

EcoVisions

Thinking Beyond Disciplinary Silos

A Peer Reviewed Interdisciplinary Research
Journal of Green Studies

Volume I: 2026



Editors
Ms. Jyoti Singh Pathak
Mr. Gaurab Sengupta
Ms. Rajashree Boruah



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ISBN: 978-81-996702-1-1

ISBN: 978-81-996702-1-1



Price: 399/-

Publishing Date: 24th January, 2026

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Published by:

North-East India Forum of Green Studies
Department of English, Duliajan College

Printed by:

Duliajan Printing Works
Tipling, Duliajan, Assam

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in gratitude for her resilience and boundless gifts.



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(Registered Under The Society Registration Act. XXI of 1860)

Registration No 279 of 1977 – 78 under Section 2(F) and 12(B) of the UGC Act, 1956

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Message from the Principal : Duliajan College



It gives me immense pleasure to learn about the initiative undertaken by the North-East India Forum of Green Studies, under the aegis of the Department of English, Duliajan College, to publish a peer-reviewed interdisciplinary research journal entitled *EcoVisions: Thinking Beyond Disciplinary Silos – A Peer-Reviewed Interdisciplinary Research Journal of Green Studies*. At a time when the world is grappling with unprecedented ecological crises, environmental degradation, and climate-induced socio-cultural transformations, the launch of a scholarly platform dedicated to Green Studies is both timely and intellectually significant.

Higher education institutions today carry a responsibility that extends far beyond classroom teaching. They are expected to generate knowledge, nurture critical inquiry, and contribute meaningfully to society through research that addresses contemporary challenges. In this context, the proposed journal represents an important academic intervention that seeks to engage with environmental concerns not in isolation, but through an interdisciplinary framework that integrates literature, culture, ecology, ethics, history and social sciences. Such an approach is particularly relevant in the Indian context, and more so in Northeast India, a region marked by rich biodiversity, indigenous knowledge systems, and complex human-nature relationships.

The idea of “thinking beyond disciplinary silos” as articulated in the title of the journal, reflects a progressive and forward-looking academic vision. Environmental issues cannot be adequately understood through the lens of a single discipline. They demand collaborative thinking and cross-disciplinary dialogue.

By encouraging contributions from scholars, researchers and practitioners working in Green Studies, Environmental Humanities, Cultural Ecology, Eco-criticism, Indigenous Studies and allied fields, EcoVisions promises to create a vibrant intellectual space for critical engagement and innovative scholarship.

I appreciate the commitment of the editorial team to maintaining high academic standards through a rigorous peer-review process and adherence to established editorial and ethical guidelines. The emphasis on originality, scholarly integrity and academic credibility will undoubtedly enhance the journal's reputation and ensure its acceptance within the wider academic community. The allotment of ISBN further strengthens the journal's institutional legitimacy and ensures its accessibility and recognition at national and international levels.

Duliajan College has consistently encouraged faculty members and academic forums to undertake research initiatives that contribute to knowledge production and community engagement. The proposed journal aligns well with the institution's vision of promoting research culture, interdisciplinary learning, and socially-responsive scholarship. It also offers an excellent opportunity for young researchers and early-career academics to publish their work alongside established scholars, thereby fostering mentorship, collaboration and intellectual growth.

The focus on environmental humanities and green studies is particularly significant for Northeast India, a region that occupies a unique ecological and cultural position within the subcontinent. The journal can play a crucial role in foregrounding regional ecological narratives, indigenous perspectives, and locally grounded research that often remain underrepresented in mainstream academic discourse. By providing a platform for such voices, EcoVisions can contribute to a more inclusive and nuanced understanding of environmental issues.

I would also like to commend the North-East India Forum of Green Studies for its sustained efforts in promoting ecological awareness, interdisciplinary research and academic dialogue. Initiatives such as this journal demonstrate the Forum's dedication to advancing scholarship that is not only intellectually rigorous but also ethically and socially relevant. Such efforts are essential in cultivating environmental consciousness among students, researchers and the wider academic community.

The successful publication of a peer-reviewed journal requires collective effort, perseverance and institutional support. I am confident that the editorial board with its academic expertise and commitment, will steer the journal towards excellence. I also hope that the journal will, in due course, become a recognized forum for scholarly exchange, contributing to policy discussions, pedagogical practices, and public understanding of environmental issues.

On behalf of the institution, I extend my wholehearted support to this academic endeavour. I sincerely hope that EcoVisions will evolve into a sustained and impactful publication, inspiring meaningful research and fostering interdisciplinary collaboration across institutions and regions. I wish the editorial team every success in their efforts and look forward to the journal making valuable contributions to the field of Green Studies and Environmental Humanities.

May this initiative encourage deeper reflection on our relationship with nature and reaffirm the role of academia in addressing the ecological challenges of our time.

With best wishes for the successful publication and future growth of the journal.

Dr. Lok Bikash Gogoi
Principal
Duliajan College
Duliajan



Assam Pollution Control Board

(Department of Environment Forests & Climate Change ::
Government of Assam)

অসম প্ৰদূষণ নিয়ন্ত্ৰণ পৰিষদ

(অসম চৰকাৰৰ বন, পৰিবেশ আৰু জলবায়ু পৰিৱৰ্তন বিভাগ)

Dr. Arup Kumar Misra
Chairman

Goodwill Message



I am extremely happy to know that “The North-East Forum of Green Studies” established by the Department of English of Duliajan College, Assam, is going to publish an Interdisciplinary Research Journal “EcoVisions: Thinking Beyond Disciplinary Silos”; yet another effort to establish the fact that we cannot achieve sustainable solutions for burning issues like environmental pollution, resource depletion, climate change and eco-disasters by remaining in silos and disciplinary boundaries. The world, at large has accepted that “Environmental Studies” is an emerging multidisciplinary discourse; integrating knowledge from natural sciences with social sciences and humanities, to holistically understand complex human-environment interactions and then offer comprehensive perspectives and foster creative problem-solving for a complex, interconnected world.

I understand, this publication has invited research essays, scientific studies, creative writings and critical reflections on the complex environmental issues that loom large over humanity. What are these complex issues? Is it dwindling natural resources and their conservation and management? Or is it degrading ecological systems and loss in biodiversity? As widely believed, is it mere environmental pollution and control? I think, none of these are fully true or independent issue. Without studies on human population and environment, their culture and heritage, their compulsions and conflicts, we cannot create any sustainable roadmap for the future. The Sustainable Development Goals also do not talk about only science and technology as enablers to solve our problems. Abundant social issues in relation to development and environment, poverty alleviation, gender equity and dignity are equally emphasized in these Goals to make the world a better place to stay by 2030.

This initiative seems to me quite refreshing and innovative. We have seen innumerable Seminars, Conferences, and Symposia etc. in the past addressing environmental problems. But for the first time I am seeing the Department of English of a College breaking the conventional silos and embracing a large number of experts, academicians, researchers and students to voice the concerns in a peer reviewed journal, which I believe is not only very unusual, but the best thing to do under the present state of affairs.

I wish a grand success of “EcoVisions: Thinking Beyond Disciplinary Silos” and extend my best wishes to each and every member of “North-East Forum of Green Studies.”


10.01.2026

(Dr. Arup Kumar Misra)

Chairman, Assam Pollution Control Board

&

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Message from the Principal



It is highly commendable that North-East India Forum of Green Studies, under the aegis of the Department of English, Duliajan College, is coming up with an Interdisciplinary Research Journal on a very contemporary approach to studying 'literature' and 'culture' from the 'environment' perspective. I am sure the insightful and well researched articles published in the book titled EcoVisions: Thinking Beyond Disciplinary Silos: A Peer Reviewed Interdisciplinary Research Journal of Green Studies will contribute substantially towards popularizing ecological and environmental themes in literature and thereby contribute towards greater awareness on the importance of the environment for the sustenance of mankind.

Choudhury
(Dr. Mriganka Choudhury)
Principal
Women's College, Tinsukia
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Women's College, Tinsukia

EDITORIAL

In this volume, we bring together a rich constellation of research essays, scientific studies, creative writings, and critical reflections on the dynamic intersections between environment, science, and the humanities- conceived broadly and pursued across disciplinary boundaries. Our aim is to honour and extend the expanding field of environmental studies by offering a forum for voices that explore how scientific inquiry, literary expression, cultural practices, and philosophical thought converge to shape our understanding of the more-than-human world.

The urgency of such a project is underscored by the scale of the environmental challenges we face- from climate change and biodiversity loss to environmental justice, sustainability, planetary health, and human co-existence with natural systems. At the same time, science offers empirical depth and technical insight, while literature and allied disciplines provide resources of imagination, ethics, memory and narrative- together forming indispensable tools for comprehending and responding to these overlapping crises.

Northeast India stands today as one of the world's most extraordinary ecological frontiers- a region where biological abundance and cultural complexity are inseparably intertwined. Stretching from the Eastern Himalayas to the floodplains of the Brahmaputra and Barak, and from dense tropical forests to wetlands, grasslands and shifting river islands, the landscape hosts an astonishing range of flora and fauna. It is recognised globally as part of two of the planet's major biodiversity hotspots: the Eastern Himalaya and the Indo-Burma region. These vast ecological reserves shelter many endangered mammals; rare orchids and medicinal plants; and an extraordinary bird population that draw researchers from across the world. Just as remarkable is the region's cultural biodiversity: many ethnic groups, each with unique ecological knowledge systems, land-use practices, oral traditions, food cultures, and rituals that reflect intimate relationships with forests, rivers and seasonal cycles. In many communities, agricultural practices such as jhum, water management traditions, and forest stewardship are deeply embedded in cosmology, storytelling and everyday life. For both literary scholars and scientists, the Northeast thus becomes a compelling site of inquiry, where cultural imagination and ecological reality overlap, and where the study of environment cannot be separated from language, identity, memory and lived experience.

Despite this richness, systematic research infrastructures that bring these varied perspectives together remain scarce. Environmental studies in the Northeast- whether in biodiversity science, climate research, anthropology, literature, or cultural studies- have often unfolded in fragmented pockets:

isolated projects, discipline-specific publications, or short-term initiatives without continuity. While scientific institutions in the region perform valuable ecological surveys and environmental monitoring, and while humanities and social-science departments document oral histories, narratives of land, or environmental conflicts, there is little institutional space where these strands can converge in an organised, sustained manner. As a result, the enormous potential of the region as an integrated environmental research zone remains under-realised. There is no formal academic forum dedicated to synthesising ecological science with cultural knowledge, to studying environmental crisis alongside indigenous environmental ethics, or to examining biodiversity loss through the lenses of policy, community resilience, literature, and sustainability studies. At a time when the Northeast is facing deforestation, riverbank erosion, urbanisation pressures, resource extraction, and shifting climatic patterns, the absence of a structured academic platform limits both the depth and the reach of research that the region urgently needs. A region so ecologically alive deserves institutions that can match its complexity- institutions capable of building conversations across disciplines, nurturing local scholarship, and making the Northeast a recognised centre for environmental thought.

It is in response to this gap that the North-East India Forum of Green Studies, under the aegis of the Department of English, Duliajan College, positions itself as a crucial and timely initiative. The Forum seeks to create a network of schools, colleges, universities in order to promote a sustained academic environment in which environmental enquiry and awareness can flourish as an interdisciplinary and intergenerational endeavour. The research journal associated with the Forum provides a dedicated platform for scholars, writers, teachers, scientists, and practitioners to explore ecological concerns from multiple angles: from biodiversity conservation and climate modelling to indigenous ecological wisdom, environmental justice, literary ecocriticism, and analyses of cultural responses to environmental change. It offers a space where empirical field studies can be read alongside community narratives, where debates on sustainability can engage with philosophical discussions of ethics and responsibility, and where the environmental challenges facing Northeast India can be documented, analysed and imagined afresh. In doing so, the Forum fulfils its core aim- to foster an intellectually rigorous, collaborative and region-rooted platform for environmental research.

Why frame a volume around environment, science, and humanities together? Because environmental realities cannot be siloed. Scientific data, ecological modelling, and environmental monitoring tell us *what is happening*; cultural narratives, historical memory, and ethical inquiry help us understand *what it means*; creative imagination and public humanities help us consider what can be done. One line of scholarship argues that literature and cultural forms play a formative role in shaping environmental consciousness, fostering empathy and

expanding awareness beyond technical or policy discourse (Radhakrishnan). As Radhakrishnan notes, literature has long served “as a powerful medium for shaping human perspectives on nature and the environment.” Alongside this, scientific research- hydrology, climatology, botany, ecology, conservation studies provide essential frameworks for understanding environmental processes, disruptions, and resilience. This volume therefore not only confines itself to the analysis and exploration of literary narratives but includes essays from scientific perspectives that examine ecosystems, biodiversity, species interactions, and climate dynamics. Together, these modes of inquiry will allow the readers to hold both empirical and imaginative dimensions of environmental life.

A defining feature of this volume is its consciously interdisciplinary orientation. While some essays employ close reading or literary/cultural analysis, others draw from environmental science, ecology, film studies, and social-science methodologies. ‘Interdisciplinarity’ here is not merely additive; it invites us to rethink categories like “nature,” “human,” “animal,” or “environment,” and to consider how knowledge systems from both the sciences and the humanities can complement each other. This generates productive challenges (terminological differences, methodological divergences) but also profound opportunities (holistic understanding, shared conceptual frameworks).

In the Anthropocene, where human activity is geologically significant, the traditional boundaries between natural science and humanities blur. Scientific observation and cultural imagination must work in tandem. The essays in this volume show how interdisciplinary collaboration allows us to attend not only to texts, but also to ecosystems, infrastructures, climate systems, species, rivers, forests, coasts, and communities.

This book offers a comprehensive, interdisciplinary exploration of ecological consciousness in literature, culture and contemporary environmental discourse, situating the Anthropocene as both a material condition and a narrative framework. The chapters introduce the concept of the Anthropocene and ecocriticism as a whole and examine various Indian and Northeast Indian literary texts- such as works by Easterine Kire, Kanseng Shyam, Janice Pariat, and Bhupendra Chandra Deka- to reveal how regional narratives portray humans as agents, victims and witnesses of environmental degradation while preserving indigenous ecological wisdom. Classical and Romantic traditions are revisited through Kalidasa, Wordsworth and Mary Shelley to demonstrate earlier nature-centric worldviews that challenge modern anthropocentrism. Comparative cultural chapters analyse Asian animated films like *Ponyo* and *Dashavatar*, highlighting myth, spirituality, and storytelling as tools of environmental education. The book further extends ecocritical inquiry to ecofeminism, food practices of indigenous

communities, river pollution, microplastics in agriculture, and energy transitions in contemporary India. By combining literary analysis with socio-environmental studies, the book argues that literature and culture remain vital for fostering ethical responsibility, ecological awareness and sustainable coexistence in an age of environmental crisis.

In assembling this volume, we reached out to scholars and practitioners across the sciences, social sciences, and humanities to reflect on how their respective methods and forms of evidence inform their engagement with environmental issues. We believe that the richness of this volume lies in this interplay: essays that might combine close reading with analyses of rivers, migrations, watershed histories; contributions that draw on ecological science, policy studies, creative practice, and community knowledge; and research that links environmental challenges to questions of justice and sustainability. This also highlights our intention to create a space where different forms of inquiry- academic, experiential, artistic, and scientific- can speak to one another. By encouraging this cross-disciplinary engagement, the volume aims to broaden how environmental issues are understood and addressed, grounding reflection not only in interpretation but also in practice, governance, and collaborative knowledge-making.

Several conceptual frames recur throughout the volume and merit mention here:

- **The Environmental Imagination:** The concept of an environmental imagination helps us understand how different knowledge systems- scientific, cultural, literary, and experiential- shape the ways people see, feel, and respond to nature. While Buell emphasises literature's role in cultivating an "environmental imagination," today the term also encompasses how ecological research, environmental education, field studies, and scientific communication contribute to challenging anthropocentrism and opening new ethical possibilities.
- **Anthropocene and Capitalocene:** Contemporary scholarship increasingly situates environmental studies- across science, humanities, and social sciences- within the era of the Anthropocene, the epoch in which human activity has become geologically significant. The Capitalocene frame, which foregrounds capitalism's role in ecological crisis, further expands this perspective. An interdisciplinary approach helps us engage not only with cultural narratives but also with geology, climate science, Earth-systems research, infrastructure studies, and ecology, enabling a fuller understanding of environment.
- **Multispecies and Posthuman Perspectives :** Moving beyond human-centred frameworks, many essays explore the lives and agencies of non-human beings, drawing from ecology, biodiversity research, conservation science, anthropology, and posthumanist theory. These perspectives reveal ecological networks, symbiosis, microbial life, and the dissolving boundaries between human and

environment-highlighting that environmental relations are always multispecies entanglements.

- **Environmental Justice, Race and Colonial Legacies:** The intersection of environment and society is shaped by questions of power: who bears the brunt of environmental degradation, whose land and resources are extracted, whose voices are silenced in environmental policy? Approaches from environmental science, geography, sociology, indigenous studies, and ecofeminism converge here. This frame brings into focus environmental racism, climate vulnerability, colonial land histories, resource inequalities, and the need for inclusive, community-centred ecological futures.

- **Interdisciplinary Ethics and Praxis:** Finally, the volume asks: what roles do science, scholarship, cultural work, and creative practices play in environmental ethics and collective action? Interdisciplinary praxis includes scientific research informing policy, community-based environmental monitoring, creative and public humanities increasing ecological awareness, and pedagogical initiatives fostering environmental responsibility. Together, these practices imagine and enact regenerative futures.

Editors
EcoVisions

Contents

- **An Ecocritical Reading of Salman Rushdie's Haroun And The Sea of Stories** *✦ Akristha Dutta* 1-8
 - **Romantic Ecology: Ecocritical Explorations in William Wordsworth's Select Works** *✦ Arti Kumari Singh* 9-19
 - **From Harmony To Exploitation: Humanity's Triple Role in the Anthropocene through Two Indian Novels** *✦ Daisy Priya Gogoi* 20-29
 - **Eco-Critical Perspectives on Mary Shelley's Frankenstein** *✦ Jyotimoyee Talukdar* 30-36
 - **An Ecofeminist Study Of Ueda Akinari's Tales of Moonlight And Rain** *✦ Dr. Kaushik Bhuyan* 37-42
 - **Ecology for the Privileged: An Ecocritical Study of Lakshmi Nandan Borah's Kayakalpa** *✦ Krishna Priya Deka* 43-50
 - **Nature as Memory and Spirit: Reading Janice Pariat's 'A Water fall Of Horses' through Ecocriticism** *✦ Krishnangee Baruah and Dr. Nunchawii Hatlei* 51-58
 - **A Study of Individual Carbon Footprint and Eco-Consciousness in the Student Population of Duliajan** *✦ Manashree Gogoi and Sijan Limbu* 59-75
 - **A Decadal Analysis of Renewable Energy Development in India** *✦ Mrinal Phukan* 76-90
-

- **An Ecocritical Reading of Kalidasa’s Abhijnana Shakuntalam**
Nandini Borthakur 91-97
 - **Microplastic Contamination in Agricultural Soils: Sources, Ecological Impacts, and Implications for Plant and Human Health**
Prateeti Bharali 98-107
 - **An Ecocritical Reading of Bhupendra Chandra Deka’s Short Story ‘Chipko’**
Priyanka Khanikar 108-114
 - **Ethnobotanical Use of Wild Plants in The Food Culture of The Mishing Tribe**
Rajive Doley 115-130
 - **An overview on river pollution in India, its Causes, Impact and Government Initiatives for Sustaining River Water-Bodies**
Sandeep Lama and Binita Chetry 131-150
 - **Cross-Cultural Comparative Reading of Asian Animated Movies Ponyo and Dashavatar**
Shubhajit Chowdhury 151-157
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An ecocritical reading of Salman Rushdie's *Haroun and the Sea of Stories*

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Abstract

Salman Rushdie's *Haroun and the Sea of Stories*, published in 1990, is often seen as a story about censorship and free speech. However, it also has an important ecological aspect that's not often discussed. The "Sea of Stories", which is Rushdie's main metaphor, represents more than just imagination; it is a delicate ecosystem, at risk from Khattam-Shud's pollutants. By looking at the novel through the lens of ecocriticism, this paper shows how Rushdie's tale connects to today's ecological concerns. It also illustrates how his imaginative, whimsical story reclaims the ocean as a symbol of renewal, diversity, and resistance to oppressive power. The Sea of Stories serves as an environmental symbol that reflects both ecological decline and cultural suppression during Rushdie's own historical period, particularly after *The Satanic Verses* controversy and the fatwa that silenced him. The novel presents storytelling as a regenerative process of ecology that defies silence, control, and monoculture.

Keywords: ecocriticism, censorship, stewardship, pollution, silence, fatwa

Introduction

Salman Rushdie's *Haroun and the Sea of Stories* may seem like a lighthearted children's story at first, but beneath its playful surface, it holds a strong political and ecological message. Rushdie wrote *Haroun and the Sea of Stories* for his son Zafar, who asked him to create a story for kids. The book was published in 1990, two years after *The Satanic Verses*. The backlash from that book forced Rushdie to spend a long time away from his son during the period of isolation following the 1989 fatwa. The focus on the father-son bond, along with themes of censorship and silencing, suggests a link between the environmental themes in the story and Rushdie's own experiences. Haroun

brings to life the struggle for creativity and expression in a world stifled by rigid ideologies. The novel's ecological images, such as the polluted Sea of Stories, the dying Wellspring, and the living Plentimaw fish, turn storytelling into an ecological act, mirroring the connections between natural systems. The setting of Haroun's city portrays a place filled with despair. This novel illustrates how human experiences intertwine with the natural world, emphasizing that both are dependent on each other.

Ecocriticism is a critical approach to literature and culture that looks at how humans relate to the natural world. It began in the 1990s in response to rising concerns about environmental damage and the effects of human actions on the planet. Ecocritics explore how literature and other cultural forms depict and engage with nature. They want to see how environmental issues appear in literary works and how literature can raise awareness of these concerns while promoting sustainability and ecological understanding. As Cheryll Glotfelty explains in her introduction to the 1996 book, *The Ecocriticism Reader: Landmarks in Literary Ecology*, ecocriticism studies the connection between literature and the physical environment. Through this lens, *Haroun and the Sea of Stories* can be viewed as a text that reimagines narrative diversity as ecological diversity and censorship as ecological destruction. The novel suggests that the life of stories relies, like the earth, on the free exchange of diverse elements. The attempt to silence or control these elements is similar to environmental pollution. This theme resonates both politically and personally, given Rushdie's own experiences with silencing and exile.

In Greg Garrard's view, ecocriticism focuses on the environmental crisis. It considers the causes of the crisis, its effects on other organisms, and the measures humans take to address it. In his 2004 book, *Ecocriticism*, Garrard builds on Glotfelty's ideas. He calls ecological criticism a political mode of analysis, much like feminism and Marxism, because "ecocritics generally tie their cultural analyses explicitly to a 'green' moral and political agenda" (Gerrard 3). Pollution is a crucial issue since it harms essential elements needed for life on earth, like water and air. The novel vividly describes pollution in water and the streams of stories, affecting the entire narrative as it remains the primary source of all creative imagination.

The physical environment where a story unfolds can greatly impact the narrative. An ecocritical approach can examine how the natural setting affects the characters, plot, and themes. This includes not just the beauty or wildness of landscapes, but also places altered by human activity, urban areas, and even dystopian visions of future Earth. Even though ecocriticism focuses on nature and the environment, it can still fall into the trap of anthropocentrism. This means it often gives priority to human viewpoints and values over those of the non-human world. In the novel, the Chupwalas or the land of silence represent this anthropocentric approach as they attempt to silence the Sea of Stories and put a stop to all creative efforts. One can also compare this to Rob Nixon's idea of "slow violence." This type of violence happens gradually and out of sight; it involves delayed destruction that spreads over time and space. Khatam-shud's attempts to poison the Sea of Stories to slowly erase the presence of stories in the world reflect this notion of slow violence. Iff makes this clear when he says, "We have ignored it for too long, and now we pay the price" (Rushdie 87).

Discussion

At the heart of *Haroun and the Sea of Stories* is the bright image of the Ocean, a vast, swirling body of stories and life. "It was made up of a thousand thousand different currents, each one a different colour, weaving in and out of one another like a liquid tapestry of breathtaking complexity" (Rushdie 72). This depicts the Sea not just as a metaphor for imagination but as a living ecosystem that supports the world's cultural and creative life. The Sea of Stories becomes a symbolic biosphere; each stream represents an individual story, adding to the diversity of the imaginative world. Just as ecosystems rely on the variety and interaction of species, the narrative world also depends on the weaving of stories. The "thousand thousand currents" highlight the ecological idea of interdependence, showing that no story, like no species, exists alone.

Moreover, the Sea of Stories illustrates the processes of recycling and renewal, which are crucial for ecological sustainability. The Plentimaw Fish, described as "always speaking in rhyme," swallow stories, and "when they spew the stories out they are not old tales but new ones" (Rushdie 86). Their role is similar to that of decomposers in an ecosystem; they break down, change, and renew organic material. As Cheryll Glotfelty points out,

ecocriticism highlights that “human culture is connected to the physical world, affecting it and affected by it” (Glotfelty xix). The Plentimaw Fish embody this mutual influence: human storytelling supports the Sea, and the Sea, in turn, feeds imagination. Rushdie’s symbolic ecology merges narrative, creativity, and natural process into one cohesive system.

