authorized dismantler and recyclers for preventing leakage of E-Wastes to the unorganized sector). Similarly, small enterprises have been brought under the ambit of the 2016 Rules as they are recognised to be a major source of E-Waste generators.⁶⁷ Hence, by binding them to the rules applicable for manufacturer's responsibility, it can be ensured that the collection and channelization of E-Wastes will go to authorized places and avoid resorting to the unorganised sector.⁶⁸

E-Waste (Management) Amendment Rules, 2018

The E-Waste (Management) Rules of 2016 were further amended in 2018 to institute efficient implementation of regulating E-Waste in India in a more environmentally sound manner. This can be ensured by bringing E-Waste sector in a much more formal structure. The amended Rules of 2018 had not only revised the collection targets under EPR provision by fixing 70% E-Waste collection after 2023⁶⁹ to improve management of the sector, keeping the reality of situation intact. It had also introduced a different category of collection-targets for those producers having sales operations less than their

⁶⁵ *Supra note 53., r. 12.*

⁶⁶ *Id., r. 24.*

⁶⁷ *Id., r. 2(b).*

⁶⁸ *Id., r. 3(z).*

⁶⁹ The E-Waste (Management) Amendment Rules, 2018, r. 2(a).

product's average life.⁷⁰ The CPCB has been empowered in the compliance mechanism with PROs having to register itself with it⁷¹ and it can conduct random sampling of EEE to monitor the reduction of hazardous substances in such equipment.⁷²

E-Waste Management in North East India

Like any other place, North East India has also been plagued by the rampancy of e waste problems especially considering the amount of E-Waste accumulating in the region. Several hassles do arise when addressing the problem when lack of data is considered while considering questions pertaining to monitoring, reporting and verification. Although a considerable responsibility is placed on the local bodies to take necessary action, it is disheartening to observe the absence of a specific plans to deal with E-Waste management as can be seen in the city of Guwahati.⁷³

In view of such circumstances, the Ministry of Electronics and Information Technology (MEITY) has also partnered with Consumer Electronics and Manufacturers Association (CEAMA), National Association of Software and Services Companies (NASSCOM) as its industry partners and an academic partner in Maharaja Agrasen Institute of Technology (MAIT) for dealing with the hazards associated with E-Wastes by bridging a glaring awareness gap of its impact in the North Eastern region

⁷⁰ *Supra note 69., r. 2(b)(I).*

⁷¹ *Id.*

⁷² *Id., r. 2(c).*

⁷³ Abdul Gani, "Guwahati in dire need of E-Waste hazard awareness" Times of India, September 6, 2018, available at <timesofindia.indiatimes.com/city/guwahati/guwahati-in-dire-need-of-E-Waste-hazard-awareness/articleshow/60390409.cms > (last visited on Nov. 29, 2021).

under the 'Digital India' initiative whereby Guwahati and Imphal were identified to be pilot cities to begin the sensitization programs.⁷⁴ Several stakeholder based meetings were also conducted under the aegis of the Guwahati Municipal Corporation to initiate stakeholder based actions.

Nonetheless, a baneful fact that appears in the absence of effective E-Waste management in the North Eastern region especially from the data generated with regards to Assam is that waste has also not been segregated properly at the time of disposal, which includes E-Wastes to mix along with all other kinds of solid wastes. This inadvertently leads to the increasing levels of toxicity to be observed in the leachate from the solid waste management sites due to the presence of cadmium, lead and other metallic elements in exponential amount. The matter had also been brought up before the Gauhati High Court in various public interest litigations where various directions were passed to the government and its department to ensure effective management of solid waste which includes revised master plans for waste management, identification of sites for waste disposal and even ordering municipal authorities to collect fines from erring individuals who have been found to be throwing wastes on the roads in accordance with the Solid Waste Management rules.⁷⁵

It can only been foreseen at this stage that for E-Waste management to be solidified in the North Eastern region,

⁷⁴ Saptarshi Dutta, "E-Waste in Northeast India: How Assam is Planning to Fight the Rising Crisis", available at <swachhindia.ndtv.com/E-Waste-in-northeast-india-how-assam-is-planning-to-fight-the-rising-crisis-9459/> (last visited on Nov. 29, 2021).

⁷⁵ Pradip Baruah v. Union of India and Ors., PIL/40/2021 (High Court of Assam, Nagaland, Mizoram and Arunachal Pradesh)

there is no doubt that the E-Waste rules must be followed in its complete letter and spirit, but as long as a vacuum exists for its effective implementation, steady recourse must be sought to the Solid Waste Management Rules as this way provides for a manner to not only keep the authorities at its feet but to establish legally-established accountability on their part.

5. Way Forward

The study of EU laws concerning E-Waste management provides the opportunity to further analyse the implementation of best practices that could be adopted within the framework of E-Waste management in India, even though the existing regulation has been in line with international best practices. Instances of such practices that have been included in the context of India are the provisions concerning EPR, RoHS and providing for collection targets, among other things. Nevertheless, as Dr Bernd Kopacek mentions, it would be prudent to follow an approach that involves the “best of 2 world” rather than applying the European solution in verbatim in Indian context.⁷⁶

Although the WEEE and RoHS Directive are very comprehensive in nature, they also struggles with the problems of strict enforcement to achieve the efficiency of the implemented regulations.⁷⁷ It has also been observed from the feedback mechanisms of the system that regular updates to the legislation could be helpful in making the list of WEEE applicable for recycling more

⁷⁶ Neeta Mishra, “Electronic Waste India: Can We Learn from the European Experience?” Business World, May 19, 2018, available at <www.businessworld.in/article/Electronic-Waste-India-Can-We-Learn-From-The-European-Experience-/19-05-2018-149504/> (last visited on Nov. 29, 2021).

⁷⁷ *Supra* note 9 at 14425.

inclusive than what it is.⁷⁸ At the same time, it is also helpful to the European context if the WEEE Directive could incentivize the re-use of appliances which has been burdened by the pressure to meet recycling targets.⁷⁹ It is encouraging to see the EC's proposal for the "right to repair" in pursuance of this.⁸⁰

Issues in the same context have also appeared for dispute resolution before the European Court of Justice (ECJ) concerning the interpretation and application of the WEEE and RoHS Directives. In a matter concerning, a decision to exempt the use of *Decabromodiphenyl* ether (DecaBDE) in EEE for the purposes of adapting to technical progress in the Annex to RoHS Directive, the ECJ annulled such a move on the ground that the exemption had not met the conditions of Article 5(1) of the Directive and was counter-intuitive to the legislative objective to prohibit the components hazardous to health and environment.⁸¹ Similarly, the European Commission (EC) has taken member-states such as Germany to the ECJ for not transposing several modified provision of the WEEE Directive and has also asked for financial penalties to be levied.⁸²

⁷⁸ *Id.*

⁷⁹ Satish Sinha, et.al., Waste Electrical and Electronic Equipment—the EU and India: sharing best practices (2012) available at <toxicslink.org/docs/Waste_Electrical_Electronics_Equipment_.pdf> (last visited on Nov. 27, 2021).

⁸⁰ Hemani Sheth, "EU Proposes 'Right to Repair' Legislation to curb E-Waste", The Hindu Business Line, March 12, 2020, available at <www.thehindubusinessline.com/news/world/eu-proposes-right-to-repair-legislation-to-curb-E-Wate/article31047381.ece#> (last visited on Nov. 29, 2021).

⁸¹ European Parliament and Kingdom of Denmark v Commission of the European Communities [2008] ECR I-01649.

⁸² "Press Release: Commission refers GERMANY to Court for E-Waste failings and proposes fines", European Commission, May 28, 2015)

The Indian regulation on E-Waste management, on the other hand, still requires to meet the funding demands necessary for E-Waste collection and channelization infrastructure which would also improve compliance systems.⁸³ Though the 2011 and 2016 E-Waste Rules attempted to address the issues related to the unorganised sector has E-Waste industry, it is important to ensure that the strength of the informal sector skills is not gone unutilized which would be beneficial in avoiding their loss of employment. For this, lessons can be learnt from the Solid Waste Management Rules of 2016 by which a system can be established where informal WEEE collectors are integrated with authorised dismantlers and recyclers.⁸⁴ An important concern that remains to be addressed concerns better clarity of ancillary options within EPR such as take-back or Deposit Refund Scheme in order to maintain transparency among the stakeholders.⁸⁵

Enforcement mechanisms have also been compromised in certain cases as observed in a case before the National Green Tribunal (NGT) where the applicant found in a survey that E-Wastes were still collected by unauthorized *kabadiwala*, against which there were insufficient actions taken by Uttar Pradesh PCB (UPPCB) or Government of UP.⁸⁶ The Tribunal in its order directed the authorities to hold responsibility in seeing that the E-

available at <europa.eu/rapid/press-release_IP-15-5054_en.htm> (last visited on Nov. 28, 2021).

⁸³ Rashmi Makkar Panwar, et.al., “E -Waste Legislation in India: Study and Comparative Analysis” 3(3) Engineering and Technology Journal 399(2018).

⁸⁴ The Solid Waste Management Rules, 2016, r. 15(c).

⁸⁵ Harveen Kaur and Sushma Goel, “E-Waste Legislations in India- A Critical Review” 41(1) Management and Labour Studies 69(2016).

⁸⁶ Shailesh Singh v. State of Uttar Pradesh and Ors. O.A. 512 of 2018 (NGT)

Waste Rules are complied with and apt measures are taken against the violators.⁸⁷ Simultaneously, the alertness of CPCB could be witnessed when it found three dismantlers/recyclers to be in violation of the 2016 Rules and immediately informed producers and PROs to not have any interaction with violating parties in pursuance of EPR agreements.⁸⁸

Despite all of these, several hurdles are still needed to be addressed in the regulation of E-Wastes such as preparing an inventory of E-Waste generation by the SPCBs and PCCs and identifying producers who are functioning without EPR authorisation, a task which requires the support of the CPCB, SPCBs/PCCs, Custom department, Ministry of commerce and Ministry of electronics and telecommunication. Pollution control authorities are needed to verify the quantity of E-Wastes collected by all EPR authorised Producers alongside verifying the systems provided by such Producers for collection and channelization of E-Wastes. Regional pollution control authorities such as the SPCBs and PCCs would also require the support of the Commissioner of Police to verify the facilities of dismantlers and recyclers for their infrastructure and records, while also keeping a check on informal trading, dismantling and recycling of waste. State governments are required to formulate mechanism for facilitating the collection of E-Wastes and incentivising the establishment of recycling facilities. Finally, capacity

⁸⁷ *Id.*

⁸⁸ Central Pollution Control Board, Notice to all producers of EEE and PROs as per E-Waste (M) Rules, 2016 dated 12.03.2020, 2020, available at [\(http://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvMTA2MV8xNTg0MDg0MDgzX21lZGlhcGhvdG8zNzExLnBkZg==\)](http://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvMTA2MV8xNTg0MDg0MDgzX21lZGlhcGhvdG8zNzExLnBkZg==) (last visited on Dec. 29, 2021).

building concerning such matters still remain inadequate at the district, state and central level for which special workshops are needed held for functionaries in both governmental and non-governmental organisations.⁸⁹

Nonetheless, among the several lessons that could be picked up from the European framework to improve the E-Waste regulations in India, as guided by the Precautionary Principle and the Polluter Pays Principle, which are also a part of the environmental laws of the land.⁹⁰ Hence, it would be helpful to focus on four aspects which pertains to the following: -

- a) segregation of E-Wastes at source before disposal by consumers and to increase its awareness alongside imposing penalties on those violating E-Waste segregation provisions;
- b) monitoring, reporting and verification (MRV) mechanisms need to be strengthened by the collaborative efforts of the task forces of CPCB and SPCBs/PCCs along with district administrations in order to preclude local vested interest in the enforcement of such regulations;
- c) involvement of all the stakeholders to consult among themselves to have periodic discussion on the categories of WEEE to be collected and channelized in an environmentally sound manner along with other categories of hazardous substances that require to be reduced in the production stage of EEE; and
- d) harmonization of all the regulations and guidelines pertaining to E-Waste management within a comprehensive framework. For example,

⁸⁹ *Supra note 83.*

⁹⁰ *Vellore Citizens' Welfare Forum v. Union of India* (1996) 5 SCC 647.

ban on categories of E-Wastes to be imported is in the Hazardous Waste Management Rules and there are separate guidelines on implementing EPR⁹¹ and environmentally sound management of E-Wastes. Hence, it would be helpful for the future amendment to the existing E-Waste regulation to consist of all these complementary factors within a single space.

6. Conclusion

In this study, it is seen that legislative measures have a major influence on E-Waste management especially concerning factors like rates of collection, recycling and recovery of resources. Nonetheless, the primary objective of such policy measures exist in addressing a cleaner environment and secured public health at a time where there has been an immense and rapid growth in consumption of electrical and electronic appliances. Complacency in the regulation of E-Waste would lead to unmitigated and irreparable disaster, given that such wastes involves many hazardous substances too.

The European directives on WEEE and RoHS have been the front runner concerning the management of E-Waste in the world. Many of its provisions have been adopted in various jurisdictions as it has shaped several internationally recognized best practices. The success of its framework arrives from the involvement of all the stakeholders along with its dependence and adaptation of scientific and technical progress in this field. Several of its practices also resort to be data-driven which is

⁹¹ Central Pollution Control Board, Implementation Guidelines for E-Waste (Management) Rules, 2016, 2016, available at <ospboard.org/wp-content/uploads/2017/01/28-Jan-2017Latest_135_GUIDELINES-E-WASTE_RULES_2016.pdf>(last visited on Dec. 29, 2021).

made possible by its information and reporting provisions. It is also important to recognize the compliance mechanism that has been adopted by the EC to keep the E-Waste system functioning.

It has also been mentioned earlier that the Indian framework, despite being at a nascent stage, has still made serious attempts to be in line with the existing best practices in E-Waste management. Simultaneously, it also acknowledges its own unique position regarding the involvement of a large unorganised sector in this industry. However, looking at the European model, it is imperative for producers to be responsible for their EEE to effectively implement E-Waste regulations. Provision of flexibility in the EPR strategy alongside SMART⁹²(specific, measurable, appropriate, realistic, time bound) targets for collection of E-Wastes would improve the compliance mechanism among the stakeholders. Nevertheless, a significant role also is to be played by the enforcement authorities like pollution control boards, in tandem with industries and local bodies to lead the road ahead for efficient management of E-Waste in India. Also, where gaps can be seen to occur due to the non-implementation of E-Waste rules, stakeholders must resort to all other remaining mechanisms to keep the authorities at the edge for them to comply with their duties and functions.

In conclusion, the European model and its practice could play an important role in paving the path forward, within the context of India, for all the authorities to observe the obligations ensuring a pollution free environment and in actively meeting the governance deficit on the subject. Thus, given that we are living in the era of climate action

⁹² *Supra note 79.*

where neglecting the violation of environmental law could be very costly, it is also imperative that there is monitoring at higher levels and leadership is provided, rather than leaving the matter to lower levels or just issuing direction, as this would not result in improving the situation, as has also been recognised by the NGT.⁹³

⁹³ *Supra* note 86.

CHAPTER-13

TRADITIONAL KNOWLEDGE, BENEFIT SHARING AND BIODIVERSITY CONSERVATION OF NORTH-EAST INDIA

Riya Gulati*

1. Introduction

Traditional knowledge (TK) refers to the know-how, practices, knowledge, innovations and skills that are nurtured, sustained and carried on from one generation to the other (within the community) that intermittently forms the fraction of its spiritual and societal identity. TK exists in a vast variety of contexts, be it technical, scientific, ecological, agricultural, medicinal, environmental and biodiversity-related knowledge. The traditional knowledge-based innovations can be safeguarded under the ambit of trademark, patent, and geographical indication, or be shielded as confidential information or trade secret.¹ TK have the potential to

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¹ Traditional Knowledge, available at: [https://www.wipo.int/tk/en/tk/#:~:text=Traditional%20knowledge%20\(TK\)%20is%20knowledge,its%20cultural%20or%20spiritual%20identity](https://www.wipo.int/tk/en/tk/#:~:text=Traditional%20knowledge%20(TK)%20is%20knowledge,its%20cultural%20or%20spiritual%20identity). (last visited on January 25, 2022).

make a powerful contribution to sustainable development. The majority of indigenous people are situated in areas that are suffused by the vast immensity of the world's vital resources and indigenous knowledge. As natural resource managers, the local communities cultivate, utilize, sustain, and shield the biological diversity and TK in a sustainable way which succours in promoting biodiversity and maintaining a healthy ecosystem. Moreover, the adroitness and techniques of indigenous people proffer imperative knowledge to the global community and useful models for biodiversity policies.² The NE region of India has a unique richness of bioresources that makes it a potential hub for the economic growth of the nation. The NE is also the homeland of assorted animal genetic resources and set out an idiosyncratic agricultural ecosystem with consolidated sustenance truncated input tribal production framework wherein farm animals play a pivotal part in revamping the socio-economic status and sustenance of humankind. Technically, the application of genetic resources, whether from microbes, animals or plants, implies to the procedure of probing their propitious properties and utilizing them to proliferate scientific comprehension and cognition, or to originate commercialized products.³

As a matter of fact, the North-East India possess a very profound system of traditional knowledge. Over the years, the aboriginal community of the NE region have developed an exquisite knowledge base with regards to

² Traditional Knowledge and the Convention on Biological Diversity, available at: <https://www.cbd.int/traditional/intro.shtml> (last visited on January 25, 2022).

³ N Manoranjan Singh & L Anandakumar Singh, "Farm animal genetic resources in agro ecosystem of North East India" 11 *The Indian Journal of Animal Sciences* 3 (2019).

the application of its affluent bioresources and showcased colossal sagacity in their comprehension of the environment and its contribution to well-being and survival of the society. Its persisting TK based on animal and plant resources remains the constructive yardstick for the researchers. There lies a dire desideratum to adopt proper measures for the conservation of rich bioresources of this region.⁴ The preservation marks as the foremost tread in a series of consecutive actions entailed for functioning with conventional knowledge. In peculiar context to ecological pertaining practices, preservation presumes primacy owing to the intrinsic character of the ecosystem. If mangled or disorientated, reinstating and rectifying such ecosystems to their primordial performance is an obstacle. With regards to R&D, reinvigorating TK necessitates extraordinary dedication and sensitivity from a scientific and social perspective. The cardinal procedures have developed over a prolonged time span and attained the equilibrium state, and altering this entails arrant commitment. Emboldening the aboriginal groups to investigate and extemporize is faced with frigid resistance in the inceptive phases, where the upshots are not instantaneous. Nonetheless, this alters steadily with hands on experimentation, a reinforcing association and beclouding of frontiers between the inventor and the maker (local communities). The well-informed immersive indagation has the capability to reform the manner we 'see' and 'value' a product or process, and generate exceptional solutions that bring about overall development. The NE India proffers a captivating backdrop for ecology-based novel development solutions that integrate the conventional sagacity with

⁴ Konthoujam Khelchandra Singh, *Bioresources and Traditional Knowledge of Northeast India 1* (MIPOGRASS, Mizoram, 2013).

contemporaneous thought bestows ingenious hybrid solutions and a self-sustaining development model.⁵

2. Regional, Domestic and Global procedures for shielding the Traditional Knowledge

In NE India, there are informal IP-similar dominions that shield definite subject matters in the sphere of conventional therapeutic herbs. There are two set-ups that modulate this domain: the codified structure of conventional medicine and the non-codified system. The informal IP dominions are composite of spiritual beliefs, occults and rituals that enclose indigenous medicine. These informal systems carry out an equally pivotal purpose in the diffusion, conception and stimulation of medicinal inventions in indigenous and local coteries.⁶

The desideratum for guarding the TK has escalated with changing time, principally so as to avert commercial and unsanctioned misapplication of such knowledge. It is pertinent to shield the aboriginal individuals from such loss and also aid them to preserve bygone practices. Safeguarding TK also promotes its wider appliance, methodical use and thereby avoiding biopiracy cases. The two forms of IP safeguards that are being sought are: **(i) Defensive safeguard** which avert individuals outward the community from procuring IP prerogatives over the traditional knowledge, and, **(ii) Positive protection** that

⁵ Sanjeev Shankar, Revitalizing Traditional Knowledge in North East India by Combining Conservation, Research and Entrepreneurship: Living Root Bridge Case Study, Environment and Society: The Context of North East India, Held on (Shillong and 14-15 March 2016), available at <<https://megbiodiversity.nic.in/sites/default/files/combining-conservation-research-and-entrepreneurship-revitalize-traditional-knowledge.pdf>> (last visited on January 25, 2022).

⁶ Neelotpal Deka, "Traditional Knowledge in North-East India: Scope for a sui generis protection" 3 The Clarion 92 (2014).

grants prerogatives that empower communities to promote their TK, constraint its uses and gains from its mercantile exploitation. Some uses of TK can be safeguarded by dint of the existing IP framework, and numerous nations have also reinforced discrete laws. Nevertheless, any peculiar safeguard afforded under the domestic regulation may not hold for other nations, one rationale why many local and indigenous coteries and governments are insisting on an international legal instrument. Additionally, the challenges posed in the protection of TK under the IP regime are limited protection period, inadequacy in the legal system, ignorance of the rights of the traditional information holders in a few systems and lack of uniformity in global IP laws. India has collated a searchable database of conventional medicine that can be utilized as corroboration of the prior art by patent examiners when appraising patent applications. Notwithstanding, the Traditional Knowledge Digital Library (TKDL) has its own deficiencies, such as, it has no record of oral traditional knowledge; translation problems persist;⁷ it poses structural barriers, high level of confidentiality and imposes access restrictions.⁸

⁷ India: IPR Vis-à- Vis Traditional Knowledge, available at: <https://www.mondaq.com/india/patent/743482/ipr-vis--vis-traditional-knowledge#:~:text=Unlike%20other%20categories%20of%20intellectual,for%20revocation%20of%20a%20patent> (last visited on January 25, 2022).

⁸ The Digital Protection of Traditional Knowledge: Questions Raised by the Traditional Knowledge Digital Library in India, available at: <https://cis-india.org/a2k/blogs/giswatch-december-9-2016-sunil-abraham-and-vidushi-marda-digital-protection-of-traditional-knowledge-questions-raised-by-traditional-knowledge-digital-library-in-india> (last visited on January 25, 2022).

The work of WIPO on TK tackles three discrete yet related areas: genetic resources (the genetic material of actual or potential value present in microbes, animals and plants); conventional cultural expressions/expressions of folklore (cultural manifestations such as art, music, performances, symbols and designs); and traditional knowledge in the stern sense (skills, practices, technical know-how and inventions related to health, agriculture or biodiversity). Albeit for majority communities' genetic resources, TCEs and traditional knowledge form section of a solitary unified heritage, from an IP stance, they elevate divergent matters and may entail distinct sets of solutions. In all three sections, in supplement to work on global legal contrivance, WIPO is acknowledging the solicitations from governments and communities for pragmatic assistance and technical guidance to validate coteries to make more efficacious utilization of prevailing IP frameworks and engage more constructively in the IGC's (Intergovernmental Committee) negotiations. The work of WIPO embraces assistance to reinforce and develop regional and national frameworks for the preservation of TK (laws, policies, practical tools and information systems) and the Creative Heritage Project which renders hands-on training for managing IP prerogatives and interests when documenting cultural heritage.⁹ As the prevailing global intellectual property system does not entirely shield TK and TCEs, numerous governments and communities have called for an international legal instrument proffering *sui generis* protection. An international legal instrument would delineate what is meant by TK and TCEs, state the right holders, layout a resolution for the striving claims by

⁹ Traditional Knowledge and Intellectual Property- Background Brief, available at: https://www.wipo.int/pressroom/en/briefs/tk_ip.html (last visited on January 25, 2022).

coteries, and what entitlements and exemptions probable to appertain.¹⁰

3. Ousting the Biopirates via Access and Benefit Sharing Agreement (ABSA)

Biopiracy is referred to as acquiring exclusive monopoly prerogatives over the biological material of one nation by the institutes, corporations or individuals of other nations that eventually causes the repudiation of prerogatives of the country of origin with the object to introduce new plant varieties and new living organisms, produce pharmaceuticals, and privatize the traditional knowledge. Biopiracy has many ill-effects on biodiversity such as privatization of bio-treasures, genetic erosion of biodiversity and extinction of endemic genotypes of the nation. It is an exceedingly profitable business and as an upshot majority of racketeers tend to misuse the bioresources of the Third World Nations and procure patents for these uses. Biopiracy literally impedes the economical, cultural, social and environmental system of the nation.¹¹

The Resource-opulent NE India is bedevilled by biopiracy with exceptional medicinal herbs, orchids and other endangered species being contraband out of the state. In Nagaland, countless plants have been taken off by pharmaceutical corporations through intermediary who employed natives to accumulate natch grown species for meagre amounts. The local species of ginseng (pseudo ginseng and panax ginseng) which have an excessive requirement in global marts have been almost obliterated

¹⁰ *Id.*

¹¹ P.K. Rajeevan, L.C.De, et.al., Biodiversity, Conservation and Biopiracy of Genetic Resources in India 35 (De Gruyter Open, Poland, 2019).

from the wilds of Nagaland. Ginseng, which is vended in packs both powdered and raw, is deemed as a remedy for all types of maladies by people in South-East Asian nations. Likewise, *Paris cordifolia* which is a poisonous herb utilized in producing high-value drugs has fallen quarry to bio-piracy.¹² The scientific eruption has thus given rise to traditional disruption. NE India is a recognized biodiversity hotspot wherein the evolutionary forces are of their optimum, making this region the hub of genesis for multifarious species. Overexploitation and unscientific exploration without perfect knowledge of the bioresources may bring about an imbalanced ecosystem of this mega diversity region. At the same time, very little exploitation and exploration will impede biodiversity-based development. Human pursuits are destroying, changing and degrading bioresources in an unplanned method. Adoption of scientific bioprospecting of the bioresources will uplift the economy whilst guaranteeing the conservation and ecological balance.¹³

TK of the NE is frequently utilized to develop commercial products such as new herbal medicines, pharmaceuticals, cosmetics, seeds, crop protection and personal care products. Usually, the bio prospectors (commercial users) are the scientists and corporations in technologically advanced nations. In majority of cases, they seek IPRs on the resulting product to obtain competitive edge via exclusive market prerogatives. The unsanctioned commercial application of genetic resources and conventional knowledge without benefit sharing with the community or nation of origin, and patenting of bogus 'innovations' based on such resources

¹² "Bio-piracy Rampant in Nagaland" Hindustan Times, May. 3, 2008.