Rushdie’s strongest ecological warning appears in his portrayal of pollution. At the start of the novel, he establishes the setting and the idea of pollution. He writes about Alifbay as “a sad city.” He states, “In the north of the sad city stood mighty factories in which (so I’m told) sadness was actually manufactured, packaged and sent all over the world, which never seemed to get enough of it. Black smoke poured out of the chimneys of the sadness factories and hung over the city like bad news” (Rushdie 15). The images of “black smoke” and “factories” convey a sense of pollution in the city. The antagonist, Khattam-Shud, whose name means “completely finished,” is described as “the Arch-Enemy of all Stories, even of Language itself” (Rushdie 39). His goal to poison the Ocean so that every story ever told will be ruined turns censorship into an environmental disaster. Through this image, Rushdie connects political repression with ecological decline. He equates the stifling of creative freedom with the poisoning of natural systems. Greg Garrard, in *Ecocriticism*, identifies pollution as a central theme in environmental literature, describing it as “both a material and a symbolic form of contamination” (Garrard 16). In Rushdie’s story, the poisoning of the Sea is both literal and deeply symbolic; it represents the corruption of public discourse, imagination, and cultural diversity under authoritarian control. The Wellspring, the source of all stories, is described as both blocked and poisoned. This image of blockage evokes environmental and linguistic suffocation, a halt to flow and renewal. This suffocation parallels Rushdie’s own experience under the fatwa, during which his voice was silenced. In many of his writings, he recalls this period as a form of ‘asphyxiation.’ The connection between pollution and censorship is not just metaphorical but also personal; Rushdie’s environment was made toxic by political intolerance. The poisoned Sea reflects his own situation, a world where communication, exchange, and creativity are threatened. Rushdie highlights his struggle as a storyteller, where non-conformist voices are dismissed. He also uses the concept of pollution to critique the literary world of his time. He subtly addresses the politicization of stories and language.

Khattam-Shud's tactics, such as sealing the Wellspring, creating toxins, and forbidding stories, align with the imagery of industrial destruction. Rushdie describes the black shadow factories where poisons are created, evoking pollution from industrialization. As a result, "nature is no longer a central presence, no longer the life-sustaining air" (Glotfelty and Fromm 201). Garrard's observation that industrial modernity often makes pollution invisible until it is too late applies to Khattam-Shud's quiet poisoning of the Sea. The antagonist's attack on the environment mirrors how oppressive systems erode language and thought until all vitality is lost. Khattam-Shud's dialogue reflects the ongoing totalitarianism in language: "The world, however, is not for fun. The world is for controlling" (Rushdie 161). Thus, the ecological metaphor reaches beyond the natural world. It includes the politics of narrative control, positioning Rushdie's art as resistance to both environmental and ideological decline. The novel suggests that the cure for pollution lies in reviving the flow of stories, much like restoring a polluted river.

If Khattam-Shud represents pollution and domination, the characters who care for the Sea represent ecological stewardship. Mali, the Floating Gardener, symbolizes this ethic, and his earthly counterpart is the Floating Garden that Haroun sees on the Dull Lake (Rushdie 43). His body is made of plants, showing the harmony between human and nonhuman life. Mali's job is to untangle the Streams of Story, "Untwisting twisted Story Streams. Also unlooping same. Weeding. In short: Gardening" (Rushdie 83). Mali's quiet, ongoing work contrasts with Khattam-Shud's violent mechanization. His care for the Sea reflects a form of ecological action that values renewal, patience, and connection. Following the pattern set by Butt and Mali, Bagha and Goopy also cross the line between human and nonhuman. They are monogamous, "faithful partners for life" (Rushdie 85). They are very talkative and communicate only in rhyming couplets. Their Earthly equivalent is more complex than Mali's. Bagha and Goopy's symbolic role and environmental message are clearer. They depend on the Sea of Stories for survival. This talkative pair of fish represents real creatures living in the Earth's oceans. Through their portrayal, Rushdie illustrates the impact that ocean pollution can have on sea life. On first meeting Haroun, they tell him of the bad taste caused by all the "dirt" in the Sea, exclaiming,

“All this bad taste! Too much diet!
Swimming in the Ocean starts to hurt!
Call me Bagha! This is Goopy!
Excuse our rudeness! We feel droopy!
Eyes feel rheumy! Throat feels sore!

When we’re better, we’ll talk more “(Rushdie 85).

Later, when they reach the source of the pollution, they find they cannot proceed because of the unbearable pain caused by the acidic contaminants. Because they can speak and describe how the pollution affects them, the reader can sympathize with them more easily than with the silent animals in reality. Similarly, Iff the Water Genie uses his “Disconnecting Tool” to control the flow of story-water between worlds. This comparison highlights Rushdie’s views on ecology- language, like water, sustains life but needs careful management to stay pure. Iff’s role is similar to that of environmental regulators who ensure that shared resources remain untainted. In the novel, stewardship involves both ecological and cultural aspects. It calls for protecting the Sea’s biodiversity and preserving freedom of language and imagination. Rushdie suggests that caring for stories is the same as caring for life itself, as both rely on interdependence, diversity, and renewal.

The most notable ecological aspect of Rushdie’s Sea is its variety of stories. The narrator notes, “Different parts of the ocean contained different sorts of stories, and as all the stories that had ever been told and many that were still in the process of being invented could be found here, the Ocean of the Streams of Story was in fact the biggest library in the universe” (Rushdie 72). This description reflects biological evolution and celebrates cultural diversity, the blending of myths, languages, and traditions. Haroun brings this idea to life by showing the Sea as a living archive of global storytelling traditions, from the *Arabian Nights* to modern science fiction. The mixing of these currents creates new narrative forms, just as genetic variation leads to resilience in ecosystems. The Plentimaw Fishes’ ability to create new tales becomes a statement for pluralism. Their constant consumption and production of stories indicate that creativity is never fixed; it is a process of transformation.

Understanding the ecological allegory of the novel requires placing it within Rushdie's personal experience of exile and silencing. Written during his years of hiding after the fatwa from 1989 to 1998, the novel comes from a time when his own "sea of stories" faced severe challenges. In interviews, Rushdie called Haroun a 'gift to my son' and a way to reconnect with the art of storytelling. Writing became a way for him to heal, a cleansing of his poisoned imagination. The allegory of the poisoned Wellspring mirrors Rushdie's experience with censorship. Just as Khattam-Shud tries to "plug the Source of the Sea" (Rushdie 162), Rushdie's opponents aimed to cut him off from his creative roots. The "poison" in the Sea reflects the harmful rhetoric of censorship and extremism surrounding *The Satanic Verses*. However, the ending, where Haroun restores the Wellspring, shows the resilience of both ecological and artistic systems. Like nature, imagination heals through renewal. Rushdie's tale shows this, Haroun does not restore the Sea alone but with the help of various beings, symbolizing ecological symbiosis and collective resistance. The healing of the Sea parallels Rushdie's own recovery of voice through collaboration with readers, translators, and advocates for free expression. In this way, the novel can be seen as an autobiographical ecology. The Sea represents the author's imaginative space, polluted by persecution but ultimately healed by the power of storytelling. The final image, "It's just the rain, it's making everybody happy" (Rushdie 208), along with the memory of the city's name, "Kahani, isn't it a beautiful name for a city? It means 'story', you know" (Rushdie 209), suggests a renewal after disaster, similar to ecological rebirth after contamination. This theme carries a tragic yet hopeful tone, especially in light of later events in Rushdie's life, such as the 2022 stabbing attack, which highlighted the ongoing violence against the artist. Still, like his fictional Sea, Rushdie's imagination keeps flowing, showing that creative ecosystems, while vulnerable, are strong. The ecological metaphor thus becomes both personal and prophetic; the Sea survives by adapting and renewing, just like the storyteller.

Bringing these ideas together, *Haroun and the Sea of Stories* can be seen as illustrating what Glotfelty describes as "the study of literature as a mode of environmental consciousness" (Glotfelty xxi). Rushdie's imaginative ecology connects environmental and linguistic survival. Both need diversity, movement, and care. The Sea acts as the biosphere of human creativity, and

its pollution reflects the human-caused crises on our planet. The structure of the novel also follows ecological cycles - pollution, collapse, restoration. Haroun's act of turning the "Story Tap" back on restores the Sea and his father Rashid's lost storytelling abilities, reinforcing the idea that personal, cultural, and environmental well-being are linked. Therefore, Rushdie and ecocritics emphasize the need for balance and "insists on the interdependence of ecocentric and anthropocentric values" (Buell 639).

Conclusion

Salman Rushdie's *Haroun and the Sea of Stories* changes the political allegory of censorship into a story about the fragility of life and language. Through images of pollution and purification, the novel promotes an ethics of care that connects ecological and imaginative worlds. In the Sea of Stories, Rushdie imagines a living system that relies on diversity, stewardship, and freedom from control. These ideas reflect the environmental and ethical concerns of our time. The novel is not just a defence of artistic freedom, but also a work of environmental imagination that redefines creativity as ecological interdependence. The novel's tale of poisoned waters and restored wells captures Rushdie's journey from silenced exile to renewed expression. The novel shows the lasting power of stories to heal, regenerate, and remind us that to harm the imagination is to threaten the world itself. The novel's humor and childlike tone do not hide its deep ecological insight: creativity, like life, is a fragile resource that needs protection. To poison the Sea of Stories is to hurt the shared imagination of humanity. To cleanse it is to bring back the chance for coexistence. In this way, *Haroun and the Sea of Stories* goes beyond its political message and becomes a story about ecological ethics. It encourages readers to be gardeners, not consumers, of their imaginative and environmental worlds.

References :

Buell, Lawrence. "Toxic Discourse". *Critical Inquiry*, Vol. 24, No. 3 (Spring, 1998), pp. 639-665. *JSTOR*, <https://www.jstor.org/stable/1344085>.

Garrard, Greg. *Ecocriticism*. Routledge, 2004.

Glotfelty, Cheryl, and Harold Fromm. *The Ecocriticism Reader: Landmarks in Literary Ecology*. The University of Georgia Press, 1996.

Rushdie, Salman. *Haroun and the Sea of Stories*. Penguin Books, 1991.

Romantic Ecology: Ecocritical explorations in William Wordsworth's select works

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Abstract: This paper explores William Wordsworth's profound ecological vision and his portrayal of Nature as a living, moral, and spiritual force. Through an ecocritical lens, it examines how Wordsworth's poems—such as “*The World is Too Much with Us*,” “*Lines Written in Early Spring*,” “*Daffodils*,” “*To a Butterfly*,” “*The Tables Turned*,” “*Written in March*,” and “*Three Years She Grew in Sun and Shower*”—reveal a deep interconnectedness between humanity and the natural world. The study argues that Wordsworth's poetic imagination transforms Nature from a passive background into an active presence that teaches, heals, and reforms. His depiction of Nature as a teacher and moral guide challenges the industrial and materialistic tendencies of his age, emphasizing instead simplicity, harmony, and spiritual renewal. Through close textual analysis, the paper demonstrates how Wordsworth's works anticipate modern environmental thought, presenting Nature as both resilient and vulnerable—a source of inspiration that also demands ethical responsibility. The poet's recurrent lament for humanity's alienation from Nature underscores his early ecological awareness and his conviction that moral decay parallels environmental degradation. Ultimately, the study concludes that Wordsworth's Romantic ecology envisions a symbiotic relationship between humans and Nature, wherein true wisdom and happiness arise not from material progress but from living in harmony with the natural world. This ecocritical exploration reaffirms Wordsworth's enduring relevance as a poet whose vision of Nature continues to inspire environmental consciousness and spiritual introspection in the contemporary world.

Keywords: Ecology, Environment, Nature, Poetry, Romanticism.

Introduction: From the earliest periods of English literature, Nature has held a vital place in shaping human imagination and moral vision. It has been more than a backdrop for human experience—it has been a living presence,

a symbol of divine order, beauty, and truth. However, with the rise of industrialization and the mechanized worldview of the eighteenth and nineteenth centuries, this organic relationship between humanity and Nature began to erode. Against this backdrop, the Romantic poets, particularly William Wordsworth, sought to re-establish the harmony between man and the natural world. Wordsworth's poetry reflects a deep ecological sensitivity and an awareness that Nature is not merely an object of observation but a spiritual and moral force that sustains human life.

This paper, titled "*Romantic Ecology: Ecocritical Explorations in Wordsworth's Select Works*," examines how Wordsworth's poems express an early form of ecological consciousness that resonates strongly with modern environmental thought. His works such as "*The World is Too Much with Us*," "*Lines Written in Early Spring*," "*Daffodils*," "*To a Butterfly*," "*The Tables Turned*," "*Written in March*," and "*Three Years She Grew in Sun and Shower*" reveal Nature as a moral guide, teacher, and healer capable of restoring harmony in the human spirit. Through an ecocritical approach, the study explores how Wordsworth challenges materialism and industrial progress, advocating instead for simplicity, reflection, and spiritual communion with the natural world. Ultimately, the paper argues that Wordsworth's poetic vision represents an early articulation of "Romantic Ecology," one that calls for the preservation of both Nature's purity and humanity's moral and emotional integrity.

Objectives of the Paper:

1. To examine William Wordsworth's portrayal of Nature as a moral, spiritual, and educational force through an ecocritical reading of his selected poems.
2. To analyze how Wordsworth critiques industrialization and materialism, emphasizing humanity's estrangement from the natural world and the need to restore ecological harmony.
3. To explore the relevance of Wordsworth's Romantic vision in shaping modern environmental consciousness and understanding the interdependence between human life and Nature.

Methodology:

The paper employs a qualitative and analytical methodology grounded in ecocritical theory, focusing on William Wordsworth's selected poems to

explore his representation of Nature and its moral and spiritual significance. The study uses textual analysis as its primary method, closely reading poems such as “*The World is Too Much with Us*,” “*Lines Written in Early Spring*,” “*Daffodils*,” “*To a Butterfly*,” “*The Tables Turned*,” “*Written in March*,” and “*Three Years She Grew in Sun and Shower*.” Through this approach, the paper interprets imagery, symbols, and themes to reveal how Wordsworth constructs a vision of Nature as a living, guiding presence. The research further adopts an ecocritical framework, drawing from concepts in environmental humanities to evaluate Wordsworth’s response to the industrial and social changes of his time. By situating his poetry within both Romantic and ecological contexts, the study investigates how his ideas anticipate modern concerns about environmental degradation and the loss of spiritual connection with the natural world. Secondary sources such as critical essays, scholarly interpretations, and theoretical works on Romanticism and ecocriticism are also consulted to support the analysis. This combination of close reading and theoretical application enables a comprehensive understanding of Wordsworth’s poetic ecology and its enduring relevance in contemporary environmental thought.

Discussion:

William Wordsworth believed that Nature was central to human life. It had the ability not only to move emotions but bring peace and even reform the bad within society. Unlike Industrial progress, whom he often criticized for separating humans from nature, Nature provided a source of truth and wisdom. His poems often depicted birds, flowers, rivers, and landscapes, not simply as things of beauty, but as friends and teachers who present greater truths of life and the soul. As he famously writes in his poem, “*The Tables Turned*”.

“Come forth into the light of things,
Let Nature be your teacher”.

Here, in these powerful lines, Wordsworth places Nature over books and formal learning. For him, the teachings of the natural world, its harmony, simplicity, and strength are richer than human knowledge. He suggests that through the appeal to Nature, people can cultivate not only intellectual understanding but also spiritual depth and moral conviction. Nature, in

Wordsworth's eyes, is thus a teacher of the heart and mind, guiding human beings towards wisdom and harmony with the world.

Nature, to William Wordsworth, is not just a background or a pleasant setting in his poems, but the very essence of his poetry. He sees nature as a living force that directs human beings, comforts them in times of mourning, and teaches them moral lessons. For him, nature is like a teacher, a mother and even a divine being who can guide human beings towards the divine. Rather than looking to material wealth or society for meaning, Wordsworth looks to fields, flowers, rivers, mountains, birds, and even small creatures like butterflies. He feels that Nature is speaking a language that people can learn to hear if they let their hearts be open. This is why in so many of his poems, ordinary natural things like a daffodil, a butterfly, a primrose are made such mighty symbols of joy, wisdom, and peace. Nature, in his imagination, not only gives beauty but also shapes character, heals sorrow, and reminds people of the deep connection they have with the world itself. For Wordsworth, the role of Nature is to guide human life, to inspire imagination and to remind us that true happiness is not found in wealth or material possessions but in living near the natural world. In his poem, "The World is Too Much with Us", he describes,

"This sea that bares her bosom to the moon;
the winds that will be howling at all hours".

These lines show how nature is alive, powerful and eternal, yet people fail to appreciate it. This shows how human beings lose something essential when they ignore the majesty of the natural world. At the same time, Wordsworth is criticizing human beings for their turning away from this beauty and giving their attention to materialism and industry. This reveals how human beings lose something essential when they ignore the majesty of the natural world. Nature continues to show its power and beauty, but individuals stay busy in their own selfish pursuits and cannot recognize it. In this poem, "Lines written in Early Spring", he says,

"Through primrose tufts, in that green bower.
The periwinkle trailed its wreaths."

Here the flowers represent innocence and peace, blooming quietly and happily. Wordsworth is not simply admiring flowers, he is holding up nature as a

mirror to humanity. The flowers' gentle growth and quiet unity reminds one of what society could be if it chooses cooperation over conflict. Yet, instead of following nature's example, people often scar the world through war, greed, or exploitation of the environment. Wordsworth's sadness seems timeless, because even today, despite knowing better, we continue to disturb the harmony that nature offers freely. In "Daffodils", Wordsworth describes,

"A host of golden daffodils;
Beside the lake, beneath the trees
fluttering and dancing in the breeze".

The daffodils here are more than just flowers; they become companions to the poet, offering joy and a sense of belonging. This shows how nature is not only visually beautiful but also spiritually uplifting, nature acts as the friend who rejuvenates the life of being, it restores the mind and soul. Even when the poet is away from the scene, the memory of the Daffodils continue to lift his spirits, showing that nature has a lasting, comforting presence. This reflects a deeply personal truth: moments spent in harmony with the natural world can become a source of strength and peace, helping to navigate the stresses and sadness of human life. Nature, in this sense, is a healer, reminding us that serenity and joy are available if we pause to notice and appreciate it. In "To a butterfly," Wordsworth captures that delicate beauty of nature and its transient but valuable character through the delicate image of a butterfly resting nearby. The poet's gentle appeal,

"stay near me—do not take thy flight!
A little longer stay in sight!"

expresses a wish to preserve a brief moment of natural loneliness. The butterfly becomes symbolic of transience – or reminder that the most delicate expressions of beauty in nature tend to pass away quickly. Nature in this poem is an emotionally complex presence, evoking tenderness and still reflection, and reminding us of the innocence of childhood that such images can evoke. The poem implies that natural beauty cannot be owned but must be perceived with awareness and gratitude. The butterfly's short visit reflects how life's loveliest moments are often the most fleeting, but still linger in our minds and enrich our inner lives. We learn that even exposure to nature

can promote peace and spiritual refreshment if we realize it to the fullest. Through this Wordsworth celebrates the enduring power of nature to uplift and restore the human spirit. In “The Table Turned,” Wordsworth emphasizes that nature is the best teacher, offering wisdom far beyond what books or formal learning can provide. He states,

“Come forth into the light of things,
let Nature be your teacher”,

Nature is presented here as a living guide whose teachings are direct, experiential, and very significant. In contrast to restricted study, which tends to restrict knowledge to theory, nature involves all the senses, learning patience, observation, and perception through direct experiences. The poem highlights the healing and spiritually and enlightening function of nature, showing that time spent outdoors refreshes the mind, awakens emotion, and inspires reflection. We are reminded that even brief encounters with natural beauty like the song of a bird, the movement of a stream, or the movement of leaves can bring clarity and joy that are not available in books alone. Nature, in Wordsworth’s imagination, supports knowledge, enriches the spirit and returns us to the world on terms human education generally cannot. In “Written in March”, Wordsworth praises the renewal and resilience of nature, portraying it as a living force that overcomes human interests and intellectual pursuits. He describes how

“The cock is crowing,
The stream is flowing
The small birds Twitter,
The lake doth glitter,”

using lively imagery to capture nature awakening after the stillness of winter, filled with sound, activity, and light. The landscape echoes the infinite cycle of rebirth and life, showing nature remains strong despite human anxieties or achievements. Through this vivid portrayal, Wordsworth is able to express that wisdom is not in intellectual striving but in the understanding and appreciation of nature’s limitless energy. While human knowledge tends to isolate us from innocent pleasure, nature instructs in renewal, patience, and faith. Even after hardship or decay, nature renews itself with subdued strength and beauty, teaching a strong lesson that harmony and renewal do not come

from thinking but from living in tune with the natural world. In “Three Years She Grew in Sun and Shower”, Wordsworth depicts nature as a molding and directing power in human existence, illustrating how deeply human development is connected to the natural world. The poem begins,

“Three Years She Grew in sun and shower,
Then Nature said, A lovelier flower
on earth was never sown,”

where Nature, as guardian and educator, personified, takes claims over Lucy as her own creation. By doing this, Wordsworth is implying that proper development and innocence are the result of no human oversight but if the power of nature to nurture. The natural world is a moral and emotional compass, shaping Lucy’s character in harmony with its soothing beauty. In parallel, the poem also portrays nature as symbolic of harmony between humans and nature, as Lucy becomes inseparably linked to the landscape. Her soul merges with mountains, meadows, and streams. This image reflects Wordsworth’s belief that human life achieves its fullest meaning when it moves in rhythm with nature’s quiet order.

The human and nature relationships, as it appears in Wordsworth’s poetry, are one of deep emotional and spiritual connection. According to him, nature and human are bound together through a living bond, each reflecting and influencing the other. Nature, for him, is not lifeless or separate from people, it contains a soul that speaks to the human heart. When people open their hearts to its beauty and simplicity, nature awakens their emotions, refines their thoughts and brings peace to their restless minds. Wordsworth realized that human beings often forget this sacred connection, losing themselves in material desires and intellectual pride. But by coming back to nature, one can regain purity, calmness, and moral strength. Nature becomes a silent companion, sharing human joys and sorrow, and a reminder of the world’s divine order.

In his poem, “The World is Too Much With Us,” Wordsworth laments that disconnection of humanity from nature, criticizing materialism. He describes-

“Getting and Spending, we lay waste our powers;
little we see in Nature that is ours,”

Here, he shows how industrial greed has dulled human sensitivity to the natural world. The poet longs for a renewal, hoping to be “a pagan suckled in a creed outworn,” so he could still feel divine presence in nature, highlighting the loss of spiritual communion. In “Lines Written in Early Spring,” he contrasts nature’s harmony

“Through primrose tufts, in that green bower,
The Periwinkle trailed its wreaths,”

with the moral degradation of mankind, lamenting that “what man has made of Man.” Here, Nature represents purity and divine order, while humanity disrupts it, but its beauty remains restorative and spiritually uplifting. In “Daffodils,” Wordsworth elaborates on the deep emotional connection between human beings and nature. When he sees “a host of golden daffodils,” their beauty fills his heart with joy and peace, and later, in solitude, the memory of the flowers brings him comfort and spiritual renewal:

“And then my heart with pleasure fills,
And dances with the daffodils.”

This shows how nature uplifts the human spirit and becomes a source of lasting happiness and inspiration. In “To a Butterfly,” Wordsworth finds in the creature’s delicate grace “stay near me – do not take thy flight!”, a symbol of fleeting yet precious beauty, capturing the tender transience of life and the poet’s childlike wonder toward nature. In “The Tables Turned,” he encourages leaving books behind for the wisdom of nature,

“Come forth into the light of things,
Let Nature be your teacher,”

emphasizing that nature offers more profound moral and emotional education than academic study. Similarly, in “Written in March”, celebrates the renewal and strength of nature,

“The cock is crowing,
The Stream is flowing,”

as a symbol of hope and cyclical vitality, surpassing dry human intellect. And lastly, in “Three Years She Grew in Sun and Shower,” Nature is both caregiver and guider. Nature said,

“A lovelier flower
on earth was never shown,”

shaping Lucy into balance with its rhythms, suggesting that human life reaches its fullest meaning when United with the natural world. Together, these poems establish that for Wordsworth, nature is not just a canvas against which human life is played out but a living, moral and spiritual power that can repair the breach between man and God.

Environmental concern is a central idea in William Wordsworth’s poetry, expressing his deep anxiety about the growing distance between human beings and the natural world. In his view, nature is not just a source of beauty and comfort but the origin of moral and religious life too. While human beings neglect or misuse nature, they disconnect themselves from the simplicity and purity that feed the human soul. Wordsworth realized the devastation of nature as the loss of humanity’s inner harmony, warning that greed, industrialization, and materialism undermine our connection to the living earth. By his poetic vision, he sought to awaken sensitivity and respect for the natural world, urging us to realize that each aspect of nature like the sky, rivers, trees, and even the smallest living things possesses its own spirit and significance. His concern for the environment was both emotional and ethical; he believed that nature had to be conserved for the conservation of human virtue.