¹³ Jubilee Purkayastha, *Bioprospecting of Indigenous Bioresources of North-East India* (Springer, Germany, 2016).

and knowledge has been a matter of concern.¹⁴ However, prudent blending of TK with contemporary sciences on use of the flora and fauna will clinch the economic development while taking care of ecological prosperity, prior informed consent and equitable sharing of benefits of the NE region.

The Convention on Biological Diversity (CBD) acknowledges the value of the 'inventions, knowledge and practices of indigenous and local communities' for the sustainable use and protection of biological diversity. The CBD, which is a multilateral treaty grail to shield the biological diversity; make the sustainable usage of its integrands; and pivots for the fair and equitable benefit sharing transpiring out from genetic resources. It is regarded as an indispensable document concerning sustainable development as it intends to develop domestic stratagems for the preservation and sustainable usage of biodiversity. It has two ancillary agreements namely, the Cartagena Protocol and Nagoya Protocol. The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international treaty regulating the movements of living modified organisms ensuing from contemporary biotechnology from one nation to another. The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity is the other supplemental agreement to the CBD. It lays out a lucid legal structure for the constructive execution of one of the three objects of the CBD: the fair and equitable benefit sharing arising

¹⁴ Krystyna Swiderska, "Banishing the Biopirates: A New Approach to Protecting Traditional Knowledge" IIED 4 (2006).

out of the utilization of genetic resources.¹⁵ In spite of provisions in the CBD which entail equitable benefit sharing, it is hard to avert biopiracy as the laws necessitated to carry out these CBD provisions are absent in most 'user' nations, and intellectual property right dominions permit patenting without requiring benefit-sharing. Furthermore, the CBD only applies to genetic resources collated after its entry (1993); whereas the majority of genetic resources have been collated before 1993. In addition, much TK has already been documented and can be openly retrieved from databases and publications.¹⁶

In an endeavour to shield the biological diversity in India, the Parliament passed the Biological Diversity Act, 2002. The Act was passed to meet the devoirs under the CBD (to which India is a party). The Act lays down a mechanism for equitable benefit sharing arising out of the use of traditional knowledge and biological resources.

Whilst the researchers have long contested the ethical aspect of biopiracy, the notion has mainly developed into a less politically charged term: bioprospecting. Whilst biopiracy implies the application of commercially exploiting notch occurring genetic or biochemical resources, bioprospecting (Biodiversity prospecting) is the procedure of unearthing and commercialization of pristine products based on biological resources.¹⁷ Much coeval bioprospecting has multitudinous goals,

¹⁵ Convention on Biological Diversity, available at: https://en.wikipedia.org/wiki/Convention_on_Biological_Diversity (last visited on January 26, 2022).

¹⁶ *Supra note 13*.

¹⁷ Biopiracy in India: Scientific Eruption or Traditional Disruption, available at: <https://www.lexology.com/library/detail.aspx?g=1c132aa5-97af-4164-af22-ca3c240ab172> (last visited on January 26, 2022).

encompassing the sustainable management of natural resources, preservation of biodiversity and economic development.¹⁸ The bioprospecting of animate organisms and plants for pharmaceutical purposes is not only beneficial to the pharmaceutical corporations but also to the natives and host nation, who are gained from the proprietorship of the biological resources. Even though unearthing of medicinal products by bioprospecting is beneficial in assorted manners, the applications and techniques embraced by pharmaceutical companies have been condemned at various backdrops. The upsides of bioprospecting are: it marks as an essential phenomenon of discovering novel and life-saving drugs; the primordial community and host nation not only procure proprietorship of the biological resources but also anticipate apposite compensation for resource utilization (by virtue of CBD); and bioprospecting associations between pharmaceutical firms and nations providing the medicinal knowledge and raw material not only proffer the revenue source for the developing nations, but also open opportunities for the society for better education and employment avenues. The downsides of bioprospecting are: pharmaceutical companies are oftentimes accused of deceiving inhabitants by rebuffing their financial gains and access to knowledge; various pharmaceutical corporations don't bid directly for access to biodiversity, but in lieu, work by means of intermediaries; and disparity in the ecosystem due to superfluous exploitation of material resources is always a probability. In order to overcome the above shortcomings, effective solutions must be implemented such as: designing a scheme wherein the benefits of bioprospecting are shared fairly between the indigenous

¹⁸ Andrew J. Beattie & James Smeathers, "Ecology and Bioprospecting" 36 *Austral Ecol.* 341 (2010).

people and pharmaceutical firms; the terms and conditions of bioprospecting agreements must be transparent, comprehensible and unambiguous; providing training, education, expertise, jobs, equipment and technology transfer to the source nations would benefit the denizen to progress; and ensuring that a fragment of profit funding goes to brace environmental preservation of the region supplying the biological resources.¹⁹

4. Threat Assessment and Safeguarding the Traditional Knowledge (TK), Biodiversity and Genetic Resources in the North-East

The peculiar richness of traditional knowledge, Biodiversity and Genetic Resources in NE India makes it a prospective core for the commercial growth of the nation to a competent level if tapped and utilized optimally. The NE region has a precious heritage of herbal panaceas and is the Biogeographical Gateway to India's richest biodiversity zones significant for the genetic resources worldwide. Its tribal and rural population to a great extent relies on the indigenous systems cultivation/medicine. Some of the quirky endemic species of the NE region are *Coptis teeta* (Mishmi teeta) of Arunachal Pradesh, *Renanthera imschootiana* (Manipur), *Vanda coerulea* (Manipur, Meghalaya) and *Napenthes khasiana* (Meghalaya). The factors intimidating the biodiversity's existence of the North East are habitat fragmentation and destruction due to developmental activities, deforestation, shifting cultivation, change in food habit due to subsidized food

¹⁹ Bioprospecting: Pros and Cons, available at: <http://www.hillagric.ac.in/edu/covas/vpharma/winter%20school/lectures/21%20Bioprospecting%20Pros%20and%20cons.pdf> (last visited on January 26, 2022).

grain distribution, popularisation of hybrid varieties, the introduction of exotics, poaching, trade in wild flora and fauna, overexploitation of biodiversity beyond the sustainable limit and rapid wild spread of invasive species. Rather than shielding the affluent forest resources, the contemporary procedure of development in resource use practices has caused the exhaustion of several biological resources. The advent of IPR as a major economic factor and ubiquitous application of TK and bioresources of developing nations by multinational pharmaceutical have set in motion the actions for utilization and conservation of opulent bioresources.²⁰ For primordial communities, biodiversity has always been a local, commonly shared resource on which they have been contingent for their livelihood. The move to establish new IP legislation under the GATT/WTO agreements to, in effect, ‘enclose’ these ‘commons’ and bring them under the dominion of private property and patents for the gain of corporations, are a dire threat to their very survival.²¹

“Charters and patents thus turned acts of piracy into divine will”

- Vandana Shiva

The preservation of genetic resources has long been realized as a fundamental part of biodiversity conservation. The vista of patenting of genetically modified organisms (GMO) varies in different

²⁰ Bioresources protection in North East India, available at: https://www.lyonia.org/articles/latha_rangan/article_511/pdf/articleBody.pdf (last visited on January 26, 2022).

²¹ Vandana Shiva on the Contemporary Enclosure of the Commons through IPR, available at: https://wiki.p2pfoundation.net/Vandana_Shiva_on_the_Contemporary_Enclosure_of_the_Commons_through_IPR (last visited on January 26, 2022).

jurisdictions. In some nations, patenting over GMOs is allowed whereas, in other countries, it poses moral issues. By virtue of Section 3(j) of The Patents Act, 1970, “plants and animals in whole or any part thereof apart from microbes but encompassing seeds, varieties and species and essentially biological processes for production or propagation of plants and animals are not considered as an innovation, therefore, they are not patentable”. Moreover, “an innovation the primary or intended usage or commercial exploitation of which could be contrary to public order or morality or which causes serious prejudice to human, animal or plant life or health or to the environment is also not patentable”.²²

The recent transplantation of a genetically modified pig’s heart into a human by US doctors was claimed as a milestone in xenotransplantation. A similar surgery was conducted by Dr Dhani Ram Baruah, the maverick surgeon from Assam, who was arrested and vilified for his surgery in 1997 for keeping a terminally ill patient alive for seven days on a porcine heart and lungs. The controversial journey of the “medical breakthrough” that is now the toast of science no longer belong to Dr Baruah.²³

The protection of traditional knowledge is momentous for the sake of equity and livelihood improvement; protection of traditional lifestyles; contribution to biological diversity and ecological integrity; promoting wider application and avoiding misappropriation²⁴ By the way

²² The Patents Act, 1970, s.3(b).

²³ Prabin Kalita, “Yesterday Once More for Assam Pig-heart Transplant ‘Pioneer’ Dhani Ram Baruah” *The Times of India*, Jan. 12, 2022.

²⁴ Gabriel Muzah, “Legal Protection of Traditional Knowledge: Lessons from Southern Africa” *WTO* 67 (2016).

of IPR, private companies exploit traditional knowledge and garner illegitimate profits whereas the aboriginal people are deprived of their biological resources. Biopiracy has caused countless disputes concerning the sustainability of local flora and fauna, security of indigenous people's rights, and the propensity of the nation to provide food security. The laws that shield the interest of indigenous communities encompass the Biological Diversity Act, 2002; Section 3(p) of the Indian Patent Act 1970; Protection of Plant Varieties and Farmers Rights Act, 2001; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006; and Geographical Indications of Goods (Registration and Protection) Act 1999.²⁵

In numerous methods, the North-East people have been ingenious in managing and shielding their rich biodiversity by developing numerous approaches/systems, some of which are conventional, whilst others are being applied recently. The NGOs involvement in forest management and conducting awareness programs has played a pivotal role in biodiversity preservation. Whereas the government has taken initiatives in the agriculture sector, horticulture, notified forest and protected areas, livestock, fisheries sector; framed legislation and policies; conducted educational and awareness programs; undertaken specialized projects for biodiversity conservation; identified and documented medicinal plants in different NE states; carried forward afforestation programs; initiated Joint Forest Management programme and taken up the soil and moisture conservation programmes and

²⁵ Riya, "Protection of Traditional Knowledge under Intellectual Property Rights Regime" 1 E-Journal of Academic Innovation and Research in Intellectual Property Assets 155-158 (2020)

biodiversity conservation. The Ministry of Environment and Forests, Government of India (with support from the Global Environment Facility) has prepared the North-Eastern Ecoregional Strategy and Action Plan (NEEBSAP) as a part of the National Biodiversity Strategy and Action Plan (NBSAP). The NEEBSAP put forward certain action stratagems and strategies required for alleviating and halting the prevailing biodiversity loss in the North-Eastern region and stimulating its preservation at the regional level. Whilst tackling biodiversity conservation at all three levels i.e., genetic, ecosystem and species levels, the NEEBSAP also accentuates the conservation matters relating to the cultural diversity of the northeast. The NEEBSAP covers a wide assortment of man-made and natural aquatic and terrestrial ecosystems, domesticated biodiversity, and wild animal and plant diversity. The objectives of NEEBSAP are: to analyse the initiatives and steps taken for biodiversity preservation in North-East India; to collect and compile data on numerous aspects of biodiversity in the region; to delineate various stratagems needed for preserving the rich biological diversity of the region; to appraise the gaps in initiatives, actions and information; to include numerous stakeholders in the biodiversity preservation planning procedure and to present an action plan prioritizing the actions in a phased way to attain the broader objective of biodiversity preservation.²⁶

The swift development of coeval biotechnology has permitted us to utilize genetic resources in methods that have not only radically changed our comprehension of the living world but also developed new practices and

²⁶ North-East Ecoregion Biodiversity Strategy and Action Plan, available at: <https://kalpavriksh.org/wp-content/uploads/2018/12/NBSAP-ECOREGION-MAINREPORT-FINAL-18.12.2002.pdf> (last visited on January 27, 2022).

products that bestow to the welfare of mankind, varying from essential medicines to mechanisms that revamp the safety of our food supplies. It has also ameliorated preservation techniques that succour protects global diversity. By shielding the genetic resources, we can tweak the preservation of threatened species, and the communities who rely on them.²⁷

5. Recommendations for Shielding Traditional Knowledge, Biodiversity and Genetic Resources

Traditional knowledge can be safeguarded by fortifying the customary governance, adopting holistic approaches to avert biopiracy from the scratch, ameliorating the recognition of customary law, focusing on community resource management as well as legal tools, creating more supportive policy frameworks, securing collective land tenure, acknowledging farmers' rights in participatory plant breeding, recognizing collective resource rights, respecting the right to deny access, adopting a flexible approach, rethinking Access-and-benefit sharing (ABS) frameworks, institutionalizing prior informed consent (PIC) for access to traditional knowledge and bioresources, promoting 'reverse' or 'reciprocal' access, and, enhancing awareness of IPRs and ABS amongst communities.²⁸

The biodiversity conservation strategies include: reversing the decline of species, maintaining ecological integrity, effective utilization of natural resources,

²⁷ Uses of Genetic Resources, available at: <https://www.cbd.int/abs/infokit/factsheet-uses-en.pdf> (last visited on January 28, 2022).

²⁸ Krystyna Swiderska, "Protecting Community Rights over Traditional Knowledge: Implications of Customary Laws and Practices" 18-21 (November, 2006).

averting poaching, framing strict laws on deforestation, applying genetic techniques to preserve the endangered species, creating public awareness for biodiversity conservation and developing an appropriate policy and legal environment that supports biodiversity conservation of the NE.²⁹ Further, with the increasing amount of infrastructure development being planned in the NE region, there is a need to develop meticulous benchmarks and models for social impact and environmental assessment.³⁰

The strategies for conserving the genetic diversity includes: samples of seeds, tissues, or individuals can be maintained and collated *ex-situ*, for instance, in clonal archives or seed banks; populaces can be perpetuated *in situ* in ecological reserves, parks, and other protected regions; and the genetic materials being tested in progeny or provenance tests as part of breeding programs represent an ancillary genetic resource referred to as *inter situ* conservation.³¹

6. Conclusion

Geographically, NE India is nested in one of the most biodiversity-rich regions of the world whose traditional knowledge and genetic resources play a pivotal role in social, economic and cultural development. However, owing to modernization and globalization, the biocultural

²⁹ Conservation of Biodiversity, available at: <https://www.vedantu.com/biology/conservation-of-biodiversity> (last visited on January 29, 2022).

³⁰ Anil K. Goswami, Biodiversity Significance of North East India, WWF, (Delhi and 30 June 2006), available at: http://trpennis.nic.in/test/doc_files/BiodiversitySignificanceNEIndia_WWF.pdf (last visited on January 30, 2022).

³¹ Strategies for Forest Gene Conservation in BC, available at: <https://cfcg.forestry.ubc.ca/projects/strategies-for-forest-gene-conservation/> (last visited on January 30, 2022),

resources of this region have been eroded. Therefore, there lies an exigent need to take efficient steps and collective action from the part of the government, scientific and legal institutions, NGOs, and indigenous people to mitigate and halt the adverse consequences of biopiracy, erosion of biodiversity and misappropriation of genetic resources in fragile areas.

CHAPTER-14

THE ENVIRONMENTAL PROTECTION DIMENSIONS OF THE TECHNICAL BARRIERS TO TRADE (TBT) AGREEMENT

Harsh Amrit*

1. Introduction

The Technical Barriers to Trade (TBT) regime is a set of international regulations designed to prevent unnecessary obstacles to trade while also ensuring the protection of public health, safety and the environment. The TBT regime has become increasingly important in international trade, as it aims to harmonize technical regulations, standards and conformity assessment procedures across countries to facilitate trade while maintaining high levels of protection. These technical measures are often necessary to ensure the quality, safety, and health of products traded in the global market. However, they can also impose barriers, especially for developing nations that do not have the financial means to abide by these regulations.

The TBT regime's contribution to fostering fair competition among trading partners is one of its main

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advantages. By establishing common standards and regulations, the TBT regime helps to level the playing field and prevent countries from using technical measures as a means of protectionism. This promotes greater efficiency and transparency in international trade, which can lead to increased economic growth and development. Moreover, the TBT regime helps to protect consumers from harmful or substandard products. Technical regulations and standards ensure that products are safe and meet certain quality requirements, which can prevent accidents, illness and environmental damage. This not only protects consumers but also helps to maintain public trust in international trade. The TBT regime also supports innovation and technological progress. Technical regulations and standards can promote the development of new technologies and products, which can lead to greater efficiency, productivity and competitiveness. This can help countries to improve their economic performance and create new jobs. Finally, the TBT regime plays a critical role in promoting sustainable development.

This chapter focuses on the position taken by the TBT regime on environmental protection measures. Environmental concerns are of paramount importance in the global community, and various international agreements, such as the Paris Agreement, have been established to address these concerns. However, it is essential to examine how the TBT regime intersects with these environmental protection measures, as technical regulations can sometimes create barriers to trade that can impede environmental protection.

The present chapter will begin by providing an overview of the Technical Barrier to Trade regime, including its objectives and principles, as well as the provisions. The chapter will then delve into the environmental concerns

under TBT regime, highlighting the impact of technical regulations on the environment and the link between TBT regime and sustainable development.

Additionally, the author will examine the role of TBT in environment protection, the challenges and opportunities for environmental protection under TBT, and the role of international organizations in ensuring environmental protection under TBT. The chapter will conclude with a summary of findings, implications of the research, and recommendations for future research.

Overall, the chapter seeks to contribute to the ongoing debate on the role of technical measures in promoting environmental protection and sustainable development, while ensuring that they don't put up needless trade barriers. By examining the position taken by the Technical Barrier to Trade regime on environmental protection, the chapter aims to inform policy decisions and contribute to the development of a more sustainable global trade system.

2. Overview of TBT regime

Technical Barriers to Trade (TBT) are a set of measures put in place by governments to regulate the flow of goods and services across borders. The TBT regime has been in existence for several decades and has evolved over time to meet the changing needs of the trade system worldwide. The history of the TBT regime can be traced back to the 1947 General Agreement on Tariffs and Trade (GATT), which was established to promote free and fair trade between countries. At that time, the focus was primarily on reducing tariffs and other trade barriers, but as the global economy became more complex, new

types of barriers emerged that required a different approach.¹ In 1979, the Tokyo Round of multilateral trade negotiations resulted in the adoption of the Agreement on Technical Barriers to Trade (TBT Agreement). This agreement acknowledged the requirement for nations to regulate trade in a way that did not discriminate against imported goods or erect unneeded obstacles to trade. It established a framework for countries to develop and implement technical regulations and standards that were based on scientific evidence and did not create unnecessary obstacles to trade. Since the adoption of the TBT Agreement, the TBT regime has continued to evolve.² The World Trade Organisation (WTO) was founded in 1995 to take the position of GATT as the international body in charge of overseeing international commerce. The TBT Agreement was included in the WTO Agreement and is still a crucial part of what the WTO does.

The TBT regime has played a critical role in promoting global trade by ensuring that technical regulations and standards do not create unnecessary barriers to trade. It has helped to create a level playing field for producers and manufacturers in different countries by ensuring that all products meet the same standards. It has also helped to protect consumers, public health, and the environment by ensuring that products traded internationally meet certain safety, health, and environmental standards.³

The agreement provides a framework for countries to develop and implement technical regulations and

¹ World Trade Organization, Trade and Environment 2 (2004).

² *Id.*

³ Technical Barriers to Trade, World Trade Organization (2015), https://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm.

standards that are based on scientific evidence and do not create unnecessary obstacles to trade. The TBT Agreement requires countries to follow principles of non-discrimination, transparency, and the use of international standards where possible. It establishes a committee to monitor its implementation and facilitate dispute resolution. The TBT Agreement is an important tool for promoting free and fair trade between countries by ensuring that technical regulations and standards do not create unnecessary barriers to trade, while also protecting consumers, public health, and the environment.⁴

The major provisions of the Agreement on Technical Barriers to Trade (TBT Agreement) include:

Non-discrimination: Technical regulations and standards must not discriminate against foreign products or create unnecessary obstacles to trade.⁵

Transparency: Countries must notify other countries of proposed technical regulations and standards in a timely manner and provide opportunities for comments and consultations.⁶

International standards: Countries are encouraged to use relevant international standards as a basis for their

⁴ Baron, M. (2019). The WTO TBT Agreement: Balancing Trade and Public Health Objectives. *Journal of International Economic Law*, 22(2), 393–416. <https://doi.org/10.1093/jiel/jgz008>.

⁵ Technical Barriers to Trade Agreement, art. 2.1, 15 April 1994, 1868 U.N.T.S. 120.

⁶ Technical Barriers to Trade Agreement, art. 10, 15 April 1994, 1868 U.N.T.S. 120.

technical regulations and standards, in order to minimize barriers to trade.⁷

Scientific justification: Technical regulations and standards must be based on scientific evidence and not be created for the purpose of protecting domestic industries or discriminating against foreign products.⁸

Mutual recognition: Countries are encouraged to recognize each other's conformity assessment procedures and accept test results from each other's laboratories, in order to avoid unnecessary duplication and reduce trade barriers.⁹

Committee on Technical Barriers to Trade: A committee is established to oversee the implementation of the TBT Agreement and to facilitate the resolution of disputes related to technical barriers to trade.

These provisions are designed to promote the development of technical regulations and standards that do not create unnecessary barriers to trade, while also protecting important public interests such as health, safety, and the environment.

The objective of the TBT Agreement is to guarantee that technical rules, standards, and conformity assessment processes are impartial and do not obstruct trade unnecessarily. However, the agreement also acknowledges Members' rights to enact laws and guidelines they deem necessary, such as those for

⁷ Technical Barriers to Trade Agreement, art. 2.4, 15 April 1994, 1868 U.N.T.S. 120.

⁸ Technical Barriers to Trade Agreement, art. 2.2, 15 April 1994, 1868 U.N.T.S. 120.

⁹ Technical Barriers to Trade Agreement, art. 6.3, 15 April 1994, 1868 U.N.T.S. 120.

environmental preservation and protection of important rights of its citizen.

The TBT Agreement covers three sets of activities, Firstly, the preparation, adoption, and application of technical regulations by governments. According to the definition in Annex 1 of the TBT Agreement¹⁰, technical rules are papers that specify the qualities of a product or the associated processes and manufacturing techniques, and compliance with them is required. Such “characteristics” “might relate, inter alia, to a product’s composition, size, shape, colour, texture, hardness, tensile strength, flammability, conductivity, density, or viscosity,” according to the Appellate Body in EC - Asbestos. Technical restrictions may also cover vocabulary, symbols, packaging, and labeling requirements, according to TBT Annex I. In EC – Asbestos¹¹, the Appellate Body stated, “These examples indicate that ‘product characteristics’ include, not only features and qualities intrinsic to the product itself, but also related ‘characteristics’ such as “the means of identification, the presentation, and the appearance of a product”.

Second, standardizing organizations must develop, adopt, and implement standards. According to the TBT Agreement’s Annex 1, these are “documents approved by a recognized body, that provide for common and repeated rules, guidelines, or characteristics for products or related processes and production methods with which compliance is not mandatory.”

¹⁰ WTO, Agreement on Technical Barriers to Trade, Annex 1, 15 April 1994.

¹¹ European Communities - Measures Affecting Asbestos and Asbestos-Containing Products, WT/DS135/AB/R (adopted 12 March 2001).

Lastly, the methods utilized to establish if the pertinent criteria in technical laws or standards are met are known as conformity assessment processes.¹²

3. Environmental Concerns and the TBT

Environmental issues under the TBT system are related to the possible effects of technical rules and standards on the environment. Technical guidelines and standards may be created in particular to safeguard the environment by establishing requirements for the use of environmentally-friendly materials, processes, and products. However, such regulations and standards may also create barriers to trade by imposing requirements that are difficult or expensive for foreign suppliers to meet.