In “The World is Too Much with Us,” Wordsworth mourns humanity’s material obsession

“Getting and Spending,
we lay waste our powers”

which is the exploitation and neglect of the natural world. The words

“This sea that bares her bosom to the moon;
The winds that will be howling at all hours,”

give voice to the living force of nature that humans have lost touch with. This shows Wordsworth’s understanding of how industrialisation cuts the emotional and spiritual links with the earth. In “Lines Written in Early Spring,” Wordsworth celebrates nature’s harmony, “Through primrose tufts, in that green bower” – but does bemoan, “Have I no reason to lament/what man has

made of man?" suggesting that human moral and environmental corruption are the two sides of the same coin. In "Daffodils," the lines, "A host of golden Daffodils;/ Beside the lake, Beneath the trees," is a source of joy and spiritual rebirth, emphasizing the way immersion in nature elevates human spirit and promotes a sense of harmony with the world. In "To a Butterfly," William Wordsworth values the delicate insect by saying, "stay near me – do not take thy flight!" as a symbol of the delicate balance of nature easily disturbed by human infusion, emphasizing the need for gentleness and preservation. In "The Tables Turned," the call "come forth into the light of things,/ Let Nature be your teacher," Wordsworth calls for a return to nature's wisdom against man – made learning and material progress that destroy both spirit and environment. In "Written in March," celebrates natural renewal. The lines "The cock is crowing,/ The stream is flowing," presenting the strength and resilience of nature as an encouraging alternative to human indifference, reminding readers to the earth's enduring vitality and In "Three Years She Grew in sun and shower," nature personified declares, "She shall be sportive as the fawn," illustrating its strength to form and balance human life. Here, the harmony of Lucy and nature represents an ideal ecological balance of human beings in reverence and reciprocity with the natural world.

William Wordsworth's poetry describes Nature as a living presence, moral guide, spiritual renewal, and emotional comfort. In poems like "The World is Too Much with Us," "Lines Written in Early Spring," "Daffodils," "To A Butterfly," "Written in March," "The Tables Turned," and "Three Years She Grew in Sun and Shower," he depicts Nature as a teacher and friend who forms human thought, feeling, and character. Wordsworth held that nature has more profound lessons than books or intellectual study, which cultivate purity, patience, and wisdom in those who enjoy its companionship. He mourned humanity's growing separation from nature brought by industrialisation and materialism, warning that this distance leads to moral and spiritual decay. Yet, his writings also celebrate nature's sustaining energy and the ability to cure, demonstrating that peace and harmony could be attained when human beings dwell in proximity with the outdoors. Through his deep reverence for Nature, Wordsworth not only refined its purpose within literature but also emphasized its timeless impact on the human mind.

Conclusion:

William Wordsworth's poetry stands as a timeless testament to the sacred bond between humanity and Nature. Through his lyrical vision, he transforms the natural world from a mere backdrop into a living, spiritual force that educates, consoles, and elevates the human soul. His works, such as "The World is Too Much with Us," "Lines Written in Early Spring," "Daffodils," "The Tables Turned," and "Three Years She Grew in Sun and Shower," reveal his conviction that Nature is the ultimate moral guide and a source of purity and truth. Wordsworth's ecological consciousness anticipated many of the environmental concerns of the modern age, warning against materialism, industrial exploitation, and the growing alienation of humans from their natural surroundings.

Through an ecocritical lens, Wordsworth's poetry teaches that the preservation of Nature is inseparable from the preservation of human virtue and spirituality. His poetic philosophy advocates simplicity, reflection, and a return to the rhythms of the natural world as pathways to inner peace and ethical living. The Romantic ecology he envisioned thus continues to resonate in contemporary environmental discourse, reminding readers that reconnecting with Nature is not only an aesthetic or emotional act but a moral necessity. Wordsworth's enduring message—that true wisdom lies in living in harmony with the earth—makes his works profoundly relevant in today's age of ecological crisis and spiritual disconnection.

References:

Abrams, M. H. *The Mirror and the Lamp: Romantic Theory and the Critical Tradition*. Oxford University Press, 1953.

Bate, Jonathan. *Romantic Ecology: Wordsworth and the Environmental Tradition*. Routledge, 1991.

McKusick, James C. *Green Writing: Romanticism and Ecology*. St. Martin's Press, 2000.

Wordsworth, William. *Selected Poems*. Edited by Stephen Gill, Oxford University Press, 2013.

Wlecke, Albert O. *Wordsworth and the Sublime*. University of California Press, 1973.

From Harmony to Exploitation: Humanity's Triple Role in the Anthropocene through Two Indian Novels

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Abstract

Derived from the Greek word 'anthropos', meaning 'human', the concept of the Anthropocene is that the present world has evolved into one where humans dominate over nature and use it as per their convenience. It has caused nature much harm and made the balance of nature unstable. Literature is the reflection of society. In fact, if one seeks to understand the context and history of a particular age or epoch, the literature produced in that time line would act as a window to observe the workings of the society, their cuisine, the economic and the socio-political scenarios, and even the major trends and fashion of the time. Therefore, in an age where environment and its preservation have become a primary concern of the leading countries of the world, it is inevitable for literature not to be created on this concept. There are various fictions and non-fictions featuring various aspects of the Anthropocene. For this paper, the two texts chosen are *Bitter Wormwood* by Easterine Kire and *O My Beloved River* by Kanseng Shyam. The purpose of choosing these two novels is because both the novels, through their fictional characters and their bond with nature, depict three roles into which humans fit into in the present Anthropocene scenario of the Earth- the cause, the victim and the witness. It is humans who, for their own selfish desires, devastate nature and exploit the resources.

Keywords: Anthropocene, nature, humanity, literature, Earth.

Discussion

The term 'Anthropocene' is now firmly embedded in earth science literature. Introduced by Paul Crutzen, it is used to refer to a new geological epoch characterized by the increasing human impact on Earth's geological, biological and climatic systems. Following the Holocene, the epoch which is gaining more focus of critics, climate enthusiasts and writers is the

Anthropocene. Derived from the Greek word ‘anthropos’, meaning ‘human’, the concept of the Anthropocene is that the present world has evolved into one where humans dominate over nature and use it as per their convenience.

The core concept that the term is trying to capture is that human activity is having a dominating presence on multiple aspects of the natural world and the functioning of the Earth system, and that this has consequences for how we view and interact with the natural world—and perceive our place in it. (Mahi 78)

Human activity on Earth has turned so destructive that the entire natural world is at stake. Ironically, the beings which would face the brunt of its damage is the human race itself. The 21st century has witnessed changes in climate and the melting of the glaciers, which are red alerts for what is to come in the future if humans continue to exploit the natural resources for the fast-paced modern life. What will be left for our future generations will be nothing but a barren land where even the fresh air we breathe might become scarce and poisonous. These concerns have sparked literary experimentation by various writers who seek to inform the masses of the dangers of human exploitation through their fictions and non-fictions.

Literature is the reflection of society. In fact, if one seeks to understand the context and history of a particular age or epoch, the literature produced in that time line would act as a window to observe the workings of the society, their cuisine, the economic and the socio-political scenarios, and even the major trends and fashion of the time. Therefore, in an age where environment and its preservation have become a primary concern of the leading countries of the world, it is inevitable for literature not to be created on this concept. There are various fictions and non-fictions which highlight various aspects of the Anthropocene. For this paper, the two texts chosen are *Bitter Wormwood* by Easterine Kire and *O My Beloved River* by Kanseng Shyam. The purpose of choosing these two novels is because both the novels, through their fictional characters and their bond with nature, depict three roles into which humans fit into in the present Anthropocene scenario of the Earth- the cause, the victim and the witness. It is humans who, for their own selfish desires, devastate nature and exploit the resources. Thus, humanity is witnessing the melting of glaciers, the rise of the water levels, the loss of important plants

and animal species, the increase of greenhouse gases, climate change and the depletion of the ozone layer. Furthermore, older generations of humanity, born at an age when man was not a slave to technology and the modern advancements, become witness to the sad reality of how humans themselves have destroyed mother nature. This paper shall, thus, analyze how these two selected texts portray the triple role that humans blend into in the present epoch of the Anthropocene.

Mose was born in 1937. No one knew the date but it was in late September just as the fields were being readied to be harvested. His mother, Vilaü, was in the fields, tying together the stalks of ... She tried to continue working, but the pains came again and intensified. Their field was an hour and a half away from the village, so the young mother birthed her son in the field shed.

Vilaü's mother-in-law, Khrienuo, helped her to wash the infant with a little water from the stream." (Kire 190)

Thus begins the first paragraph of the book *Bitter Wormwood* by Easterine Kire, highlighting the bond of human beings with nature. When technology was not so far advanced as we see in the present 21st century, people worked with their own limbs in the fields. They toiled hard, sowed seeds themselves, ploughed using animals and harvested the crops. They did not rely on the modern methods of agriculture and scientific pesticides to keep away insects. Instead, it was all left to the mercy of the gods. "Harvest-time was such a crucial time and if there was a sudden storm the grain could fall off the stalks and be lost" as the writer states. The serene bond of humans with nature and free spirit that this life provides is in stark contrast with the confined structure of modern school education, a fact highlighted in *O My Beloved River* by Kanseng Shyam in very first chapter. The protagonist of the text, Kurfuk, feels more like the mouthpiece of the river Nulfulu, rather than a human. It is as if the river itself is narrating her story through the character and describing its transformation through the ages.

In both joy and sorrow, the village remained united, each household playing its part. They engaged in community fishing, hunting, sporting, and worked together during cultivation and harvest seasons. Life was harmonious. (Shyam 153)

The traditions, the local songs, the prayers, the birth rituals and even the final rites of the dead are performed in sync with nature. Nature was treated as something sacred, and humans lived in perfect harmony with it. The second chapter of *Bitter Wormwood* is named “The Tree Ritual”, referring to the tree that was to be selected for the gate of their clan. Unfortunately, Mose’ father dies while felling the tree and thus, the tree is abandoned as it became taboo to use that tree. For Kunfuk’s tribe, it was a ritual to bathe the newly born in the Nulfulu river “welcoming the baby into the tribe, into the rhythm of nature, and into the protection of the sacred water (Shyam 1461). The river also believed to serve as a “conduit between life and death, a link between the physical and spiritual realms (Shyam 1471) and the elders would chant their prayers while the dead were bathed with utmost care in the Nulfulu river.

However, as the modern way of life invaded these tribes, the sacred bond between human and nature began to dwindle. Even the ones like Kunfuk, who wanted to live like the earlier times, had to accept the fact that his children were born into a time that needed education in schools and degrees. They needed skills different from those that Kunfuk possessed. Gathering herbs and vegetables from forests, swimming and fishing, such skills were not enough for their children to create a living. While they were learning more things in schools, they were losing the link with their old traditions and customs that were intricately linked with the river or nature in general. Modernity brought with it the destruction of the natural world. Humanity started becoming the cause or the reason for the destruction of the harmonious bond between nature and itself.

... fueled by changing times and the promise of modernity, meant that the remaining patches of forest were cleared to make room for new households and agricultural fields. The land that once belonged to the forest was now filled with homes, paths, and farmland. Even Kunfuk’s home, once surrounded by lush greenery, was now in the midst of a growing settlement. The seasons still came and went, but they no longer carried the abundance they once had. (Shyam 460)

The discrepancies that appear between the bond of humans with nature with the advent of time and advancement of human science is evident in the

chapters of both the texts. Furthermore, the contrast between the bond between nature and human beings and the bond among human communities is crystal clear. Kire's *Bitter Wormwood* mostly focuses on the Naga insurgency that took place in Indian history. However, there are also various scenes in the book which can be interpreted depicting the contrast between the harmonious relationship between nature and humans, as opposed to the violent and negative relation between humans and humans. As the novel begins, Mose is birthed in the lap of nature in the fields. However, later in the novel, innocent Khrienuo, the grandmother of Mose, is killed in the fields by Indian soldiers. The destructive nature of human beings- slaughtering each other to show power and dominance- is in stark contrast to the nurturing nature of the mother Earth. In *O My Beloved River*, when Kurfuk's tribe realized that they would get a huge amount of money by selling their land, as it was close to the oil mining grounds, readily agreed to it. The prospect of attaining easy money and a new life in the town was too tempting for them to resist. No one seemed to care for the natural destruction of the land. The river and nature fed them, raised them and it gave them their identity. However, humans forget it and take nature for granted. The new and luxurious way of life brought by technical advancements is irresistible for mankind. Even his own child wanted to sell his land.

...It is better we sell it now, make some money, and move to the city. A new era, a new beginning in life can be ours there. We can be part of the modern world, Father.

Kurfuk's mind raced. How could his own flesh and blood, Prukok, the one who had played by Nulfulu, who had run through the fields with his brothers, want such a thing? To turn their back on the land, to erase the stories of their ancestors from the soil that had cradled them for generations. (Shyam 810)

In both texts, the invasion of modernity, human greed for power and money reflects how far science and the human mind has conquered in this world, but at the cost of nature. Humans are the reason that the harmony of the God gifted world is destroyed and polluted. Both texts represent this nature of human beings- the cause or the reason for the destruction, exploitation and pollution of nature.

However, it is ironical that although humans are destroying nature, the ultimate victims of this exploitation will be Man himself. Intertwined with

war, political conflicts and the erosion of traditional way of life, Kire's *Bitter Wormwood*, highlights how the peaceful life of their community was disrupted by the politics of human beings where people were spiritual lived with customs, traditions and considered the land, rivers and hills sacred. But the soldiers killed these innocent people in their own fields, turning the sacred into a sacrilege. This type of violation of the harmonious natural world through bloodshed, war, deforestation is not just physical, but a spiritual violation. Mose's tribe and their identity is linked to their landscape, and by destroying it, the soldiers destroy the villagers' culture and their identity. The sad reality of today's world is witnessed in Kunfuk's words:

Kunfuk laughed and cried simultaneously when he saw people buying plastic containers of water. The sight felt surreal; a cruel reminder of how far his Mangpu had come from the days when water flowed freely from the river and wells. The laughter bubbled up from deep within him, but it was hollow, tinged with bitterness. (Shyam 574)

Kunfuk's tribe drank water from the river Nulfulu. The river also gave life to the animals and plants in the forest. The tribe never had to worry about getting nutritious food or clean water. They had the Nulfulu river. However, with the discovery of oil in the area, people started selling their land and the trees were cut down to make way for factories and buildings- "a bustling hub of industrial civilization" (Shyam 1164). The river was turned into a water park and littered with plastic bottles and other garbage, while the cutting down of the forest made many species of animals flee. Apart from losing the fresh herbs and plants that the people lost by selling away their land, the Tringyu tribe also sold away their own identity. The people chose "chosen comfort over legacy, wealth over memory" (Shyam 908). Both the novels, thus depict how it is humanity which ultimately has to suffer the brunt of their own misdoings.

The two texts establish a clear contrast between an initial pastoral ideal and a subsequent ecocalyptic reality. The opening of *Bitter Wormwood* sets a pastoral scene with Mose being born in the fields and washed with stream water, demonstrating a life "in sync with nature" where traditional communities worked the land harmoniously. Similarly, the traditions of Kunfuk's tribe—from birth rituals in the Nulfulu river to community life tied

to cultivation—depict nature as sacred and life-sustaining. However, the narrative shifts sharply into the ecocalyptic, marked by destruction. The polluted Nulfulu river, once a sacred source of life, is turned into a garbage-filled water park, while the cutting down of forests leads to the flight of animals and scarcity of clean water. The texts, therefore, function as a crucial warning, charting the transition from a symbiotic existence to an inevitable environmental collapse fueled by human greed and technological advancement.

Another important reflection on these two novels is how the writers portray humans as the ones who play the role of the witness to the changes human activity brings to the natural world. If Nature is personified, then Mose and Kurfuk, and also their heirs become the mouthpieces through which nature seems to narrate its tale. Mose's life began in a setting where nature was the primary source of their livelihood, be it the crops in the fields or a squirrel from the wild. They respected nature, as seen in case of 'genna day', when no one goes or works in the fields as they believe it displeases the spirits. Kire, using frame narrative to incorporate different narrators' perspectives, narrates the changes in Nagaland—how the villages and clans changed over time into colonies and populated cities. Forests, where it was once believed were dwelling places for evil spirits, were then used by refugees and youths of the Underground (Naga rebel organization) seeking safety, and eventually became polluted with bloodshed after Indian soldiers hunted them down there. The conflict in Nagaland, including constant wars, the laying of new roads, and the intrusion of technical and developmental activities, directly disturb the environment. The beautiful Naga Hills, long rivers, trees, wild animals, and medicinal herbs are ruined by deforestation, contamination, and a resulting ecological imbalance. Mose's life traces the history from a peaceful, traditional village life - in harmony with nature - to one marred by violence and political upheaval.

The paper's central argument that humans "dominate over nature and use it as per their convenience" directly opens the door for analysis through Deep Ecology. This theory fundamentally challenges anthropocentrism—the belief that humans are the centre of existence and all of nature is merely a resource to be exploited.

The Deep Ecology movement is a philosophical and political perspective that emerged in the 1970s as a response to the growing

environmental crisis. This essay will explore the historical and ideological origins of the Deep Ecology movement, examining its key influences and ideas, as well as its significance and impact on environmentalism and society at large. (Mohmmadi)

This theory fundamentally challenges anthropocentrism—the belief that humans are the centre of existence and all of nature is merely a resource to be exploited. The traditional life in both novels, characterized by rituals like the tree selection in *Bitter Wormwood* and respecting the river’s rest in *O My Beloved River*, reflects a non-anthropocentric worldview where nature holds intrinsic, sacred value. Modernity, however, brings with it a destructive anthropocentric shift, highlighted when Kunfuk’s own son chooses “a new beginning in life” in the modern city over the ancestral land and its stories. This greed for money and the “luxurious way of life” demonstrates the core conflict: the failure to realize that the “Earth belongs as much to the other animals and plants as to us”, leading to the destruction of the fragile connection with nature. The ultimate suffering of humanity, as the “victim” and “witness”, is the tragic consequence of this failure to recognize the intrinsic value of the non-human world.

The two texts can be analyzed from a Post colonial ecocritical lens as well. In *Bitter Wormwood*, the violence of the Naga insurgency is not merely a human conflict but an ecological violation. The same fields that were the birthplace of Mose and the source of livelihood are desecrated when his grandmother, Khrienuo, is killed there by soldiers, contrasting the “nurturing nature of the mother Earth” with the destructive nature of humanity. This political conflict directly results in environmental degradation through deforestation, contamination, and ecological imbalance as the beautiful Naga Hills are ruined by developmental activities and war. Furthermore, in *O My Beloved River*, the temptation to sell land for oil mining and move to the city reflects how global resource-driven economies perpetuate the exploitation of indigenous lands, causing the tribes to lose their identity by choosing “comfort over legacy, wealth over memory”. The environmental destruction is thus inseparable from the history of political and economic subjugation.

In Kunfuk’s Tringyu tribe, they considered the river Nulfulu sacred and did not cross the river at night, respecting it to let the gods rest. “If you take from the river when it sleeps, it may not give again when it wakes”

(Shyam 1569) advised the elders. If it was extremely necessary, the tribe's priest, Zawuraq, performed a ritual, offering a prayer and asking for a safe passage. Kunfuk recalls how he played in the river as a child, the lush greenery surrounding it, the animals that survived on its water. He also recalls the time when the river raged and swept away the village and also the times when it provided them the best of harvest. However, he also reminisces how with the passing of time modern techniques started replacing the old customs. He nostalgically recalls his childhood and the loss of the community life before the city.

The Nulfulu was no longer the mighty force that had once shaped their lives. But it was hard to let go of the memories, the smell of fresh fish caught from the river, the joy of watching the children swim and fish, the sense of connection with nature that seemed to be slipping away with every passing year. (Shyam 524)

It is also through Kunfuk that the reader gains hope of the river Nulfulu's revival, which ultimately does occur. It is as if the Nulfulu river, although it gave up on humans who forgot all that the river had given it when money blinded them, revived itself just for people like Kunfuk who never gave up on it. Kunfuk carried his tribe's tradition, oral stories and songs and passed it on to his grandchildren.

Like the river, I will eventually disappear, and all that will remain are the stories. But those stories, my dear ones, are more than just memories. They are the echo of what we left behind, what we have lost, and what we must still protect. (Shyam 146)

His tales were key factors in helping the youth organizations that fought for the preservation of Nulfulu river. The emotional bond that he shared with the river ultimately fueled and ignited the spark in his son and the youths to keep fighting for the environment- for the river Nulfulu. The readers, through Mose and Kunfuk, and their offsprings, experience the changes that their homelands undergo due to human interference with nature. Thus, they become witness and mouthpieces of nature itself and its story. This role of humans as a helpless witness stuck between the dilemma of accepting the new changes that although are hazardous, but necessary, and the want to preserve the old ways of community life is highlighted by Kire and Shyam in their texts.

Conclusion:

Analyzing both *Bitter Wormwood* by Easterine Kire and *O My Beloved River* by Kanseng Shyam makes the readers contemplate on which direction the world is heading towards. Human interference is not always beneficial for the natural world and at times it breaks the pure bond that humans were supposed to share with nature. The world is not for humans to dominate over. The Earth belongs as much to the other animals and plants as to us. Humanity needs to realize this, or else we lose the fragile connection with nature. The two texts reveal how humans first become the cause of destruction, but ultimately it is they who suffers from a loss of identity and culture because of this exploitation of nature. Unless and until humans take responsibility for their actions, they shall become mere witnesses to the destruction that the future awaits. Sustainable development is essential for the survival of humanity in the future.

References

Primary Sources

Kire, Easterine. *Bitter Wormwood*. Zubaan, 2011.

Shyam, Kanseng. *O My Beloved River*. Parth Prakashan, 2025.

Secondary Sources

Crutzen, Paul, and Eugene Stoermer. "The Anthropocene." *Global Change Newsletter*, no. 41, May 2000, pp. 17–18.

<http://people.whitman.edu/~frierspr/Crutzen%20and%20Stoermer%202000%20Anthropocene%20essay.pdf>
Accessed on 2 Nov 2025.

Malhi, Yadvinder. The Concept of the Anthropocene. *Annual Review of Environment and Resources*, 11 Sept 2017.

<https://doi.org/10.1146/annurev-environ-102016-060854> Accessed on 1st Oct 2025.

Mohammadi, Vahid. "Challenging Anthropocentrism: The Emergence and Ideology of the Deep Ecology Movement". *Medium*, 2023.

<https://medium.com/@BridgePost/challenging-anthropocentrism-the-emergence-and-ideology-of-the-deep-ecology-movement-1382175ac65a>
Accessed on 14 Oct 2025.

Eco-Critical Perspectives on Mary Shelley's *Frankenstein*

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“There is something infinitely healing in the repeated refrains of nature—the assurance that dawn comes after night, and spring after the winter”

-Rachael Carson

Abstract: Mary Shelley's *Frankenstein* (1818) has traditionally been read through the lenses of Gothic fiction, Romanticism, and scientific transgression; however, an ecocritical perspective reveals the novel as an early and prescient meditation on humanity's fraught relationship with the natural world. Set against the sublime landscapes of the Alps, the Arctic, and pastoral Europe, *Frankenstein* foregrounds nature not merely as a backdrop but as an active force that mirrors, resists, and responds to human ambition. This paper explores how Shelley critiques anthropocentric notions of mastery over nature through Victor Frankenstein's obsessive pursuit of scientific knowledge, which results in ecological and moral imbalance. The act of artificial creation disrupts natural processes of life, reproduction, and kinship, anticipating modern anxieties surrounding environmental exploitation and technological overreach. By situating *Frankenstein* within contemporary ecocritical discourse, this study argues that the novel offers an early critique of ecological irresponsibility and foreshadows present-day concerns of the Anthropocene. Ultimately, *Frankenstein* emerges as a cautionary tale that underscores the ethical necessity of harmony, responsibility, and respect in humanity's interaction with the natural world.

Keywords: Anthropocentrism, Ecocriticism, Nature, Romanticism, Scientific Hubris

Introduction:

Nature and environment always occupies a predominant space in literature, not solely as an overpowering teacher but as a guide and source of wisdom. Throughout all cultures and ages writers and poets have always

used Nature as a central agent to explore and express human emotions, moral truths, experiences and philosophical ideas. Nature works as a mirror reflecting human being's experiences and at the same place it reflects the harmony, resilience and the consequences of human actions. Ancient myths, which represent natural things carrying symbolic meaning to Romantic writers and poets depicting environment as spiritual awakener to ecological writers, that emphasize environmental responsibility, Nature bears a resemblance to a powerful teacher, shaping human consciousness. By portraying Nature in its grand form, as a mentor, literature reminds us to make balance, have patience and have respect towards it. Nature and human life are deeply intertwined.

Eco-Criticism and Literature:

Over the past few decades, literature has progressively been studied through different and interdisciplinary standpoints that go beyond traditional methods of interpretation. Among these standpoints, "Eco-Criticism" has turned up as a significant and intriguing field of study. "Eco-criticism", sometimes referred to as "literary ecology" or "green-criticism" focuses on exploring the sinuous relationship between literature and the natural environment. Eco-criticism explores how nature, landscapes, ecological concerns, environmental crises and all other aspects of nature are presented in literature and how these representations bring psychological effect and shape the attitudes of beings towards Nature. In other words, eco-criticism bridges the gap between the world of literary studies and ecological awareness. It underscores that literature cannot be created in separation or isolation from the natural world, as its origin is from the Natural itself. Eco-criticism explores and studies how poets and writers use language and imagination to engage with environmental issues. As human beings face global issues like climate changes, deforestation and environmental degradation, eco-criticism makes a way to explore literature not only through artistic point of view but also as a text that reflects human beings' relationship with Nature.