The Technical Barriers to Trade (TBT) regime is designed to facilitate international trade by reducing unnecessary technical barriers that may arise due to differences in technical regulations and standards across different countries. However, these technical regulations and standards may also have implications for the environment, as they may establish requirements for the use of environmentally-friendly materials, processes and products. Thus, exploring the relationship between the TBT regime and the environment, including the potential environmental impacts of technical regulations and standards, and the role of the TBT regime in promoting environmental protection becomes pertinent.

The potential environmental impacts of technical regulations and standards can be both positive and negative. On the one hand, technical regulations and

¹² Technical Barriers to Trade Agreement, art. 6, 15 April 1994, 1868 U.N.T.S. 120.

standards may be designed to protect the environment by establishing requirements for the use of environmentally-friendly materials, processes, and products. For example, regulations may require the use of renewable energy sources or the reduction of greenhouse gas emissions. Similarly, standards may establish criteria for the environmental performance of products or production processes. These measures can help to reduce the negative impact of economic activity on the environment, and promote sustainable development. On the other hand, technical regulations and standards may also create barriers to trade by imposing requirements that are difficult or expensive for foreign suppliers to meet. For example, a technical regulation that requires the use of a specific type of material or production process may make it more difficult for foreign suppliers to compete in the domestic market. Similarly, a standard that establishes criteria for the environmental performance of products may make it more difficult for foreign products to be sold in the domestic market if they do not meet these criteria.¹³

The potential for technical regulations and standards to have both positive and negative environmental impacts highlights the need for careful consideration in their development and implementation. The TBT regime can play an important role in ensuring that technical regulations and standards are developed and implemented in a manner that achieves environmental

¹³ Van der Welle, A. J., *The role of the WTO Agreement on Technical Barriers to Trade in Promoting Sustainable Development*, 2(1), *Transnational Environmental Law*, 81,92 (2013).

objectives while minimizing unnecessary barriers to trade.¹⁴

One way in which the TBT regime addresses environmental concerns is by requiring that technical regulations and standards be based on sound scientific and technical principles, and that they are not more trade-restrictive than necessary to achieve their legitimate objectives. This requirement is designed to ensure that technical regulations and standards are developed in a manner that is both effective and efficient, while also minimizing the potential for unnecessary barriers to trade.¹⁵

Another way in which the TBT regime addresses environmental concerns is by promoting transparency and cooperation among WTO members in the development and implementation of technical regulations and standards. This helps to ensure that all interested parties have an opportunity to provide input and that duplication of efforts is minimized. Additionally, the TBT regime encourages the use of relevant international standards as a basis for technical regulations and standards, which can help to reduce unnecessary duplication of efforts and promote the development of measures that are internationally recognized.¹⁶

¹⁴ United Nations Conference on Trade and Development. Trade and Environment Review: Environmental Requirements and Market Access. UNCTAD, 2003. https://unctad.org/system/files/official-document/iteipc20035_en.pdf.

¹⁵ United Nations Conference on Trade and Development. Trade and Environment Review: Environmental Requirements and Market Access. UNCTAD, 2003. https://unctad.org/system/files/official-document/iteipc20035_en.pdf.

¹⁶ International Institute for Sustainable Development. The Relationship Between Trade and the Environment (2011).

4. Link between Sustainable Development and TBT

Technical barriers to trade (TBT) and sustainable development are two interrelated concepts in the context of international trade. While TBT has its roots in facilitating trade by harmonizing technical regulations and standards, sustainable development focuses on economic, social, and environmental concerns in the long run. This chapter discusses the link between TBT and sustainable development and how the TBT regime can promote sustainable development goals.

The TBT regime seeks to promote international trade by reducing non-tariff barriers, such as technical regulations and standards that could impede the flow of goods and services between countries. However, these measures can also have unintended consequences for sustainable development. For example, technical regulations that prioritize economic efficiency or consumer safety may ignore environmental considerations or social impacts. Similarly, technical standards that are developed by industry stakeholders may not adequately address environmental risks or human rights concerns. As a result, the TBT regime can create conflicts between trade and environmental policies, which can undermine sustainable development goals.¹⁷

The link between TBT and sustainable development lies in the fact that technical regulations and standards can either promote or hinder sustainable development

<https://www.iisd.org/system/files/publications/relationship-trade-environment-2011-en.pdf>

¹⁷ Archana Negi, *The World Trade Organization and Sustainability Standards*, SPRINGER LINK 39, 46 (2020).

objectives. For instance, technical regulations that promote the use of clean technologies, renewable energy, and sustainable materials can contribute to sustainable development goals. On the other hand, technical regulations that restrict the use of certain products or technologies without valid environmental justifications can hinder sustainable development objectives. Therefore, the TBT regime should aim to promote technical regulations and standards that are compatible with sustainable development goals.¹⁸

The application of standards and other trade-related technicalities is first hampered by disagreements about the suitability of standards. Various actors may have varying opinions on the necessary calibre and kind of criteria to be applied. Environmental standards “should reflect the environmental and developmental context to which they apply,” as stated in the *1992 Rio Declaration on Environment and Development*, recognised this. The standards that certain nations use may be incorrect and unjustifiably costly to other nations, particularly emerging nations, economically and socially.¹⁹

The TBT agreement recognizes the importance of sustainable development and encourages its members to consider environmental protection and sustainable development objectives when developing technical regulations and standards. Article 2.2 of the TBT agreement states that:

¹⁸ Exploring Linkages Between Non-tariff Measures and the Sustainable Development Goals: A Global Concordance Matrix and Application to Asia and the Pacific, UNCTAD (Apr. 13, 2023), https://www.unescap.org/sites/default/files/Concordance_SDG-HS-NTM.pdf.

¹⁹ P. Banerjee, Beyond the Transition Phase of WTO: An Indian Perspective on Emerging Issues, NDAF 47, 54 (2006).

“Members shall ensure that technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade.”²⁰ For this purpose, technical regulations shall not be more trade-restrictive than necessary to fulfil a legitimate objective, taking account of the risks, non-fulfilment would create. Such legitimate objectives are, inter alia: national security requirements; the prevention of deceptive practices; protection of human health or safety, animal or plant life or health or the environment.²¹ This provision implies that the TBT agreement recognizes the importance of sustainable development goals, and technical regulations and standards should be developed and applied in a way that promotes sustainable development objectives.²²

In addition, the TBT agreement promotes the use of international standards as a means of harmonizing technical regulations and standards. International standards are developed by international standard-setting organizations (SSOs), such as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). The use of international standards helps promote sustainable development objectives by facilitating the use of clean technologies, renewable energy, and sustainable materials. Furthermore, the use of international standards can reduce technical barriers to trade and

²⁰ Technical Barriers to Trade Agreement, art. 2.2, 15 April 1994, 1868 U.N.T.S. 120.

²¹ WTO Analytical Index, WTO (Apr. 15, 2023), https://www.wto.org/english/res_e/publications_e/ai17_e/tbt_art2_oth.pdf.

²² Technical Barriers to Trade Agreement, art. 2.2, 15 April 1994, 1868 U.N.T.S. 120.

promote market access, thereby contributing to economic growth and social development.

However, it is important to note that the TBT regime alone cannot ensure sustainable development goals. To address this challenge, there is a growing consensus that the TBT regime should be more closely aligned with sustainable development objectives. For example, the United Nations Conference on Trade and Development (UNCTAD) has emphasized the need to integrate environmental concerns into the development of technical regulations and standards. This requires a more participatory and transparent process that involves a wide range of stakeholders, including civil society organizations, academic experts, and affected communities. By engaging with these stakeholders, technical regulations and standards can be developed that better reflect social and environmental priorities, while still maintaining the necessary level of economic efficiency.²³

Despite potential benefits, there are also significant challenges to aligning TBT with sustainable development. One major challenge is the lack of consensus on environmental and social priorities, both within and between countries. Different stakeholders may have divergent views on what constitutes sustainable development, which can make it difficult to develop technical regulations and standards that reflect shared objectives.²⁴ In addition, there are concerns that environmental and social standards could be used as a

²³ Transforming our World: the 2030 Agenda for Sustainable Development, UN (May 1, 2023), <https://sdgs.un.org/2030agenda>.

²⁴ Achieving Sustainable Development and Promoting Development Cooperation, UN (May 2, 2023), https://www.un.org/en/ecosoc/docs/pdfs/fin_08-45773.pdf.

disguised form of protectionism, particularly against developing countries that may lack the capacity to comply with strict technical regulations and standards.

5. Legal Framework for Environmental Protection under TBT

One of the fundamental goals of multilateral trade law is to prevent arbitrary or unjustified discrimination and covert limitations on international commerce. In this context, WTO agreements and case law offer a thorough framework for the adoption and use of TBTs relating to climate change. TBT Agreement provides for Environment Protection under the broader perspective of International Trade.

Firstly, the measures shall not be more trade restrictive than necessary to fulfil their objective; Article 2.2²⁵ of the TBT Agreement lists a number of possible legitimate objectives: “Such legitimate objectives are, inter alia: national security requirements; the prevention of deceptive practices; protection of human health or safety, animal or plant life or health, or the environment.”²⁶

The use of the words “inter alia” in Article 2.2 suggests that the provision does not set out a closed list of legitimate objectives, but rather lists several examples of legitimate objectives. This deferential attitude towards the WTO Member adopting the technical regulation was noted in the case of *US - Tuna II (Mexico)*.²⁷ There is no doubt that a technical rule established for the purpose of mitigating climate change would be seen as having a

²⁵ Technical Barriers to Trade Agreement, art. 2.4, 15 April 1994, 1868 U.N.T.S. 120.

²⁶ *Id.*

²⁷ United States - Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (WT/DS381/AB/R).

legitimate goal in light of the way TBT Article 2.2 is written and the pertinent case law. On the basis of previous WTO Agreements, this is also true. Furthermore, the WTO's preamble lists sustainable development as one of its goals, the Appellate Body has often cited this preamble in interpreting the rules of other WTO Agreements.²⁸

Secondly, the non-discrimination requirement can be found in Article 2.1²⁹ of the TBT Agreement, which reads that "Members shall ensure that in respect of technical regulations, products imported from the territory of any Member shall be accorded treatment no less favourable than that accorded to like products of national origin and to like products originating in any other country."

The Appellate Body established a three-part legal test for this clause in *US - Clove Cigarettes*³⁰ and *US - Tuna II (Mexico)*³¹. Article 2.1 of the TBT Agreement consists of three elements that must be proven in order to establish an inconsistency with this provision: First, that the measure at issue constitutes a 'technical regulation' within the meaning of Annex 1.1; Second, that the imported products must be similar to the domestic product and the products of other origins; and Third, that the treatment accorded to imported products must be less favourable than that accorded to similar domestic

²⁸ WTO, Panel Report, Japan – Measures Affecting Consumer Photographic Film and Paper, WT/DS44/R and Corr.1 (adopted 22 April 1998), reprinted in (1998) 37 ILM 1385 (WTO 1998b).

²⁹ Technical Barriers to Trade Agreement, art. 2.7, 15 April 1994, 1868 U.N.T.S. 120.

³⁰ United States - Measures Affecting the Production and Sale of Clove Cigarettes, WT/DS406/R (adopted Apr. 4, 2012).

³¹ United States - Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (WT/DS381/AB/R).

products. Technical specifications can only be discriminatory if they apply to “like” items.

Whether items produced with a different emission intensity, energy intensity, or kind of energy source may be regarded “unlike” pursuant to Article 2.1 of the TBT Agreement is the crucial question in the context of technical laws relating to climate change. If these were the case, a nation may be permitted to provide preference to a local product produced using renewable energy or a method that emits less CO₂ than an imported product produced using conventional energy or a process that emits more CO₂. The regulatory goal would allow discrimination between the two items even if they may otherwise be identical. The case law indicates a preference for a competition-oriented approach over one based on the regulatory goals of a technical regulation for the “like products” analysis under Article 2.1 of the TBT Agreement.³² Accordingly, it would be important to consider if two items compete in the same market. Regardless of the obvious contribution the first product makes to mitigate climate change, if it is demonstrated, for example, that a product made with renewable energy and one made with conventional energy compete in the same market, they will likely be deemed to be “like” and any different treatment may therefore be viewed as a violation of TBT Article 2.1. Curiously, the Appellate Body in *US - Clove Cigarettes* recognised the importance of regulatory concerns, to the degree they have an influence on the competitive relationship between and among the relevant items. This would imply that demonstrating how the regulatory goal supporting a

³² World Trade Organization, Panel Report, United States—Countervailing Duty Investigation on Certain Hot-Rolled Carbon Steel Flat Products from India, WT/DS436/R (adopted February 14, 2012).

differential treatment, i.e., climate change mitigation, affects demand is a consideration that should be made in future choices when assessing the similarity of two items.

Thirdly, the importance of basing technical regulations on international standards is evident from Articles 2.4 and 2.5 of the TBT Agreement.

According to Article 2.4³³: Where technical regulations are required and relevant international standards exist or their completion is imminent, Members shall use them, or the relevant parts of them, as a basis for their technical regulations except when such international standards or relevant parts would be an ineffective or inappropriate means for the fulfilment of the legitimate objectives pursued, for instance because of fundamental climatic or geographical factors or fundamental technological problems. According to Article 2.4, WTO Members must base their technical rules on pertinent international standards, if any, unless doing so would render them ineffective or unsuitable for achieving the legitimate goal being sought. As a result, States are not required to apply international standards; rather, they are only required to do so if they choose to enact a technical rule in a subject matter for which an international standard exists. In addition, if an applicable international norm is found to be “inappropriate” or “ineffective,” the governing State may choose to depart from it.

The onus of evidence is with the complainant to show that the international standard is acceptable and

³³ Technical Barriers to Trade Agreement, art. 2.4, 15 April 1994, 1868 U.N.T.S. 120.

effective in the event of a dispute involving a deviation from one³⁴. According to Article 2.5 of the TBT Agreement, technical requirements that comply with international standards are deemed to be required. They are therefore assumed to be the least trade-restrictive way of achieving a given purpose. Therefore, technical rules and conformity evaluation processes pertaining to climate change that are based on an international standard and are non-discriminatory will be deemed to be TBT-consistent. The TBT Agreement states that the “international standardisation community” is responsible for creating international standards. Technical laws at the national level frequently build upon ISO standards in fields like motor vehicles, transportation fuel, biofuels, buildings, or home appliances.

There exists a complex relationship between TBT and environmental protection. While TBT measures can have positive effects on the environment, they can also be used as trade barriers and can lead to negative impacts on trade and development. It is important for policymakers to strike a balance between environmental protection and trade liberalization and to ensure that TBT measures are based on scientific evidence and are not used as disguised trade barriers.

6. Technical Regulations

The TBT Agreement defines technical regulations as “document[s] which lay down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory.” Technical regulations

³⁴ WTO, Agreement on the Application of Sanitary and Phytosanitary Measures, Apr. 15, 1994, 1867 U.N.T.S. 493.

are distinct from standards, which are “voluntary or recommended provisions.”³⁵

Technical regulations can cover a wide range of products and processes, including food and agricultural products, machinery and equipment, chemicals, and consumer goods. They can specify requirements related to product design, performance, labelling, packaging, and testing, among other things.

Article 2³⁶ of the TBT Agreement deals with the basic principles governing the preparation, adoption, and application of technical regulations by WTO member countries. The article states that technical regulations should be based on relevant international standards or scientific principles, and should not be discriminatory or create unnecessary obstacles to trade. It also emphasizes the importance of transparency in the preparation and notification of technical regulations to other member countries. Additionally, the article calls for member countries to avoid technical regulations that could lead to unnecessary obstacles to trade or disguised restrictions on trade.

Article 3³⁷ of the TBT Agreement deals with the preparation, adoption, and application of standards by WTO member countries. The article states that standards should be based on relevant international standards or scientific principles, and should not be discriminatory or create unnecessary obstacles to trade. Like Article 2, Article 3 also stresses the importance of

³⁵ Technical Barriers to Trade Agreement, Annex 1, 15 April 1994, 1868 U.N.T.S. 120.

³⁶ Technical Barriers to Trade Agreement, art. 2, 15 April 1994, 1868 U.N.T.S. 120.

³⁷ Technical Barriers to Trade Agreement, art. 3, 15 April 1994, 1868 U.N.T.S. 120.

transparency in the preparation and notification of standards to other member countries. Additionally, the article calls for member countries to avoid standards that could lead to unnecessary obstacles to trade or disguised restrictions on trade.

Overall, both Article 2 and Article 3 emphasize the importance of basing technical regulations and standards on international standards or scientific principles, promoting transparency in the preparation and notification of such measures, and avoiding measures that could create unnecessary obstacles to trade. These provisions are intended to promote fair trade practices and reduce trade barriers while ensuring that technical regulations and standards continue to protect public health, safety, and the environment.

Many different activities, such as those involving energy efficiency, forestry/deforestation, transportation and cars, renewable energy and biofuels, plastics, and sustainable manufacturing methods, have made use of technical restrictions.

As far as environmental protection perspective is considered the Climate change-related technical regulations can be classified according to different parameters.³⁸

First, they may be used to both processes and production methods (PPMs) as well as to products. Technical rules that are applicable to specific products, such as those that control the CO₂ emissions of

³⁸ Making Trade Work for Climate Change Mitigation: The case of Technical Regulation, UNCTAD (may 13,2023), https://unctad.org/system/files/official-document/ditctab2022d7_en.pdf.

automobiles, can address the energy efficiency and carbon footprint associated with their actual use. Examples include American laws governing the reduction of air pollution, including the American Medium- and Heavy-Duty Vehicle Fuel Efficiency Programme.³⁹ Contrarily, technical laws connected to PPM can target the energy efficiency and GHG emissions associated to a product's manufacturing process, sometimes addressing the product's full lifespan.

An illustration is the 2009 European Union Fuel Quality Directive, which mandated that fuel providers lower the life cycle greenhouse gas intensity of the fuels they supplied by at least 6% by 2020 compared to levels in 2010.⁴⁰

Additionally, technical restrictions may be based on either the performance of a product or its qualities. Technical specifications based on product design or attributes define the precise qualities a product must possess, as well as the precise practices to follow, technologies to use, or materials to utilise throughout the product's manufacture. Such technical requirements have been utilised frequently in the regulation of biofuels. Several nations have created technical laws on the standards and quality of biofuels, including Brazil, India, the European Union, and the United States of America.⁴¹

³⁹ Holzer K & Lim A (2020). Trade and Carbon Standards: Why Greater Regulatory Cooperation is Needed. YALE CELP (May 13, 2023), [https://envirocenter.yale.edu/sites/default/files/files/CoolHeads_Holzer\(1\).pdf](https://envirocenter.yale.edu/sites/default/files/files/CoolHeads_Holzer(1).pdf).

⁴⁰ *Id.*

⁴¹ Trade and Climate Change WTO-UNEP Report, WTO (May 13, 2023), https://www.wto.org/english/res_e/booksp_e/trade_climate_change_e.pdf.

7. Labelling Schemes

Mandatory labelling programmes are crucial for encouraging energy efficiency, cutting emissions, and preventing climate change. Technical requirements are frequently the basis for mandatory labels, which are used “to inform consumers about international standards constituted in products, to communicate carbon footprint data and to gauge energy efficiency performance and the level of emission reduction.” Labels can help consumers make informed selections by informing them of a product's environmental effect or the steps involved in its manufacture. In order to reach a larger customer base, they can also encourage businesses to use more environmentally friendly manufacturing methods or to create goods that are more beneficial to the environment. They may be aimed at PPMs or at items, as is the case with the majority of labels for household appliances and automobiles. These labelling programmes can cover every stage of the product's lifespan, including creation, usage, and disposal. Depending on how the information is provided, energy-efficiency labels can also be divided into comparison labels and endorsement labels. Comparative labels, which are often required, give consumers information about a product's energy efficiency by giving them a scale to compare it to similar items, for example, by giving it a rating of 1 to 5 stars. Instead, endorsement labels, which are often optional, effectively serve as a mark of approval by an impartial authority guaranteeing the customers that the product complies with specific environmental standards or accomplishes particular objectives. The WTO DSB affirmed the US's eco-labelling

of tuna cans as “Dolphin Safe” in the instance of Tuna-Dolphin (II) ⁴².

8. Conformity Assessment Procedure

Procedures for conformity assessment are used to confirm that a technical regulation’s necessary requirements have been satisfied. They serve as an assurance to customers that the procedures or goods in issue uphold a predetermined level of integrity. Testing, inspection, and certification are the three basic conformity assessment processes. The most frequent process for ensuring that traded items comply with technical standards connected to climate change is testing. The process of conformity evaluation is also the one that calls for the most advanced quality infrastructure.

Testing processes connected to climate change may entail the production of a lot of data and frequently call for the development of intricate evaluation and sampling techniques, such as when confirming an electric motor model’s degree of energy efficiency. Upon approval by the administrative body, the use of alternative testing procedures is permitted under several rules creating testing requirements. The availability of accredited laboratories or other pertinent testing entities is a requirement for testing.⁴³

Inspection entails looking at a product or the production process to see if the necessary technical requirements have been met, without lab testing. Inspection is a

⁴² United States - Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (WT/DS381/AB/R).

⁴³ Trade, Testing and Toasters-Conformity Assessment Procedures and the TBT Committee, WTO (May 7, 2023), <https://www.wto-ilibrary.org/content/papers/25189808/198>.

seldom utilised conformity assessment method because of the extremely complex nature of legislation connected to climate change.⁴⁴

“Written assurance (the certificate) issued by an independent external body stating that a product, building, or company conforms to specific energy-efficiency or emission standards”⁴⁵ is what certification entails. Typically, it is based on earlier testing and inspection. Conformity may be self-declared or determined by outside evaluations. The European CE mark serves as an illustration of self-declaration. By placing the CE mark on a product, the manufacturer certifies that it complies with all applicable European Union directives about safety, health, and the environment as well as the standards for conformity assessment.⁴⁶ The European CE mark serves as an illustration of self-declaration. By placing the CE mark on a product, the manufacturer certifies that it complies with all applicable European Union directives about safety, health, and the environment as well as the standards for conformity assessment. The International Electrotechnical Commission (IEC), which oversees the operation of four conformity assessment systems including the IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE), is an example of a third-party conformity assessment process. \

⁴⁴ *Id.*

⁴⁵ *Supra note 44.*

⁴⁶ Arthur Appleton, Conformity assessment procedures, ELGAR (Apr. 14, 2023), <https://china.elgaronline.com/display/edcoll/9780857936714/9780857936714.00008.xml>.

9. Technical standards

The TBT Agreement defines technical standards as “document[s] approved by a recognized body, that provide, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory.”⁴⁷

Technical standards can cover a wide range of products and processes, including food and agricultural products, machinery and equipment, chemicals, and consumer goods. They can specify requirements related to product design, performance, labelling, packaging, and testing, among other things.

The TBT Agreement encourages the use of relevant international standards as a basis for technical regulations, in order to minimize unnecessary barriers to trade. It also provides guidance on the development and implementation of technical standards, including requirements for transparency, non-discrimination, and the use of relevant international standards.⁴⁸

Examples of technical standards that may be covered by the TBT Agreement include standards related to product performance, safety and environmental protection. For example, technical standards related to energy efficiency may specify requirements for the performance of appliances and equipment in order to reduce energy consumption and promote environmental sustainability.

⁴⁷ WTO, Agreement on Technical Barriers to Trade, Annex 1, 15 April 1994.

⁴⁸ WTO Agreement on TBT, ITA (May 5, 2023), <https://www.trade.gov/trade-guide-wto-tbt>.

Overall, the TBT Agreement's provisions related to technical standards are an important tool for promoting free and fair trade by ensuring that technical standards are developed and implemented in a manner that supports the free flow of goods and services across borders, while also protecting important public interests such as health, safety, and the environment.⁴⁹

10. Challenges and opportunities

One of the major challenges for environmental protection under the TBT regime is the potential for technical regulations and standards to create non-tariff barriers to trade. Technical regulations and standards can be used to limit imports of products that do not meet certain environmental standards, but these measures can also be used as disguised trade barriers, particularly when the requirements are more stringent than necessary. For example, the European Union's (EU) regulations on the use of certain chemicals in electronic products have been criticized as being overly restrictive and creating unnecessary barriers to trade.⁵⁰

Another challenge for environmental protection under the TBT regime is the potential for regulatory fragmentation. Technical regulations and standards can differ between countries, which can create confusion and uncertainty for businesses looking to trade internationally⁵¹. This can be particularly problematic for

⁴⁹ *Id.*

⁵⁰ Record number of concerns about technical barriers to trade raised via online platform, WTO (May 6, 2023), https://www.wto.org/english/news_e/news20_e/tbt_08jun20_e.htm.

⁵¹ Non-Tariff Measures To Trade: Economic And Policy Issues For Developing Countries, UNCTAD (May 4, 2023), https://unctad.org/system/files/official-document/ditctab20121_en.pdf.

small and medium-sized enterprises that may not have the resources to comply with different regulatory requirements in different countries. Moreover, countries may use different environmental standards to protect the same environmental goal, such as reducing greenhouse gas emissions. This can lead to inefficiencies in production, as companies may have to comply with different standards in different markets.