The term "Eco-criticism" was first widely used in the 1970 and 1980s. William Rueckert, who is credited with coining the term in 1978, described it as "The application of ecology and ecological concepts to the study of literature." Another major eco-critic, Lawrence Bell, in *The Environmental Imagination* (1995) said that "Eco-criticism is a study of literature and environment conducted in a spirit of commitment to environmental praxis."

These definitions show that eco-criticism is about promoting awareness and responsibility of human beings towards the natural environment.

Western Literature includes eco-critical perspectives in their works, for example William Wordsworth's "Lines written a Few miles above Tintern Abbey" (1798) or Mary Shelley's *Frankenstein*, which emphasizes that beauty, spirituality, the power of nature, challenges of industrialization and its impact like alienation of human beings from the natural world. Mary Shelley's *Frankenstein* presents both the beauty and terror of nature, as well as the dangers which humans have created by trying to interfere in the natural cycle of beings. Indian Literature as well has always given a prominent role to Nature through spirituality. The ancient Vedas and Upanishads always described the greatness and sacredness of natural objects like flowers, rivers, trees, animals etc. Poets like Kalidasa, celebrated natural beauty in works like *Meghadutta* and *Ritusamhara*.

Both Western Literature and Indian Literature, acknowledge that literature is not only about stories or poems, it is also about our surroundings, our environment. Western Literature shows Nature as a voice of conscience, a mirror to human ambition and a plea for balance in the age of technology. Indian Literature gives its own touch, through cultural traditions where rivers are worshipped, animals are guardians and earth itself is divine and sacred.

Nature in Mary Shelley's *Frankenstein*:

Mary Shelley's *Frankenstein* (1818) is more than a parable of scientific ambition and tragic downfall- it is also an evocation of humanity's relationship with the natural world. Eco-criticism, a modern critical approach that studies literature in relation with environmental concerns, emphasizes the readers to read *Frankenstein* not just as a Gothic narrative but also as a story where Nature plays a huge role as a teacher, healer, and moral guide. The novel's main storyline is about Victor Frankenstein, a young scientist who is driven by an unquenchable desire for gaining unconventional knowledge, creates a being, who was brought to life from death. The novel is also given a second title as "Modern Prometheus" as Victor is over ambitious and faces his downfall due to his same attitude towards life. His own creation, ambition, quest for reaching to a point where nobody ever made, brought his downfall in the end. Both Victor and his creation had to go through lots of ups and downs, alienated themselves from society, family and were forced to face the consequences of Victor's unchecked ambition, ignorance and lack of

responsibility. Victor can be seen as a scientist as well as a being from the industrial revolution era, representing the restless spirit of the early nineteenth century. As a scientist, he represents humanity's thirst for knowledge, power, superiority, which includes disrupting the boundaries of the natural cycle of creation and destruction. Victor mirrors the industrial mindset, efficiency, innovation, discovery and control over nature. Just like machines in an industry he creates something new from fragmented body parts, stitched and attached together and giving it a life and bringing into existence from death.

In the novel, Shelley has given Nature a prominent role as a teacher, a constant source of solace and a force of restoration for Victor Frankenstein, equiposing his obsession with Science, discovery, invention and all other industrial ambition. While Victor is portrayed as a scientist, personifying the restless, industrial spirit of progress, Shelly consistently contrasts these moments with when nature provides him peace and guidance. Whenever Victor is overwhelmed with his restlessness and ambition, he automatically moves towards nature for solace, recovery and right direction, indicating that the natural environment possesses a healing wisdom that human innovation often lacks. As a guide, a philosopher, nature reminds Victor of all the limitations that humans have over nature and its continuous cycle, and the danger of violating nature's laws. After creating the creature, Victor goes through lots of hardships, suffers both mental and physical torment, yet it is the serene beauty of Alpine valleys that provides him strength and kind of re-charges his soul. He often seeks refuge in the natural landscapes, near the lakes, and rivers, and the majestic mountains provide him comfort. The places soothe his disconcerted and distressed mind, offering him peace that his success in creating a creature, his achievement in his ambition could never. Nature provided him harmony during the mess and chaos, even though the harmony was temporary, he was sufficiently relieved in nature. Nature is represented in light, joy and brightness, in contrast to the dark, suffocating and filthy laboratory in Victor's dormitory. The contrast symbolises the oppositeness of both the environments and the kind of energy it gives to Victor.

As we move forward, and explore more in the story line, we find that the role of nature in shaping the creature's nature and behavior is equally significant as Victor's. The Creature who has been abandoned by his creator after his birth and was rejected by all other human beings, at that point nature became a parental nurture to him. The rivers, mountains, forests, and the

changing seasons acted as his protector, teacher and guide. Nature shields him, instructs him and offers directions to him. In the absence of parental care and social integration, it was nature that provided the creature survival, knowledge, moral insights and sense of belonging.

From the moment of his creation, the creature is thrust into a hostile, malicious world, due to Victor's abandonment and negligence. Victor runs away in panic and fear, leaving his creation, his child in his condition without any guidance, care, nurture, or comfort. In this helpless and unshielded condition, Nature provided him the first refuge. The woods shield him from the cruelty of humankind, the leafy canopy and shadows provided physical protection from the sun, rain and people's eyes, while the streams and fruits sustained his body. When villagers drove him away with stones and hatred, nature again became his protector. The forest, in particular, acts as a womb. In eco-critical terms, Shelley portrays nature as an alternative caregiver that refuses to abandon the helpless. In winter, Nature protects the creature through fire-which he discovered accidentally. Here, fire acts as a protector from cold and predators, underscoring the eco-critical idea that Nature is not passive but offers ways and tools for survival whenever humans fail. Unlike Victor, who disrupts the natural laws, breaks the cycle of life and death, the creature accepts nature's gift with humility and dependence.

Nature's protection also amplifies beyond the physical form. The sublimity of mountains, lakes, forest and sky provides the emotional strength to the creature. When humiliated by the De Lacys, he moves back into the wild landscapes where grandeur absorbs his anguish. The Alps and the glaciers, in their immensity, provide him refuge from human cruelty. Through an eco-critical perspective, this shows that Nature has unlimited power to absorb all the negativity and trauma caused by humans in society.

For the creature, who received no guidance or instructions from Victor, Nature becomes the first and most enduring teacher. On a literal level, rivers and stars guiding his movements, streams carry him to new lands, and celestial bodies oriented him at night. Unlike Victor, whose journey has always been with twisted plots, because of his ambitious and industrial mindset, the creature always follows natural landmarks. Shelley has splendidly portrayed the inter-connection between human psyche and environment by mirroring the emotional state and the weather, the landscapes. Sublime landscapes mirror

his inner states; when he feels peace, blooming fields and spring blossoms reflect renewal; when consumed by rage, storms and lightning embody his fury. Focusing on the Creature's relationship with Nature, through eco-criticism, it reveals Shelley's prophetic awareness of human's dependence on and estrangement from the environment.

Transformation From Creature To Monster:

The creature's creation outside the natural order marks the first step in his transformation. As a being, assembled from different dead bodies from the grave and stitched altogether, he is born into a world that denies or does not accept someone like him. In the initial level, he was very much connected to Nature, he was innocent, he used to wander in nature and had feelings like sympathy, empathy and belongingness. But his attempt to find solace in the natural world was constantly thwarted by human beings' behavior, rejection and humiliation. Every time he tried to create a connection with people or ever tried to reach out to them, he was always responded with hate, violence, and horror. His experience with De Lacy's family and others gradually destroyed his innocence and innate goodness in him. Nature once protector, his refuge, gradually becomes a trauma, a reflection of his inner turmoil. The mountains, forests, rivers that once soothed him, now mirrors his isolation. The natural world was exact, and beautiful but after all of his experiences, the same nature feels different and exhausting. From an ecological perspective, this shift in the feeling about Nature marks a breakdown of the creature's ecological identity. He is no longer in harmony with Nature.

Victor plays a major role in the creature's descent into monstrosity. The novel does not merely narrate a story of an ambitious scientist and his experiments- but also represents a psychological and moral study of how ignorance, negligence, pride and lack of empathy can corrupt innocence. Victor succeeded in creating the creature, out of his ambition, a greed for discovering something unconventional. But instead of taking responsibility for his own creation, he cowardly flees away, he totally abandons his creation, who was unaware of this cruel world. This abandonment marked the creature's first experience of loneliness. Through this, Shelley exposes Victor's failure as both a parent and scientist. When the creature approaches Victor, requesting for understanding and companionship, Victor refuses his proposal. Victor acted as a false God, being deaf to the sufferings of his own creation. At this, the

creature warns him that if Victor continues denying him or his existence, he would destroy all of his loved ones. And Victor actually ends up losing all of his loved ones. The deaths are not mere acts of revenge but symbol of Nature's justice, punishing humans for tampering with its sacred order. After losing everyone, Victor becomes isolated, consumed by guilt and despair.

Conclusion:

In conclusion, from an eco-critical perspective, *Frankenstein* portrays Nature both as a nurturing and corrective force. Initially, for Victor, nature was a peaceful place for him to relax, to enjoy the beauty, he used to find solace in the sublime landscapes of the Alps and the serenity of lakes. But, once he violated nature by breaking its law and acting against it, from that point onwards, Nature turned drastically against him. Nature started mirroring his violations. Shelley represents Nature in a way where we can say that it reflects our own behavior and attitude towards Nature. If we are in harmony with Nature, it brings peace to us and if we try to break the natural cycle and harm Nature, it will definitely bring destruction to us.

References:

Primary Source:

Shelley, Mary. *Frankenstein; or, The Modern Prometheus*. 1818.

Secondary Source:

Glotfelty, Cheryll, and Harold Fromm, ed. *The Ecocriticism Reader: Landmarks in Literary Ecology*. University of Georgia Press, 1996.

Mellor, Anne K. "Possessing Nature: The Female in *Frankenstein*." *Romanticism and Feminism*, edited by Anne K. Mellor, Indiana UP, 1988, pp. 220–232.

Wawrzinek, Jennifer. *Ambivalent Structures: Representations of Identity in the British and European Romantic Tradition*. Rodopi, 2008.

An Ecofeminist Study of Ueda Akinari's *Tales of Moonlight and Rain*

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Abstract: It can be safely asserted that there have been substantial academic discussions and research on Ecofeminism and Ecofeminist texts in recent times. To analyse the interconnectedness between nature and gender, and their representation in literature sounds intriguing, and hence, one can see the growing interest. It has to be mentioned that these discussions have been limited to certain time and spaces. There appears to be a gap, which is narrowing the scope of Ecofeminism. This paper shall try to fill the void by taking a Japanese text, which is relatively old. It is not that Japanese texts have not been under the scanner of the Ecofeminist lens. Yet, they have again been limited to modern times and popular culture. This analysis shall try something new, by bringing in Ueda Akinari's *Tales of Moonlight and Rain* (1776), a text from the Edo Period (1603-1867) in Japan.

Keywords: Myth, Sprit, Women, Demon, Witch, Ecofeminism

Ueda Akinari's *Tales of Moonlight and Rain* is a collection of nine short stories or tales. These are mainly ghost stories and retellings of earlier Chinese and Japanese myths. In his research on this text, Dennis Washburn calls it a literary 'pastiche', "with Akinari borrowing not simply the plot outlines from Chinese and Japanese sources, but even minute details of characterisation or description, sometimes lifting whole lines from original texts" (1990:39). The statement may raise questions regarding its originality. Still, Washburn believes that foreign readers are likely to be ignorant of the facts due to unfamiliarity with the context. Nonetheless, his statement does clarify that these stories were not the original constructs from Akinari's mind or pen. However, this should not be seen as a lack of Akinari's skill, as he too, like William Shakespeare, is providing a new outlook to existing stories.

The nine stories have different spirits in their narratives. However, this research is primarily concerned with only three of them, the ones which consist

of a female spirit. The first story that shall be utilised for the analysis is sixth one of the collection - "The Caldron of Kibitsu". It is claimed by Washburn as "the most ghastly of the nine tales" (69). The story is about Shotaro, a man taken to drinking, who marries a lovely woman named Isora. An ominous tone is set at the start of the story, where a Caldron (an oracle in the story) warns Shotaro against the dangers of their marriage. This warning turns out to be true, as Shotaro, abandons his wife Isora, for a prostitute named Sode. This is what ultimately leads to the gruesome ending of the story, where Isora's spirit takes vengeance for Shotaro's betrayal. One important thing to notice is that there is a shift in the narrative perspective in the tale. Whereas the first part is impersonal, the second is narrated relatively from the perspective of Shotaro. Therefore, even if readers initially resent Shotaro and sympathise with Isora, things take a different turn after the change of the narrator. Isora's brutal killing of her husband highlights it to be a result of her jealousy. And according to Japanese myth, a woman in jealousy becomes a serpent, which "can wreak her fury with a thunderbolt" (Akinari 149).

The above-mentioned statement by Akinari becomes more relatable with the next story for analysis. It is the seventh tale, where a spirit of a white serpent is actually present. The story is named "The Lust of the White Serpent", and both the negative words - 'lust' and 'serpent' are meant for a woman named Manago. So, quite clearly, a reader is certain to encounter yet another female evil spirit. This is the longest of the nine tales, and Manago's spirit takes three forms to win over Toyoo, a character represented as an irresponsible son of a fisherman. In her first attempt, Toyoo is rescued by an old man who remarks - "These evil creatures are aged serpents. Their nature is governed by lust" (177). This is a reference to Manago and her accomplice. So, just like in the previous story, here again, is an evil female spirit – who is governed by sinful qualities.

This constant categorisation of evil spirits as women even appears in a tale, which does not even have a female spirit in its plot. In "The Blue Hood", an abbot turns into a spirit. The villagers who know the abbot, find it difficult to comprehend this – as they only know instances where women turn into malicious demons. Kaian Zenji, the hero, is perplexed, and after listening to the villagers and their stories, he comments that "all of these cases are about

women. Probably because of the malice in their nature females readily turn into vicious demons” (189). This shows how myths are formed around women, categorising them as spirits that are jealous, lustful and malicious.

It is not that the collection does not have any virtuous female spirits. In the story “The House Amid the Thickets”, there is a feminine spirit who does not harm anyone, and only awaits the return of her husband after her death. However, out of the nine, this is only one story where a female spirit is not dubious. Still, she cannot be even called outwardly good. It is true that she does not unleash any trouble, but she does not perform any moral tasks as well. The example of stereotyping bad spirits to be women is not only limited to Japan. It is apparent in other cultures as well. In the case of the Santhal tribe from Jharkhand and West Bengal, witches are believed to be the prime danger to society. Interestingly, “Witches among Santhal can only be women” (Nathan 1998: 60). The transformation happens when a Santhal woman abandons her duties and professes familiarity with a ‘Bonga’ (family spirit). Coming back to Japan, there are other examples from literature where there are female evil spirits. One such example is none other than the spirit of Lady Rokujo from *The Tale of Genji* (1008) written by Murasaki Shikibu.

This is a long and comparatively old book, and there is a possibility that many have not read this work. Luckily due to the advent of ‘intertextuality’, one is likely to learn about the Lady Rokujo anecdote in Haruki Murakami’s novel *Kafka on the Shore* (2002). It should also be mentioned that Akinari’s work too was mentioned in this novel, and it deserves proper credit as this particular research would not have been initiated without it. *Kafka on the Shore* consists of a character named Oshima. He is insightful, and due to his large array of knowledge in different subjects; he is able to clear many doubts of the protagonist of the novel Kafka Tamura. Oshima primarily takes the aid of ‘intertextuality’ to do so, as he constantly alludes to literary references. So, when Tamura inquires about the existence of living spirits, Oshima instantly refers to *The Tale of Genji*. He cites that part of the story where Lady Rokujo “becomes so consumed with jealousy over Genji’s wife, Lady Aoi, that she turns into an evil spirit that possesses her. Night after night she attacks Lady Aoi in her bed until she finally kills her” (Murakami 242). Thus, again, what is prevalent is the idea of a vile female spirit.

In Japanese folklore, the idea of immoral female demons and ghosts is so common that there are a lot of online articles on this particular topic. One of them is an article by Gabriela Herstik, where she compiles a list of some of the cunning female demons from Japanese folklore. She marks that “These spirits often seek vengeance, typically from anything they encounter. While some have the ability to kill, others will simply watch the objects of their disaffection suffer and die” (np). This statement is followed by a discussion of spirits like –Oiwa, Hannya, Ubume, Nure-onna and others. This list, in a way, sheds light on how women in Japanese folklore have been depicted as nasty spirits, receiving the most unfavourable judgement. It is not a trivial issue at all and the seriousness of it can be brought forward by looking at it through the lens of Ecocriticism and Ecofeminism.

Cheryll Glotfelty in her essay “Introduction: Literary Studies in an Age of Environmental Crisis” analyses Ecocriticism by comparing it to Elaine Showalter’s model on the stages of feminist criticism. Glotfelty points out how the first stage of feminism deals with women’s representation in canonical texts. According to her,

These studies contribute to the vital process of consciousness raising by exposing sexist stereotypes-witches, bitches, broads, and spinsters-and by locating absences, questioning the purported universality and even the aesthetic value of literature that distorts or, altogether ignores the experience of half of the human race. (1996:22-23)

She then compares it to the ways in which Ecocriticism looks at the misrepresentation of environmental elements in literature. It enables her to form a connection between both approaches. This interconnection between women and the environment is also what Ecofeminism tries to study, and the literary text discussed here can be scrutinised through it.

It is to be noted that all the evil female spirits take refuge in nature. What they are transformed into - serpents, foxes and badgers; are nothing but animals from nature. These animals at the same time are also the embodiment of mischievousness. The serpents are attributed with the title of lust and jealousy, whereas foxes and badgers are attributed as tricksters. This constant use in classical Japanese folklore of denoting the same attributes to these animals has led to the creation of the ‘myths’ surrounding them. In

other words, the mythical stories have given the animals their mythical identity. In addition, these identities are also ascribed to women. This ultimately leads to the projection of women and animals as vindictive creatures that are capable of committing the most heinous deeds. The Ecofeminist, Greta Gaard acknowledges the persuasive power of literature. She mentions how broad social movements have been inspired by literary works like Harriet Beecher Stowe's *Uncle Tom's Cabin* (1852). She also believes that "literary critics are justifiably eager to contribute to the development of an Ecofeminist movement" (1996:2). This development and contribution from the Ecofeminist movement has to be an attempt at debunking the myths. As she pointed out, the persuasive power of literature is immense, and therefore the above discussed literary examples can prove to be dangerous.

Coming back to Great Gaard's comments - literature is persuasive. So, even if the writer has no vile motives in his representations of female spirits, he is presenting them as immoral nonetheless. As the work is considerably popular now, it might persuade readers into forming a stereotype about women spirits. This formation is problematic because while spirits are a subject of belief and non-belief, women likely will become a substitute for the evil spirits. This is where the role of Ecofeminism is crucial. Modern readers, who are aware of these ideas must carefully locate the misrepresentations of women in literature. Here, Ecofeminism is used instead of Feminism because here the concentration is more on the cruel supernatural women spirits that are a part of the natural world. Feminists have more or less successfully pointed out misrepresentations and also altered people's mindset. Now, the time is for Ecofeminism to do the same, as it is a rising movement. The task is again to recognise the stereotypical representations of women and the natural world. Akinari was unaware of the concept, but it is the modern readers and critical thinkers, who need to carry out the operation of rectifying the problematic rendering. As literature is persuasive, what can be done is to create works that will question the older writings. It will pose a challenge to the traditional notions and hopefully will also correct them.

References

- Akinari, Ueda. *Ugetsu Monogatari* or *Tales of Moonlight and Rain*. Translated by Leon M. Zolbrod, Routledge, 2012.
- Gaard, Greta, and Patrick D. Murphy. "A Dialogue on the Role and Place of Literary Criticism Within Ecofeminism." *Interdisciplinary Studies in Literature and Environment*, vol. 3, no. 1, 1996, pp. 1–6. JSTOR, <http://www.jstor.org/stable/44085412>. Accessed 28 Jul. 2022.
- Glotfelty, Cheryll, and Harold Fromm. *The Ecocriticism Reader*. University of Georgia Press, 1996.
- Herstik, Gabriela. "The Cunning Female Demons and Ghosts of Ancient Japan." *Vice*, Jan 30 2016, <https://www.vice.com/en/article/the-cunning-female-demons-and-ghosts-of-ancient-japan/>
- Murakami, Haruki. *Kafka on the Shore*. Translated by Philip Gabriel, Vintage, 2005.
- Nathan, Dev, et al. "Women as Witches and Keepers of Demons: Cross-Cultural Analysis of Struggles to Change Gender Relations." *Economic and Political Weekly*, vol. 33, no. 44, 1998, pp. WS58–69. JSTOR, <http://www.jstor.org/stable/4407326>. Accessed 28 Jul. 2022.
- Washburn, Dennis. "Ghostwriters and Literary Haunts. Subordinating Ethics to Art in Ugetsu Monogatari." *Monumenta Nipponica*, vol. 45, no. 1, 1990, pp. 39–74. JSTOR, <https://doi.org/10.2307/2384497>. Accessed 23 Jun. 2022.

**Ecology for the Privileged: An Ecocritical Study of
Lakshmi Nandan Borah's *Kayakalpa***

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Abstract:

Heterogenous distribution of environmental resources throughout the centuries are being overlooked by the concept of Anthropocene as the capitalists have monopolized the profit generation lately. This selective Anthropocene has thus become a subject of scrutiny for encouraging fundamental injustice against the suffering majority at the expense of privileged few, who have eventually come to normalize environmental exploitation under the influence of long-gone colonial discourse. A postcolonial ecocritical lens yet again exposes the colonial perspective of considering "nature" as an "empty" space to resume their exploitation by disregarding the presence and acquisition of local communities. Ecocriticism does not confine itself within anthropocentric manipulation, it also revisits the generational oppression upon the socially, economically underprivileged group whose unfamiliarity with globalized market economy has become a prime factor behind the tyrannical subjugation.

**Keywords: Anthropocentrism, Capitalocene, Ecocriticism,
postcolonialism**

Introduction:

Extractivism is understood as a process that feeds accumulation by differentiated ways of removing and appropriating nature (natural resources) through differentiated levels of labour exploitation. Imperialism and colonialism's historical economic, social and environmental asymmetric and exploitative exchange relations shaped and paved the way for the current dynamics of global capitalism.

By analyzing the implementation and outcomes of green policies, this book shows that new strategies of capital accumulation arise through the creation of new commodities, markets, vehicles of accumulation and ways of legitimizing capital accumulation.

Natacha Bruna, *The Rise of Green Extractivism*

In this introduction to the concept of extractivism, Bruna envisages the impact of capitalists' diverse ways to extract the resources from indigenous communities as they implement green policies to firmly affirm their authority by questioning the traditional ecological practices. Exploring the repetitive pattern through the pages of history, one can easily comprehend the significance of postcolonial ecocriticism, further commencing on the ongoing inequalities towards the third world nations. Acclaiming the prestigious Saraswati award for *Kayakalpa* (2002), Lakshmi Nandan Borah intertwines the scientific endeavors of Dr. Kripalani and his ethics, as the clash between them duly persuades menace to the ecology.

The primary aim of this paper is to criticize the illegal anthropocentric acquisition of natural reserves as "resource grabbing" (Bruna) continues to be an outlandish yet a very familiar injustice to the autochthonous inheritance rights in global south. Additionally, it also focuses on the ill-effects of commodification of nature as selective anthropocentrism by the capitalists eventually invigorates authority upon the socio-economically marginalized group.

Discussion:

"Nature is nothing more than an anthropomorphic construct created by Wordsworth and the rest for their own purpose" (Coupe,171). Language plays a major role in constructing the superiority of human over the non-humans. The concept of 'nature' was tactfully constructed to establish the significance of the majority, who consider themselves to be the torchbearer of human civilization. Bate's book *Song of the Earth* (2000) argued that colonialism and deforestation have gone together, as both of these worked hand-in-hand to push the 'unrecognized' to the periphery and devalued them by disregarding diversity. To validate human's anthropocentric expedition, the scientific experiments enjoy the privilege to use nature as its personal laboratory. To strengthen Liu's controversial statement on nature, Dr. Bob Walters' Dream Laboratory can be considered as the concrete version of Wordsworth's poem. While the astounding depiction of Indian "culture" mesmerized him, the vulnerability of "nature" was yet to be known.

I never imagined such a depleted state of Indian villages. Would I be able to stay here? Would I acclaim any pleasure by staying here?
However, to be able to build a house containing all the amenities and live there would have been a better idea.

(Borah, *Kayakalpa* 64)

Rather than earning recognition for its authenticity, nature gets validated by technological advancement to promote economic activities, campaigned by media. Nature does not remain an entity of its own but becomes a major source of profit generation, which is achieved by making a distinction between nature as a daily society and a romanticized version of natural beauty (Kidner 2000, Gómez-Baggethun et al. 2010, Shoreman-Ouimet and Kopnina 2015). Bob Walters envisioned the rural India to be a part of his upcoming philanthropic project, that would eventually give rise to Third World Tourism in India. Third world tourism is another notable concept of ecocriticism as the capitalist countries confer the responsibility of eco-friendly livelihood to these nations while the benefits of anthropocentric world are solely enjoyed by the capitalists themselves. Dr. Watson is one such fine example, whose laboratory artificially provided the healing power of nature, yet he could not convince himself to completely adapt to it. A visible detachment from contact with nature has eventually made people apprehend the significance of reconnecting with natural ecosystems that can assure freedom from modern civilization, especially in Western European countries (Fletcher)

“Listen, I am disgusted with what we claim to be technological civilization.”