Speaking from a pure legal perspective, The TBT Agreement has certain ambiguous provisions, which pose challenges for environmental protection. For instance, Article 2.2 of the TBT Agreement provides that technical regulations must not be more trade-restrictive than necessary to fulfil a legitimate objective. However, the term “legitimate objective” is not clearly defined, which leaves room for interpretation. Therefore, it is difficult to determine whether a technical regulation is necessary for environmental protection or is an unjustifiable trade barrier.⁵² Further, The TBT Agreement does not have any specific environmental standards. Instead, it relies on the environmental protection measures of other international agreements. This poses a challenge for environmental protection because there is no clear guidance on how to balance environmental protection with trade liberalization. Moreover, there is a lack of harmonization between different environmental agreements, which creates confusion and inconsistency in environmental protection measures. Furthermore, The enforcement of environmental protection measures under the TBT Agreement is challenging. The TBT Agreement relies on member states to enforce their domestic regulations and standards. However, there is a lack of

⁵² The WTO Agreements Series, WTO (May 4, 2023), https://www.wto.org/english/res_e/publications_e/tbttotrade_e.pdf.

resources and technical expertise in many developing countries, which poses challenges for enforcing environmental protection measures. Moreover, member states may be reluctant to enforce environmental protection measures if they perceive it as a trade barrier.

One of the significant challenges in environmental protection under the TBT regime is the potential conflict between trade and environmental objectives. The TBT Agreement recognizes the need to protect human health, animal welfare, and the environment, but it does not prioritize these objectives over trade interests. The agreement requires that technical regulations and standards should be based on scientific evidence and should not be more trade-restrictive than necessary. However, in practice, the determination of what is “necessary”⁵³ to protect the environment is often subjective and can vary between countries. This creates a challenge for developing countries that may have limited resources to establish and implement their environmental regulations and standards. One such case where trade was prioritized over the environment under the TBT Agreement is the Shrimp-Turtle case⁵⁴ between the United States and several countries in Asia and Latin America. The case arose when the US imposed a ban on the import of certain types of shrimp caught using methods that endangered sea turtles, in order to protect the marine environment. However, the affected countries claimed that this ban was a technical barrier to trade and was in violation of the TBT Agreement. In 1998, the dispute was brought before the World Trade Organization (WTO) and was ultimately decided in favour of the

⁵³ Technical Barriers to Trade Agreement, Preamble, 15 April 1994, 1868 U.N.T.S. 120.

⁵⁴ WTO, United States--Import Prohibition of Certain Shrimp and Shrimp Products, WT/DS58/AB/R (12 Oct. 1998).

affected countries. The WTO found that the US ban did indeed constitute a technical barrier to trade and was not justified under the exceptions provided by the TBT Agreement. As a result, the US was forced to either lift the ban or face trade sanctions.

This case highlights the challenges faced in balancing trade and environmental protection under the TBT regime. While the TBT Agreement allows for measures to be taken to protect public health and safety, such measures must be based on scientific evidence and cannot be used as disguised protectionism. In this case, the US was unable to provide sufficient scientific evidence to justify its ban on certain types of shrimp, and therefore trade was prioritized over environmental protection.

Another challenge is the lack of coherence and coordination between the TBT Agreement and other international environmental agreements.⁵⁵ Environmental agreements such as the Convention on Biological Diversity and the Paris Agreement on climate change have their own set of rules and requirements that are not always consistent with the TBT Agreement. This can lead to conflicts and inconsistencies in the implementation of environmental protection measures.

Despite these challenges, there are also opportunities for environmental protection under the TBT regime. One such opportunity is the potential for international cooperation on environmental standards. As more countries adopt environmental regulations and standards, there is an opportunity for countries to work

⁵⁵ Diebold, Nicolas F., Standards of Non-Discrimination in International Economic Law, 60(4) *The International and Comparative Law Quarterly*, 831, 855(2011).

together to harmonize these regulations and standards. This can help to reduce regulatory fragmentation and create a more level playing field for businesses looking to trade internationally. For example, the EU and the United States have worked together to harmonize certain environmental regulations and standards in areas such as chemicals and waste management.

Another opportunity for environmental protection under the TBT regime is the potential for technology transfer.⁵⁶ Technical regulations and standards can be used to encourage the adoption of environmentally friendly technologies, such as renewable energy sources or more efficient production processes. By promoting the use of these technologies, countries can reduce their environmental impact while also potentially creating new markets for these technologies. For example, Japan has promoted the use of energy-efficient appliances through its Top Runner program, which sets energy efficiency standards for appliances and encourages manufacturers to exceed those standards.⁵⁷

To overcome these barriers, several measures can be taken. Firstly, there is a need for enhanced dialogue and cooperation between trade and environmental authorities at both the national and international levels. Collaboration between these two groups can help to identify areas of mutual interest and facilitate the

⁵⁶ Christopher Gibson, *Breaking Down Barriers to Technology Transfer*, Research Gate (May 4, 2023), https://www.researchgate.net/publication/228276281_Breaking_Down_Barriers_to_Technology_Transfer_Reforming_WTO_Standard-Setting_Rules_and_Establishing_an_Advisory_Facility_in_Standard-Setting_for_Developing_Least_Developed_Countries.

⁵⁷ Top Runner Programme, IEA (Apr. 28, 2023) <https://www.iea.org/policies/1945-top-runner-programme>.

development of standards and regulations that are compatible with both trade and environmental objectives.

Secondly, there should be increased participation of developing countries in international standard-setting bodies.⁵⁸ These bodies are responsible for developing international standards and technical regulations that have a significant impact on international trade. However, the participation of developing countries in these bodies is limited, which can result in standards and regulations that are not compatible with their environmental protection objectives. By increasing their participation, developing countries can ensure that their interests are better represented in the development of international standards. One strategy is to promote international cooperation on environmental standards, such as using international organizations like the United Nations Environment Programme (UNEP) or through bilateral or multilateral agreements.

Thirdly, the TBT Agreement should be revised to provide more explicit recognition of the importance of environmental protection. The agreement should also include provisions that prioritize environmental protection over trade interests in situations where there is a conflict. This would help to clarify the objective of the TBT Agreement and provide greater certainty for countries seeking to implement environmental protection measures.

Finally, there should be greater coordination and coherence between the TBT Agreement and other international environmental agreements. This can be achieved through the development of guidelines and best

⁵⁸ *Supra note 59.*

practices for the implementation of environmental protection measures that consider the requirements of both trade and environmental agreements.

11. Conclusion

The Technical Barriers to Trade (TBT) regime plays a crucial role in international trade by ensuring that technical regulations, standards, and conformity assessment procedures do not create unnecessary obstacles to trade. While the TBT regime is primarily focused on trade liberalization and enhancing economic growth, it also has important implications for environmental protection.

Technical regulations can have significant impacts on the environment, particularly when they regulate the production, use, and disposal of products. The TBT regime recognizes the importance of protecting the environment and includes provisions for environmental considerations in the development of technical regulations. However, the implementation of these provisions has been limited, and there is a need for more effective coordination between environmental and trade policies.

The TBT regime also has a significant impact on sustainable development, as technical regulations can promote or hinder the adoption of sustainable technologies and practices. There is a growing recognition of the need to align trade and environmental policies to promote sustainable development, and the TBT regime has an important role to play in this regard.

Analysis of the TBT regime on environmental regulations reveals both opportunities and challenges. On the one hand, the TBT regime can provide a framework for the

development of environmentally sound technical regulations and standards, and can help promote the adoption of environmentally friendly products and technologies. On the other hand, the TBT regime can also be used to challenge environmental regulations and standards, particularly by countries with weaker environmental protections.

Despite these challenges, there are opportunities for environmental protection under the TBT regime. Collaboration between trade and environmental organizations can help ensure that technical regulations are developed in a way that promotes sustainable development and environmental protection. Greater transparency and stakeholder engagement in the development of technical regulations can also help ensure that environmental considerations are taken into account.

To fully realize the potential for environmental protection under the TBT regime, there is a need for greater coordination and coherence between trade and environmental policies. This can be achieved through better integration of trade and environmental considerations in policy development, and through the development of more effective mechanisms for coordination and information-sharing between trade and environmental organizations.

In conclusion, the TBT regime has significant implications for environmental protection and sustainable development. While there are challenges to be overcome, there are also opportunities for collaboration and coordination between trade and environmental policies. By working together, trade and environmental organizations can ensure that technical regulations are developed in a way that promotes both trade liberalization and environmental protection.

CHAPTER-15

ENVIRONMENTAL REFUGEES: OVERLOOKED FOLKS OF CLIMATE CHANGE

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1. Introduction

One of the most catastrophic events in the world today is climate change. As per Groundswell Report¹, by 2050, more than 216 million people would be scattered throughout the world due to environmental change. It could be caused by natural events like volcanic eruption or by human activities such as global warming caused by burning of fossil fuels. Though the entire global society is suffering consequences, those living in war zone and other conflict stuck areas are the most vulnerable. Climate change may result in displacement and hamper the living condition of those living in such areas.

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¹ Groundswell Report, World Bank (2021), <https://www.worldbank.org/en/news/press-release/2021/09/13/climate-change-could-force-216-million-people-to-migrate-within-their-own-countries-by-2050> (last visited May 13, 2023).

2. Environmental Refugees

Migration has been central to human evolution. History suggests² that the migration of Africans and Neanderthal (migration to maximise fitness in a seasonal environment) predated the migration to flee from conflicts, political repression and religious intolerance. Therefore, ecological and biogeographic factors have been driving forces to relocate since time- immemorial. However, the changing climate has upended the status quo. The present climate is a welter of contradictions- with the winter droughts in France, scorching summers of Spain and floods in Jacobabad (characterised as the world's hottest city). In a manner none are insulated from the ravages of climate change. However, some have borne the brunt of climate change disproportionately, to find their life hanging by a thread.

Climate refugees also known as environmental refugees are those who are displaced due to climate change. Since, they are not sheltered by the rights under the Refugee Convention 1951³ (as not fleeing due to "*well-founded fear of persecution*") but from the vicissitudes of climate change, they would be ineligible for refugee status under the above law.

As per the report⁴ of United Nation High Commission for Refugees (UNHCR), more than 36 million people were

² Flahaux, M.-L. and Haas, H.D. (2016) African Migration: Trends, Patterns, Drivers - Comparative Migration Studies, Springer Open. Available at: <https://comparativemigrationstudies.springeropen.com/articles/10.1186/s40878-015-0015-6> (Accessed: 13 May 2023).

³ Convention relating to Status of Refugees (1951)

⁴ Environmental Refugee (2023) National Geographic Education. Available at: <https://education.nationalgeographic.org/resource/environmental-refugee> (Accessed: 13 May 2023).

displaced in 2009 due to climate change. Scientists predict this number to soar up to 200 million by 2050. Though the idea of recognising climate refugees has been mooted across several conventions, as the New York Declaration for Refugees and Migrants, Global Compact for Safe, Orderly and Regular Migration, the term has not received any kind of official recognition from any international agency nor codified by any national or international laws.

3. Global Scenario

The Global South has been at the receiving end of climate change. Climate Change will not only lead to displacement of masses, but also bring forth⁵ food insecurity and spark conflicts. Besides, the inconspicuous disasters that afflict the Global South could snowball into a cataclysmic series of events. The Global South comprising nations adjunct to waterbodies such as Maldives and Bangladesh are frequently submerged by floods and are on the brink of being drowned. The low-intensity earthquakes that strikes Nepal is tied to climate change. With Nepal lying in an earthquake -prone area, and after witnessing how the Turkey-Syria earthquake panned out (not only leading to series of tremors and further loss of lives), but also leading to outbreak of cholera), it is evident the human cost of a disaster is unfathomable. Moreover, according to IDEA, climate change could also lead to a slide back in democratic freedoms, in autocratic or hybrid regimes (which a majority nations of Global South account for) as during COVID-19. Thus, while the Global North is

⁵ Chapter 5: Food Security — Special Report on Climate Change - IPCC (no date) Intergovernmental Panel on Climate Change. Available at: <https://www.ipcc.ch/srccl/chapter/chapter-5/> (Accessed: 13 May 2023).

bickering over ‘climate conspiracy theories’, the South is at the risk of another ‘disaster in the making’ in an already unstable world.

Though the Global North emits the lion’s share of the greenhouse gas emissions, (with the US and the European Union’s emissions amounting to 40% and 29% respectively⁶), the impacts are being largely felt in the low-income nations, though they are the least responsible for climate change. The 6th report of IPCC has acknowledged ‘climate colonialism’ for aggravating climate change. The climate colonialism is not restricted to the looting of resources, but also extend to usurping the land and ensuring that native population do not thrive (through banning of centuries-old subsistence methods. IPCC mentions that ‘Climate colonialism’ has not been consigned to the past but is an ongoing catalyser of climate crisis.

While the acts of Global North accrue for climate change, it falls heavily upon the South to recuperate the environment. For instance, the Amazon rainforest spanning across 8 nations is a trove of biodiversity and natural resources. Under Jair Bolsonaro, with an aim to stimulate the economy, the Bolsonaristas carried a rampage in the Amazon, clearing forests for ranching and encouraged illegal mining. This deforestation led to massive fires that swept across Amazon in 2019. Shortly afterwards, the G-7 leaders pledged⁷ financial and

⁶ J, H. (2020) Quantifying National Responsibility for Climate Breakdown: An Equality-based Attribution Approach for Carbon dioxide Emissions in Excess of the Planetary Boundary, *The Lancet. Planetary Health*. Available at: <https://pubmed.ncbi.nlm.nih.gov/32918885/> (Accessed: 13 May 2023).

⁷ G7 cash for Amazon fires is ‘chump change’, say campaigners (2019) *The Guardian*. Available at:

technical assistance to douse the fires and revive Amazon. However, this did not go down well with the then President. He rebuked the assistance of G7 leaders, tweeting that the international alliance treats his country as it were “a colony” or “no man’s land”. Here, there is a conflict between fostering economic activity in Brazil and protecting the environment. While the developed nations turned a new page through Renaissance, and Industrial revolution (coal being the linchpin of the industrial revolution) accelerating their growth to chieve the present status, asking the less-developed nations to curb coal burning and stick to their climate targets reeks of hypocrisy for many of those in the South.

Currently, instead of siphoning Carbon dioxide, Amazon rainforests is emitting more of it. The international community must take collective action to preserve the ‘lungs of the world’. The Global North must endure a greater share of the burden, while providing incentives to the South to protect their resources.

Between 1880 and 1990, the South argued for the climatic debt incurred by it from the North since it accounted for 84% of carbon dioxide emission from fossil fuels and 75% from deforestation. To mitigate this, United Nations Framework Convention on Climate Change (UNFCCC) incorporated Principle 7 in Rio Declaration. As per the principle, the responsibility of a country to address climate change would be proportionate to its contribution and its capacity of handling it. This has been further restated in the Paris

Agreement⁸ which was entered into by the countries in 2015 for the promotion of Sustainable Development and to mitigate climate change “*equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.*”

It contains provisions to avert the rise of temperature by not more than 2 degrees Celsius and contains loss and damage provision and adopted ‘bottom -up approach’ where each country would communicate its National Determined Contributions (NDC) which is the greenhouse gas reduction pledge. The same year, 17 Sustainable Development Goals were approved by UN member states. However, even after passing several laws for protection of environment, there was an abnormal increase in migration including high rate of cross border movements.

The recent report from IPCC shows that the climatic change would make certain parts of the globe less viable to live in. Certain parameters set out in it were that:

- the world would be 1.8 – 4 degrees Celsius higher in 2099 than it is of now.
- Hydrological cycle will swap round causing floods, storms and droughts to be severe and frequent.
- Rise in sea level resulting in submerge of many island states. Uninhabitation of island states would itself contribute to 65 million people being displaced.

⁸ The Paris Agreement United Nations. Available at: <https://www.un.org/en/climatechange/paris-agreement> (Accessed: 13 May 2023).

- Crop yields would drop by 30% in Central and South Asia which would lead to surge in malnutrition rates.

A push factor that comes along with environmental problems is poverty. For instance, it was seen in the US Dust Bowl in 1930s⁹ where people had to be displaced due to extreme drought that ‘social and financial’ capital had acted as secondary agent for migration.

It was only in 2013 at COP 19 held in Warsaw, Poland that climate displacement was dealt with for the first time with the incorporation of decision held in Paris Agreement for the establishment of Warsaw International Mechanism for Loss and Damage in order to determine the compensation incurred due to climate change. An executive Committee¹⁰ to “*develop recommendations for integrated approaches to avert, minimize, and address displacement related to the adverse impacts of climate change*” was set up. In COP22 held in Marrakech, further deliberations on embodying displacement “*into relevant planning and action, as appropriate, and to encourage bilateral and multilateral entities to support such efforts*” was held. This mechanism is still in its infancy stage and its future rests in uncertainty¹¹.

⁹ Chapter 5: Food security — Special Report on Climate Change - IPCC (no date) Intergovernmental Panel on Climate Change. Available at: <https://www.ipcc.ch/srccl/chapter/chapter-5/> (Accessed: 13 May 2023).

¹⁰ Migration, Displacement and Human Mobility (no date) Unfccc.int. Available at: <https://unfccc.int/wim-excom/areas-of-work/migration-displacement-and-human-mobility#:~:text=The%20Executive%20Committee%20established%20a,adverse%20impacts%20of%20climate%20change.> (Accessed: 13 May 2023).

¹¹ Mariam Traore, D. and Chazalnoel, I. (2018) Advancing the Global Governance of Climate Migration Through the United Nations, Taylor &

4. National Scenario

In modern times, the deteriorating climatic conditions has led to extreme weather changes which in turn has resulted in large scale migration. As per the Global Trends Report published by United Nations High Commission for Refugees (UNHCR), around 50 lakhs¹² were internally displaced in India due to climate change.

Instances of internal displacement in India

Odisha

Owing to climatic disasters like cyclone, storm and flood in coastal district of Kendrapara in Odisha, residents are driven to migrate¹³.

Himalayan regions

Joshimath, the sinking Himalayan town, is an example portraying the vulnerability of Himalayas towards climate change. The town is built on rubble following a land slide brought about by an earthquake. Establishment of hydroelectric projects, unplanned construction and poor

Francis. Available at:
<https://www.taylorfrancis.com/chapters/edit/10.4324/9781315109619-7/advancing-global-governance-climate-migration-united-nations-framework-convention-climate-change-global-compact-migration-mariam-traore-chazalnoel-dina-ionesco> (Accessed: 13 May 2023).

¹² UN Climate Change Quarterly Report: Q1 2023 (no date) Unfccc.int. Available at:
https://unfccc.int/?gclid=EAIaIQobChMI9t_O4rzy_gIVIGt9Ch11mgqaEAAYASAAEgIhxPD_BwE (Accessed: 13 May 2023).

¹³ Barik, S. (2022) Extreme Climate Events Trigger Migration in Odisha's Kendrapara, Jharkhand's palamu, The Hindu. Available at:
<https://www.thehindu.com/news/national/other-states/extreme-climate-events-trigger-migration-in-odishas-kendrapara-jharkhands-palamu/article65475731.ece> (Accessed: 13 May 2023).

drainage system has worsened the situation. This led to evacuation of hundreds of people.

In 2021, a piece of Nanda Devi glacier which borders Nepal and China broke off, in spite of the winter season, resulting in an avalanche of water giving rise to large scale displacement of many villages in North India¹⁴. The place had experienced calamitous flooding in 2013 leading to death of around 6000. Climate change is begetting vulnerability of Himalayas to wrecking of life, property and livelihood.

Rising seas in the Sundarbans

The Indian part of Sundarbans consist of 102 islands with half of them inhabited have been victim of coastal erosion with¹⁵ the average sea level rising by 3 cm over the past 20 years. Thousands have already lost their homes despite tall erections being made to stop the approach of water and has further rendered farmland uncultivable owing to high salinity. The rate of erosion in Sagar Island is the world's highest¹⁶. This has also led to disappearance of tiger's hunting grounds which force them to cross rivers in search of livestock reared by humans. Venomous snakes, saltwater crocodiles are also

¹⁴ Nanda Devi Glacier burst: What we Know so Far (2021) The Indian Express. Available at: <https://indianexpress.com/article/india/uttarakhand-glacier-burst-all-you-need-to-know-7178580/> (Accessed: 13 May 2023).

¹⁵ On the front line of climate change in India's Sundarbans (2019) Mongabay Environmental News. Available at: <https://news.mongabay.com/2019/10/sundarbans-climate-change-tigers-india/> (Accessed: 13 May 2023).

¹⁶ Rapid erosion of the coast of Sagar Island, West Bengal - India. Available at: https://www.researchgate.net/publication/226957521_Rapid_erosion_of_the_coast_of_Sagar_island_West_Bengal_-_India (Accessed: 13 May 2023).

drawn towards human settlements with the rise in sea level.

5. Action Policy

Though India has been in the forefront in battling climate change through launching of International Solar Alliance along with France and its adherence to international conventions, it has also propagated ample conditions for the exacerbation of climate crisis.

India's reduction of mass poverty happened on the heels of Green Revolution (rice being the primary crop). However, rice is also a great contributor of climate change responsible for 10% of global methane emissions¹⁷. Though efforts have been made to diversify crop production (millets being the game-changer have been recognised as 'nutri-cereals' in 2018 and its cultivation encouraged through mainstreaming under PDS), more must be done on this front. Similarly, the existing irrigation practices like the groundwater extraction in Punjab are not sustainable in the long run. According to National Green Tribunal, Punjab's groundwater is likely to deplete below 300 metres by 2039.

India's heavy reliance on coal has dampened the spirits to phase out coal production. A last-minute U-turn was carried out in the climate negotiation of 2021 to provide breathing space for India, and thereby favoured phasing down coal to phasing out coal. While the government has announced ambitious goals for renewable energy (500 gigawatts of renewable energy by 2030 or about half

¹⁷ Greening the Rice We Eat (no date a) World Bank Blogs. Available at: <https://blogs.worldbank.org/eastasiapacific/greening-rice-we-eat> (Accessed: 13 May 2023).

of its electricity), it seems that the government has its head in the clouds. India is unlikely to wean off coal soon, because not only provides energy, but also secures jobs. As a country that is manoeuvred by electoral gains (subsidies and freebies), coal production is a huge roadblock in its path to achieve climate mitigation targets.

India's climate mitigation targets also face administrative hurdles.¹⁸ There is dissonance between the climate action policies formulated by the legislature and the national priorities. Coupled with it is that Urban Local Bodies is marked by their absence in the decision-planning as well as has a toothless and fragmented governance. Climate action policy also encounters the problem of being self-contradictory to SDG. The policies are often ambiguous and overlapping and there is no laying down of the context-specific details of the target.

Concerted efforts need to be made to tackle climate change, as they have a larger-than-life impact on the present and future generations. The National Plan on Climate Change launched in 2008 with 8 National Missions, although commendable (such as the National Solar Mission), appears to be a paltry effort in addressing climate change. (Particularly so because of the glacial pace in its execution).

Climate Change is no longer an imminent crisis but is happening right under our noses. As stated before, efforts need to be focussed on adaptation and mitigation

¹⁸ Sonali Sharma (2023) India's Climate Change Policy: Challenges and Recommendations, ISPP. Available at: https://www.ispp.org.in/policyreview_blog/indias-climate-change-policy-challenges-and-recommendations/ (Accessed: 13 May 2023).

as we are way off our climate targets. The Coalition for Disaster Resilience has a colossal role to play here. A multi-stake holder partnership is a repository of knowledge and resources for other countries to bolster their infrastructure to withstand disasters. With the Turkey-Syrian earthquake (Turkish building companies flouted regulatory guidelines also accounted for the large number of casualties) and Denmark's floating market farms are testimony of importance of climate-resilient infrastructure in the coming world. This could also prevent people from relocating (e.g.: due to washed down homes) and tide over a refugee crisis.

6. Climate Change Litigation

A new arena that has taken the world by storm is climate change litigation. Climate change litigation involves suing by individuals, corporations and non-Governmental Organisations against governments and cooperations for their non-compliance or inaction in aggravating the climate crisis. The actors encompass property owners, municipalities, states, insurers, shareholders, and public interest organizations. With the adoption of the Paris Agreement and the increasing value of damage due to climate change, this field has gained momentum. Rapid strides were made in this field as seen with countries such as Guyana and Taiwan filing cases for the first time in 2021¹⁹. While the Global North account for most climate litigation cases, South has also been making progress with 88 cases, (47 in Latin

¹⁹ Global Trends in Climate Change Litigation: 2022 Snapshot (2022) Grantham Research Institute on Climate Change and the Environment. Available at: <https://www.lse.ac.uk/granthaminstitute/publication/global-trends-in-climate-change-litigation-2022/> (Accessed: 13 May 2023).

America and the Caribbean, 28 in Asia Pacific, and 13 cases in Africa.) as of 2022.

Climate Change litigation could be classified into three waves. The initial suits (first wave) were limited to administrative cases, as the one brought against the US Highway Traffic Administration to raise standards – *Cities of Los Angeles and New York v. US National Highway Traffic Safety Administration*²⁰. With the adoption of Kyoto Protocol and Paris Agreement (second and third wave respectively), climate change litigation found its way to Europe and Third World. By then claims against corporations and governments extended to tort of nuisance; breach of fiduciary duty; securities fraud class action; duty of care/human rights; constitutional claims. (*Urgenda Foundation v. State of Netherlands*, *Ashgar Legari v. Federation of Pakistan*²¹).

The *Uganda* case is landmark having inspired the *Legari* case, *VZW Klimatzaak v. Kingdom of Belgium* and the *Swiss Senior Women for Climate Protection v. Swiss Federal Council*²² (scientific reference point of the Paris Agreement buttresses the petitions) to nudge the states to commit to climate mitigation targets.

While in some of the cases, climate change occupies the central argument (*Comer v Murphy Oil USA*²³), in others climate change has been side-lined to the fringes (peripheral cases- *Gloucester Resources Limited v. Minister for Planning*²⁴). There are also cases, where there

²⁰ City of Los Angeles v. Nhtsa 912 f.2d 478 (d.c. Cir. 1990)

²¹ Leghari v. Federation of Pakistan 2015 w.p. No. 25501/201

²² Swiss Senior Women for Climate Protection v. Swiss Federal Council 1C_37/2019

²³ Comer v Murphy Oil USA 839 F. Supp. 2d 849

²⁴ Gloucester Resources Limited v. Minister for Planning 2019 NSWLEC 7

is no explicit reference to climate change, but it has an adverse impact on the mitigation targets. (Incidental cases- *Breyer Group plc and others v. Department of Energy and Climate Change*²⁵)

Recently, elderly people in Switzerland broke the mould by clubbing climate crisis with human rights, how global warming put them at increased risk of dying due to heatwaves. (*Verein KlimaSeniorinnen Schweiz and Others v. Switzerland*²⁶) This could spur a new wave of litigation.

Despite the progress, climate change litigation has been a legal minefield. Though, most of the cases instituted advance climate policies and seek behavioural shift in key actors, there are others which oppose climate change mitigation policies due to the threat to wildlife and biodiversity. On this note, there has been a litany of cases against-

- i. installation of wind mills -*Animal Welfare Institute v. Beech Ridge Energy LLC*²⁷
- ii. solar energy projects- *Newberry Community Services District v. County of San Bernardino and Defenders of Wildlife v. U.S. Fish & Wildlife Service*
- iii. biomass subsidies regulation- *EU Biomass Plaintiffs v. European Union*²⁸
- iv. Phasing out coal- *RWE v. Kingdom of the Netherlands*²⁹

²⁵ *Breyer Group plc and others v. Department of Energy and Climate Change* [2015] EWCA Civ 408

²⁶ *Verein KlimaSeniorinnen Schweiz and Others v. Switzerland* Application no. 53600/20

²⁷ *Animal Welfare Institute V Beech Ridge Energy LLC* 675 F. Supp. 2d 540 (D. Md. 2009)

²⁸ *EU Biomass Plaintiffs v. European Union* T-141/19

This is self-defeating as seen from the latest report of IPCC, according to which we have neared the tipping point of 1.5°C and the only way forward is to adapt to the changing climate.

7. Judicial Pronouncements

Rural Litigation and Entitlement Kendra & Ors. v. State of Uttar Pradesh & Ors.³⁰

Illegal limestone mining was carried on in the Mussoorie hills of the Himalayas which resulted in landslide, killing villagers and livestock. The court ordered the mining to be stopped and Eco-Task Force of the central department of environment to reclaim the destroyed land.

This was the first few cases which tried to set an equilibrium between environment and ecological integrity against industrial needs and thus prevented dispersion of villagers from this place.

M. C. Mehta v. Union of India³¹ (Delhi Sewage Treatment Plant Case)

On absence of sewage treatment plant in many areas, millions of people in Delhi and living beside the river Yamuna had to face severe health hazards. The court ordered for the establishment of plants in 16 different localities.

²⁹ RWE v. Kingdom of the Netherlands ICSID Case No. ARB/21/4

³⁰ Rural Litigation and Entitlement Kendra & Ors. v. State of Uttar Pradesh & Ors 1985 AIR 652

³¹ M. C. Mehta v. Union of India 1988 AIR 1115

8. Environmental Refugees- A Detailed Overview

Displacement caused by environment degradation can be broadly divided into two categories- those caused by

- a. Immediate human activity
- b. Long term human activity

a. Immediate human activity: Bhopal Gas Tragedy-

The tragedy which occurred in Union Carbide India Ltd. in 1984 is considered to be one of the world's tragic industrial accidents. The industry disposed waste which included toxic effluents in open pits and open sewage drains. On December 2, 1984; 45 tons of methyl isocyanate leaked from the plant and spread to densely occupied adjacent areas killing more than 2500. Even after a decade after the disaster, the groundwater was contaminated with mercury and other chemicals making it importable for drinking which has led to large scale migration.

b. Long term human activity: Southeast Asia-

Continued exploitation of forest in Cambodia is an example of migration due to long term human activity. The absence of forest cover has led to flooding and siltation. The Tonle Sap lake which is one of the largest fishing grounds in the world is dying due to excessive siltation. This has imperilled community mostly dependant on it for livelihood which has led to their displacement.

Air pollution, rise in sea level, drought have triggered migration by making many places uninhabitable. Island countries like Maldives, Kiribati have been focal point of discussion on how the destructive capacity of climate

change affects quality of the life of people. However, the means to counter climate change are however ill-equipped to deal with climate refugees as there is a lack of political awareness of the same. Climate refugee crisis are a catch-22 situation, requiring long-term solutions (neither judicial intervention could be of any help because the refugees are 'off the books'. Further, the delayed judicial response could not stem the crisis).

It is high time that the victims of environmental disaster be granted the status of 'refugee'. As per UNHCR Handbook³², a refugee lacks protection from his or her state and is outside the home country owing to prosecution or fear of prosecution and "is unable or, owing to such fear, is unwilling to avail himself of the protection of that country." The word 'unable' shows that in presence of situation where the will of person in receiving protection does not matter. Further, the definition mentions 'grave circumstances' portrays that presence of persecution is not a necessity, thus, the definition of refugee requires a modification to include environmental disasters.

Legislative Responses

a. United States of America

The country provides Temporary Protected Status³³ (TPS) to those people who are unwilling to go to their home country due to the presence of any dangerous situation. However, the granting of status is by

³² The Legal Framework. Annex 14 - UNCHR Handbook on Procedures and Criteria for Determining Refugee Status

³³ What is temporary protected status? (no date) Council on Foreign Relations. Available at: <https://www.cfr.org/backgrounder/what-temporary-protected-status> (Accessed: 13 May 2023).

designating a country so that its nationals are fit for protection. A country may be designated where:

- There is armed conflict
- Environmental disaster like earthquake or flood
- On the request of the country

It is generally granted for a duration of 6 – 18 months but can be extended depending on the circumstances of the country which has been designated the status. In 1998, on the grounds of Hurricane Mitch, residents of Honduras and Nicaragua were granted temporary status. Following 2 earthquakes, people from El Salvador were granted the status.

The opponents of TPS see the status as magnet for unauthorised movement.

b. European Union

The EU Temporary Protection Directive – It was a response to sudden inflow of people due to violence or climate change as the scope is very wide. The protection does not include cross-border movement nor nationals of non-member states.

The EU Qualification Directive- It does not contain any express provision on safeguarding from environmental hazards but it could be covered under ‘inhuman or degrading treatment’.

National Laws- Swedish asylum law provides³⁴ that ‘unable to return to their country of origin because of an

³⁴ United Nations High Commissioner for Refugees (no date) Sweden: Aliens act (2005:716), Refworld. Available at: <https://www.refworld.org/docid/3ae6b50a1c.html> (Accessed: 13 May 2023).

environmental disaster'. However, this provision have not been used till today.

Legislative Proposal- The United Nations was approached by the Belgian Senate in 2006 calling for the acknowledgment of 'environmental refugee' status. However, this was opposed³⁵ on absence of identification of root problem.

9. Extending the Definition of Refugee

In 1985, environmental researcher Essam El- Hinawi was the first person³⁶ who suggested extending the refugee status to those who fled on account of environmental disasters. However, the suggestion was turned down since it did not meet the essentialities provided in Article 1A of the Refugee Convention. Firstly, most people who fled owing to environmental disaster preferred to stay in their country of origin which backlashed the necessary requirement. Secondly, it is difficult to prove that climate change is the reason or the agent of persecution. For instance, in the case of Teotia, the applicant had requested for refuge in New Zealand by reason of greenhouse gas emissions beyond the prescribed limit in industrialized countries which led to extreme climate change in Kiribati. Yet, the court of New Zealand observed that the fear owing to greenhouse gas emissions would not amount to persecution. Thirdly, the

³⁵Convention Relating to the Status of Refugees Available at: https://www.un.org/en/genocideprevention/documents/atrocity-crimes/Doc.23_convention%20refugees.pdf (Accessed: 13 May 2023).

³⁶ Scissa, C. (2021) Recognition and Protection of Environmental Migrants in International Law, E- International Relations. Available at: <https://www.e-ir.info/2021/06/24/recognition-and-protection-of-environmental-migrants-in-international-law/> (Accessed: 13 May 2023).

persecution must be on account of nationality, religion, race, affiliate of any social group.

10. Impending the Recognition of Environmental Refugee Status Through Soft Laws

On absence of international consensus, lots of people have been left to strife with climatic and environmental disasters which leads to escalation in poverty. 2015's Agendas- the 2030 Agenda on Sustainable Development and the Agenda for the Protection of Cross-Border Displaced Persons in the Context of Disasters and Climate Change (Protection Agenda), gave a new look to environmental displacement. The main objective of Agenda is to offer aid and protection to those affected by cross-boundary disaster through constructive practices at ground level.

New York Declaration for Refugees and Migrants, 2016 marks a special provision for forced migration due to environmental hazard (par. 1, and 7 of Chapter II in Annex II). The Sustainable Development Goal Report, 2020 observes that only 54 percentage of countries worldwide has ample laws to lessen inequalities. Dearth of dedication is not only seen in United States which withdrew from the Paris Agreement, but also in European Union where the resettlement programmes and the Common Asylum System was dysfunctional for the past 5 years.

11. Conclusion

The discussion on environmental displacement and migration started thriving in not less than 3 decades. There exist various arrangements for the same but there is absence of binding force. Binding conventions like the Kampala convention are weakly executed meanwhile

Paris Agreement, does not include those afflicted by climate change. The safeguard to this category remains a humanitarian crisis and thus, the need of the hour.

CHAPTER-16

NATURAL RESOURCE MANAGEMENT VIS-À-VIS INDIA'S COMMITMENT IN COP-26

Krishna Kant Dwivedi*

1. Introduction

COP 26, also known as the 26th Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC), is a key event in the global effort to tackle climate change. India, as a signatory to the UNFCCC, has made several commitments to address the issue of climate change, including the management of its natural resources. In terms of natural resource management, India has pledged to increase its forest cover and enhance its capacity for renewable energy generation. The country has also committed to reducing its carbon footprint through the use of clean energy technologies and the promotion of energy efficiency. In addition to these commitments, India has also emphasized the importance of conservation and sustainable use of its water resources. The country has established several initiatives aimed at improving water management and reducing water pollution, such as the National River Conservation Plan and the National Water

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Mission. It is crucial for India to fulfil its commitments in COP 26 in order to ensure a sustainable future for its citizens and the planet as a whole. Effective natural resource management will play a critical role in achieving these goals, as well as mitigating the impacts of climate change. India's commitment to the sustainable management of its natural resources will be closely watched at COP 26. The success of these efforts will be crucial for the country's ability to address the challenges posed by climate change and ensure a sustainable future for its citizens and the planet.

2. Natural Resource Management & CoP 26

Natural resource management (NRM) refers to the responsible use, conservation, and protection of natural resources, such as land, water, wildlife, and minerals, for present and future generations. This involves balancing the economic, social, and environmental needs and concerns to ensure sustainable use and preservation of resources. It includes practices such as soil conservation, water management, wildlife management, and sustainable forestry. Effective natural resource management is essential for maintaining biodiversity, combating climate change, and promoting sustainable development. COP26 (26th Conference of the Parties) is a United Nations climate change conference which took place in Glasgow, Scotland in November 2021. It is one of the largest and most important gatherings of world leaders, policy makers, and experts to address the global challenge of climate change.

The main objective of COP26 is to bring countries together to accelerate action towards the goals of the Paris Agreement, signed in 2015, to limit global warming to well below 2 degrees Celsius and pursue efforts to limit it to 1.5 degrees Celsius. At COP26, countries will

negotiate and agree on new, more ambitious targets for reducing emissions, known as Nationally Determined Contributions (NDCs). The conference will also provide an opportunity for countries to showcase their actions and initiatives to address climate change, and to encourage others to step up their efforts. The outcome of COP26 was to have significant implications for global efforts to combat climate change and will shape the direction of international climate policy for years to come.

3. India's policy to Natural Resource Management

India has implemented several policies and programs to manage its natural resources sustainably. Some of the key initiatives include:

National Forest Policy: The National Forest Policy, 1988, provides the framework for the management and conservation of forests in India. The policy aims to balance the needs of forest-based communities, industry, and the environment.

National Water Policy: The National water policy 2012 is the framework for the sustainable management and use of water resources in India. The policy aims to ensure the availability of water for all, also addressing issues such as water scarcity and water pollution.

National Biodiversity Act: The National Biodiversity Act, 2002, provides a legal framework for the conservation and sustainable use of India's biodiversity. The act establishes the National Biodiversity Authority and the state biodiversity boards to manage and conserve India's biodiversity.

National Action Plan on Climate Change: The National Action Plan on Climate Change, 2008, outlines India's strategy for mitigating and adapting to the impacts of climate change. The plan includes initiatives to promote the use of renewable energy, improve energy efficiency, and conserve forests.

National River Conservation Plan: The National River Conservation Plan is a national program aimed at improving the ecological health of India's rivers. The program focuses on riverfront development, afforestation, and the creation of parks and recreation areas.

Swachh Bharat Abhiyan: The Swachh Bharat Abhiyan (Clean India Campaign) is a national program aimed at improving sanitation and waste management in India. The program aims to create a clean and healthy environment and improve the quality of life for all citizens.

These policies and programs aim to promote sustainable natural resource management in India and ensure the long-term health of the country's natural resources for future generations.

Sustainable use of Natural Resources

Sustainable natural resource utilisation refers to the stability and efficiency and consumption of biological assets in a way that fulfils current requirements without jeopardising future generations' capacity to satisfy their own needs. This requires correcting financial, social, and natural difficulties. Some of the major natural resources that need to be sustainably utilized include:

Water: Water is a finite resource and its sustainable utilization is crucial for both human consumption and

agricultural use. This involves reducing waste and improving efficiency in the use of water resources.

Forests: Forests provide critical ecosystem services, such as carbon sequestration, water regulation, and biodiversity conservation. Sustainable forest management practices aim to balance the economic benefits of forestry with the conservation of forest ecosystems.

Minerals: The extraction and use of minerals can have serious ecological consequences, such as desertification and water contamination and greenhouse gas emissions. Sustainable mineral development involves minimizing these impacts through responsible mining practices and rehabilitation of mined lands.

Energy: The world is heavily reliant on fossil fuels, which are finite and have significant environmental impacts. Sustainable energy practices aim to reduce dependence on fossil fuels for energy while increasing reliance on sources of clean energy, such as wind, solar, and geothermal energy.

Land: Land is a finite resource that is critical for agriculture, forestry, and urban development. Sustainable land use practices aim to balance economic development with the protection of soil and ecosystems.

Sustainable utilization of natural resources requires careful planning, management, and implementation of practices that balance economic, social, and environmental considerations.

4. Role of NGT (Natural Resource Management) in NRM

The National Green Tribunal (NGT) is a specialized court in India that deals with environmental disputes and enforces laws related to the protection of the environment. It was established in 2010 under the National Green Tribunal Act of 2010¹. The NGT has jurisdiction over all environmental disputes and matters relating to the implementation of environmental laws in India. The NGT is headquartered in New Delhi and has regional benches in several cities across India. The Tribunal is composed of judicial and expert members, and its decisions are binding on all parties involved. The NGT has the power to enforce environmental laws, regulate the extraction of natural resources, impose penalties for environmental violations, and order compensation for environmental damages. It also provides a fast-track mechanism for resolving environmental disputes, and its decisions are binding on all parties involved.

The NGT plays a crucial role in promoting natural resource management in India by balancing economic growth with environmental protection and ensuring that development activities are carried out in a sustainable manner that does not harm the environment. The Tribunal's decisions and guidelines have helped to improve environmental governance in India and to protect the country's rich biodiversity and natural resources.

The National Green Tribunal (NGT) plays a crucial role in natural resource management in India. Some of the key

¹ National Green Tribunal Act, 2010, Acts of Parliament, 2010, (India).

ways in which the NGT helps in natural resource management include:

Adjudicating environmental disputes: The NGT provides a fast-track mechanism for resolving environmental disputes, allowing for quick and effective resolution of environmental issues.

Enforcing environmental laws: The NGT has the power to enforce environmental laws and regulations, and to issue directives to government agencies and private parties to take action to protect the environment.

Promoting sustainable development: The NGT encourages sustainable development by balancing economic growth with environmental protection. It has issued guidelines and directives aimed at reducing the negative impact of development activities on the environment.

Protecting biodiversity: The NGT has taken several initiatives to protect India's rich biodiversity, including imposing bans on certain activities that harm wildlife and forests.

Regulating resource extraction: The NGT has the power to regulate the extraction of natural resources, such as minerals and petroleum, to ensure that these resources are extracted in a sustainable manner that does not harm the environment. Overall, the NGT plays a crucial role in promoting natural resource management in India by enforcing environmental laws, resolving environmental disputes, and promoting sustainable development.

5. Some of the Key Cases That Have Helped to Protect NRM in India Include:

Vellore Citizen's Welfare Forum v. Union of India (1996)²: This is a landmark environmental case in India from 1996. The case dealt with the pollution of the Palar River in the state of Tamil Nadu by tanneries and dyeing units. The petitioner, Vellore Citizen's Welfare Forum, filed a public interest litigation (PIL) to seek relief from the pollution of the river, which had a severe impact on the health of the local population and the environment. The Supreme Court ordered the closure of the tanneries and dyeing units that were polluting the river and imposed penalties on them for violating environmental laws. The Vellore Citizen's Welfare Forum case was an important step in the development of environmental jurisprudence in India, as it demonstrated the role of the courts in protecting the environment and promoting sustainable resource management. The case set a precedent for other public interest litigations and helped to raise awareness about the need to protect India's natural resources and to enforce environmental laws. The case also highlighted the need for effective implementation of environmental laws and regulations and the importance of public participation in environmental decision-making. It was a victory for environmental protection and demonstrated the power of the courts to enforce environmental laws and to ensure that the rights of citizens are protected.

M.C. Mehta v. Union of India (1987)³: The case dealt with the pollution of the Ganges River by industrial and municipal waste and sought relief from the pollution. The petitioner, M.C. Mehta, filed a public interest litigation (PIL) seeking the protection of the Ganges River, which is

² Vellore Citizen's Welfare Forum v. Union of India (1996) 5 SCC 647.

³ M.C. Mehta v. Union of India, (2015) 12 SCC 764: 2014 SCC Online SC 1123.

considered one of the holiest rivers in India and is of great cultural and religious significance. The SC ordered the govt. to take steps to reduce the pollution of the river and to improve its ecological health. This lawsuit was a significant step forward in the establishment of environmental legal precedent in India because it proved the significance of the courts in environmental protection. and promoting sustainable resource management. The case set a precedent for other public interest litigations and helped to raise awareness about the need to protect India's natural resources and to enforce environmental laws. The case also resulted in the creation of the National River Conservation Plan, which aimed to improve the ecological health of India's rivers and ensure the long-term use of waterways. The case was a victory for environmental protection and demonstrated the power of the courts to enforce environmental laws and to ensure that the rights of citizens are protected.

Goa Foundation v. Union of India (2005)⁴: The case dealt with the mining of iron ore in the Western Ghats, one of India's biodiversity hotspots and a region of great ecological significance. The petitioner, Goa Foundation, filed a PIL seeking a ban on mining in the Western Ghats to protect its biodiversity and ecological values. The Supreme Court banned mining in the region, citing the potential damage to the environment and the need to preserve the region's biodiversity. The case also highlighted the need for effective implementation of environmental laws and regulations and the necessity of citizen involvement in environmental judgement. The ban on mining in the Western Ghats has helped to preserve

⁴ Goa Foundation (V) v. Union of India, (2005) 11 SCC 564: 2005 SCC Online SC 988.

the region's biodiversity and to promote sustainable resource management in India.

6. India's Commitment in COP26

India is an important player in the global efforts to combat climate change and has made significant commitments ahead of COP26. Some of India's key commitments include:

Renewable energy: India has set a target to achieve 450 GW of renewable energy capacity by 2030, including 175 GW from solar, 100 GW from wind, 60 GW from hydro and others from biomass and small hydro.

Emissions reduction: India has pledged to reduce its carbon intensity (emissions per unit of GDP) by 33 to 35% below 2005 levels by 2030. It is also working towards increasing its forest cover and improving land use practices to enhance carbon sinks.

Energy efficiency: India is taking steps to improve energy efficiency across various sectors, including transportation, industry, and buildings, to reduce its energy consumption and greenhouse gas emissions.

Adaptation and mitigation: India are actively implementing adaptation and mitigation measures to address the impacts of climate change, including disaster risk reduction, water management, and ecosystem-based adaptation.

Climate finance: India has committed to provide climate finance and technology transfer to developing countries, particularly in Africa and small island states, to help them transition to low-carbon and climate-resilient pathways.

India's participation and commitment in COP26 will be important for the global effort to combat climate change, as it is one of the largest and fastest-growing economies in the world and a major contributor to global emissions.

As component of its engagement in the Paris Climate Agreement, India has pledged to minimize its emissions of greenhouse gases. The Paris Agreement is a worldwide pact signed by almost 200 nations with the objective of keeping global warming much below 2°C beyond pre-industrial temperatures and working to keep something below 1.5°C. Under the Paris Agreement, India has committed to reduce its emission level (the quantity of greenhouse gases generated per unit of economic production) by 33% to 35% around gas (ghg) emissions by 2030. The nation has set a target of generating 40% of its total electricity capacity from renewable electricity by 2030. In addition to these pledges, India has established several policy initiatives to encourage clean energy and reduce emissions, such as the National Solar Mission, Wind Energy Mission, and National Biofuel Policy. Furthermore, the government has taken steps to promote energy efficiency in a variety of areas, including buildings, industries, and commuting. While India confronts tremendous obstacles in decreasing emission and transforming to a low-carbon economy, the government is taking critical initiatives to combat climate change and achieve its Paris Agreement goals.

Being one of the globe's largest and most populated nations, India's measures to combat environmental issues have far-reaching global effects. In accordance with its undertakings under the Paris Agreement, the Indian government has been diligently working to decrease emissions of greenhouse gases and encourage the widespread use of clean energy technologies. Some of India's key commitments and actions to address climate

change include: **Reducing Emissions Intensity:** India has committed to reducing its emissions intensity (emissions per unit of GDP) by 33-35% below 2005 levels by 2030.

Increasing Renewable Energy: By 2030, India hopes to have 40% of its own power generation capacity powered by non-fossil fuel sources. The nation has made substantial strides in implementing renewable energy sources, especially inside the wind and solar power sectors.

Enhancing Energy Efficiency: India is working to improve energy efficiency across its economy through the implementation of mandatory efficiency standards and labelling programs for appliances and buildings.

Promoting Sustainable Agriculture: India is taking steps to promote sustainable agriculture practices that reduce emissions and improve soil health.

Investing in Climate-Resilient Infrastructure: India is investing in infrastructure that is better able to withstand the impacts of climate change, such as sea-level rise and more intense weather events. In addition to these domestic efforts, India has been active in international climate negotiations and has played a leadership role in the formation of the International Solar Alliance, which aims to promote the deployment of solar energy in developing countries. Overall, India is playing an important role in the global effort to address climate change, and its efforts are a key component of the world's collective response to this global challenge.

India has recently announced its commitment to reaching net-zero emissions by 2070. This was stated by the Indian Prime Minister, Narendra Modi, during his

address to the United Nations General Assembly in September 2021.

This commitment comes as part of India's efforts to combat climate change and its impacts, which the country has already been experiencing in the form of heat waves, floods, and other extreme weather events. While some have criticized India's timeline for reaching net-zero as being too far off, it is important to note that India has already taken significant steps to reduce its greenhouse gas emissions. For example, India has set a target of achieving 450 gigawatts of renewable energy capacity by 2030, and has also introduced a number of policies and initiatives aimed at promoting electric mobility and energy efficiency. Furthermore, India is also one of the country's most vulnerable to the impacts of climate change, and has been working to address these impacts through measures such as the implementation of climate-resilient agriculture practices, and the establishment of a National Adaptation Fund. Overall, India's commitment to reaching net-zero emissions by 2070 is a significant step towards a more sustainable future, and demonstrates the country's commitment to addressing the global climate crisis.