(Borah, *Kayakalpa* 58)

The concept of being close to nature remains a romanticized indoctrination by disconnecting the privileged society from the vulnerable authenticity of it. Walters’ curiosity to witness a “virgin tourist spot” (Borah, *Kayakalpa* 59) unveils their unhinged obsession with observing nature in its performative nature rather than conservating it as an obligation. As harmony prevails in Dr. Kripalani’s complimentary note on the village, he intentionally avoids commenting on the lack of irrigation, healthcare and other facilities by revealing their double jeopardy towards the underprivilege and the nature. While Dr. Kripalani admires nature for its pastoral beauty, he exposes his own contradictory stand by showcasing his interest on the cultured version of nature where he witnesses only the unbothered beauty and non-vulnerable side of nature. It can be considered as an ill influence of industrialization, urbanization and DSP that makes it challenging “for most individuals to physically experience nature in the sense of natural areas” by enhancing detachment and alienation from nature (Bogert et al., 2022).

The journey of Dr. Kripalani moves from the digital countryside of Watson’s Dream Laboratory to Amarendra Brahmachari’s hermitage in

Himalayan ‘scenic sublime’. Beneath the change in spaces, the anthropocentric motive remains visible to prove nature’s obligation for human benefit.

with the intention of conducting research on the floras found at the remote heights of the Himalaya, teams of Western tourist-scientists participate in these expeditions. Involvement of scientists from pharmaceutical institutions is not unfeasible either.

(Borah, *Kayakalpa* 134)

Polarization of ownership upon environmental substances leads to further exploitation. State protected forests contribute towards making deforestation a regional issue due to the irresponsibility of concerned authority. This repetitive pattern is widely visible throughout the world until they get recognized as a global issue, followed by pollution, global warming etc. To understand this ownership, one can consider it a political construct as casteism in India was a social construct made to exploit the marginals. Vandertop refers to Jason W. Moore’s term Capitalocene, while referring to the “ecocritical crisis to the historically specific operations of capital”, as the colonies were highly responsible for providing the “Four Cheaps” (253) to ensure profit for the colonizers.

To validate the unlawful extraction of indigenous properties in the form of knowledge and raw material, these privileged minority manipulated the majority and kept them underprivileged till date by exploiting their resources for their own advantage. Dr. Kripalani’s conversation with Dr. Watson unveils the bitter truth, as opposite to the struggles of farmers in agro-based economies, the capitalists get to enjoy its benefits. The series of criminal events leading from the theft of “Bacterium Anujium” by Bacteriologist Dr. Jerry Brown, further takes the readers to international treacheries. This relationship between human and nature is entirely based on instrumental values, as human put them on top of the hierarchical ladder as they institute subjugation of nature as human’s basic right (Shoreman-Ouimet and Kopnina).

Under the limelight of ecocritical perspective, the depiction of captive infrastructures provides a vague apocalyptic overview throughout the novel. As Dr. Kripalani chooses to “disconnect himself from the outside world” (Borah, *Kayakalpa* 36) by avoiding technology; Dr. Gehlot seeks for internet connection to escape from the cyber trap (Borah, *Kayakalpa* 91), all while

Janak Kumar had to digitally assassinate his robot guard to ensure freedom from the observation centre. On the other hand, Dr. Kripalani's diplomatic use of money could grant him freedom from the grasp of his abductors (Borah, *Kayakalpa* 203). The picturesque façade to culture the nature in all these hostage buildings prevents them from being exposed.

Language becomes a planned construct to alter the natural cycle. Janak Kumar was kept in a laboratory resembling the green-house under controlled statistics, while the concept of green house itself is an attempt to artificially capture the wilderness within a structure to feed human's post-structural doctrine. Janak Kumar becomes a prime example of "the domestic picturesque" (Barry, *Literary Theory* 255) due to his designation as a gardener and a "research sample" at Dr. Kripalani's residence (Borah, 154). Regardless of all the efforts, the civilized façade of Janak Kumar could not hide the wilderness within him. In an apocalyptic manner, he sacrificed himself for the betterment of a community that treated him selfishly based on his capacity to provide. Janak Kumar can be considered as the human portrayal of nature, as he is treated like a non-human by the benefactors of humanity. His deteriorated health and mind that eventually leads to self-destruction is the symbol of nature giving up on being the provider.

Although Anuj was stunned to see the magic of his medicinal potion, yet Janak Kumar's marvelous physique and strength terrified him... If Anuj fails to fulfil Janak Kumar's plea to set him free from the laboratory, then the latter is likely to strangle Anuj to death.

(Borah, *Kayakalpa* 155)

Revisiting the dilemma of the creature in Mary Shelley's *Frankenstein* (1818), Dr. Borah ignites a flame of terror through the "youthful" version of two guerillas. The ecocritical opinions to oppose the activities that could potentially harm the environment would not have been stronger, if scientific experiments were not conducted on the mute animals. Both, the "creature" of Victor Frankenstein and the sexually excited guerillas of Dr. Kripalani were the tragic outcomes of their creators' extraordinary brilliance. Nature is used as a hunting ground by the capitalists who are capable of claiming their ownership upon any creature available in our environment: "The prime component of all research is curiosity" (Borah, *Kayakalpa* 146)

Although the endless trial to suppress the non-human remains constant, yet Janak Kumar's becomes their representative despite belonging from the

exploiters' race. The character of Janak Kumar has been marginalized to such an extent that besides dedicating himself as a "research sample" for the development of medical science, he could not find any better reason to stay alive. He is the embodiment of mute non-human beings who possess no voice to protect themselves.

As the global capitalization of ecology encourages its agents to gain control over both flora and fauna yet available in nature, Dr. Kripalani's perspective discloses the hypocritical objective behind it. According to the data extracted from Peta, more than 774 thousand animals were held captive in laboratories and in Great Britain itself, 2.64 million scientific procedures were conducted involving living animals in the year 2024, as per the official annual statistics released by the Home Office (2025). Nature and the elements found in it should have been democratized, in fact, they were, until these neutral goods turned into something valuable with knowledge. This selective Anthropocene, therefore, has been repeatedly marginalizing the socially, economically and politically underprivileged, and bestowing opportunities predominantly to the capitalists. Referring to the practice of animal husbandry and scientific breeding of guerillas, capitalist scientist like Dr. Kripalani commends it as a "fast growing profitable business". Needless to comment, because instead of animals, he illegally extracted saplings from the remote heights of the Himalayas. However, the use of "illegally" is ironical due to the ongoing deforestation of those supposedly reserved areas. This puts Dr. Kripalani out of question because he was preserving a shrub from the face of extinction (Borah, *Kayakalpa* 141).

Anthropocentrism not only places humans above nature, but it is also related to the concept of cultural determinism, which assumes that society is shaped by cultural perceptions (Shoreman-Ouimet and Kohn 2015). To validate this argument, we ought to reconsider the remarks left by Nayana Narlikar on her husband Dr. Anuj Kripalani. Although social establishment is forever fluctuating, Dr. Kripalani's dedication to alter this perception is primarily the prelude of this novel.

You may choose to be a dog in the mating season, but my dignity does not permit me to be a bitch.

(Borah, *Kayakalpa* 184)

A society's perception of natural cycles of nature exhibits their morality, the schema, that they are likely to abide by during the moment of crisis and

in abundance. The phrase “mating season” does not solely represent the reproductive period but it also serves the purpose as an artificial way of holding onto one’s disorderly physical needs. Although scientific advancement receives compliment for such discovery, yet we ought to realize how environmental manipulation has resulted in mankind’s desired outcome. Ajanta Dikshit’s lost youth can be considered as an emotional manipulation (Borah, *Kayakalpa* 103), whose personality resembles with the nourishing quality of nature who would rather provide selflessly than safeguarding her own interest. In both of these instances, defenseless nature and defenseless human loses their identity. An uncanny resemblance between Dr. Kripalani as a person and as a scientist is seen through colonial perspective. The colonizers’ obsession with considering the colonies “empty” in knowledge and wisdom is reflected in the actions of Dr. Kripalani and other Western-scientists. Both Ajanta Dikshit’s ideology and Amarendra Brahmachari’s wisdom were the prime elements to reverberate Dr. Kripalani’s insight into reconnecting with nature, which were vital to regain his consciousness and let go of the research shaped by revenge and curiosity. It is evident that a capitalist agenda with a colonial mindset to establish ownership upon nature is prone to become the subject of scrutiny, as one exhibits this exploitation within a broader framework.

Conclusion:

Therefore, Lakshmi Nandan Borah’s *Kayakalpa* is not only a novel containing human’s uncontrollable greed under the influence of over-consumption, but it also shades light on the ill effects on ecology as we start following the consumerist model of capitalism.

The consequences of environmental degradation, therefore, is eventually impacting the entire globe whereas the uneven distribution of these resources is an irony to the situation. Amongst these benefactors, majority of them live in the industrialized developed nations and the minorities are the most privileged residents of other developing nations’ urban elites’ area. Whereas equal access to and distribution of natural resources should have been a fundamental right under the umbrella term of democracy, yet the privileged few are partaking environmental exploitation at the expense of the deprived majority. Needless to mention, but sustainable livelihood is yet a foreign concept to them. Hence, this complex arrangement highlights the need of reviewing ecocriticism with a varied version of anthropocentric view on the basis of socio-economic disparity.

References:

- Annual Statistics of Scientific Procedures on Living Animals, Great Britain 2024. 2025 www.gov.uk/official-documents.
- Barry, Peter. *Beginning Theory: An Introduction to Literary and Cultural Theory*. Manchester University Press. 2018
- Bate, Jonathan. *The Song of Earth*. Harvard University Press. 2002
- Bogert, Jeanne M., et al. "Reviewing the relationship between neoliberal societies and nature: implications of the industrialized dominant social paradigm for a sustainable future". *Ecology and Society* 27 (2):7. 2022. <https://doi.org/10.5751/ES-13134-270207>
- Borah, Dr. Lakshmi Nandan. *Kayakalpa*. M/s Jyoti Prakashan. 2002
- Bruna, Natacha. *The Rise of Green Extractivism, Rural Livelihoods and Accumulation in a Climate-Smart World*. Routledge. 2023. pp. 1,2.
- Coupe, Laurence, ed., *The Green Studies Reader: From Romanticism to Ecocriticism*. Routledge. 2000
- Fletcher, R. "Against wilderness. Green theory & praxis". *Journal of Ecopedagogy* 5(1):169:179. 2009
- Kidner, D. W. Fabricating nature: a critique of the social construction of nature. *Environmental Ethics* 22(4):339-357. 2000 <https://doi.org/10.5840/enviroethics20002242>.
- Moore, Jason W. *Capitalism in the Web of Life*. ———. "The Capitalocene Part II: Accumulation by Appropriation and the Centrality of Unpaid Work/Energy." *Journal of Peasant Studies*, Vol 45, No. 2, 2017. P. 237–79. London. 2015. <https://share.google/5CvACESEBFOv14fIn>
- PETA. "Facts and Statistics About Animal Testing". <https://www.peta.org/issues/animals-used-for-experimentation/animals-used-experimentation-factsheets/animal-experiments-overview/>
- Shoreman-Ouimet, E., and H. Kopnina. "Reconciling ecological and social justice to promote biodiversity conservation". *Biological Conservation* 184:320-326. March, 2015. <https://share.google/kdlIXP5UQ9so5XwVo>
- Vandertop, Caitlin. "The Earth Seemed Unearthly": Capital, World-Ecology, and Enchanted Nature in Conrad's Heart of Darkness". *MFS Modern Fiction Studies*, vol. 64, no. 4, Winter 2018, pp. 680-700.

**Nature as Memory and Spirit: Reading Janice Pariat's
'A Waterfall Of Horses' through Ecocriticism**

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Abstract

This paper studies eco-consciousness in Janice Pariat's short story "A Waterfall of Horses", from her collection *Boats on Land*, through the point of view of ecocriticism. The story is set in the Khasi hills of Northeast India and it delineates the complex relationship between humans and their natural environment. It further delineates the sceneries as backdrops and also as living presences that shape memory, identity, and ethical consciousness. Through close reading, thematic analysis, and ecocritical interpretation, the study analyses how Pariat combines oral traditions, local language, and cultural memory to convey ecological and moral awareness. Nature functions as both memory and spirit which then preserves communal histories that guide human actions and reflect their responsibilities. The story also highlights the limitations of language in fully capturing lived reality and emphasises the potency of oral narratives in transmitting ecological and cultural knowledge. More than that, the narrative binds magical realism with historical and social contexts and illustrates the ethical and ecological consequences of human actions within the environment. Through its complex portrayal of human-environment interconnectedness, ethical complexity, and regional specificity, Pariat's work contributes to a broader understanding of ecological literature in India. This paper shows that literature can serve as a vital medium for sustaining ecological consciousness which links cultural memory, ethical reflection, and environmental stewardship.

Keywords: Ecocriticism, Northeast India, Oral traditions, Nature and memory, Humanenvironment relationship, Magical realism

Introduction

William Wordsworth as a central figure of Romanticism, laid emphasis on the moral, spiritual, and educational power of nature. In “The Tables Turned”, he famously urges: “Come forth into the light of things, / Let Nature be your teacher,” (Wordsworth 258) which suggests that direct engagement with the natural world cultivates wisdom, memory, and ethical awareness. For Wordsworth, nature is a backdrop for human activity and also a living presence that shapes thought, nurtures the imagination, and preserves cultural and ecological and cultural consciousness, that links human life with the rhythms, histories, and spirits of the environment.

S.T. Coleridge, another pioneering figure of Romanticism, delineated the imaginative and moral dimensions of human engagement with nature. In *Biographia Literaria*, he writes about the role of the poet in perceiving “the living spirit of nature” (Coleridge 304) and mediating its ethical and spiritual significance to society. For Coleridge, observing and reflecting on the natural world cultivates ethical awareness and a sense of responsibility towards it. His conceptualisation of nature as a living, dynamic force forms an early theoretical framework for ecocriticism, and that acts as strong tools to examine how literature can encode ecological ethics, spiritual memory, and human interconnectedness with the environment.

Eco-consciousness is defined as an ethical factor known for a strong awareness of the environment and its ecological processes. It consists of an individual’s knowledge, attitude, and behaviour regarding the environment and the internal relationship between humans and nature. This concept rears an ecological view point that prioritises paying attention to environmental cues that guide communities towards a path of sustainable survival and development through a recognition of their deep interconnectedness with the natural world.

The relevance of eco-consciousness in literature is noticeable through the way in which traditional wisdom, ancestral knowledge, and ecological ethics are deeply embedded, preserved, and transmitted through folktales, myths, and oral narratives. In Northeast India, folktales such as the Khasi

story of Ka Lukhimai, the Assamese tale of Tejimola and many other folktales reflect a grave awareness of the natural world. These folktales often depict human interactions with forests, rivers, and other natural elements that reveals the consequences of disrupting ecological balance. Through such stories, communities encode complex lessons about respect for nature, sustainable resource use, and the spiritual significance of the environment. Thus, literature functions as an important medium for sustaining and reinforcing ecological consciousness across generations that links cultural memory with ethical care for the natural world.

Janice Pariat is a contemporary Indian English writer whose works often reflect ecological consciousness which is based on her experiences growing up amidst the natural beauty of Assam and Shillong. *Boats on Land* by Pariat is a collection of short stories that often explores human relationships with memory, place, and nature. “A Waterfall of Horses”, one of the stories in this collection, evokes nature as a living presence, and that shapes identity, memory, and the spiritual sensibilities of its characters.

Northeast India is the easternmost region of the country. It stands out for its astounding natural beauty and rich, distinctive cultural heritage. Despite its beautiful landscapes: towering hills, serene lakes, lush valleys, and winding rivers: the region remains relatively unexplored and often overlooked. Janice Pariat’s debut work, *Boats on Land: A Collection of Short Stories*, deals sensitively into the historical, cultural, and social dimensions of Northeast India, that binds together its unique traditions, everyday life, and the grave connection between people and their environment.

Objectives

The paper aims to:

- Examine the representation of nature as memory and spirit in Janice Pariat’s “A Waterfall of Horses”.
- Explore how ecological ethics and human-nature relationships are encoded in her narratives.
- Analyse the influence of regional folklore and cultural memory on Pariat’s ecological imagination.

Methodology

The study adopts a qualitative, literary-analytical approach, which focuses on close textual interpretation. The primary text for analysis is Janice Pariat's *Boats on Land*, with particular emphasis on the short story "A Waterfall of Horses". Secondary sources include ecocritical theory texts and scholarly studies on Northeast Indian folktales. The research conducts close reading, which involves careful, detailed analysis of the text to uncover layers of meaning; thematic analysis, used to identify and examine recurring motifs and ideas such as nature, memory, and spirituality; and ecocritical interpretation, which interprets the text through the lens of human-environment relationships and ecological ethics. These tools together help light up the way in which Pariat's narratives encode ecological consciousness and the interconnection between humans and nature.

Results And Discussions

Ecocritical Analysis Of Janice Pariat's "A Waterfall Of Horses"

Janice Pariat's short story "A Waterfall of Horses" is a part of her collection *Boats on Land*, gives us an important material for ecocritical reading that binds human experience, cultural memory, and the natural environment. Set in the village of Pomreng in the 1850s, the story situates itself in Northeast India, specifically the Khasi hills, a region known for its lush landscapes, rivers, and forests. The choice of setting is itself ecocritical: it reflects the geographic and ecological specificity of the region but also the ways in which human memory, culture, and identity are crocheted with the natural world. Through a detailed close reading of Pariat's language, narrative techniques, and thematic concerns, the story emerges as an exploration of nature as memory, as spiritual presence, and as an ethical framework guiding human interaction with the environment.

Nature As Memory And Cultural Repository

One of the most significant features of "A Waterfall of Horses" is the manner in which natural landscapes serve as vessels of memory. The story is narrated by an unnamed child narrator and it positions the reader within the lived experiences of the village, where hills, rivers, and forests are background sceneries and they also actively participate in the preservation and

transmission of cultural memory. Pariat's use of oral narrative which is emphasised by the child narrator that recounts the story second-hand, reflects the larger theme of oral traditions as custodians of collective memory. The story probes questions such as "how much more accurate, and potent, are oral traditions as compared to the written word?" and "how much of our reality cannot be conveyed at all through language?" By incorporating snippets of Khasi, left untranslated, like "Ka ktien" Pariat delineates the limitations of written language in fully capturing local realities, while she simultaneously delineates the deep rootedness of culture and memory in oral practice. The environment: forests, rivers, and village landscapes: acts as a mnemonic device, that anchors memory and allows the past to persist through spatial and ecological continuity.

The ecological consciousness in Pariat's narrative is reverberated by this connection between memory and environment. The Khasi hills and village settings are depicted with an atmospheric attention that conjures both pastoral beauty and historical specificity. The hills are not passive; they absorb, retain, and reflect human histories, from colonial intrusion to local resistance. By encoding memory within the environment itself, Pariat aligns with ecocritical perspectives that regard landscapes as active participants in cultural and ethical processes, that amplifies the Romantic emphasis on nature as both moral and mnemonic agent.

Nature As Spiritual Presence

Nature in "A Waterfall of Horses" also functions as a spiritual presence which is closely connected to its role as a repository of memory. The story includes elements of magical realism, particularly through the villagers' resort to black magic in response to the threat posed by colonial figures. In Indian cultural understanding, black magic carries consequences for its victims and also for its practitioners which delineates an ethical dimension inherent in engagement with unseen natural and spiritual forces. Pariat's delineation of these forces places the environment as morally and spiritually responsive: humans cannot act upon it without repercussions. This narrative strategy shows the ethical knot between human actions and the ecological and spiritual worlds, and that reflects the Romantic idea, articulated by figures like Wordsworth and Coleridge, that nature is imbued with a living, instructive spirit.

The atmospheric descriptions of the village landscape further strengthens this spiritual dimension. Pariat shifts between idyllic pastoral scenes and depictions of desolation, which reflects the moral and emotional states of her characters. The hills and rivers matches with the human experience; they are crocheted with the narrative of cultural resilience, the consequences of colonial intrusion, and the ethical complexities of using supernatural forces. In this sense, nature serves as both mirror and agent, shaping identity and moral consciousness, while it simultaneously delineates human responsibility toward the environment.

Human-Nature Interconnectedness And Ecological Ethics

Pariat's story also focuses on the ecological ethics through human-environment relationships. The villagers' actions are set against a scenario which is connected to historical and cultural resonance, suggest an implicit ethical code: engagement with natural and spiritual forces carries consequences, and community well-being is contingent upon respecting these forces. The black magic episode exemplifies this principle. While it is a fantastical narrative element, its ethical weight reflects ecological reality: misuse or disruption of natural forces: symbolized here through magical intervention, has repercussions, and this reflects broader principles of sustainability and environmental responsibility.

More than that, the narrative lays emphasis on how the environment structures daily life and social interactions. The Khasi language embedded in the text, the depiction of local customs, and the vivid portrayal of village life delineates a profound interconnectedness between human society and its ecological setting. Through these elements, Pariat points to a subtle environmental consciousness: the natural world is a living, ethical space, inseparable from human experience, memory, and culture. By bringing the specificity of Northeast Indian sceneries and cultural practices to the fore, the story challenges universalised, homogeneous representations of nature and culture and focuses on the importance of localised ecological knowledge and ethical engagement.

Oral Tradition, Language, And The Limits Of Expression

A distinctive feature of the story is its meditation on oral traditions and the limitations of language. The story probes the question of how much

reality can be captured through written words, and how oral traditions might convey truths inaccessible to conventional textual forms. This thematic concern aligns with ecocritical theory which recognises alternative modes of knowing and experiencing the environment. Oral narratives are gravely tied to place, culture, and ecological context; they show both ethical and ecological awareness that written texts may fail to fully convey. By including untranslated Khasi words and relying on a second-hand child narrator, Pariat delineates the enormous complexity of human-environment interactions, revealing how ecological and cultural consciousness is transmitted through both speech and experience, rather than solely through language.

Through this narrative strategy, Pariat shows the intimate bond between humans, language, and the environment. The story suggests that some aspects of ecological and cultural reality, whether the moral consequences of black magic, the rhythm of village life, or the historical presence of colonial forces: can only be apprehended through lived experience in a particular scenario. This reinforces the ecocritical perspective that knowledge of the environment is not abstract but deeply intertwined with memory, culture, and ethical sensibilities.

Subversion Of Binary Narratives And Ethical Complexity

Another important aspect of Pariat's ecological and cultural vision is her dynamic portrayal of human agents within historical and environmental contexts. While the story is set during the British colonial period, it avoids simplistic binaries of Indian good versus British bad. Characters are portrayed with ethical complexity which shows that human behaviour: like interaction with the natural world: is morally complex and conditional. This reflects the ecological principle that human-environment relationships are complex and dynamic, and so it resists simplistic moral categorisation. By knitting in magical realism, historical context, and the ethical aspect, Pariat situates ecological consciousness not as an abstract ideal but as lived, culturally grounded, and morally textured.

Conclusion

In "A Waterfall of Horses", Janice Pariat shows how literature can act as a medium for ecological awareness, moral reflection, and cultural memory. Through her atmospheric delineation of the Khasi hills, incorporation of oral

traditions, ethical framing of magical realism, and dynamic characterisation, the story depicts nature as both memory and spirit and shows the interdependence of human and environmental systems. Pariat's narrative strategy points out the limitations of language in conveying ecological and cultural truths while celebrating the power of oral storytelling to preserve ethical and ecological consciousness. By placing her story within the specific landscapes and cultural traditions of Northeast India, Pariat expands the terrain of Indian English literature and also contributes to a global dialogue on literature, ethics, and ecological awareness.

References

- Barry, Peter. *Beginning Theory: An Introduction to Literary and Cultural Theory*. Manchester University Press, 2007.
- Buell, Lawrence. *The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture*. Belknap Press, 1995.
- Coleridge, Samuel Taylor. *Biographia Literaria*. 1817. Edited by H. J. Jackson, Princeton University Press, 1983.
- Glotfelty, Cheryll, and Harold Fromm, editors. *The Ecocriticism Reader: Landmarks in Literary Ecology*. University of Georgia Press, 1996.
- Guha, Ramachandra. *Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation*. Oxford University Press, 2000.
- Naess, Arne. *Ecology, Community and Lifestyle: Outline of an Ecosophy*. Cambridge University Press, 1989.
- Pariat, Janice. *Boats on Land: A Collection of Short Stories*. Random House India, 2012.
- Shiva, Vandana. *Staying Alive: Women, Ecology and Development*. Zed Books, 1988.
- Wordsworth, William. "The Tables Turned." *The Norton Anthology of English Literature*, edited by Stephen Greenblatt et al., 10th ed., vol. 2, W. W. Norton & Company, 2018, pp. 258–259.