7. Paris Agreement & Climate Change

The Paris Agreement is a legally-enforceable international convention agreed on December 12, 2015, by 195 nations with the aim of lowering the effects of climate change. The central goal of the Paris Agreement is to solidify countries' capacity to cope with the worldwide consequences of climate change by keeping the rise in global average temperatures well below two degrees Celsius higher than pre-industrial levels, but also trying to pursue initiatives aimed at limiting the temperature rise to a minimum of 1.5 degrees Celsius. The Paris

Agreement also sets a mechanism for nations to routinely report on their emissions and to take domestic policies aimed at lowering them. The accord also intends to improve nations' ability to adapt to the effects of climate change, including as increasing sea levels, more frequently occurring and severe rising temperatures, and more extreme weather events. The Paris Agreement is largely viewed as a watershed moment in the ongoing fight against global warming since it is the first time almost all of the world's governments have pledged to act upon this humanitarian problem. Yet, considerable effort is needed to fulfil the Paris Agreement's targets, as emissions are still rising and the impacts of global warming are already being observed in numerous parts of the globe.

8. Sustainable development and Carbon Emission

Sustainable development and carbon emissions are closely linked, as reducing greenhouse gas emissions is a key part of achieving a sustainable future. Carbon emissions, particularly from the burning of fossil fuels, are the main driver of climate change, and without action to reduce them, the world will be unable to achieve the goal of a sustainable future. Sustainable development seeks to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. In order to achieve this, it is necessary to reduce carbon emissions and to transition to a low-carbon, sustainable economy. This requires investments in clean energy, energy efficiency, sustainable agriculture, and other sectors that reduce emissions and promote sustainability. However, the transition to a low-carbon, sustainable economy can also present challenges, particularly for countries that are heavily reliant on fossil fuels for energy and economic

growth. To address these challenges, it is important to implement policies that support the transition to a sustainable future while minimizing economic disruption. This may include measures such as carbon pricing, regulations to promote clean energy, and investment in low-carbon infrastructure and technology. In short, sustainable development and reducing carbon emissions are critical components of achieving a sustainable future. The world must work together to reduce emissions, promote sustainable practices, and transition to a low-carbon, sustainable economy. Sustainable development and environmental protection are closely linked concepts that are critical to achieving a sustainable future. Sustainable development seeks to balance economic, social, and environmental priorities in order to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. Environmental protection, on the other hand, refers to the actions and measures taken to preserve and protect the natural environment, its ecosystems, and biodiversity. Environmental protection is a critical component of sustainable development, as it helps to ensure that economic growth and social progress are achieved in a way that is environmentally sustainable. This requires the implementation of policies and practices that reduce environmental impacts, protect natural ecosystems and biodiversity, and promote the responsible use of natural resources. In practice, environmental protection and sustainable development often go hand in hand. For example, investments in renewable energy can help to reduce greenhouse gas emissions and promote sustainability, while also supporting economic growth and social progress. Similarly, the protection of natural ecosystems, such as forests and wetlands, can help to conserve biodiversity, reduce the impacts of climate change, and provide

important ecosystem services that support human well-being. Overall, sustainable development and environmental protection are critical components of a sustainable future, and the world must work together to achieve both to create a future that is economically, socially, and environmentally sustainable.

9. Environmental Protection & India's Commitment in Removing Carbon Footprint

Environmental protection refers to the actions and measures taken to preserve and protect the natural environment, its ecosystems, and biodiversity. This can include actions to reduce pollution, conserve natural resources, and protect wildlife and habitats. Environmental protection is necessary to ensure that the planet can continue to support human life and maintain its natural systems and biodiversity. This is important for both current and future generations, as a healthy environment provides essential services, such as clean air and water, which are necessary for human well-being. There are many ways to protect the environment, including reducing waste, conserving natural resources, reducing greenhouse gas emissions, and protecting ecosystems and wildlife. For example, reducing waste through recycling and reducing consumption of single-use plastics can help to reduce the amount of waste that is generated and limit the impact on the environment.

Governments, organizations, and individuals all play a role in protecting the environment. Governments can implement policies and regulations that promote environmental protection, such as restrictions on pollution, conservation requirements, and incentives for the development of clean technologies. Organizations can adopt environmentally-friendly practices, such as using renewable energy and reducing waste, and individuals

can make changes in their own lives, such as reducing their carbon footprint, conserving water, and reducing waste. Overall, environmental protection is a critical component of ensuring a sustainable future and is necessary to maintain the health of the planet and the well-being of all species that depend on it. India has made significant commitments to reducing its carbon footprint and mitigating the impacts of climate change. In recent years, the Indian government has taken many initiatives to promote the use of renewable energy, reduce greenhouse gas emissions, and enhance energy efficiency. One of India's most notable commitments to reducing its carbon footprint is its goal of achieving 40% renewable installed power capacity by 2030. This goal is a significant step towards reducing India's dependence on fossil fuels and reducing its carbon emissions. In addition, India has also made significant investments in improving energy efficiency, with a goal of reducing energy intensity by 33-35% by 2030, compared to 2005 levels. This will help to reduce energy waste and lower greenhouse gas emissions. The Indian government has also launched several initiatives aimed at promoting the use of electric vehicles and reducing the country's dependence on fossil fuels for transportation. This includes the launch of the National Electric Mobility Mission Plan, which aims to have 6-7 million electric vehicles on Indian roads by 2020. Overall, India is making significant efforts to reduce its carbon footprint and mitigate the impacts of climate change. The country recognizes the importance of a low-carbon, sustainable future, and is taking concrete steps to achieve this goal.

10. Global Challenge to Natural Resource Management

One of the biggest global challenges to natural resource management is the increasing demand for resources,

coupled with their limited availability. As the global population continues to grow, there is an increasing demand for resources such as water, food, energy, and minerals. However, these resources are finite and their availability is decreasing, which can lead to conflicts and competition over access to them. Climate change is also a significant challenge to natural resource management. Rising temperatures, changing precipitation patterns, and extreme weather events can have profound impacts on natural systems, including water availability, food production, and biodiversity. Another challenge is the degradation and loss of natural ecosystems, which can occur due to activities such as deforestation, land-use change, and overfishing. This can lead to declines in biodiversity, soil degradation, and changes in the hydrological cycle. Poor management of natural resources can also exacerbate poverty and inequality. This can happen when communities rely on natural resources for their livelihoods, but are unable to access or manage them sustainably. Finally, natural resource management can also be affected by political and economic factors. For example, weak governance, corruption, and market failures can lead to unsustainable resource extraction and poor resource management practices. Addressing these challenges will require a combination of policy, technology, and behavioural changes to promote sustainable use of natural resources, protect ecosystems, and support the needs of local communities.

Population a threat to Natural resource

The population threat to natural resources refers to the negative impact that an increasing human population can have on the natural resources that are essential for sustaining life on Earth. As the global population continues to grow, the demand for natural resources

such as land, water, and energy also increases, leading to overexploitation and depletion of these resources. The population growth puts pressure on the environment and natural ecosystems as more people require more resources to meet their needs. The unsustainable use of natural resources, such as deforestation, overfishing, and pollution, can lead to habitat destruction, loss of biodiversity, and degradation of ecosystems.

The threat to natural resources is compounded by the fact that many developing countries have large populations and limited resources. This can lead to resource conflicts and can exacerbate poverty and inequality. It is essential to manage population growth and to ensure that natural resources are used sustainably to avoid irreversible damage to the environment and to guarantee the long-term well-being of future generations. India is the second most populous country in the world, and its rapidly growing population is putting significant pressure on the country's natural resources. Here are a few examples of how population growth is impacting natural resources in India:

1. Water: India's water resources are under tremendous pressure due to a growing population and increasing demand for water. Many parts of the country are facing severe water shortages, and groundwater levels are declining rapidly.

2. Land: India is a predominantly agricultural country, and the growing population is putting pressure on the limited arable land available. This has led to deforestation and encroachment on forest areas, which in turn leads to soil erosion, loss of biodiversity, and other environmental problems.

3. Air: The growing number of vehicles, industrial emissions, and construction activities are contributing to air pollution in major cities across the country, leading to health problems and environmental degradation.

4. Energy: The growing demand for energy is putting pressure on India's limited fossil fuel reserves and natural resources. India is heavily dependent on coal for energy, which contributes to greenhouse gas emissions and air pollution.

5. Wildlife: The growing population is also putting pressure on India's wildlife and natural habitats. As human settlements expand into previously uninhabited areas, the natural habitats of many animals are being destroyed, leading to the loss of biodiversity and increased conflict between humans and wildlife.

the growing population in India is putting significant pressure on the country's natural resources, and urgent action is needed to address these challenges. This includes the promotion of sustainable development practices, the conservation of natural habitats and resources, and the adoption of cleaner and more sustainable energy sources.

11. Conclusion

India's commitment to natural resource management (NRM) is reflected in various policies and initiatives aimed at conserving and managing natural resources sustainably. India has a rich endowment of natural resources, including forests, water, minerals, and biodiversity, and their effective management is crucial for the country's economic and social development. The Indian government has set up various regulatory bodies such as the Ministry of Environment, Forest and Climate

Change (MoEFCC) and the National Biodiversity Authority (NBA) to oversee the implementation of NRM policies. Additionally, India is a signatory to various international agreements and conventions such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), which further highlight its commitment to NRM. However, India's population, which is the second-largest globally, poses a significant threat to NRM. The demand for natural resources is high, leading to deforestation, soil erosion, water scarcity, and pollution. Therefore, there is a need for a comprehensive approach to address the challenges posed by population growth and the demand for natural resources. The National Green Tribunal (NGT) is a specialized court in India that has been established to deal with environmental disputes and cases related to NRM. The NGT has played a vital role in ensuring compliance with environmental regulations and has taken action against industries and individuals found to be violating NRM policies. India's commitment to addressing climate change is evident in its participation in the Conference of Parties (COP) meetings. India is committed to the United Nations Framework Convention on Climate Change (UNFCCC) and has made a significant contribution to global efforts to combat climate change. India is set to participate in the upcoming COP26 meeting in Glasgow, where it will likely reaffirm its commitment to achieving its climate targets under the Paris Agreement. Overall, India's commitment to NRM and addressing climate change is evident through various policies, regulatory bodies, and international agreements. However, there is a need for continued efforts to conserve and manage natural resources sustainably and combat the challenges posed by population growth and climate change.

CHAPTER-17

FROM DISPARITY TO HARMONY: ADDRESSING NORTH-SOUTH ENVIRONMENTAL TRADE CHALLENGES

Mainak Mukherjee*
Swaswata Das**

1. Introduction

In the context of industrialized nations, the proliferation of environmental regulations and standards could potentially impose constraints on the trade opportunities available to developing nations. The primary concern within many developing nations revolves around the possibility that stricter product standards prevailing in affluent nation's markets may inadvertently create impediments for their export activities. Furthermore, there exists a widely held belief that these environmental restrictions are sometimes employed as a subtle strategy to shield the interests of businesses in the Northern markets.

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Given the relatively limited market influence wielded by developing nations, they are particularly susceptible to alterations in market conditions prevailing in the Northern markets. These market conditions are shaped by a complex and often contradictory interplay of environmental regulations and protective measures. This Chapter aims to delve into various facets related to environmental considerations.

Within the framework of North-South economic relations, this discourse examines the dual aspects of protectionism and market access, with a specific focus on the repercussions stemming from the adoption of ecolabeling practices within Northern markets.

The debate on trade and environment is often polarized between interest in free trade and environment protection. However, it is pertinent to note that there exists a direct correlation between higher standards of environment protection and unhindered international trade.

The interplay between trade and environmental protection rules is intricately intertwined, forming a dynamic nexus that plays a pivotal role in shaping the trajectory of global economic development. This synergy reflects the recognition that trade is not merely an economic endeavour but a crucial instrument for optimizing resource allocation, including the preservation of environmental resources. Concurrently, development emerges as a paramount objective, as it serves as a catalyst for poverty reduction and generates the requisite means to safeguard our environment. Consequently, environmental preservation emerges as a vital imperative, serving as the bedrock upon which long-term trade expansion and sustainable economic growth can be built. This intricate web of relationships underscores the

significance of striking a harmonious balance between trade, development and environment. The undeniable connection between trade, the environment and development become clear when we consider the following instances:

Efficient allocation of resources:

Trade is needed for more efficient allocation of resources, including environmental resources, which is a key instrument for achieving all-round development in the global scenario. Trade helps in optimizing the utilization of natural resources. When countries engage in trade, focusing on producing goods and services where they have a comparative advantage, this leads to a more efficient allocation of resources.

Reduce poverty and raise resources for protecting the environment:

Development is directly proportional to reduction of poverty. The development of the economy directly leads to development in living standards of the people, better access to education, healthcare facilities and a raised awareness towards environmental issues. This thereby, would lead to reduction in poverty and protection of natural resources and environment. Moreover, such economic development generates resources, including financial ones, that can be used to protect the environment. This includes funding for conservation efforts, research into sustainable practices, and investments in clean technologies.

Environmental protection is needed for long-term expansion of trade and sustainable economic growth.

Natural resources generally, are the fundamental ingredient of most industries and economic activities. These fundamental resources may range anywhere from clean air and water to arable land for agriculture and energy sources like coal and petroleum. Environmental protection is crucial for ensuring the availability of these resources in sufficient quantities for industries and trade to thrive in the upcoming future. Consequently, lack of adequate protection of such resources would lead to pollution and depletion of such resources which subsequently would hinder the expansion of trade practices in the longer term.

This chapter embarks upon an exploration of salient issues pertaining to the interface between environmental preservation and market accessibility within the context of North-South dynamics. In the forthcoming part, the authors delve into a comprehensive examination of the ongoing discourse concerning the tension between environmental considerations and trade imperatives, elucidating its far-reaching implications across the North-South spectrum. The extant environmental protection regulations enshrined within the General Agreement on Tariffs and Trade, 1994 (GATT), and the proactive measures undertaken by the World Trade Organization (WTO), a pivotal multilateral trade platform, to enhance the quality of trade standards in this context is also scrutinized. By examining select disputes that have unfolded within the realms of the General Agreement on Tariffs and Trade and the WTO, the authors are offering a detailed analysis of the various facets of the ongoing debate. Thereafter, focus centers on elucidating the intricate positioning of developing countries within this North-South dichotomy, shedding light on their unique challenges, perspectives and solutions. The culmination of our exploration takes place in last part of the Chapter, where we proffer a set of

pragmatic solutions, grounded in comprehensive research and analysis, aimed at fostering a more harmonious coexistence of environmental preservation and international trade, thereby contributing to the overarching objective of sustainable global development.

2. The Debate - Environment v. Trade

In the realm of international trade and environmental policies, a paramount objective is to strike a delicate balance between fostering free trade and addressing environmental concerns. This balance entails the internalization of externalities in market prices, thus ensuring that the environmental costs associated with production and consumption are factored into economic decision-making. However, the challenge lies in achieving this equilibrium without causing or exacerbating market failures or introducing unnecessary trade barriers.¹

One fundamental recognition is that individuals and nations possess divergent environmental preferences. This inherent variability is not antithetical to the principles of free trade; rather, it is a key driver of international commerce. The fact that nations have differing comparative advantages based on their environmental conditions and resource endowments is central to the rationale for trade.² For instance, a nation with a comparative advantage in agriculture might specialize in agricultural production, while another with a comparative advantage in manufacturing might specialize in producing manufactured goods. Such specialization facilitates economic efficiency and trade, leading to overall welfare gains.

¹ New Report, Home | Human Development Reports (2023), <https://hdr.undp.org/> (last visited Sep 15, 2023).

² Id.

However, the challenges arise when these disparities in environmental standards lead to imbalances in competitive advantages. In practice, some nations may have lower environmental regulations in place, granting their businesses an edge in terms of lower production costs. This can result in environmental degradation, as businesses prioritize cost-cutting over sustainable practices. Moreover, it can lead to concerns about unfair competition and environmental harm.³

Numerous international organizations, including the World Trade Organization (WTO), the United Nations Conference on Trade and Development (UNCTAD), the United Nations Environmental Program (UNEP), and the Organisation for Economic Co-operation and Development (OECD), have recognized the imperative of addressing the intricate nexus between trade and the environment. However, their collective endeavours have often encountered limitations in terms of achieving substantial impact. This limitation can be attributed, in part, to the predominant influence wielded by economically affluent nations within these international forums.⁴ The disproportionate power dynamics prevalent in these organizations have at times hindered the formulation and implementation of comprehensive policies that effectively balance the imperatives of trade liberalization with environmental sustainability.⁵

To address these issues, it is imperative to devise a multi-pronged approach. Firstly, international efforts

³ C. Russell H. Shearer, Comparative Analysis of the Basel and Bamako Conventions on Hazardous Waste, 23 ENVTL. L. 141, 144-46 (1993). 100. Our Common Future

⁴ Esty, D.C. (2000), 'Bridging the Trade-environment Divide', Journal of Economic Perspectives, vol. 15, no. 3, pp. 113-30.

⁵ *Id.*

should focus on encouraging the harmonization of environmental standards to a reasonable extent, without stifling diversity or impeding trade.⁶ Secondly, compensatory trade measures can be explored, such as carbon border adjustments or environmental subsidies, to level the playing field and ensure that nations adhering to higher environmental standards are not disadvantaged. Thirdly, global cooperation is essential to establish a framework that prevents a race to the bottom in environmental regulations. Such cooperation can take the form of international agreements that set minimum environmental standards and encourage countries to improve their environmental practices over time.⁷

While variations in environmental preferences and standards are intrinsic to the global trade landscape, it is crucial to find solutions that strike a balance between promoting free trade and safeguarding environmental sustainability. Achieving this balance necessitates careful policy considerations, international collaboration, and innovative approaches that internalize environmental externalities while minimizing adverse economic consequences.

3. The Prevailing laws on Trade and Environment

The international trade in GATT regime is primarily regulated by the given articles provided under the GATT agreement of 1994:

⁶ Mary Critharis, Symposium Note, Third World Nations are Down in the Dumps: The Exportation of Hazardous Waste, 16 BROOK. J. INT'L L. 311, 312, 315 n.24, 316 (1990).

⁷ *Supra note 3.*

Article I (MFN Principle):

Article 1 of the General Agreement on Tariffs and Trade (GATT), known as the Most-Favoured-Nation (MFN) principle, is a fundamental and essential concept in international trade. This principle states that if a member country of the World Trade Organization (WTO) grants favourable trade terms or concessions to one of its trading partners, it must extend the same treatment to all other member countries as well. In simpler terms, it means that a country cannot discriminate among its trading partners by offering better trade terms, such as lower tariffs or preferential trade agreements, to one nation without offering those same terms to all the other members.⁸

For instance, if Country 'A' offers a lower tariff rate on imports of a specific product (say, steel products) from Country B, it must also extend the same lower tariff rate to imports of the steel products from Country C and all other WTO member countries. This ensures that no country receives special treatment in terms of tariffs.

The MFN principle thereby promotes fairness, non-discrimination and equal treatment in international trade. It encourages countries to maintain a level playing field and prevents trade practices that could lead to trade wars or protectionism.

Article III (Non-discrimination of like products)

The principle of non-discrimination as stated under Article III of GATT agreement is a fundamental

⁸ Huang, H., and Labys, W.C. (2002), 'Environment and trade: a Review of Issues and Methods', *International Journal of Global Environmental Issues*, vol. 2, nos. 1/2, pp. 100-60.

cornerstone of the GATT/WTO system. It mandates that both domestic and imported goods and services must receive equal treatment. This principle is also highlighted in the *chapeau* clause of the GATT Agreement.

The primary keyword of the Article, used in the *chapeau* and qualified in Paragraph 2 is the term 'like product'. This is defined as meaning 'a directly competitive or substitutable product'.

Another relevant concept with regards to the principle of non-discrimination under Article II of GATT is the Product-Process Method (PPM) principle. This principle addresses the issue of how to classify and apply trade regulations to products based on the methods of production or manufacturing used. The PPM principle is not explicitly mentioned in GATT but has been developed eventually through GATT/WTO jurisprudence and trade disputes. In international trade, products can be manufactured in various ways, often using different methods or processes. The PPM principle concerns the classification and treatment of these products based on the processes or methods used in their production.⁹

The PPM principle often comes into play when countries implement particular environmental or health regulations for the production or manufacturing of a specific product i.e. if a country bans or restricts the import of a product because it was produced using a process deemed harmful to the environment or public

⁹ Choi, W-M. (2003), 'Like Products' in International Trade Law: Towards a Consistent GATT/WTO Jurisprudence, Oxford: Oxford University Press.

health, it may face challenges under the PPM principle even if the product in question is a like product.¹⁰

Disputes related to the PPM principle arise when one country claims that another country's trade regulations violate the GATT principles of non-discrimination. These disputes are typically resolved through the WTO's dispute settlement mechanism, which aims to strike a balance between a country's right to regulate in the interest of public health or the environment and the principle of non-discrimination. For instance, if Country A bans the import of a certain type of product produced using a process that emits high levels of toxic chemicals in the water body causing detrimental effects to the aquatic ecosystem. Country B, a major exporter of such products, challenges this ban at the WTO, arguing that it does not violate the PPM principle and the restrictions put by Country A discriminates against its products based on their production methods in not admissible. The WTO would then assess whether Country A's regulations are justified on environmental or health grounds as provided under Article XX (b) and (g) or whether they constitute unfair discrimination thereby violating the Article III of GATT Agreement.¹¹

Article XX (General Exceptions)

The two paragraphs in Article XX of the relevant trade agreement are particularly significant when discussing Product-Process Methods (PPMs). Paragraph (b) of Article XX permits member countries to adopt trade measures that are necessary to protect human, animal or plant life

¹⁰ Choi, W-M. (2003), 'Like Products' in International Trade Law: Towards a Consistent GATT/WTO Jurisprudence, Oxford: Oxford University Press.

¹¹ *Supra note 11.*

or health. To use this exception, a member country has to prove that the trade action is both essential and non-discriminatory in nature. They need to demonstrate that such action is the only sensible approach to tackle the issue and that it does not unfairly favor their own products or unfairly disadvantage foreign goods.

Paragraph (g) of Article XX allows member countries to implement trade measures related to the conservation of exhaustible natural resources. This exception recognizes that countries may restrict the import/export of certain resources to ensure their sustainable use and prevent overexploitation.

Sanitary and Phytosanitary Measures (SPS) agreement:

SPS Agreement aims to ensure that countries can implement measures to protect human, animal, and plant life and health without unfair disruption of trade. It recognizes that measures related to food, safety and health are essential but should not be used as unjustified barriers to trade.

Technical Barriers to Trade (TBT) Agreement

It addresses concerns related to technical regulations, product standards, and conformity assessment procedures. The TBT Agreement permits the use of internationally agreed technical standards to support exceptions under Article XX(b) for health and safety concerns. An essential aspect of the TBT Agreement is the principle of regulatory proportionality, meaning that any import regulations, such as packaging and labeling requirements, should not impose greater trade restrictions than what is essential, considering the risks associated with non-compliance.

4. GATT Disputes

GATT has served as the backdrop for a multitude of disputes that have revolved around environmental issues of paramount significance. This part of the Chapter is dedicated to a meticulous examination of several pivotal disputes that have transpired within the GATT framework. These disputes represent critical junctures where the realms of international trade and environmental preservation have intersected, resulting in intricate legal and policy deliberations. By dissecting these disputes and comprehensively analyzing their outcomes, we aim to provide an enriched understanding of the evolving dynamics between trade and environmental concerns, thereby contributing to the broader discourse on sustainable global governance.

Dolphin-Safe Tuna cases¹²

The GATT dolphin–tuna trade dispute case stands as a seminal illustration within the discourse on trade regulation and environmental considerations. This case marked the initial test of the legitimacy of import restrictions, notably those imposed by the United States, targeting environmentally detrimental PPMs. The controversy surrounding the tuna–dolphin issue stems from the intricate ecological interdependence observed in the eastern Pacific, where shoals of yellowfin tuna coexist beneath pods of dolphins. Modern tuna fishing techniques in this region involve locating dolphins on the ocean’s surface. However, certain methods, such as small and medium gauge driftnets, employed in tuna

¹² GATT (1991), United States – Restrictions on Imports of Tuna, Report of the Panel, Geneva: GATT, DS21/R. See also, GATT (1994), United States – Restrictions on Imports of Tuna, Report of the Panel, Geneva: GATT, DS29/R.

fishing have resulted in high dolphin mortality rates, giving rise to a complex confluence of trade and environmental concerns.

The genesis of the PPM issue lies in the fact that tuna and dolphins become effectively linked products when specific catch techniques are employed, leading to substantial negative environmental externalities, chiefly manifested through elevated dolphin mortality rates. The United States took a pioneering step by enacting national legislation in the form of the 1972 Marine Mammal Protection Act (MMPA), which aimed to safeguard dolphins. The MMPA established limits on acceptable dolphin mortality rates, especially concerning endangered species, and mandated the presence of official observers on US tuna vessels. Subsequently, the Direct Embargo or 'comparability' provision of 1984 was enacted, barring imports of yellowfin tuna from countries lacking conservation programs akin to those of the United States. This provision was coupled with the Intermediary Nation Provision, necessitating that third-country exporters, primarily tuna canners, demonstrate the prohibition of tuna landings from countries subject to the Comparability Provision.

In 1990, the United States passed the Dolphin Protection Consumer Information Act (DPCIA), specifying that dolphin-safe labels could only be affixed to tuna harvested in a manner deemed 'not harmful' to dolphins. Nevertheless, the US State Department and Department of Commerce refrained from applying the embargoes under the 1984 provisions, primarily for commercial and political reasons. This lack of action prompted a successful legal challenge by a coalition of environmental organizations, compelling the United States to impose temporary embargoes on tuna imports from several

countries, including Mexico, in 1990. A permanent embargo came into effect on February 22, 1991.

The GATT Tuna Case I unfolded when Mexico lodged a complaint with the GATT on November 5, 1990, asserting that its tuna exports to the United States had been banned due to its non-compliance with the MMPA. Mexico's central argument hinged on the extraterritorial application of the US MMPA, constituting a GATT-incompatible trade barrier. The GATT Panel, established on February 6, 1991, issued its findings on August 16, 1991. The crux of the legal debate in the tuna-dolphin case revolved around the conformity of the US MMPA regulations with GATT Articles III (National Treatment), XI and XIII (Quantitative Restrictions), and XX (General Exceptions). The Panel first examined whether the MMPA constituted an internal regulation under Article III or a quantitative restriction under Article XI, determining that it did not directly regulate tuna sales under Article III. Consequently, the MMPA was evaluated under Article XI, where it was found to represent a quantitative restriction. Therefore, the MMPA was deemed incompatible with the GATT.

The Panel proceeded to consider the US assertion that the MMPA could be justified under GATT Article XX, General Exceptions, specifically, Paragraphs (b) and (g). Regarding Article XX(b), the issue at hand was whether the MMPA provisions could be extraterritorially applied. The Panel ruled against the United States, concluding that the measures did not meet the necessity requirement, and reasonable alternatives had not been exhausted. Furthermore, the calculation of permissible dolphin mortality rates was deemed unpredictable. Concerning Article XX(g), the Panel rejected the extraterritorial application of the US conservation policies, stating that even if they were accepted, the

unpredictable dolphin mortality rate did not align with GATT-consistent measures.

The GATT Panel also examined the labelling of 'dolphin-safe' tuna in accordance with the US DPCIA under Article I, Most Favoured Nation. It determined that the advantage derived from consumer choice was not contingent on the product's origin, thus aligning with Article I.1.

In its Concluding Remarks, the GATT Panel clarified that its findings did not assess the appropriateness of the dolphin conservation policies of Mexico and the United States. It noted the limited scope for considering domestic environmental policies under Article XX Paragraphs (b) and (g) due to the absence of specific criteria, suggesting that this issue could only be resolved through GATT text waivers or amendments.

Remarkably, the 1991 GATT Panel Report on tuna was never adopted, despite significant support from the European Union and several intermediary countries. The lack of consensus prevented the Panel Decision in the first tuna case from becoming part of GATT's jurisprudence.

The GATT Tuna Case II emerged in the aftermath, with the European Union filing a complaint in 1992 against the original tuna Panel Decision. The Netherlands, representing the Netherlands Antilles, later joined the EU as a co-complainant. The complaint contended that the United States had not amended the MMPA, leaving inconsistencies with third countries unresolved. The Panel proceedings were halted in 1992 when the United States made amendments to the MMPA and passed the International Dolphin Conservation Act, coinciding with the Conservation of Dolphins Agreement (La Jolla

Agreement). This agreement, ratified by eleven signatories, including Mexico and the United States, established dolphin mortality rate limits, observation and monitoring requirements, and penalty provisions.

The second GATT tuna Panel Report, published in June 1994, broadly affirmed the findings of the first Panel, although it diverged on the interpretation of Article XX. It concurred with the United States on the extraterritorial application of its conservation policies under Article XX(g). However, it found the actual measures incompatible with the GATT. Regarding Article XX(b), the Panel acknowledged the coverage of US conservation policies but ruled against their necessity.¹³

Once again, the Panel Report remained unadopted, as the United States argued that it lacked sufficient time to review the findings before the transition from GATT to the WTO on January 1, 1995.

Since the conclusion of the second GATT case, the tuna-dolphin issue has grown more complex. The United States, along with Mexico and nine other signatories, endorsed the 1995 Declaration of Panamá. This declaration called for the lifting of the US embargo on tuna imports from signatory countries in exchange for a binding treaty on various dolphin conservation measures. The United States committed to removing the embargo upon ratification by four countries. To facilitate this, the US Congress passed the International Dolphin Conservation Program Act in 1997. President Clinton amended the MMPA to align with the second GATT Panel

¹³ McLaughlin, R. (1997), 'Settling Trade-related Disputes over the Protection of Marine Living Resources: UNCLOS or the WTO?', *Georgetown International Environmental Law Review*, vol. X, no. 1, pp. 29-96.

ruling, thereby averting a complaint under the WTO Dispute Settlement Understanding. However, the attempt to redefine 'dolphin-safe' tuna to include net-caught fish with zero dolphin mortality rates has divided the environmental movement. Legal challenges have emerged, contending that insufficient scientific evidence supports zero dolphin mortality rates. Moreover, major US canners refuse to purchase net-caught tuna. Consequently, Mexico has been unable to market its tuna as 'dolphin-safe', raising concerns about its potential withdrawal from the International Dolphin Conservation Program.¹⁴

The GATT Tuna–Dolphin Cases and PPM Issues

The tuna–dolphin cases within the context of PPMs raise crucial questions concerning the interpretation of GATT Articles III (National Treatment) and XX (General Exceptions) by the two Dispute Panels in relation to US dolphin-safe measures.¹⁵

The Panel's examination of Article III primarily revolved around whether the US measures to protect dolphins could be applied to tuna, irrespective of its origin. The Panels concluded that dolphin and tuna were not analogous products. However, the Panels were not required to adjudicate whether dolphin-safe and non-safe tuna were alike, and thus whether national restrictions on non-safe tuna were GATT-consistent. The intricacy in defining products within the PPM context arises when negative externalities result from joint production. In the tuna case, certain catch technologies

¹⁴ Laird, S. (2001), 'Dolphins, Turtles, Mad Cows and Butterflies – a Look at the Multilateral Trading System in the 21st Century', *The World Economy*, vol. 24, no. 4, pp. 453-81.

¹⁵ *Id.*

lead to the capture of both dolphins and yellowfin tuna in the eastern Pacific. However, neither tuna Dispute Panel assessed this issue due to the indirect nature of the US protective measures.¹⁶

The disparity in the interpretations of Paragraphs (b) and (g) of GATT Article XX is noteworthy. The second tuna Panel found the US dolphin conservation policy to be consistent with the GATT and amenable to extraterritorial application. Nevertheless, it deemed the actual measures neither ‘necessary’ nor in alignment with the GATT. The Declaration of Panamá and the International Dolphin Conservation Program now likely satisfy the consistency and necessity criteria of the chapeau to Article XX. The first GATT tuna Panel also examined Mexico’s request to assess the provisions of the US DPCIA for dolphin-safe labelling under Article IX.1 (Marks of Origin). It determined that since the dolphin-safe label applied to all tuna regardless of origin, it did not conflict with the GATT. It’s crucial to note that this finding lacks legal status as the Panel Report was not adopted.

In summary, the GATT tuna–dolphin cases marked pivotal junctures in the intersection of international trade and environmental preservation. These disputes revealed the intricate challenges of reconciling the regulation of trade and environmental concerns, particularly concerning PPMs. While the Panel decisions were not formally adopted, they underscored the complexities of addressing issues where negative externalities arise from joint production, such as the tuna–dolphin case. Moreover, the evolution of the case beyond the GATT framework highlighted the ongoing

¹⁶ *Id.*

relevance and complexity of PPM-related trade disputes in contemporary international trade.

Shrimp-Turtle case¹⁷

The WTO shrimp–turtle case deals with a range of trade and environmental issues, particularly those related to Production and Processing Methods (PPMs), akin to the two tuna–dolphin cases discussed earlier. What sets the shrimp–turtle case apart is that it was initiated after the introduction of the WTO Dispute Settlement Understanding (DSU), thus making the final Panel Decision an integral part of WTO case law.

The 1973 US Endangered Species Act mandated the use of turtle-excluder devices (TEDs) on US shrimp trawlers and other shrimp vessels operating in US waters when there was a likelihood of encountering sea turtles. TEDs are now considered the international standard for protecting turtles due to their cost-effectiveness and ease of use.

In November 1989, the Act was amended to authorize embargoes on shrimp imports from countries lacking a comparable sea turtle protection program to that of the United States. All US shrimp imports necessitate certification of TED usage and a sea turtle mortality rate similar to that of the United States, except in cases where the fishing environment poses no threat to sea

¹⁷ WTO (2001), United States – Import Prohibition of Certain Shrimp & Shrimp Products, Recourse to Article 21.5 by Malaysia, Report of the Panel, Geneva: WTO, WT/DS58/RW. See also, WTO (1996a), United States – Import Prohibition of Certain Shrimp & Shrimp Products, Request for Consultations by India, Malaysia, Pakistan and Thailand, Geneva: WTO, WT/DS58/1.

turtles. In 1995, the IUCN's Marine Turtle Specialist Group identified shrimp fishing methods as a major threat to endangered sea turtles. In response, the United States imposed an embargo on all non-turtle-safe shrimp imports in May 1996.

In October 1996, India, Malaysia, Pakistan, and Thailand filed a complaint with the WTO against the US embargo, arguing that such import bans should not be applied extraterritorially. Unlike the tuna cases, the US defense rested solely on GATT Article XX exceptions, excluding Article III on national regulations.

The WTO shrimp Panel Report, published on April 6, 1998, concluded that the measures were discriminatory because the United States did not consider methods other than TEDs for protecting sea turtles. Additionally, it found that negotiated concessions such as certification, technical and financial assistance, and longer transition periods were selectively offered to specific countries, mainly in the Caribbean. Consequently, the prohibition of shrimp imports from non-certified WTO Member countries was deemed a quantitative restriction under Article XI. The US argument that the ban on non-certified shrimp imports fell under Article XX(g) was rejected by the Panel on the grounds that sea turtles are not¹⁸ an exhaustible resource, and unilateral measures of this nature could jeopardize the multilateral trading system.

The United States appealed the Panel Decision, contending that endangered sea turtles should be considered exhaustible under Article XX(g), justifying its

¹⁸ Shaffer, G. (1996), 'The WTO Shrimp-turtle case', *International Trade Reporter*, vol.15, no. 7, pp. 294-301.

import restrictions. The WTO Appellate Body Report, published on October 12, 1998, reversed the original Article XX(g) Decision, classifying endangered sea turtles as an 'exhaustible resource' and thus endorsing environmental and conservation objectives as legitimate trade measures. However, the Appellate Body determined that the US protective measures were 'arbitrarily' discriminatory and therefore inconsistent with the chapeau to Article XX, constituting a violation of Article XI.

In response to the Appellate Body's findings, the United States amended its Endangered Species Act and published Revised Guidelines for shrimp imports in March 1999. In October 2000, Malaysia filed a DSU Article 21.5 complaint against the United States, questioning the compliance of the Revised Guidelines with the Appellate Body ruling and the US's failure to negotiate a WTO-compatible multilateral agreement on sea turtle conservation. The Panel Report, published in June 2001, found that the US Revised Guidelines violated Article XI but were justified under Article XX(g). However, the Panel refrained from making a ruling on US intentions regarding a multilateral sea turtle agreement.

Notably, the United States lost the WTO shrimp-turtle case not because it sought to protect the environment, but due to the discriminatory nature of its measures. This case holds significance in WTO case law as it recognized the validity of the US Endangered Species Act. US Trade Representative Robert Zoellick highlighted the WTO's acknowledgment of legitimate environmental concerns among its Members, emphasizing the case's pivotal role in this regard.

The issues central to the WTO shrimp-turtle case was closely parallel to those of the GATT tuna-dolphin cases.

Both sets of cases emerged from significant negative environmental externalities resulting from the joint production of tuna/dolphins and shrimps/sea turtles, respectively. While the United States did not invoke Article III.4 to defend its shrimp–turtle measures, the Appellate Body reaffirmed the interpretation of Article XX(g) to encompass conservation, a precedent established in the second GATT tuna case. This interpretation was based on the broader application of the concept of exhaustible resources in Article XX(g), encompassing all living beings, particularly endangered species, in light of the objective of sustainable development articulated in the Preamble to the WTO Agreements.

EU-Asbestos case¹⁹

The WTO asbestos case examines import restrictions based on national health and safety concerns and the classification of goods as ‘like products’, despite differing health effects. France imposed a ban on asbestos in December 1996, with exceptions for safer alternatives. Canada, a major asbestos exporter, filed a complaint in May 1998, leading to a WTO Panel investigation. Canada alleged that France’s ban on carcinogenic chrysotile asbestos violated international standards and favoured less hazardous substitutes, invoking various provisions like SPS Agreement, TBT Agreement, and GATT Articles.

The WTO Panel’s September 2000 findings revealed that France’s ban was discriminatory under GATT Article III.4, considering chrysotile asbestos and substitutes

¹⁹ WTO (2001), European Communities – Measures Affecting Asbestos & Products Containing Asbestos, Report of the Appellate Body, Geneva: WTO, WT/DS135/AB/R.

alike, violating GATT Article XI. However, the Panel justified the ban under GATT Article XX(b) due to the scientifically proven carcinogenic properties of all asbestos forms. It highlighted that the ISO's acceptable risk level was higher than France's, indicating that the ISO lacked multilateral status and mostly set minimal industry standards, not national health risk guidelines.

Both Canada and the EU appealed. Canada contested the WTO's compliance with health standards, while the EU challenged the 'like products' determination based on GATT criteria.

In March 2001, the WTO Appellate Body reversed the Panel's 'like products' decision, emphasizing that health risks should be considered in the 'likeness' assessment under Article III.4. It upheld the ban's justification under Article XX(b), asserting its necessity for public health. This Article III.4 reversal invalidated Canada's WTO challenge under the SPS and TBT Agreements and GATT Article XI. EU Trade Commissioner Pascal Lamy praised the ruling, highlighting the precedence of health over trade.

The asbestos dispute is pivotal in establishing WTO case law on national health standards and 'like products.' The Article XX(b) decision reinforces national government's authority in setting health and safety regulations, superseding non-governmental agreements. Upholding Article XX(b) prevents WTO Member countries from facing trade restrictions on dangerous goods, while the importance of considering all relevant criteria in Panel decisions is underscored.

5. Position of Developing Countries

The intricate interplay between environmental protection and international trade presents a persistent challenge on the global stage, with the positioning of developing countries at its core. Developing nations have consistently advocated for heightened environmental standards, underscoring the importance of safeguarding the planet's ecological well-being. However, they have unequivocally asserted that such environmental endeavours should not come at the expense of undermining multilateral trade.

In stark contrast, developed nations have exhibited a proclivity for endorsing comparatively stringent environmental standards, often with an intent to encourage their adoption worldwide. This advocacy for stringent standards can be attributed to both environmental considerations and a desire to create a more level playing field in terms of international competitiveness. However, this approach has been met with scepticism and apprehension from developing countries, who perceive it as an unwarranted imposition that could curtail their export opportunities and hinder their socio-economic development.

The fundamental discrepancy between the perspectives of developed and developing nations serves as a significant impediment to the harmonization of trade and environmental objectives within the framework of international policy. This discord underscores the complex nature of the challenge at hand, as it necessitates the reconciliation of divergent interests, priorities, and ideologies.

Developing countries have valid reasons for their apprehension regarding stringent environmental

standards imposed by developed nations. Firstly, these nations often find themselves in the early stages of industrialization and economic development. Consequently, their economic priorities may centre on achieving rapid growth and alleviating poverty, which can be at odds with stringent environmental regulations that may entail increased compliance costs. Moreover, imposing such standards without accommodating the varying capacities and resource constraints of developing countries can exacerbate economic disparities on a global scale.

Secondly, the historical context of international trade has reinforced the scepticism of developing nations. Historically, trade has often been a source of exploitation and inequality, with developed nations benefiting disproportionately from the globalization of markets. As a result, developing countries approach any proposed trade-environment nexus with caution, concerned that environmental standards could be used as veiled protectionist measures to disadvantage their exports. As exemplified by the dispute that unfolded within the World Trade Organization (WTO) involving Venezuela, Brazil, and the United States of America concerning gasoline standards, the issue of reconciling national pollution control legislation with the tenets of the WTO remains a contentious matter. The gasoline standards case, which transpired because of a 1990 amendment to the US Clean Air Act and the subsequent implementation of the 'Gasoline Rule' on January 1, 1995, was instituted with the overarching aim of mitigating toxic motor vehicle pollution. This rule established minimum cleanliness standards for 'reformulated gasoline' designated for sale in areas afflicted by severe pollution, and 'conventional gasoline' intended for sale in less polluted regions. Notably, these standards applied universally to both

domestic and imported gasoline, rendering it subject to rigorous compliance measures.

The dispute initiated when Venezuela, later joined by Brazil, lodged a complaint on January 24, 1995, contending that the US regulations constituted a violation of several provisions within the General Agreement on Tariffs and Trade (GATT), specifically Articles I (Most-Favoured Nation) and III (National Treatment Obligation), as well as the Technical Barriers to Trade Agreement. The crux of their grievance was that the new US regulations unfairly discriminated between domestic and foreign refineries. This discrimination was evident in the imposition of stricter statutory baseline composition and emission standards on gasoline imports compared to domestic production. Moreover, while US refineries were assessed for compliance on an annual average basis, foreign refineries had to meet the standards on a per-shipment basis. Consequently, this regulatory framework imposed a disproportionately onerous burden on exports of refined heavy crude from Venezuela, primarily due to its elevated sulfur content, rendering compliance with the stricter EPA statutory baseline exceedingly challenging.

The Panel Decision, released on January 29, 1996, ultimately ruled against the United States. The Panel determined that the Gasoline Rule contravened Article III.4 of the GATT, which pertains to the treatment of “like products”, as it imposed more stringent standards on foreign refineries than domestic ones. Additionally, because the Gasoline Rule permitted variations in baseline standards among domestic refiners, it failed to uphold consistent national air quality levels, rendering it

unjustifiable under the purview of Article XX(b), (d), and (g).²⁰

The United States appealed the Panel Decision, contending that the Gasoline Rule fell within the ambit of Article XX(g). While the WTO Appellate Body, in its Report published in April 1996, concurred with the Panel's overarching conclusions, it diverged by suggesting that the baseline composition and emission rules should be considered under Article XX(g). However, it stipulated that these rules did not meet the requisites of the chapeau.

Subsequently, in August 1997, the United States adapted its regulations to align with the WTO ruling. Notably, this adaptation involved permitting foreign refineries to utilize all available methodologies to calculate baseline compliance with the Gasoline Rule, contingent upon their respective governments subjecting them to US inspection and enforcement.

This case underscores the principle that WTO members possess the prerogative to institute national regulations aimed at environmental protection, as encapsulated in Article XX(g), provided that such regulations are in harmony with WTO norms, notably non-discrimination. In the gasoline case, the US sought to curtail toxic vehicular emissions, stemming from the negative externality of adverse health consequences linked to gasoline consumption. Although this case sparked considerable controversy in the United States, it primarily revolved around the issue of regulatory discrimination against foreign refiners, rather than the environmental pollution per se. Under the Panel's

²⁰ *Supra* note 3.

interpretation of Article XX(g), any WTO member is entitled to establish its own permissible emission standards, albeit contingent upon their consistency with WTO principles, thereby ensuring non-discrimination. Nevertheless, the position of developed nations in advocating stringent environmental standards is not devoid of merit. They argue that a uniform global framework is essential to combat pressing environmental challenges, such as climate change and biodiversity loss. Additionally, from an ethical standpoint, developed nations assert that all nations share a collective responsibility for environmental stewardship.²¹

In light of these competing interests and perspectives, reconciling trade and environment becomes a formidable task. One potential solution lies in a nuanced approach that recognizes the developmental needs of developing nations while embracing the imperative of environmental protection. This approach encompasses several key elements which have been considered in the next segment of this Chapter.

6. Proposed Measures to Address the Disparity

Balancing trade and environmental considerations in the face of competing interests and perspectives is a challenging endeavour. However, a potential solution lies in adopting a nuanced approach that takes into account the developmental needs of developing nations while recognizing the imperative of environmental protection. This multifaceted approach could encompass several key elements:

²¹ *Supra* note 17.

i. Common but Differentiated Responsibilities (CBDR):

The principle of Common But Differentiated Responsibilities, as enshrined in Principle 7 of the Rio Declaration from the first Rio Earth Summit in 1992, should serve as a cornerstone. This principle acknowledges that states have common responsibilities for environmental preservation, but these responsibilities should be differentiated. Developed countries should acknowledge their historical contributions to global environmental degradation and the resources at their disposal. As a result, international agreements should allow for distinct commitments. Developed nations, owing to their historical role in environmental degradation, could undertake more substantial obligations, while developing nations are supported in gradually improving their environmental standards.

ii. Technical Assistance and Capacity Building:

Developing countries often lack the technical expertise and financial resources required to meet stringent environmental standards. To bridge this gap, international organizations and developed nations should step in to provide technical assistance, capacity building and financial support. These resources will facilitate the transition of developing countries toward more sustainable practices and help them align with global environmental goals.

iii. Trade-Related Environmental Measures (TREM):

Developing countries should be granted flexibility in implementing Trade-Related Environmental Measures (TREM). These measures should be designed to protect the environment without disproportionately burdening developing nations or distorting

international trade. By allowing flexibility, a balance can be struck between environmental preservation and economic development.

iv. Global Cooperation:

A collaborative and global approach is crucial. Efforts must be made to foster international cooperation and facilitate the transfer of environmentally friendly technologies to developing countries. This technology transfer can bridge the gap between environmental protection and development aspirations, allowing nations to achieve their economic and environmental objectives simultaneously.

In conclusion, the intricate relationship between trade and the environment necessitates a comprehensive and inclusive approach. While there are contrasting viewpoints between developed and developing nations, finding a balanced and equitable solution is both feasible and essential for addressing urgent global environmental challenges. This approach should accommodate the unique circumstances of developing nations while upholding the global imperative of environmental protection. By emphasizing international cooperation, recognizing differentiated responsibilities, and providing technical support, we can navigate this complex terrain and harmonize trade and environmental objectives on a global scale. Such an approach not only reconciles these competing interests but also lays the foundation for a more sustainable and equitable future.

7. Conclusion

Numerous factors have been meticulously examined to unravel their intricate influence on the trade and economic development prospects of developing nations.

This analysis is particularly pertinent in light of the North-South disparities in environmental policies and the broader framework of global environmental resource allocation. Within this comprehensive examination, discernible are the potential adverse repercussions stemming from stringent environmental product standards imposed by industrialized Northern countries on the export capabilities of their developing Southern counterparts.

These identified challenges underscore the critical importance of the proposed solutions presented within this Chapter. By embracing the multifaceted strategies outlined herein, there exists a tangible opportunity to alleviate the predicaments and foster a more equitable and sustainable global trade landscape. These strategies encompass differentiated responsibilities based on historical contributions, technical support, capacity-building initiatives, and the judicious application of trade-related environmental measures. Through the implementation of these solutions, the trade and economic growth prospects of developing nations can be significantly enhanced, ensuring that they are not unduly burdened by environmental standards, and thus enabling them to partake more actively in the global economy. Ultimately, the amalgamation of these strategies has the potential to harmonize economic progress with environmental sustainability on a global scale, benefitting both Northern and Southern nations alike.

CHAPTER-18

JOURNEY OF CITES FROM 1973-2023

Twinkle Deoraja*

1. Introduction

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement to which States and regional economic integration organizations adhere voluntarily. Currently there are 184 Parties (including countries and regional economic integration organizations). CITES was drafted as a result of a resolution adopted in 1963 at a meeting of members of the International Union for Conservation of Nature (IUCN). The IUCN is a membership Union uniquely composed of both government and civil society organisations. It provides public, private and non-governmental organisations with the knowledge and tools that enable human progress, economic development and nature conservation to take place together.

CITES emerged in response to the escalating threats faced by many species due to unsustainable exploitation and illegal trade. Recognizing the need for international

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collaboration to address this crisis, the United Nations General Assembly called for a global convention to regulate wildlife trade. The result was the establishment of CITES, which came into force on July 1, 1975.

The primary objective of CITES is to ensure that international trade does not threaten the survival of wild animals and plants. The Convention achieves this by regulating the import, export, and re-export of species listed under its three appendices. Appendix I includes species threatened with extinction, and trade in these species is strictly controlled and generally prohibited. Appendix II covers species that may become endangered if trade is not regulated, requiring permits for their international trade. Appendix III lists species protected by at least one member country, who seeks cooperation from other member countries in controlling their trade.

CITES employs a permit system to regulate the international trade of protected species. Member countries are required to establish management and scientific authorities responsible for implementing the Convention's provisions. These authorities monitor and regulate trade, issue permits and certificates, and collaborate with other member countries to ensure compliance.

To facilitate international cooperation and information sharing, CITES organizes regular meetings called Conferences of the Parties (CoP). During these gatherings, member countries discuss and negotiate new listings, adopt resolutions, and evaluate the effectiveness of the Convention's implementation. The CoP is the central decision-making body of CITES, and its decisions guide the future direction of wildlife conservation efforts.

CITES has made significant contributions to wildlife conservation since its inception. The convention has helped to prevent the extinction of numerous species by regulating their international trade. One of the notable success stories is the recovery of several whale species, including the humpback whale and southern right whale, which have rebounded in numbers due to protection under CITES.