A Study of Individual Carbon Footprint and Eco-Consciousness in the Student Population of Duliajan

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Abstract: Carbon footprint (CF) refers to the total greenhouse gas emissions, expressed in carbon dioxide equivalents (CO₂ e), resulting from human activities. At the individual level, carbon footprint reflects the environmental impact of personal lifestyle choices such as energy consumption, transportation patterns, food habits, and waste generation. Assessing individual carbon footprints is essential for understanding the role of everyday behaviour in climate change mitigation. The present study was conducted to assess the individual carbon footprint of the students in Duliajan and check the eco-consciousness levels among the literate student population of Duliajan. The study follows a quantitative research design and is based on primary data collected from 50 undergraduate students aged 19-22 years belonging to middle- and lower-income groups in a semi-urban setting. Data were gathered using the WWF carbon footprint calculator, a structured Google Form-based questionnaire, and selective personal interviews. The findings reveal that eco-consciousness levels among students are considerably low despite existing government and institutional (top-down) interventions. This indicates the need for a shift in individual mindset towards environmental responsibility. The study concludes that an effective reduction in individual carbon footprint requires a synergistic integration of top-down policy measures and bottom-up behavioural change.

Keywords: Carbon footprint, Climate change, Eco-consciousness, Sustainability, Youth.

Introduction:

A carbon footprint refers to the total amount of greenhouse gases- primarily carbon dioxide (CO₂), but also methane (CH₄), nitrous oxide (N₂O), and other emissions- released directly or indirectly by human activities. These gases trap heat in the atmosphere and contribute significantly to global warming and climate change. A carbon footprint can be calculated for an

individual, household, organization, community, product, or even an event, depending on the scale being assessed. It includes emissions from everyday actions such as using electricity, cooking, traveling by car or air, manufacturing goods, managing waste, and producing food. At a broader level, industries, transportation networks, energy production systems, and agricultural practices also contribute heavily to overall emissions. Measuring the carbon footprint helps identify which activities or sectors generate the highest emissions, enabling individuals and policymakers to adopt strategies for reduction. For example, using renewable energy, improving fuel efficiency, practicing sustainable agriculture, reducing consumption, and promoting recycling can significantly lower emissions. A lower carbon footprint generally indicates more sustainable living and production patterns, whereas a higher footprint signifies practices that place greater strain on the environment. As climate challenges intensify globally, understanding the concept of a carbon footprint becomes essential for developing effective mitigation policies and encouraging responsible behavior. It also helps countries and institutions track their progress toward international climate goals such as those outlined in the Paris Agreement. Ultimately, recognizing and reducing carbon footprints is crucial not only for environmental preservation but also for protecting public health, enhancing energy security, and ensuring long-term ecological balance. The research study of individual carbon footprint of students in Duliajan College is necessary because it plays a crucial role in raising awareness and environmental consciousness among college students, who are future decision-makers and responsible citizens. Understanding the concept of carbon footprint will help students recognize how their daily choices- such as transportation, energy use, consumption habits, and waste generation- directly impact the environment and what they can do on the individual level to contribute to environmental sustainability.

Objectives of the Study:

- To calculate the individual Carbon Footprint of collage going students of Duliajan.
- To compare how they stack up against the current global average of 4.7 tons CO₂e/person/year.

- To identify high emission areas and make lifestyle changes in order to reduce personal Carbon Footprint in an effort to align it with the global benchmark of sustainable personal Carbon Footprint of 2 tons CO₂e/ person/ year by 2050.
- To access the current eco-awareness levels among the College students.

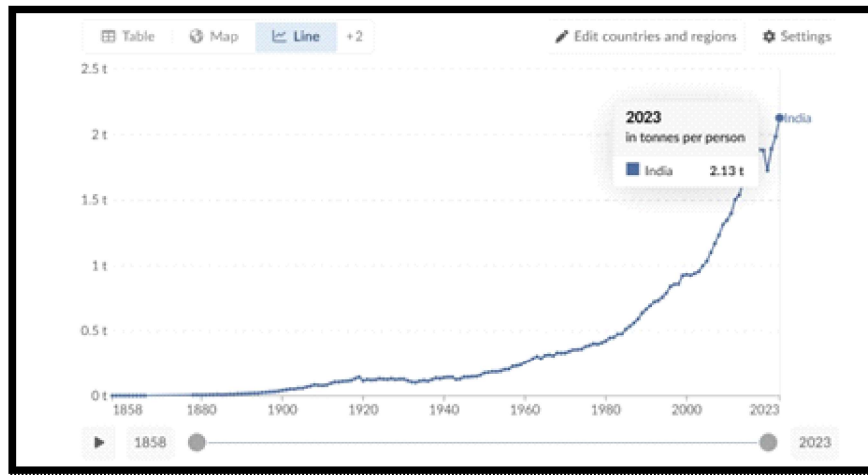
Methodology:

The study is conducted with 50 respondents who are college students aged between 19 and 22 years, belonging primarily to middle- and lower-income groups in a semi-urban area. The research follows a quantitative analysis approach and is based on the following methodology:

- **Carbon Footprint Calculator:** A standardized carbon footprint calculator (<https://footprint.wwf.org.uk/>) was used to assess the individual carbon emissions of students based on their lifestyle patterns, including energy use, transportation, food habits, and waste generation.
- **Google Form–Based Questionnaire:** A structured questionnaire was administered through Google Forms to collect quantitative data on students’ daily activities, awareness levels, and attitudes towards environmental sustainability.
- **Personal Interview Interaction:** One-to-one interviews were conducted with selected students of Duliajan College.

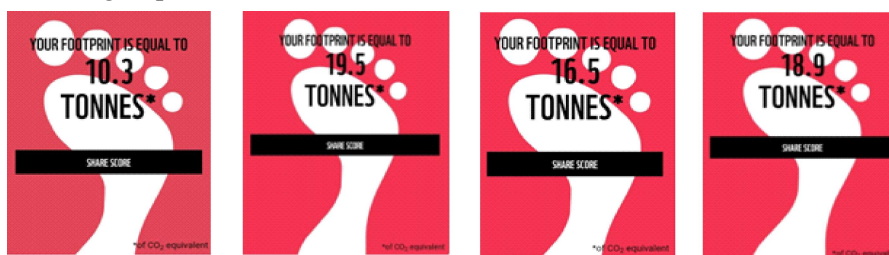
Analysis:

The ideal maximum carbon footprint required to prevent severe climate change and limit global warming is widely considered to be less than 2 tons (as against the current Carbon Footprint of 4.7 to 4.8 tonnes per year according to the International Energy Agency) of CO₂ equivalent (CO₂e) per person annually. This threshold is regarded as the sustainable per capita limit that individuals should strive to remain below in order to support global climate goals and reduce environmental stress. This target (is to be achieved globally) aligns with the Sustainable Development Goal 13 (SDG 13), “Climate Action” which calls for urgent action to combat climate change and its impacts in line with the Paris Agreement. However in case of India, according to the article “India: CO₂ Country Profile”, published in *Our World in Data* the CO₂ emissions per person annually is above 2 tons (2.13 t as per 2023 data).



Data Source: <https://ourworldindata.org/co2/country/india>

Based on the Carbon Footprint Calculator, in our study it was observed that among the 50 respondents, all of whom were college students between 19 and 22 years of age, the average carbon footprint recorded was markedly higher than not only the global average Carbon Footprint but also more than the current average Carbon Footprint of India. Every respondent exceeded the sustainable threshold, highlighting a concerning pattern of high-emission lifestyles even within a semi-urban student population of middle- and lower-income groups.

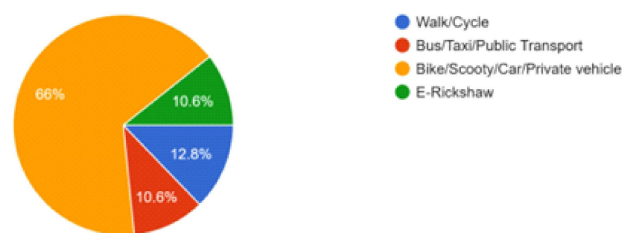


Sample of Results generated from Carbon Footprint Calculator (The average being 10.98/Person/Year)

Questionnaire to analyze reasons (Lifestyle) behind high Carbon Footprint Emission:

Besides the Carbon Footprint Calculator, a questionnaire was designed to analyze the reasons behind the high Carbon Footprint noticed amongst the students. Following are the questions and the responses based upon the questionnaire followed by the analysis of the responses:

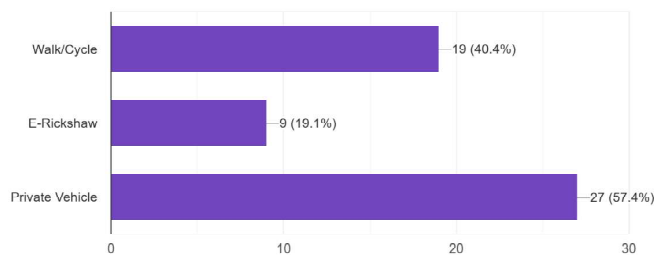
Q1: How do you usually come to College?



It is observed that 10.6% of the respondents use E-Rickshaw, 10.6% use Bus/Taxi/Public Transport, 12.8% of respondents walk/cycle and a majority, i.e., 66% use Private Vehicles like Bike/Scooty/Car, etc. for daily transportation, due to the non-accessibility to a robust public transportation system thereby contributing to the high carbon footprint as observed by the carbon footprint calculator.

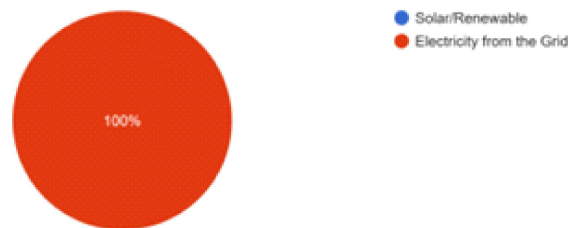
Q2: When going short distances (less than 2 kms), what do you usually choose?

2. When going short distances (less than 2 km), what do you usually choose?
47 responses



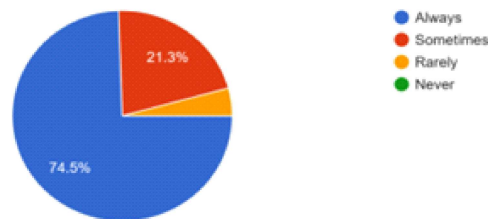
From the above data it is figured out that even in case of short distances, majority i.e., 57.4% opt for private vehicles. Only 19.1% use E-rickshaws and 40.4% opt to walk/cycle.

Q3: What type of electricity is mainly used at your home?



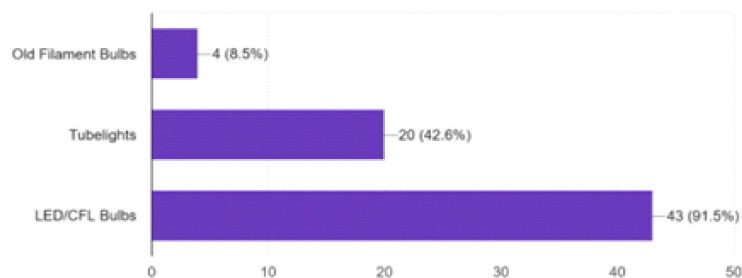
The above data clearly states that 100% respondents use electricity from the grid (generated by thermal power plants and some energy generated by Oil India Limited through fossil fuels). In Duliajan and its surrounding areas the prevalence of solar/renewable energy either in houses or institutions is not seen.

Q4: Do you switch off lights, fans, chargers when not in use?



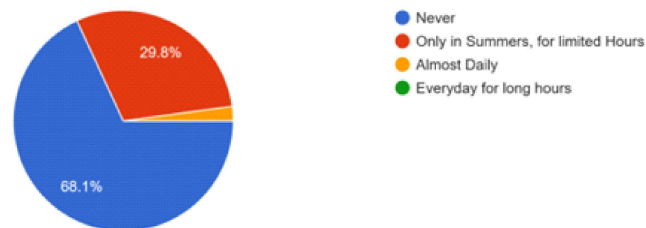
Based on the given response, it is observed that 74.5% of participants reported that they always do so. When asked why, the primary reason given was cost-cutting- as people are generally concerned about reducing personal expenses. On further analysis it was found that the eco-consciousness levels were absent or minimal in most cases.

Q5: What type of bulbs do you mostly use at home?



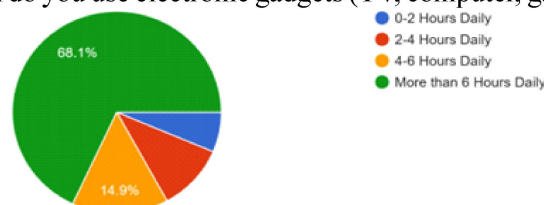
One positive finding is that most respondents, i.e., 91.5% use CFL bulbs. On personal interview it was found that CFL bulbs were preferred over traditional bulbs and tube-lights, to cut electricity cost. There was no conscious environment related concern in this regard as well.

Q6: How often do you use air conditioning (AC)?



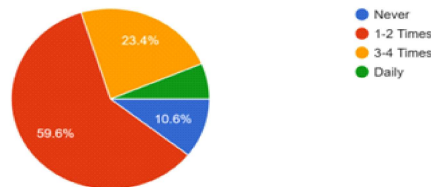
68.1 % said they never do, and in follow-up personal interviews a large portion said they simply do not have an AC at home. This aligns with global research, as stated in the article ‘Air Conditioning and Inequality’, showing that ownership and usage of AC is strongly linked to income level: wealthier households are far more likely to have and use AC than lower- or middle-income ones. In the article ‘The Impact of Air Conditioning on Residential Electricity Consumption across World Countries’ published in *The Journal of Environmental Economics and Management* confirm that once households adopt air conditioning, their electricity consumption jumps significantly (on average by ~36 %). As AC usage spreads with rising income and living standards, overall residential electricity demand for cooling and associated carbon-dioxide emissions are projected to double globally by 2050. (Nature Communications). Because many of the respondents belong to lower or middle income groups they lack AC at home, thus their carbon footprint remains comparatively lower in this regard. In the absence of eco-consciousness as seen above, (in case of increased affluence) the Carbon Footprint will climb automatically.

Q7: How often do you use electronic gadgets (TV, computer, gaming, mobile)?



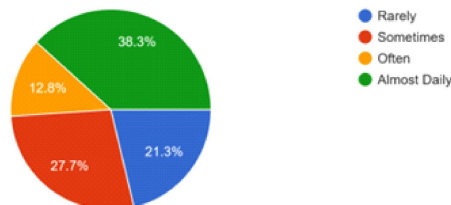
It is observed that the majority- 68.1% of participants engage in using electronic gadgets for more than 6 hours. Electronic gadgets contribute significantly to carbon footprint through energy-intensive manufacturing (mining, processing, etc.), high operational energy use (electricity for devices, data centers, streaming) and massive E-waste. Digital tech emissions are a growing concern, potentially doubling by 2025 if unchecked, impacting climate change.

Q8. How often do you eat meat in a week?



A majority- 59.6% consume meat 1-2 times weekly, while 23.4% consume 3-4 times weekly with a significant amount of respondents consuming meat on a regular basis. Non vegetarian diets (high in red meat) have a significantly larger carbon footprint than vegetarian and vegan diets due to resource intensive animal agriculture, leading to more greenhouse gas (GHG) emissions from food, land-use, deforestation and waste.

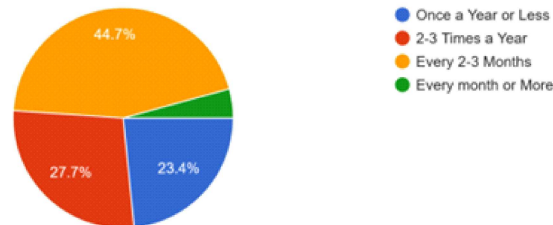
Q9: How often do you eat packaged snacks (chips, chocolate, soft drinks)?



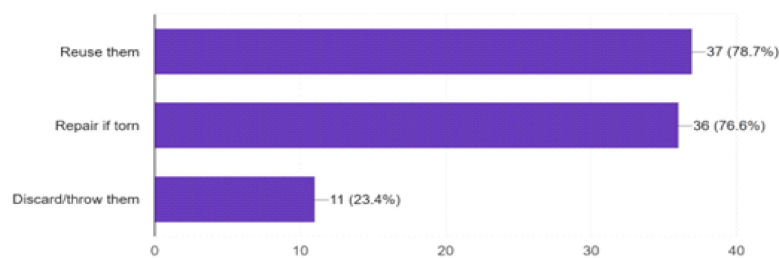
According to the collected data, a significant proportion of respondents regularly consume packaged snacks: 38.3% almost daily, 27.7% sometimes, 12.8% often, and only 21.3% rarely. This pattern of consumption has important environmental implications. Packaged snacks carry a substantial carbon footprint, largely due to the packaging itself—raw materials alone account for nearly 50% of total packaging-related emissions. Additionally, the transportation of packaged food items, including deliveries through services like Swiggy and Zomato, further increases emissions. Food waste and

discarded packaging materials also contribute to greenhouse gases such as methane, which is more potent than carbon dioxide. Moreover, the production of processed food relies on energy-intensive manufacturing processes and agricultural practices involving chemical fertilizers, extensive land use, and high resource consumption. Overall, frequent consumption of packaged snacks indirectly amplifies carbon emissions across multiple stages- from production and packaging to transportation and waste management.

Q10 (a): How often do you buy new clothes?

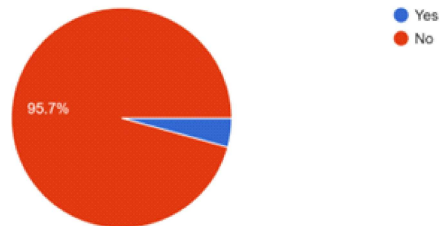


Q 10 (b): With regards to used clothes, which one would you prefer?



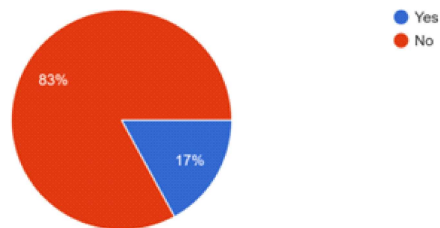
In response to the question, “How often do you buy new clothes?”, it is seen that the consumption of clothes is high and almost 23.4% of clothes were discarded or thrown away, adding to the garbage. Also, the data indicates a strong tendency toward reuse and repair, which is encouraging from a sustainability perspective. Such practices are often associated with lower and middle-income groups, where frugality is a necessity. This also reflects a broader pattern observed in environmental studies: higher-income groups typically generate a larger carbon footprint, partly due to higher consumption levels, including frequent clothing purchases. In contrast, lower-income groups tend to follow more sustainable habits like reusing and repairing, which naturally help reduce overall carbon emissions.

Q11: Do you purchase sustainable items?

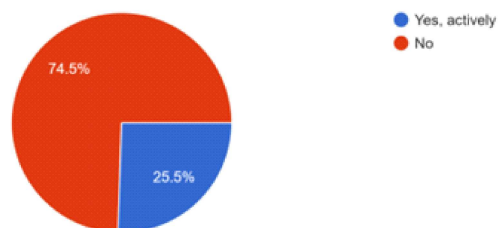


The statistics reveal that almost 96% of the population here is not aware/conscious of sustainability while purchasing items/products. This reflects the low eco-sensitivity and awareness of the concerned population.

Q12 (a): Are you aware of your carbon footprint?

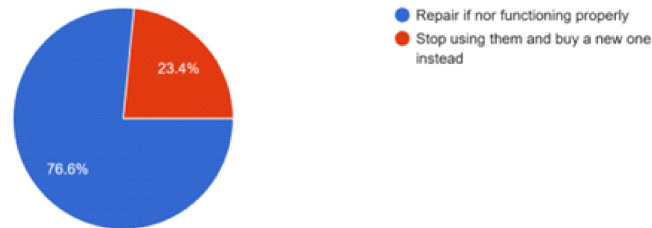


Q12 (b): Do you consciously take steps to reduce it?

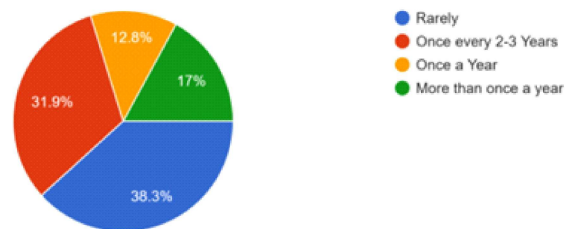


From the above data, it is seen that 83% of the respondents are totally unaware of the concept of carbon footprint and 74.5% revealed that they never took any steps to reduce their Carbon Footprint as they are not aware of the same. From the analysis it becomes clear that majority of the respondents lacked the eco-consciousness despite their literacy levels.

Q13 (a): With regards to gadgets, which one would you prefer?- Repair if not functioning properly/Stop using them and buy a new one instead?

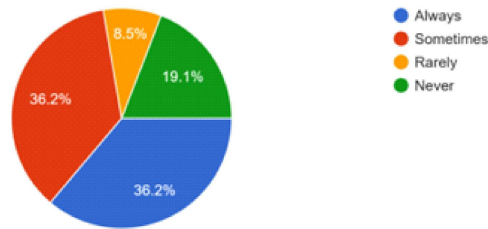


Q13 (b): How often do you buy new gadgets (phone, laptop, headphones, etc.)?



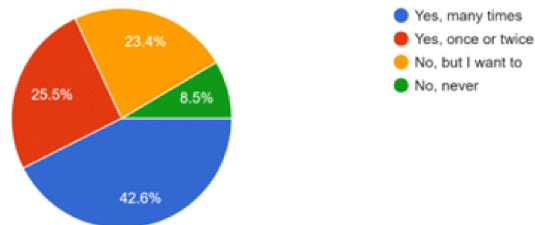
With regards to buying new gadgets, 76.6% opted to go for repairing and reusing the gadgets if it does not function properly. Though these are sustainable practices it may have more to do with the low income levels rather than eco-consciousness. The data also reinforces the results of research studies which show that carbon footprint is higher in higher income groups. An authentic and widely cited analysis on Carbon Footprint of different income groups (reports by Oxfam International and the SEI-Stockholm Environment Institution, particularly the 2023 report “Climate Equality: A Planet for the 99%”) shows that high income groups have a significantly larger footprint than low-income groups- both globally and within individual countries.

Q14: Do you separate waste at home (dry/wet, recyclable/non-recyclable)?

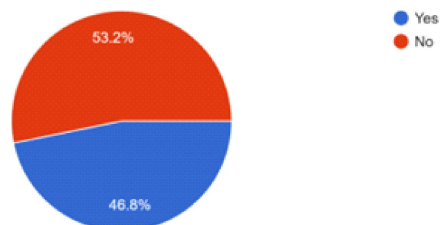


Though a majority- 36.2% did separate solid from wet waste, on personal interview it has been figured out that there is no waste management project or recycling plant functioning in the locality. Some of the solid waste are sold off for recycling (to units which are not local) and most of the other solid and wet waste are disposed off in vacant lands, drains, etc.

Q15 (a): Have you ever planted a tree yourself?

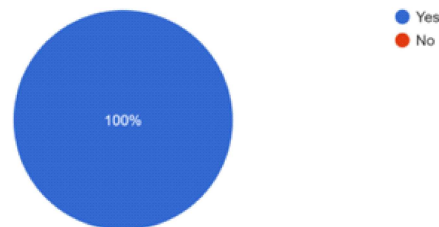


Q 15(b): Have you kept track of the survival/growth of trees planted by you?

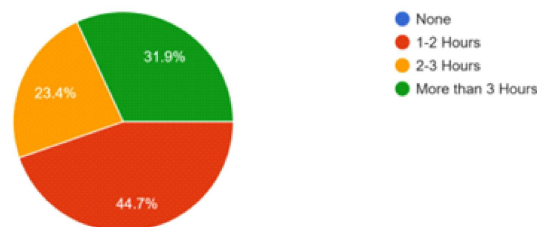


Majority-42.6% planted trees themselves many times but almost an equal majority-53.2% responded that they never kept a track of their survival. The plantation of trees may be more because of the mandatory tree plantation programme for college admissions as per government policy. Since there was no such policy to keep track of their survival it is obvious that a large majority responded that they had never kept track of the same. Thus, the practice of tree plantation emerged more of a mandatory exercise rather than being prompted by eco-consciousness.

Q16 (a): Do you feel rejuvenated when you are in the midst of greenery/nature?



Q16 (b): How much time do you spend relating to Nature?



From the above data it is clear that 100% of the respondents feel rejuvenated by nature. However, their lifestyles reveal that time spent in nature for majority of them is minimal, i.e., restricted to 1-2 hours. This could be due to modern lifestyles and screen focused lives- like increased engagement with electronic gadgets, social media, rapid urbanization and industrialization- that physically separate us from natural experiences leading to diminished understanding and appreciation of ecosystems. Modern lifestyles prioritize indoor, digital and consumer driven activities over outdoor engagement, causing a cultural shift where nature is seen as separate from humanity rather than integral to it.

Suggestions:

The recommendations emerging from this study operate at two interconnected levels. At the individual level (bottom-up approach) is essential, where people consciously adopt lifestyle changes, become aware of their personal Carbon Footprint, and take active/proactive steps to reduce it. Equally important is the policy level (top-down approach) in which the government and institutional bodies implement stronger regulations, infrastructure support, and environmental policies to curb Carbon Footprint at the systemic level. Together, these two approaches can create a comprehensive pathway for meaningful and sustained carbon reduction. Following are the suggestions:

A) Individual Level(Bottom-Up Approach):

- Restrict the use of private vehicles for both long and short distances, and rather opt for public transport, vehicle pooling, cycling, or walking whenever possible. This shift can significantly reduce unnecessary fuel consumption and lower overall carbon emissions.
- Install solar panels on individual roof tops for power generation, if possible.
- Tree plantation and continuous maintenance for survival.
- Reduce meat consumption by choosing lower-impact protein sources such as plant-based proteins, legumes, tofu, and other sustainable alternatives.
- Opt for locally sourced food whenever possible and avoid packaged and processed food as packaged and processed foods increase Carbon Footprint because they require more energy for manufacturing, packaging and long-distance transportation and they generate plastic and packaging waste that adds to carbon emissions.
- Making sustainable clothing choices- such as opting for organic cotton, organic dyes, handlooms and adopting a minimalist wardrobe- can significantly reduce the carbon footprint generated from fashion and textile consumption. Reuse and recycle textile waste.
- Single Use Plastics (SUP) increase carbon footprint because they are made from fossil fuels, require high energy for production, are used briefly and create long-lasting waste that adds to river and land pollution and emissions of greenhouse gas. Therefore, conscious restrictions of SUP should

be practiced. For eg.: Carrying environment friendly shopping bags may be opted for while shopping.

- Encourage a conscious and mindful reconnection with nature in daily life, through simple practices such as spending time outdoors, engaging with green spaces, and appreciating natural surroundings. Such habits foster environmental responsibility and strengthen personal commitment to sustainability.
- Take conscious steps to participate as environment stewards by promoting practices such as- engaging in neighborhood cleanup, tree plantation and maintenance, support environmentally responsible business, support local artisans, growing native plants and herbs/vegetables at home which require less water and maintenance.
- Be aware and create awareness on personal waste (through wet-dry segregation) management and proper disposal.
- Be mindful of digital habits by deleting old emails, unsubscribing from unnecessary newsletters, and watching videos in lower resolution or downloading content when possible. As deleting old emails reduces carbon footprint because emails are stored on energy-consuming data servers. Fewer stored emails mean less energy is needed for storage, backup and cooling in data centers, which lowers electricity use and CO2 emissions. Choose greener technologies by opting for energy-efficient or remanufactured devices.

B) Top-Down Approach:

- In Duliajan and its surrounding areas, the lack of robust public transportsystem compels people to rely heavily on private vehicles. The government should therefore strengthen and expand public transport services, making them more reliable, affordable, and accessible. Additionally, dedicated cycling lanes and well-maintained roads should be developed to encourage safe and sustainable mobility options such as cycling.
- Demand Corporate Responsibility: In a place like Duliajan, where ample open land is available, institutions such as OIL and other mega companies can play a significant role through their CSR (Corporate Social Responsibility) initiatives. They may install solar panels in unused or vacant areas, enabling the generation of substantial amounts of renewable energy.

Investment in development of community solar/wind energy programmes through creation of Solar/WindFarms can further strengthen local sustainability efforts and reduce dependency on non-renewable sources.

- Awareness on proper waste-management practices must be strengthened through institutional initiatives. Local recycling units for wet waste, solid waste, and e-waste should be established to ensure systematic processing of waste products. Scientific and efficient waste-management methods are essential to reduce environmental impact and promote long-term sustainability.
- The government should prioritize the creation and preservation of green spaces over unchecked urbanization, as expanding greenery helps absorb carbon emissions, improves air quality, and significantly contributes to reducing the overall carbon footprint. Also, a stricter enforcement of existing laws is necessary to combat environmental pollution effectively.
- Educational institutions to prioritize awareness building on environment through awareness programmes, student projects, etc.
- Create awareness through digital initiatives by leveraging online platforms to advocate for environmental protection. Sharing eco-friendly ideas, promoting sustainable practices, and influencing consumer behavior through social media and digital campaigns can significantly amplify environmental consciousness.
- Hold companies accountable for perceived greenwashing or environmentally harmful practices, and apply public pressure for greater transparency.
- Encourage businesses to adopt genuinely sustainable operations to drive broader systemic changes and reduce overall environmental impact.
- Make eco-friendly alternatives in consumer products accessible and affordable.
- Advocate for policy change especially with regard to SUP (Single Use Plastic) both in production and in usage.

Conclusion:

In conclusion, this study finds that the individual carbon footprint of college students in Duliajan is notably high. A primary contributing factor is a deficit in individual environmental consciousness, as evidenced by the survey data. Effective mitigation requires a dual-pronged strategy. Systemic interventions such as enhancing affordable public transit, instituting efficient waste management, and rigorously enforcing environmental policies must be coupled with individual behavioral shifts towards sustainable lifestyles. It is also suggested that there is an urgent need to embed environmental ethics in the education curriculum along with pedagogical accountability in its execution starting from the school level upto graduation. Cultivating such environmental stewardship through pedagogy is essential to prepare future generations. Ultimately, fostering sustainability in Duliajan will depend on a synergistic top-down and bottom-up approach, integrating policy with personal responsibility.

References

<https://ourworldindata.org/co2/country/india>

<https://www.sciencedirect.com/science/article/pii/S0095069625000063>

<https://policy-practice.oxfam.org/resources/climate-equality-a-planet-for-the-99-621551/>

A Decadal Analysis of Renewable Energy Development in India

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Abstract:

India in the past years has seen rapid economic expansion which has been paired with rapid industrialisation. Propelled by such rapid economic expansion and sustained industrialisation, India's energy demand and consumption have surged by a huge margin, making the nation one of the world's fastest growing energy markets. As a direct consequence of this unprecedented growth and the necessity to secure stable, long term supply, India has strategically prioritised increasing its overall energy generation capacity. A major focus has been placed on diversifying the energy mix, with a significant shift toward renewable sources of energy such as solar energy, biomass, wind energy and hydro energy. This strategy not only aims to meet the enormous power requirements of modernising economy but also to fulfil the nation's commitments to a sustainable, low-carbon future. This paper gives a brief definition of native forms of energy such as solar energy, wind energy, biomass energy and small hydro power and thereby makes an analysis of how these forms of energy have developed in India in the last decade. It glosses over the advantages and disadvantages of each of the aforementioned sources of energy and gives a brief overview of the measures taken by the government to promote each source. This paper also presents a detailed analysis of the growth rates of solar energy, biomass, wind energy and small hydro energy from the FY 2014-15 to the FY 2024-25. Also suggestions for the possible reasons for the growth rates of each of the aforementioned source have been made. It is to be noted that the presented data is all correct as of March 2025.

Keywords: Biomass, Development, Energy, Renewable, Solar, Wind.

An Analysis of Renewable Energy Development in India:

In the last decade, India's power sector has witnessed massive increase in its output to meet the rising demand. As such the electricity generation has increased from 1,168 billion units in the year 2015-16 to an estimated 1,824

billion units in the year 2024-25. Also the total capacity has increased from 305 gigawatts in the year 2015-16 to 475 gigawatts in the year 2024-25.

In its increased electricity output India has put a huge emphasis on providing clean and sustainable energy. Therefore a major focus has been given on different forms of renewable sources of energy, as a result India's power sector is among the most diversified in the world, with power generation from non renewable sources like coal, natural gas, etc. as well as sustainable sources like solar, wind, biomass, small hydro and various other sources. As of the month of March year 2025 India has met a total installed power capacity of estimated 475 gigawatt which is comprised of 240 gigawatt of thermal, 105.6 gigawatt of solar and 50.4 gigawatt of wind power.

What are alternative sources of energy?

Alternative sources of energy are methods of energy production that are used instead of, or as an alternative to, conventional fossil fuels.

While the term "alternative energy" is very broad, it most commonly refers to renewable energy sources which possess the following features:

- **Renewable:** they are naturally replenished, making them virtually inexhaustible over a human timescale.
- **Cleaner:** They typically produce little to no greenhouse gases or other pollutants during operation.

Why the need for alternative sources of energy ?

The necessity for alternative sources of energy is a transition driven by quantifiable environmental urgency, geopolitical risks and compelling economic advantage.

- *Environmental Concern:* The primary need stems from the fact that global energy related carbon dioxide emissions reached a record 38 gigatons in 2024, mainly due to the burning of fossil fuels. To prevent catastrophic climate change, a decisive shift is mandatory: the International Energy Agency (IA) forecasts that to meet climate goals, the share of renewable power generation must rise from 32% in 2024 to 43 % by 2030. Furthermore, pollution from fossil fuels contributes to various health related issues globally each year , a public health crisis that clean alternatives eliminate. The transition is not just about reducing future emissions ; it is about mitigating an existing health and climate catastrophe.

- *Economic competitiveness and market dominance:* The switch to alternative energy is now economically rational, independent of subsidies the cost of utility scale Solar PV has declined by over 90% since 2010 and the cost of battery storage systems has fallen off by 93% over the same period. In 2024, 91% of all newly commissioned utility scaled renewable capacity delivered power at a lower cost than the cheapest new fossil fuel based alternative establishing renewables as the most affordable source of new electricity worldwide. This economic dominance is driving massive investment, with global renewable energy investment hitting \$807 billion in 2024.
- *Energy Security and Employment Growth:* Relying on imported fossil fuels creates massive risk and price volatility, as approximately 80% of the world's population lives in energy importing nations. Deploying domestic alternatives like solar and wind inherently improves energy independence and stability. The sector is also a major job creator: the clean energy sector has demonstrated faster employment growth than the fossil fuel sector with renewable energy creating 2.5 to 5 times more jobs per unit of energy produced compared to conventional fuels. This makes the alternative energy transition a strategic pathway for economic development and industrial diversification.

What are the forms of alternative forms of energy?

1. Biomass energy:

Biomass refers to renewable organic matter derived from plants and animals, containing stored chemical energy from the sun, generated through photosynthesis. It can be directly combusted for heat or transformed into liquid and gaseous fuels through various processes.

1.1. India's biomass scenario:

India's bio-energy sector is a cornerstone of its renewable energy strategy, leveraging the nation's substantial agricultural economy to generate power and fuels. The installed bio-power capacity (including biomass power and biogases/non-biogases co generation) has increased by

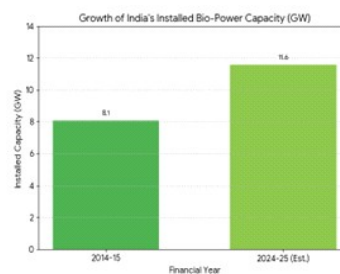


Fig:1(Growth of India's bio-power capacity from 2014-15 to 2024-25)

approximately 42-43% over the last decade, rising from around 8.1 GW in FY 2014-15 to an estimated 11.6 GW by FY 2024-25 as seen represented in Fig:1. While this growth is steady, it pales in comparison to the multifold expansion seen in solar and wind power. Crucially, the non-grid-connected and decentralised segment has witnessed significant policy focus, with the Compressed Biogas (CBG) sector expanding from virtually a single project (around 8 Tonnes per Day (TPD) capacity) in 2014 to approximately 150 projects with a cumulative capacity of over 1,200 TPD in 2024-25, primarily driven by the SATAT scheme. Furthermore, there's a major regulatory shift with the mandate for thermal power plants to co-fire a minimum of 5% biomass pellets with coal by 2026, creating an annual market for millions of tonnes of processed biomass. The gross annual availability of surplus agriculture-based residue remains vast, estimated at around 230 million metric tonnes (MMT), which holds a massive potential for power generation, estimated to be as high as 50,000 MW.

1.2. Advantages:

- **Waste Management & Pollution Reduction:** It utilises agricultural and municipal waste, directly addressing critical issues like open-field burning (stubble burning) and landfill accumulation, promoting a circular economy.
- **Rural Economy and Income Generation:** It creates stable, local supply chains for feedstock, providing supplementary income to farmers for selling their residues and generating decentralised employment opportunities.
- **Dispatchable Renewable Power:** Unlike variable solar or wind, biomass power plants can operate continuously, providing reliable, firm power to support grid stability.

1.3. Disadvantages:

- **High Logistical and Operational Costs:** The low energy density and scattered nature of feedstock lead to high costs for collection, transport, and storage, making it less cost-competitive than other renewables.
- **Air Quality and Emissions:** Combustion, even of clean biomass, releases pollutants like particulate matter (PM) requiring expensive emission control systems, particularly in densely populated areas.

- Sustainability and Land Use Risk: Poor management can lead to unsustainable harvesting practices, deforestation, or competition with food production (Food vs. Fuel).

1.4. Governmental measures to promote biomass energy:

The Government of India promotes biomass through targeted programs and financial incentives. The National Bio-energy Programme (2021-2026) offers significant Central Financial Assistance (CFA) for setting up Waste to Energy, Biogas, and non-bagasse co-generation projects, including support for biomass pellet/briquette manufacturing. Crucially, the mandate for 5% biomass co-firing in thermal power plants creates a massive, guaranteed market for processed agricultural residue. Additionally, the Sustainable Alternative Towards Affordable Transportation (SATAT) initiative specifically drives the establishment of Compressed Biogas (CBG) plants, while the Pradhan Mantri JI-VAN Yojana supports commercial-scale Second-Generation (2G) bio-ethanol projects from agricultural waste.

2. Solar Energy:

Solar energy is a form of renewable energy, in which sunlight is turned into electricity, heat, or other forms of energy we can use. It is a “carbon-free” energy source that, once built, produces none of the greenhouse gas emissions that are driving climate change.

2.1. India’s solar energy scenario:

Fig:2(Growth of India’s Solar power Capacity from 2014-15 to 2024-25)

India’s solar energy sector has witnessed phenomenal, unprecedented growth over the last decade, becoming the dominant force in the nation’s renewable energy push. The installed solar power capacity (including grid-

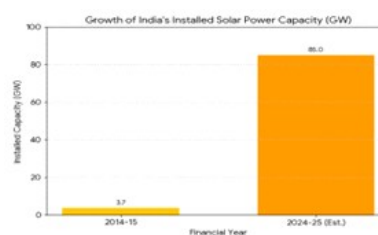


Fig:2(Growth of India’s Solar power Capacity from 2014-15 to 2024-25)

connected utility and rooftop solar) skyrocketed from just 3.7 GW in FY 2014-15 to an estimated over 85 GW by FY 2024-25 as depicted in Fig:2, representing an approximate 23-fold increase. This massive expansion, driven by rapidly falling costs, is a crucial part of India’s commitment to achieve 500 GW of non-fossil fuel capacity by 2030.

2.2. Advantages

- **Abundant, Limitless Fuel:** India receives vast amounts of solar radiation, making it an inexhaustible energy source across the entire country.
- **Rapid Deployment and Scalability:** Projects range from small rooftop units (kW scale) to massive solar parks (GW scale), allowing for quick deployment and decentralised generation.
- **Zero Operational Emissions:** Solar photovoltaic (PV) generation produces zero greenhouse gases or air pollutants during operation, helping meet climate goals.

2.3. Disadvantages:

- **Intermittency and Storage Needs:** Power generation is intermittent (only available during the day), necessitating expensive and complex Battery Energy Storage Systems (BESS) for grid stability.
- **Large Land Footprint:** Utility-scale solar parks require vast tracts of land, which can lead to land acquisition challenges and conflicts over land use.
- **Material and Waste Issues:** The manufacturing of PV panels involves energy-intensive processes, and the eventual disposal of panels creates a growing e-waste management challenge.

2.4. Governmental measures to promote solar energy:

The Government of India promotes solar energy through several focused initiatives backed by significant financial commitments. The PM Surya Ghar: Muft Bijli Yojana is a key residential scheme, providing up to ¹ 78,000 in subsidies to install rooftop solar on 1 crore households. In the agricultural sector, the PM-KUSUM Scheme targets 30 GW of solar capacity by FY 2026, offering 60% subsidies for solar pumps. To boost domestic manufacturing, the Production Linked Incentive (PLI) Scheme is allocated over ¹ 24,000 crore to establish Giga Watt-scale module manufacturing. This is complemented by the Solar Park Scheme, which facilitates the development of 50 parks with a capacity target of 37.9 GW, ensuring the necessary infrastructure for rapid utility-scale deployment.

3. Wind energy:

Wind energy is a form of renewable energy that harnesses the power of the wind to generate electricity. It involves using wind turbines to convert the turning motion of the blades to, pushed by moving air into electrical energy.

3.1. India's wind energy scenario:

India's wind energy sector has seen steady, mature growth, retaining its position as the second-largest renewable source after solar. The installed wind power capacity grew significantly, rising from 22.5 GW in FY 2014-15 to an estimated over 47 GW by FY 2024-25 as depicted in Fig:3, marking an increase of approximately 109%. While annual additions have fluctuated following the shift from the feed-in-tariff (FIT) regime to a competitive Reverse Auction Mechanism (RAM),

wind remains crucial due to its complementary generation profile (strongest during evening/monsoon months, when solar is low). Recent policy focus includes encouraging wind-solar hybrid projects to optimise land and transmission infrastructure, and formulating policies for the nascent offshore wind sector along the Gujarat and Tamil Nadu coasts.

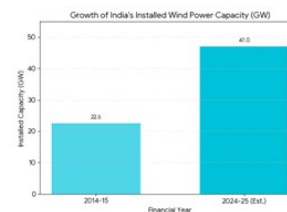


Fig:3 (Growth of India's Installed Wind Power Capacity from 2014-15 to 2024-25.)

3.2. Advantages:

- **Low Operating Costs:** Once installed, wind turbines have minimal operating expenses and a long operational lifespan (over 20 years).
- **Highest Capacity Utilisation Factor (CUF):** Wind projects, especially in high-wind zones (like Tamil Nadu and Gujarat), often achieve better CUF than solar, making them highly efficient.
- **Land Use Efficiency:** Wind farms can be installed on large agricultural lands where the land between turbines can still be used for farming or grazing.

3.3. Disadvantages:

- **Geographic Concentration:** High-potential sites are concentrated primarily in a few southern and western states, leading to challenges in grid integration and inter-state transmission.
- **Visual and Noise Pollution:** Wind farms can be visually intrusive and generate significant noise, leading to public opposition in certain areas.
- **Impact on Wildlife:** Rotating blades pose a threat to birds and bats, requiring careful environmental impact assessments and mitigation strategies.

3.4. Governmental measures to promote wind energy:

The government shifted to a Competitive Bidding Framework (Reverse Auction) to drive down tariffs. The introduction of the National Offshore Wind Energy Policy is aimed at unlocking the immense potential along the coastline. Most importantly, the government actively promotes Wind-Solar Hybrid Power Projects through specific policies to stabilise power output, optimise land use, and better utilise the existing transmission infrastructure by combining two distinct, complementary generation patterns.

4. Small Hydro-Energy:

In India hydro power plants with a capacity of 25 MW or below are known as Small Hydro.

4.1. India's small hydro scenario:

Small Hydro Power (SHP), defined as projects with a capacity of up to 25 MW, is one of the oldest renewable technologies in India and provides reliable, decentralised power, often in remote mountainous regions. The installed SHP capacity showed slow but steady growth, increasing from approximately 4.0 GW in FY 2014-15 to an estimated 4.9 GW by FY 2024-25 as depicted in Fig:4, representing about 22-23% growth. Unlike solar and wind, SHP growth is fundamentally limited by the

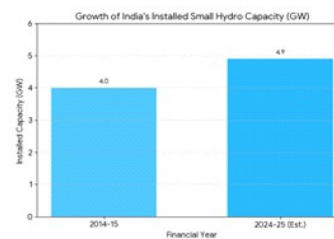


Fig:4(Growth of India's Installed Small Hydro Capacity from 2014-15 to 2024-25)

availability of suitable sites with perennial water flow. Its value lies in its firm and continuous power generation capability, making it highly valuable for local grid stability in remote areas, particularly in the Himalayan and sub-Himalayan regions where electricity access can be challenging.

4.2. Advantages:

- **Predictable and Firm Power:** SHP is a mature, established technology that offers reliable, non-intermittent power generation driven by water flow.
- **Decentralised Power Source:** Ideal for providing electricity to remote or isolated communities where transmission costs from the main grid are prohibitive.

- **Minimal Environmental Impact:** Unlike large hydropower dams, SHP projects typically involve run-of-the-river schemes that require minimal reservoir creation, significantly reducing social and ecological displacement.

4.3. Disadvantages:

- **Site and Water Flow Dependency:** Growth is strictly limited by the availability of sites with specific hydrological conditions and reliable, perennial water flow.
- **Vulnerability to Climate:** Generation is highly vulnerable to climate change factors, such as reduced or erratic rainfall and changing snowfall patterns.
- **High Initial Capital Cost:** The initial investment required for civil works (dams, canals, weirs, powerhouse construction) is substantially higher than for solar or wind projects.

4.4. Governmental Measures to promote Small hydro energy:

The SHP sector is supported by specific government policies under the Ministry of New and Renewable Energy (MNRE), which provides Central Financial Assistance (CFA) for both the development of new projects and the renovation and modernisation of old ones. A significant focus is placed on streamlining the clearance process and conducting resource assessments to identify potential sites, particularly in the Northeast and Himalayan states. The government also mandates the purchase of SHP power through Renewable Purchase Obligations (RPOs) for distribution utilities to ensure market demand.

Overall scenario of India's renewable energy sources:

The transition of India's renewable energy sector between FY 2014-15 and FY 2024-25 represents a strategic repositioning driven predominantly by Solar Energy. The combined installed capacity of the four key sources (Solar, Wind, Biomass, Small Hydro) expanded substantially, growing from 38.3 GW to approximately 172.37 GW (a 350% increase). This growth fundamentally altered the energy mix: in 2014-15, Wind Energy was the largest contributor at nearly 59% (22.5 GW), while Solar held a minor share at 9.7% (3.7 GW). By 2024-25, Solar Energy had become the dominant source, commanding 61.3% (105.65 GW) of the total renewable capacity, underscoring the success of national policy initiatives and the maturity of solar photovoltaic technology in driving India's energy transition.

A detailed analysis of the growth rates:

The table:1 below displays the installed capacity for each of the sources in gigawatts for the respective years. While the table:2 displays the growth factor for each of the sources of energy from the FY 2014-15 to 2024-25. The fig:7 provides the same info as in table:1 but graphically.

Financial Year	Solar Power (GW)	Wind Power (GW)	Bio Power (GW)	Small Hydro Power (GW)
FY 2014-15	3.99	23.35	8.55	4.06
FY 2015-16	7.12	26.78	8.92	4.27
FY 2016-17	12.78	32.28	9.12	4.38
FY 2017-18	22.35	34.15	9.67	4.49
FY 2018-19	29.10	35.63	10.10	4.59
FY 2019-20	35.61	37.74	10.22	4.68
FY 2020-21	41.24	39.25	10.53	4.79
FY 2021-22	54.00	40.36	10.68	4.85
FY 2022-23	66.78	42.63	10.80	4.94
FY 2023-24	81.81	45.89	10.94	5.00
FY 2024-25	105.65	50.04	11.58	5.10

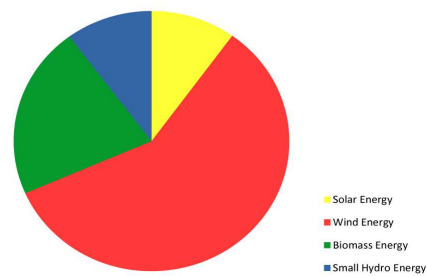


Fig:5(India's Installed power capacity mix as of March 2015)

Table:1(Growth of the Installed power capacities for each year

Energy Source	FY 2014-15 Capacity (GW)	FY 2024-25 Capacity (GW)	Growth Factor (Approx.)	Growth Rate Type
Solar Power *	3.99	105.65	26.5x	Exponential
Wind Power	23.35	50.04	2.1x	Steady/Linear
Bio Power	8.55	11.58	1.35x	Slow/Sustained
Small Hydro Power	4.06	5.10	1.25x	Near Stagnation

Table:2(Overall Growth from 2014-15 to 2024-25)

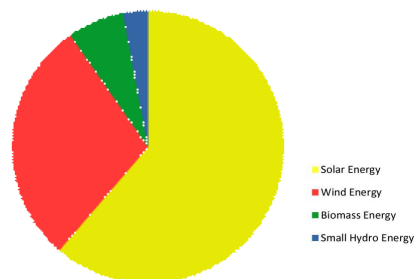


Fig:6(India's installed power capacity mix as of March 2025)

1.Solar Power: Exponential Growth:

Solar power experienced the most dramatic growth, moving from a niche source to the foundation of the country's renewable energy strategy.

The growth rate is exponential, averaging a 35% to 45% Compound Annual Growth Rate (CAGR) over the decade. This aggressive acceleration is evident as annual additions consistently increased, peaking well over 12 GW in recent years.

1.1.Possible Reasons for High Growth:

- *Cost Collapse and Grid Parity:* This is the single biggest driver. The Levelized Cost of Electricity (LCOE) for solar modules dropped by over 80% globally during this period. Competitive reverse auctions in India drove tariffs to record lows, making solar power the cheapest new power source on the grid.
- *Aggressive Policy & Targets:* The government's ambitious goal of 100 GW of solar by 2022 (part of the larger 175 GW target) provided immense market certainty and accelerated land allocation for large solar parks.
- *Ease of Deployment:* Compared to wind farms or thermal plants, utility-scale solar projects have a shorter gestation period, fewer logistical hurdles, and a lower reliance on complex supply chain infrastructure, enabling faster project commissioning.