The Convention has also played a vital role in combating illegal wildlife trade, which is a major threat to many endangered species. By establishing a framework for international cooperation and law enforcement, CITES has enabled member countries to collaborate in combating wildlife trafficking. The Convention facilitates information sharing, capacity building, and technical assistance, supporting efforts to dismantle criminal networks involved in the illicit trade of wildlife products.

CITES has also contributed to raising public awareness about the importance of wildlife conservation. The Convention has brought attention to the ecological, economic, and cultural significance of biodiversity, fostering a sense of responsibility among governments, organizations, and individuals worldwide. By placing restrictions on the trade of endangered species, CITES has influenced consumer behaviour, discouraging the demand for products derived from wildlife and encouraging sustainable alternatives.

Despite its achievements, CITES faces several challenges in its ongoing mission to protect wildlife. Illegal wildlife trade continues to thrive, driven by demand for exotic pets, traditional medicine, luxury goods, and trophies. Organized criminal networks are involved in these activities, exploiting weak enforcement capacities, corruption, and inadequate penalties. CITES must

continually adapt and strengthen its mechanisms to address these evolving challenges effectively.

The Vision Statement of CITES

Conserve biodiversity and contribute to its sustainable use by ensuring that no species of wild fauna or flora becomes or remains subject to unsustainable exploitation through international trade, thereby contributing to the significant reduction of the rate of biodiversity loss.¹

The aim of this present Chapter is to understand the evolution of CITES in 50 years and how it works towards ensuring that international trade in specimens of wild animals and plants does not threaten their survival.

2. Cites During Its Initial 25 Years (1973-1998)

The first 25 years of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) witnessed significant evolution and development of the treaty. From its inception in 1973 to 1998, CITES experienced crucial milestones, expanding its scope, enhancing its effectiveness, and responding to emerging challenges in wildlife conservation and trade regulation.

Inception and Early Years

The roots of CITES can be traced back to the early 1960s when concerns about the impacts of international trade on wildlife conservation started gaining global attention. It became evident that the unregulated exploitation of species for trade was leading to severe declines in populations and even extinction of some species.

¹ Willem Wijnstekers, *The Evolution of Cites* 39 (9d ed. 2011).

Recognizing the need for international collaboration to address this crisis, the United Nations General Assembly called for a global convention to regulate wildlife trade. This call led to the drafting of CITES, which was adopted on March 3, 1973, in Washington, D.C., and entered into force on July 1, 1975.

During its early years, CITES focused on establishing the necessary infrastructure and mechanisms for implementation. Member countries were required to designate their management and scientific authorities responsible for enforcing the Convention's provisions. The permit system was put into practice, ensuring the proper regulation of international trade.

Membership Expansion and Global Recognition

From its inception, CITES garnered significant interest and support from countries worldwide. The convention was open for signature to all states and regional economic integration organizations, leading to rapid membership expansion.

By the end of the first 25 years, the number of member countries had increased from the initial 21 to 144, showcasing the growing global commitment to wildlife conservation. CITES gained recognition as the primary international agreement governing the trade of endangered species.

Amendments and Appendices

CITES underwent several amendments in its first 25 years to strengthen its provisions and increase its effectiveness. The most significant amendment was made in 1979, establishing three appendices to categorize

species based on their conservation status and regulate their trade.

Appendix I, the most restrictive category, includes species threatened with extinction. Trade in these species is generally prohibited, except in exceptional circumstances. Species listed in Appendix I receive the highest level of protection under CITES. It is to be noted that species under Appendix I cannot be used for commercial purpose. However, it can be used for Research and Development purpose. But in order to take these species for Research and Development purpose, both import and export permits are required.

Appendix II covers species that may become endangered if trade is not regulated. For species listed in this appendix, CITES requires permits for their international trade, ensuring that trade is sustainable and not detrimental to the survival of the species.

Appendix III lists species protected by at least one member country, who seeks cooperation from other member countries in controlling their trade.

The development and implementation of the appendices brought a systematic approach to species conservation and trade regulation under CITES. The inclusion of species in the appendices is based on scientific assessments and recommendations provided by the member countries.

Conference of the Parties (CoP) Meetings and Decision-Making

The Conference of the Parties (CoP) emerged as the central decision-making body of CITES. The CoP meetings, held every two to three years, provided a

platform for member countries to discuss and negotiate amendments, resolutions, and strategies to enhance the implementation of the convention.

During the first 25 years of CITES, six CoP meetings were held, shaping the future direction of the treaty. These meetings witnessed the adoption of critical decisions, including the listing of species in the appendices, the establishment of working groups, and the development of guidelines for trade regulation and enforcement.

The first CoP meeting took place in Bern, Switzerland, in 1976. This meeting focused on establishing the rules and procedures for implementing CITES and adopting resolutions to guide member countries in enforcing the Convention.

The subsequent CoP meetings were built upon the foundation laid in the early years and addressed emerging challenges in wildlife conservation. For example, the second CoP meeting in 1979 introduced the amendments that established the appendices, providing a comprehensive framework for regulating trade.

Throughout the CoP meetings, member countries engaged in discussions, negotiations, and consensus-building to ensure effective implementation of the Convention. The decisions made during these meetings had far-reaching implications for species conservation and trade regulation.

Species Listings and Success Stories

One of the major achievements of CITES in its early years was the listing of numerous species in the appendices, providing them with international

protection. These listings were crucial in addressing the threats posed by trade and ensuring the conservation of vulnerable species.

The listing of species in the appendices is based on scientific assessments and recommendations provided by member countries. Species are assessed against specific criteria, such as population size, trends, and threats. The listings are subject to rigorous scrutiny and involve consultation with scientific experts and stakeholders.

Several success stories emerged as a result of the listings made under CITES. One notable example is the African elephant (*Loxodonta Africana*). Recognizing the devastating impacts of the ivory trade on elephant populations, the African elephant was listed in Appendix I in 1976, providing it with the highest level of protection. This listing led to a decline in ivory demand and strengthened enforcement efforts, contributing to the recovery of elephant populations in some regions.

Similarly, the regulation of trade in marine turtles, crocodiles, and numerous timber species demonstrated the positive impact of CITES listings on species conservation. The regulation of trade, coupled with conservation measures and habitat protection, contributed to the recovery and stabilization of these species' populations.

Cooperation and Collaboration

CITES emphasized cooperation and collaboration among member countries to address wildlife conservation challenges. Information exchange, capacity building, and technical assistance were emphasized to support countries in implementing the Convention effectively.

CITES facilitated information sharing through the establishment of a secretariat responsible for coordinating and disseminating information to member countries. The secretariat acted as a hub for scientific data, trade statistics, and best practices in conservation and trade regulation.

CITES also forged partnerships with other international organizations, such as the International Union for Conservation of Nature (IUCN) and the World Customs Organization (WCO). These partnerships aimed to enhance cooperation in combating illegal wildlife trade and strengthening enforcement measures.

Technical assistance and capacity-building programs were implemented to support member countries in implementing CITES provisions. These programs included training workshops, seminars, and the provision of financial resources to assist countries in developing their management and scientific authorities.

Challenges and Future Directions

Despite its achievements, CITES faced challenges during its initial 25 years. Rapidly evolving trade patterns, insufficient resources, inadequate enforcement capacities, and the emergence of new threats required the adaptation and strengthening of the Convention's mechanisms.

One of the significant challenges was the increasing demand for wildlife products, driven by factors such as traditional medicine, exotic pets and luxury goods. Illegal wildlife trade became a lucrative criminal activity, threatening many endangered species. CITES recognized the need for enhanced enforcement efforts and

collaboration among member countries to combat this illegal trade effectively.

Technological advancements, such as e-commerce and the internet, posed new challenges to CITES. The online trade in endangered species increased, requiring innovative approaches to monitoring and regulating such transactions. CITES acknowledged the importance of adapting to these changing dynamics and incorporating digital platforms into its enforcement strategies.

Climate change and habitat loss emerged as critical challenges during the first 25 years of CITES. These environmental threats directly impacted species' survival and required a more holistic and integrated approach to conservation. CITES recognized the interconnections between biodiversity conservation, climate change mitigation, and sustainable development, and sought to align its efforts with other international agreements and organizations working in these domains.

Looking to the future, CITES aims to strengthen its effectiveness and address emerging challenges in wildlife conservation. The Convention continues to evolve, incorporating new scientific knowledge, technologies, and best practices into its framework. It strives to foster greater cooperation, information sharing, and capacity building among member countries to achieve its objectives effectively.

In conclusion, the first 25 years of CITES witnessed significant evolution and achievements in wildlife conservation and trade regulation. The Convention expanded its membership, established the appendices, and facilitated decision-making through the CoP meetings. Species listings and success stories

demonstrated the positive impact of CITES regulations on conservation outcomes.

Cooperation, collaboration, and capacity building were emphasized to support member countries in implementing CITES provisions. Challenges, including illegal wildlife trade and emerging threats, were acknowledged, and efforts were made to strengthen enforcement and adapt to changing dynamics.

As CITES moves forward, it will continue to play a crucial role in preserving biodiversity and protecting endangered species. By fostering international cooperation, addressing emerging challenges, and adapting to new realities, CITES can contribute significantly to the conservation of our planet's precious wildlife and ensure their survival for future generations.

3. Cites During the next 25 Years (1998-2023)

The period from 1998 to 2023 marked significant developments and transformations in the evolution of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). During these 25 years, CITES faced new challenges, adapted to emerging issues, and worked towards strengthening its effectiveness in wildlife conservation and trade regulation.

Strengthening the Implementation Framework:

In the late 1990s and early 2000s, CITES focused on strengthening its implementation framework to enhance the effectiveness of the Convention. Efforts were made to improve the accuracy and transparency of trade data through the development and implementation of the CITES Trade Database. This database allowed member

countries to track and monitor the trade of CITES-listed species more effectively.

To support the implementation of CITES provisions, the Convention also worked on capacity building initiatives. Technical assistance programs were developed to help member countries enhance their enforcement capabilities, improve data collection and reporting, and strengthen their management and scientific authorities.

Amendments and Appendices

Throughout the period from 1998 to 2023, CITES continued to amend and refine its provisions to address emerging challenges and improve the conservation status of endangered species. The CoP meetings held during this period witnessed the adoption of several critical decisions and amendments.

One significant amendment was made in 2000, updating the criteria for the inclusion of species in the appendices. The revised criteria aimed to ensure a more scientific and objective approach to species listing decisions, taking into account factors such as population size, distribution, and trends.

During this period, several species were listed in the appendices, receiving international protection under CITES. Notable examples include the African lion (*Panthera leo*), the great white shark (*Carcharodon carcharias*), and numerous timber species.

Combating Illegal Wildlife Trade

Illegal wildlife trade continued to pose a significant threat to biodiversity during the 1998-2023 period. CITES recognized the need for enhanced efforts to combat this

illicit activity and worked towards strengthening its enforcement measures.

Collaboration with other international organizations and initiatives became a key strategy in combating illegal wildlife trade. CITES actively engaged with INTERPOL, the World Customs Organization (WCO), and other law enforcement agencies to enhance intelligence sharing, capacity building, and coordination in tackling wildlife trafficking networks.

In 2016, CITES adopted the Strategic Vision 2016-2020, which outlined key priorities for addressing illegal wildlife trade. The strategic vision focused on strengthening enforcement, reducing demand for illegal wildlife products, and promoting sustainable livelihoods for local communities.

Technological Advancements and Digital Trade

The rapid advancement of technology and the rise of e-commerce presented new challenges and opportunities for CITES during this period. The internet and digital platforms became significant avenues for the trade of endangered species, requiring innovative approaches to monitoring and regulating online transactions.

CITES responded to this challenge by incorporating digital tools and technologies into its enforcement strategies. The use of advanced monitoring systems, such as the CITES e-permitting system, facilitated the tracking and control of legal trade in CITES-listed species.

Efforts were also made to address the illegal online trade through collaboration with internet service providers, online marketplaces and financial institutions. CITES

worked towards improving cooperation and information exchange with stakeholders involved in the digital trade of wildlife products.

Engaging Local Communities and Indigenous Peoples

Recognizing the importance of local communities and indigenous peoples in conservation efforts, CITES focused on promoting their involvement and participation. The Convention acknowledged the crucial role these communities play in the sustainable use and management of natural resources.

CITES emphasized the inclusion of local communities and indigenous peoples in decision-making processes, capacity building initiatives and benefit-sharing mechanisms. The participation of these stakeholders was considered essential for the successful implementation of conservation and sustainable trade measures.

Efforts were made to strengthen partnerships between member countries, local communities, and indigenous peoples for fostering dialogue, knowledge exchange, and collaborative actions towards wildlife conservation.

Climate Change and Biodiversity Conservation

The period from 1998 to 2023 witnessed a growing recognition of the interconnections between climate change and biodiversity conservation. CITES acknowledged the impacts of climate change on species habitat, migration patterns and survival, and worked towards integrating climate change considerations into its framework.

The Convention emphasized the need for synergies and collaboration with other international agreements and

organizations addressing climate change and sustainable development. Efforts were made to align the objectives and actions of CITES with those of the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD).

CITES recognized the importance of ecosystem-based approaches, habitat protection, and sustainable use of natural resources in building resilience to climate change and conserving biodiversity.

Collaboration and Partnerships

Collaboration and partnerships remained key strategies for CITES during this period. The Convention continued to work closely with other international organizations, non-governmental organizations (NGOs), and civil society groups to advance its objectives.

CITES actively engaged with the International Union for Conservation of Nature (IUCN), TRAFFIC (the wildlife trade monitoring network), and other NGOs to leverage their expertise, knowledge and networks in supporting conservation and trade regulation efforts.

Partnerships with the private sector, including businesses involved in the trade of wildlife products, were also fostered. CITES encouraged responsible business practices, transparency, and adherence to sustainability standards within the industry.

Emerging Challenges and Future Directions

The period from 1998 to 2023 presented CITES with new and emerging challenges that continue to shape the future of the Convention. Some of the key challenges include the increasing demand for wildlife products,

habitat loss and degradation, emerging infectious diseases, and the impact of climate change on biodiversity. CITES recognized the need to strengthen its capacity to address these challenges effectively. The Convention continues to explore innovative approaches, such as the use of new technologies, data-driven decision-making, and collaboration with diverse stakeholders, to enhance its impact on wildlife conservation and trade regulation. Looking ahead, CITES aims to further improve its effectiveness, adapt to changing circumstances, and contribute to the conservation and sustainable use of wild fauna and flora. The Convention will continue to evolve and respond to emerging issues, fostering collaboration, knowledge exchange, and innovative solutions to address the complex challenges facing our planet's biodiversity.

4. Evolution of CITES in India

The evolution of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in India over the years has been marked by significant developments, challenges, and achievements. As one of the world's megadiverse countries, India has been actively involved in the implementation of CITES provisions to protect its rich biodiversity and regulate trade in endangered species. From its early engagement with CITES to recent initiatives, India's journey with the Convention reflects its commitment to wildlife conservation and sustainable trade.

India has proposed to remove rosewood (*Dalbergia sissoo*) from Appendix II of CITES. The species grows at a very fast rate and has the capacity to become naturalised outside its native range, it is invasive in other parts of the world as well.

- The regulation of trade in the species is not necessary to avoid it becoming eligible for inclusion in Appendix I in the near future.

India has also proposed to transfer small clawed otters, smooth coated otters, Indian Star Tortoise from Appendix II to Appendix I, thereby giving more protection to the species. The proposal also includes inclusion of Gekko gecko and Wedgefish (Rhinidae) in Appendix II of CITES. The Gekko gecko is traded highly for Chinese traditional medicine.²

Illegal Wildlife Trade (IWT) is the 4th largest illegitimate business with an annual worth of \$14 billion. Due to India's geography and socio-demographic makeup, it acts as an integral focal point for this trade across international markets, putting our hallowed biodiversity at the risk of being extirpated³.

Early Engagement and Legislative Framework

India became a member of CITES in 1976, just a year after the Convention's entry into force. Recognizing the need to regulate international trade in endangered species, India began developing a robust legislative framework to align with CITES provisions.

The Wildlife (Protection) Act, 1972, served as the cornerstone for wildlife conservation in India and provided a solid foundation for implementing CITES. The Act empowered the government to declare protected

² Cites, Drishti IAS (August 06, 2019).

³ Faisal Patil and Shyama Kuriakose, Implication of CITES Inclusion Within India's Wildlife Law, WCS-INDIA (November 11, 2022).

areas, regulate hunting, and control trade in wildlife and their derivatives.

Protected Area Network and Conservation Initiatives

India boasts an extensive network of protected areas, including national parks, wildlife sanctuaries, and tiger reserves. These protected areas play a crucial role in preserving biodiversity and providing habitat for endangered species.

CITES has played a significant role in supporting India's conservation efforts by regulating international trade in species found within its protected areas. The Convention's provisions have helped ensure that trade in Indian wildlife is sustainable and does not pose a threat to species survival.

India has also undertaken various conservation initiatives to protect endangered species. One notable example is the Project Tiger, launched in 1973, which aims to conserve and restore tiger populations and their habitats. CITES has been instrumental in regulating the international trade in tiger products, such as skins and bones, to prevent illegal trade and poaching.

Species Conservation and Trade Regulation

India is home to a wide array of charismatic and endangered species, such as the Bengal tiger, Indian elephant, Indian rhinoceros, and several species of turtles, birds, and medicinal plants. CITES has played a vital role in regulating the international trade of these species to ensure their protection and conservation.

Over the years, India has actively participated in the listing of species in the CITES appendices. The inclusion

of species like the Indian star tortoise, red sanders, and rosewood in Appendix II has helped regulate their trade and ensure their sustainable management. India has also taken steps to enforce CITES provisions within its borders. The country has established designated authorities responsible for issuing permits and monitoring trade in CITES-listed species. Furthermore, India has implemented stringent measures to combat illegal wildlife trade, including strengthening enforcement agencies, increasing penalties for offences, and conducting regular monitoring and surveillance activities.

Elephant Conservation and Ivory Trade

India has a significant population of Asian elephants, which are listed under Appendix I of CITES. The country has been actively involved in elephant conservation and the regulation of ivory trade.

In 1991, India imposed a ban on the export of ivory, demonstrating its commitment to curbing illegal trade and protecting elephant populations. The ban, combined with CITES regulations, has helped in controlling the domestic and international trade in elephant ivory.

India has also been at the forefront of global efforts to combat illegal ivory trade. The country has participated in initiatives like the Elephant Trade Information System (ETIS) and collaborated with international organizations to share intelligence, enhance law enforcement, and raise awareness about the detrimental impacts of ivory trade.

Tiger Conservation and Stripes Campaign

India's efforts to protect tigers have gained significant momentum in recent years, with a focus on addressing

the threats posed by poaching, habitat loss, and illegal trade. The country has been actively engaged in international forums and initiatives related to tiger conservation.

In 2008, India launched the National Tiger Conservation Authority (NTCA) to strengthen tiger conservation efforts across the country. The NTCA works closely with CITES and other stakeholders to combat illegal trade in tiger parts and products.

India has also been at the forefront of the global Stripes Campaign, which aims to raise awareness about the importance of tiger conservation and eliminate demand for tiger products. Through public awareness campaigns, law enforcement efforts, and strict vigilance, India has made significant progress in combating the illegal trade in tiger parts.

Collaboration and Capacity Building

India has actively collaborated with CITES and other member countries to enhance its capacity in implementing the Convention's provisions. The country has participated in capacity-building workshops, training programs, and knowledge-sharing initiatives to strengthen its institutional and enforcement capacities.

India has also taken steps to engage local communities and indigenous peoples in conservation efforts. Recognizing their traditional knowledge and the role they play in biodiversity conservation, India has promoted community-based conservation models and implemented schemes to involve local communities in the management of protected areas and wildlife conservation.

Challenges and Future Directions

The only thing that CITES controls is trade, it does nothing to limit hunting or killing. Theoretically, if a nation wanted to kill all of its species for domestic consumption, CITES could do nothing to prevent it.⁴ While India has made significant progress in implementing CITES provisions, several challenges remain. Illegal wildlife trade, habitat loss, human-wildlife conflict, and climate change continue to pose threats to the country's biodiversity.

India's future engagement with CITES will likely focus on addressing these challenges and strengthening conservation efforts. This may involve enhancing cooperation with neighbouring countries to combat cross-border wildlife trafficking, adopting technology-driven solutions for monitoring and enforcement, and promoting sustainable livelihoods for local communities dependent on wildlife resources.

Furthermore, India's commitment to the Sustainable Development Goals (SDGs) and the Convention on Biological Diversity (CBD) will likely influence its future engagement with CITES. Aligning the objectives of these international agreements will be crucial in ensuring the conservation and sustainable use of India's wildlife resources.

In conclusion, the evolution of CITES in India has been characterized by a strong commitment to wildlife conservation, the regulation of trade in endangered species, and collaborative efforts with international partners. India's active participation in CITES has helped

⁴ Shyam Divan & Armin Rosencranz, *Environmental Law and Policy in India* 914-915 (3d ed. 2022).

protect its rich biodiversity and ensure the sustainability of trade in wildlife. As the country moves forward, it will continue to face challenges but remains dedicated to safeguarding its natural heritage and contributing to global conservation efforts.

5. Conclusion

CITES regulates international trade in specimens of species of wild fauna and flora, i.e., export, re-export and import of live and dead animals and plants and of parts and derivatives thereof, based on a system of permits and certificates which can only be issued if certain conditions are met and that must be presented before consignments of specimens can leave or enter a country.⁵

CITES, as the preeminent international agreement regulating the trade of endangered species, has played a critical role in wildlife conservation for nearly five decades. The Convention's success lies in its ability to foster international cooperation and facilitate the exchange of scientific knowledge and best practices among member countries. By controlling and monitoring the international trade of endangered species, CITES has significantly contributed to the preservation of biodiversity and the protection of vulnerable ecosystems.

Over the years, CITES has achieved remarkable milestones in wildlife conservation. It has prevented the extinction of numerous species by imposing restrictions on their international trade and providing them with much-needed protection. The recovery of whale populations, such as the humpback whale and southern right whale, is a testament to the positive impact of CITES regulations. Additionally, the Convention's efforts

⁵ Willem Wijnstekers, *The Evolution of Cites* 39 (11d ed. 2018).

in combating illegal wildlife trade have led to increased law enforcement cooperation and the disruption of criminal networks involved in this illicit activity.

Beyond its direct conservation outcomes, CITES has also had a profound influence on public awareness and attitudes toward wildlife protection. By placing restrictions on the trade of endangered species, the convention has raised global consciousness about the ecological, economic, and cultural value of biodiversity. It has fostered a sense of responsibility among governments, organizations, and individuals, leading to the adoption of sustainable practices and the promotion of alternatives to products derived from wildlife.

However, challenges persist, and CITES must remain adaptive and proactive to address emerging threats. Illegal wildlife trade continues to be a significant issue, driven by demand and facilitated by technological advancements. CITES must continue to collaborate with member countries and strengthen enforcement measures to combat this lucrative criminal activity effectively. Enhanced intelligence sharing, capacity building, and increased penalties for wildlife traffickers are essential components of this effort.

Moreover, the Convention needs to adapt to changing environmental and socio-economic conditions. Climate change, habitat loss, and the increasing pressures on wildlife populations require a holistic and integrated approach to conservation. CITES should collaborate closely with other international agreements and organizations, such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), to develop synergistic strategies for addressing these interconnected challenges.

In conclusion, CITES stands as a beacon of hope and international cooperation for wildlife conservation. Its comprehensive approach to regulating international trade and promoting sustainable practices has yielded significant achievements in preserving endangered species and their habitats. However, the ongoing threats posed by illegal wildlife trade and environmental degradation necessitate continued efforts and innovation in the implementation of CITES. By remaining vigilant and adaptive, CITES can continue to protect wildlife, safeguard ecosystems, and secure a sustainable future for all living beings on our planet.

About the Editors



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Refugee Law organized jointly by the International Committee of the Red Cross (ICRC), United Nations High Commissioner for Refugees (UNHCR) and National Law School of India University, Bangalore. He has written 5 books on Intellectual Property Rights, International Law, and Mediation. He has also written two Volumes of Halsbury Annotated Statutes of India on Intellectual Property Rights. Most of his books have been published by top International Publishing Company Lexis Nexis. His latest book is Krishna and Mediation.



Dr. Amol Deo Chavhan brings a decade of experience from a prestigious institution to his role at the National Law University and Judicial Academy, Assam. Holding degrees in social science, law, and human rights, he earned his qualifications from Sant Gadge Baba Amravati University Amravati, including a Ph.D. for his ground-breaking research on negligence in medical treatment. Since 2009, Dr. Amol has been dedicated to teaching, now serving as an Associate Professor at NLUJA Assam, focusing on subjects such as Criminal Procedure Code, Indian Penal Code, Law of Torts, Law of Evidence, Prison Administration etc. Passionate about academia, Dr. Amol has authored numerous articles and research papers published in esteemed journals and presented his work at national and international conferences.

His expertise extends beyond academia, having held administrative roles such as Proctor-cum-Provost, Director of IQAC, and Convenor of the Centre for Career Counselling and Capacity Building. He remains an active contributor to university programs and institutions as a resource person.



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