2.Wind Power: Steady Growth with a Mid-Decade Dip:

Wind power maintained a high initial base but exhibited a slower, more volatile growth trajectory than solar. The overall growth is steady and linear (about 2.1 times total increase). However, the annual addition rate was volatile, peaking at 5.5 GW in FY 2016-17 before sharply dropping to under 2 GW in the following years.

2.1.Possible Reasons for Volatility and Moderate Growth:

- *Policy Transition Shock (Post-2017):* The shift from a high, guaranteed price Feed-in Tariff (FIT) system to a competitive reverse auction model in 2017 created massive market uncertainty. This caused many developers to delay or cancel projects as they adjusted to razor-thin margins and lower returns, resulting in the sharp drop in new capacity additions.
- *Resource and Land Constraints:* Prime wind sites with high Capacity Utilisation Factors (CUF) are geographically limited (primarily concentrated in states like Gujarat, Tamil Nadu, and Maharashtra). Land acquisition and securing transmission corridors for these specialised sites became a major bottleneck.
- *Grid and Infrastructure Limitations:* Wind power's high intermittency and frequent location in remote areas often lead to curtailment (grid operators forcibly restricting output) to maintain grid stability. This reduces the profitability of wind farms and slows down new investment.

3. Bio Power : Limited Growth Due to Operational Risks:

Bio power has witnessed very Low, Sustained. The 3.08% CAGR is marginal. The growth is primarily driven by incremental additions, often in captive sugar mill co-generation facilities (biogases-based), rather than large-scale independent power projects.

3.1. Possible Reasons for Low Growth:

- *Supply Chain and Logistical Risk:* This is the critical barrier. Bio Power requires a continuous, year-round supply of biomass fuel (agricultural residues, plant matter). Creating a reliable biomass supply chain—including collection, storage, and transportation—is complex, costly, and vulnerable to weather and local market conditions.
- *High Variable Cost:* Unlike solar and wind (which have zero fuel cost), biomass plants incur high variable costs for fuel procurement and handling. For many plants, fuel costs account for 60-70% of operating expenses, making them uncompetitive against low-LCOE solar.
- *Technology and Waste Challenges:* Projects based on municipal Waste-to-Energy face challenges due to poor waste segregation, high moisture content, and the heterogeneous nature of Indian waste, limiting efficiency and scalability.

4. Small Hydro Power (SHP) : Stagnation Due to Site and Regulatory Barrier::

With the lowest CAGR of 2.30%, the SHP sector has effectively reached a standstill. Annual capacity additions are minimal, reflecting a lack of viable new projects.

4.1. Possible Reasons for Stagnation:

- *Geographic Saturation:* The most significant limiting factor is the finite number of feasible sites. Most readily accessible and economically viable locations (based on factors like stream flow and head availability) for SHP projects (under 25 MW) have already been exploited.
- *Complex Regulatory & Environmental Hurdles:* New SHP projects are located in increasingly sensitive or remote areas. They face prolonged and complex environmental clearance, forest department approvals, and issues related to local ecology and water rights, significantly increasing project development time and regulatory risk.

- *External Policy Focus:* Government attention and capital investment have overwhelmingly shifted to high-growth, cost-effective sectors like solar, leaving SHP without the necessary policy incentives to overcome its inherent site and regulatory challenges.

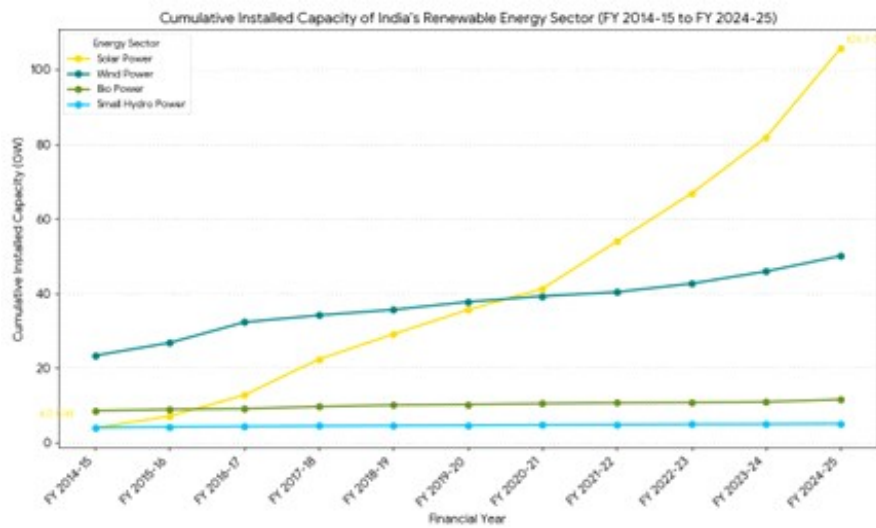


Fig:7(A graphical depiction of the growth rates of the biomass, solar, small hydro and wind energy sector)

Conclusion:

As we have seen based on our analysis the growth rates of each of the energy sectors has a huge variation over the different types, this may be attributed to different factors such as collateral damage due to development or energy harvesting, potential risks, low ROI and technological challenges etc. Energy sectors which do not have the aforementioned issues have seen prominent growth while those with the issues have not seen much development.

Future prospects of Indian fuel energy scenario:

Building on the foundation of the last decade, where solar and wind capacity saw unprecedented Compound Annual Growth Rates (CAGR), the future of India's energy sector is overwhelmingly anchored by the national

goal of achieving 500 GW of non-fossil fuel capacity by 2030. This imperative dictates a critical dual trajectory for the renewable sector. The core of this expansion will be Solar and Wind, driven primarily by their sustained low Levelized Cost of Electricity (LCOE) and rapid scalability. Solar is slated to achieve approximately 280 GW by 2030, with growth heavily supported by the INR 19,500 crore Production Linked Incentive (PLI) scheme for high-efficiency solar PV module manufacturing, ensuring domestic supply chain resilience. Wind energy, crucial for its complementary generation profile (often peaking in the evening and night), will contribute significantly, with future capacity expansions expected through competitive auctions and the eventual opening of Offshore Wind projects, leveraging vast coastal resources. Critically, the long-term viability and dominance of these intermittent resources are linked to the successful deployment of Energy Storage Systems and Pumped Hydro Storage . Current plans target up to 50t GW / 200 GW capacity by 2030, which is the technical prerequisite for transforming intermittent supply into reliable, firm power for grid stability.

In sharp contrast to these core generation sectors, the capacity additions for Bio Power and Small Hydro (SHP)—which have been marginal due to logistical and physical constraints—are projected to continue slowing, thereby forcing them into highly specialised, strategic niche roles. Bio Power’s economic viability is shifting away from bulk power generation durable fuel logistics and high operational costs. Instead, its growth is being strategically redirected toward waste management and transportation fuel diversification, underpinned by the SATAT (Sustainable Alternative Towards Affordable Transportation) scheme, which promotes the development of over 5,000 decentralised Compressed Biogas (CBG) plants. This capacity is invaluable as it provides dis-patchable, localised base-load capacity which can stabilise the grid during solar/wind dips, while simultaneously solving local waste challenges. Similarly, the Small Hydro (SHP) sector (projects 25 MW) is constrained by the saturation of readily available sites and increasing environmental regulations. Its primary role is shifting entirely to the modernisation, rehabilitation, and updating of existing facilities. The measurable utility of SHP in the future will be to provide predictable, non-intermittent peaking support for micro-grids and localised grids in remote, often hilly regions, ensuring regional energy security rather than influencing the national energy mix targets dominated by solar and wind.

References

- <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=2116510®=3&lang=1>
- <https://www.mospi.gov.in/publication/energy-statistics-india-2025-0>
- Renewable Energy Statistics | MINISTRY OF NEW AND RENEWABLE ENERGY | India
- India Climate & Energy Dashboard
- Energy Statistics India 2025: Report - Renewable Watch
- Overview | MINISTRY OF NEW AND RENEWABLE ENERGY | India
- Bio Energy Overview | MINISTRY OF NEW AND RENEWABLE ENERGY | India
- Solar Overview | MINISTRY OF NEW AND RENEWABLE ENERGY | India
- Wind Overview | MINISTRY OF NEW AND RENEWABLE ENERGY | India

**An Ecocritical Reading of Kalidasa's *Abhijnana
Shakuntalam***

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Abstract: In Indian classical literature, the recognition of nature's sacredness and interconnectedness is deeply embedded in cultural philosophy. Kalidasa's *Abhijnana Shakuntalam*, translated by Chandra Rajan in *The Loom of Time* (1989), vividly captures this ecological wisdom. In this play, nature is not passive or ornamental—it is lively, emotional, and divine. The forest, the river, the trees, and even the tiniest living creature participate in the story's emotional flow, creating a poetic world where humans and non-humans coexist in profound harmony. Nature influences the characters' lives at every point in the play, and love, separation, and reunion are driven by its forces. The paper explores how Kalidasa's work can serve as a model for world literature in shifting from an anthropocentric to a nature-centric perspective, and how Kalidasa can be seen as a romantic poet with idealized views of nature, characterized by its beautiful, biologically diverse landscape.

Keywords: Ecocriticism, nature, culture, classical literature

Introduction:

Eco-criticism is one of the most significant and evolving approaches in contemporary literary studies. It seeks to understand how literature represents the relationship between human beings and the natural world, and how this relationship shapes one's ethical, emotional, and cultural lives. In simple terms, eco-criticism views nature not merely as a backdrop for human activity but as a vital character. The origins of Ecocritical theory can be traced back to William Rueckert, who coined the term 'ecocriticism' in 1978 in his essay "Literature and Ecology: An Experiment in Ecocriticism." Cheryl Glotfelty thereafter revived it in 1996, when she co-edited a book with Harold Fromm entitled *The Eco-Criticism Reader: Landmarks in Literary Ecology*. Back in 1992, Glotfelty had also founded the ASLE, the Association for the Study of Literature and Environment, and had its own journal, ISLE,

Interdisciplinary Studies in Literature and Environment. Glotfelty defines it as “the study of the relationship between literature and the physical environment. In Indian classical literature, this awareness of nature’s sacredness and interdependence is deeply rooted in cultural philosophy. Kalidasa’s *Abhijnana Shakuntalam*, translated by Chandra Rajan in *The Loom of Time* (1989), beautifully expresses this ecological wisdom. In this play, nature is not passive or decorative—it is vibrant, emotional, and divine. The forest, the river, the trees, and even the smallest living being participate in the story’s emotional rhythm, creating a poetic world where the human and non-human exist in profound harmony. Nature intervenes in the characters’ lives at every stage of the play, and love, separation, and reunion are brought about by its forces. The paper examines how Kalidasa’s work can serve as a model for world literature in transitioning from a human-centered to a nature-centered system, and how Kalidasa can be considered a romantic poet with romantic notions of nature, characterized by its beautiful, biologically diverse landscape.

Discussion:

Nature comes alive in the text, and the spectator and the reader can never escape the ravishing beauty of the dense forest with wild bucks, mango trees, jasmine flowers, birds, and brooks. The different seasons play a significant part in the play. The prologue praises summer as the season of love. The play begins in summer and ends in spring. Kalidasa describes the sensuous beauty of the forest and the seasons with meticulous care, taking the spectator directly into the enchanting wilderness. Kalidasa’s subtle portrayal of the invasion of culture into nature through the picturesque description of an antelope with its “haunches folded into its chest” and the “open mouth dropping half-chewed grass” on the path not only gives a visual image of the fast-running, terrified animal but also knowledge about the encroachment of King Dushyanta into the forest. The antelope stops at the side of Shakuntala only to get protection from Dushyanta. Though Dushyanta invades the forest as an outsider, he cannot be alienated from the story, for it is he who protects the sacred grove from the attack of the demons. The fact that the deer requires thick vegetation for its sustenance gives a picture of the dense forest. A look into Sage Kanva’s ashram reveals the beauty and uniqueness of nature. Kalidasa describes the forest path to the ashram as a

path strewn with “wild grain under the trees” where the “parrots nest in hollow trunks”. The stones on the path are “stained by the dark oil of crushed ingudi nuts,” and the deer that trust the human voices “do not break their gait”. It is only the presence of Dushyanta, who is a perfect stranger to the forest, that makes the deer run for its life. The natural environment remains undisturbed, with fallen grains and nuts lying untouched under the plants and trees. The deer continues its movement undeterred by the presence of humans. The reader can only marvel at the play’s unpolluted environment.

Nature as a Living Entity:

A key feature of *Abhijnana Shakuntalam* is Kalidasa’s deep respect for nature. His depiction of Sage Kanva’s hermitage creates a poetic image of ecological harmony, where trees, flowers, rivers, and animals coexist peacefully with the ascetics and their disciples. The forest exudes calmness and purity; even silence feels meaningful here. Shakuntala is often likened to a delicate jasmine flower, spreading her fragrance and caring for the plants and animals in the woods. Jasmine blooms mainly in spring and summer and is used to make garlands for deities and rituals. This highlights Shakuntala as the forest goddess—she is entrusted with Kanva’s ashram when he’s away, making her a god to be worshipped in his sacred space. Her close connection to nature enhances her ethereal beauty, with natural adornments like flowers and leaves, and her bark clothing adds to her charm. She seamlessly blends with her environment, sensing even the smallest movements, and the plants and trees seem to call her with their swaying branches. Growing up in this tranquil setting, Shakuntala embodies the true spirit of a child of nature. Her gentle, compassionate, and sensitive demeanor reflects her surroundings. She lovingly waters the plants and cares for her deer friends, prompting the forest to respond kindly in return. When she prepares to leave for her husband’s palace, Kanva’s deep emotion is evident— “Every plant she tended seems to droop in sorrow at her departure.” — Kalidasa, trans Chandra Rajan, p. 214 This scene is not just poetic; it highlights the profound emotional connection between humans and the natural world. Kalidasa’s vision foreshadows today’s understanding of the environment as a living being capable of emotion, response, and empathy.

The Hermitage as an Ecological Ideal:

The hermitage in Kalidasa's play functions as a perfect ecological model—a place where human life exists in complete balance with nature. The ascetics live simple lives guided by the principles of restraint, compassion, and harmony. They consume only what they need, avoiding all forms of excess and waste. Every action within this sacred space reflects respect for life in all its forms. This ideal world of the forest contrasts powerfully with the materialistic world of the royal court, where desires and ambitions dominate. Dushyanta, the king, represents a civilization that is gradually losing touch with its natural roots. The hermitage, by contrast, becomes a metaphor for the ecological and spiritual order that sustains the universe. Through this contrast, Kalidasa offers a subtle critique of human arrogance and materialism, reminding readers that civilization, if separated from its natural context, loses its moral and spiritual foundation. The forest thus becomes not just a setting but a moral teacher, urging humanity to rediscover humility and balance.

Shakuntala as the Spirit of Nature:

Shakuntala stands as one of the most beautiful and symbolic figures in Indian literature. Through her, Kalidasa gives form to nature as feminine and spiritual. She symbolizes purity, tenderness, and fertility—the nurturing qualities that sustain life. Her character is deeply connected to her natural environment; she blends in so seamlessly with the forest that she appears to be a part of it. Her love for Dushyanta, an outsider, signifies the union between nature and civilization. Nevertheless, her curse and separation highlight a more profound ecological message: when humans forget or neglect their bond with nature, harmony breaks down. Dushyanta's forgetfulness mirrors the modern human condition—being disconnected from the environment, blinded by ego and ambition. Shakuntala's suffering thus becomes a symbol of the pain inflicted on nature when it is ignored or abandoned. Recovery occurs when Dushyanta remembers her—and, by extension, reconnects with nature—restoring order and happiness. This renewal suggests that reuniting with nature is also a moral and emotional rebirth for humanity.

The Sacredness of Nature in Indian Thought:

Kalidasa's vision of the environment is deeply informed by ancient Indian philosophy, which perceives the world as an interconnected web of

life. In Vedic and Upanishadic thought, nature is considered divine—rivers are revered as goddesses, mountains are regarded as sacred, and trees are viewed as living spirits. This belief that all elements of the universe are filled with prana, or life force, is beautifully reflected throughout *Abhijnana Shakuntalam*. The forest is described as “adorned with new blossoms and humming bees,” a space filled with the music of life. Every part of this setting is active and aware. The ascetics perform rituals that honor trees and animals, acknowledging their role in maintaining the balance of the cosmos. This is what eco-critics today refer to as a biocentric or eco-spiritual worldview—one that does not place humans above other creatures but views them as equal participants in the sacred dance of life. Kalidasa’s poetic imagination transforms this belief into art, making *Abhijnana Shakuntalam* a timeless celebration of ecological unity.

The Symbolism of Seasons and Flora:

One of the most delicate and artistic features of Kalidasa’s writing is his use of nature’s cycles to reflect human emotions. In *AbhijnanaShakuntalam*, the passing of seasons mirrors the transformation in Shakuntala’s life. The springtime of the play’s beginning, filled with blossoms, bees, and birds, corresponds to the freshness of her love. Later, when separation and sorrow enter her life, the natural imagery darkens—the forest seems subdued, the flowers lose their glow, and the breeze carries a note of melancholy. The poet describes how “The forest seemed to share her sorrow; even the vines she loved had lost their luster.” — Kalidasa, trans Chandra Rajan, p.213.

Through such symbolism, Kalidasa gives the environment an emotional consciousness. Plants and seasons do not merely exist—they communicate, grieve, and rejoice. This close identification of the human and the natural world highlights Kalidasa’s deep ecological sensitivity and his understanding that the rhythms of nature and the rhythms of the heart are intertwined.

Human Emotion Mirrored in Nature:

Throughout the play, nature serves as an emotional mirror, reflecting and intensifying human feelings. When Shakuntala pines for Dushyanta, the rustling leaves and the birds’ songs echo her loneliness, as if the entire forest mourns with her. Kalidasa’s imagery fuses the outer landscape with the inner

landscape of the heart. Even silence in the play is expressive—the quiet of the hermitage, the stillness of the river, or the hush of twilight all correspond to emotional states of longing, reflection, and devotion. By giving nature a shared emotional capacity, Kalidasa breaks down the barrier between human and non-human life. Interconnected emotional universe anticipates what modern eco-critics call ecological empathy—a recognition that one’s feelings and actions ripple through the entire web of life. In this sense, *Abhijnana Shakuntalam* is not only a play about love and destiny but also about emotional coexistence between humans and the natural world.

Eco-Spiritual Restoration:

The conclusion of *Abhijnana Shakuntalam* offers a profound message of spiritual and ecological healing. When Dushyanta finally regains his memory and reunites with Shakuntala in the celestial grove, the play’s atmosphere shifts from one of loss to one of renewal. This reunion symbolizes the restoration of harmony between humanity and the natural world. Dushyanta’s rediscovery of Shakuntala also represents his rediscovery of conscience, humility, and connectedness. The image of their son playing fearlessly with wild creatures captures the innocence and balance that characterize a life in tune with nature. Dushyanta exclaims, “This boy is the true son of the forest!” — Kalidasa, trans. Chandra Rajan, p. 198

—a line that beautifully expresses his awakening to the natural bond he had once forgotten. Kalidasa closes the play with a sense of peace and completeness, reminding us that love, morality, and ecology are all aspects of the same universal order. When one is restored, so too are the others.

Conclusion:

Kalidasa’s *Abhijnana Shakuntalam* remains one of the most ecologically sensitive works in the entire tradition of world literature. Through its graceful blending of romance, spirituality, and environmental consciousness, the play offers a timeless reflection on the human relationship with nature. Kalidasa does not preach ecological values—he embodies them poetically. His forest is alive with emotion, his characters are bound to the elements, and his moral vision sees no separation between the spiritual and the ecological. In an age when the natural world faces crisis and exploitation, Kalidasa’s work continues to speak with quiet urgency. It reminds us that our

identity as human beings is inseparable from the environment that sustains us. To forget nature, as Dushyanta once did, is to lose a part of our own soul. And to remember it, as he finally does, is to rediscover harmony, compassion, and peace. In this way, *Abhijnana Shakuntalam* is not only a classical drama of love and fate but also a prophetic text of ecological wisdom, as relevant today as it was more than two thousand years ago.

References:

Alapatt, Dr Nisha Francis. "An Ecocritical Reading of Kalidasa's *Abhijnana Shakuntalam*." *RJELAL*, 2017.

Bansal, Dr Hemraj. "'Look Back in Wonder'- What a world it was! An Ecocritical Study of Kalidasa's *Abhijnana Shakuntalam*." *Langlit*.

Glutfelty, Cheryll, and Harold Fromm, editors. *The Ecocriticism Reader: Landmarks in Literary Ecology*. University of Georgia Press, 1996.

Kalidasa. *Abhijnana Shakuntalam*. Translated by Chandra Rajan, in *The Loom of Time: A Selection of His Plays and Poems*. Penguin Books, 1989.

Rueckert, William. "Literature and Ecology: An Experiment in Ecocriticism." *Iowa Review*, vol. 9, no. 1, 1978, pp. 71–86.

Microplastic Contamination in Agricultural Soils: Sources, Ecological Impacts, and Implications for Plant and Human Health

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Abstract

Plastic pollution which was primarily associated with oceans, is now a growing concern to the agricultural soils. The global plastic production of microplastics is about 516 million which is expected to exceed 1.2 billion tons by 2060 which will lead to pervasive microplastic (MP) accumulation in farmlands (UNEP, 2025). Microplastics is defined as synthetic particles between the range of 1 μ m to 5 mm in size, which originate from both primary and secondary sources. Primary sources are those which are intentionally manufactured, and secondary sources are derived from the fragmentation of larger plastics. Agricultural soils receive microplastics through fertilizers, plastic mulch, atmospheric deposition, sludge application, surface runoff, and landfill leachate. For example, plastic mulch uses in China contributed over 1.5 million tons of plastic annually, of which over 40% was not recycled (Hoang *et al.*, 2024). Microplastics alter key soil features and affect plant growth, reducing yields and hampering crop productivity. It also reduces food quality, which ultimately affects human health and metabolism via food chain. Policy recommendations for measures to reduce microplastic pollution encompass short-term measures like bans or taxes, mid-term measures like enforcing Extended Producer Responsibility, and long-term transitions to bio-based plastics (Prata *et al.*, 2019). In conclusion, microplastics in agriculture create multifaceted challenges to soil health, food safety, and environmental resilience. An urgent, holistic, and interdisciplinary effort is needed to transition towards sustainable soil management and effective Microplastic pollution governance.

Keywords: Human health, Plant yield, Microplastic

Introduction

Plastics have revolutionized modern life but at a great ecological cost. The plastic production has reached 516 million tons this year (UNEP, 2025),

and it is forecasted to exceed 1.2 billion tons by 2060(Le *et al.*, 2024). The persistent nature of plastic, its widespread distribution, and its detrimental impact on ecosystems signifies the urgency of addressing this issue. While ocean plastic pollution has always stolen the spotlight, soils are quietly becoming the largest plastic pollution sinks(Okeke *et al.*, 2022). Agricultural soils receive plastic from various sources including plastic mulching films, polyethylene irrigation pipes, greenhouse coverings, wastewater reuse, biosolids, and plastic-coated fertilizers (Hoang *et al.*,2024). Around 11 million tons enter aquatic ecosystems every year, and about 13 million tons are accumulating annually in soils(Ky *et al.*, 2023). Through natural breakdown like sunlight and mechanical stress, plastics form microplastics which are pervasive across all environments. Microplastics block root pores, impair nutrient uptake, and reduce crop yields. Recycling is not solving this. Only 9% of plastic is recycled, and most is not even economically viable (UNEP, 2025).A global shift to a circular economy is essential—not just for oceans, but for soils, food security, and public health.

Definition and Classification of Microplastics

Microplastics are defined as synthetic solid particles or polymeric matrices ranging in size from 1 micrometer (µm) to 5 millimeters (mm). These particles may have regular or irregular shapes and originate from either primary sources (manufactured at small size) or secondary sources (fragmented from larger plastics). Importantly, microplastics are insoluble in water and persist in the environment due to their resistance to degradation.(Frias & Nash, 2018).

Microplastics are classified into two main types based on how they are formed.

Primary microplastics are those that are intentionally manufactured in small sizes. These are often added to personal care products like face scrubs or toothpaste, used in industrial processes, or come from synthetic fibers in clothes. They enter the environment directly in their micro-sized form.(Jing *et al.*,2024)

On the other hand, **secondary microplastics** come from the breakdown of larger plastic waste — like bottles, bags, or packaging — when they are exposed to sunlight, wind, and water over time. These fragments are found both in oceans and in soil.(Jing *et al.*,2024)

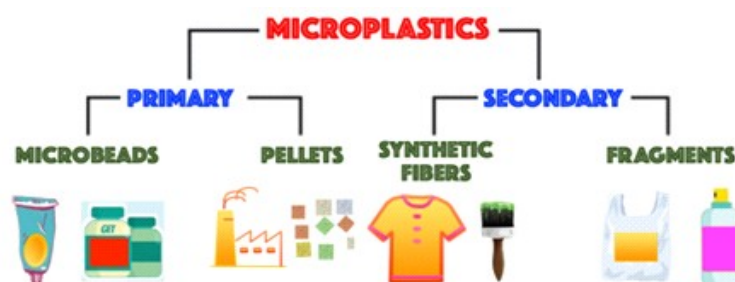


Figure 1: Types of microplastics, Source: Milan Polymer Days (n.d.).

Sources of Microplastics in Agricultural soils

Microplastics enter farmland through a variety of direct and indirect pathways, many of which are linked to modern agricultural practices. These include the use of plastic materials for crop production, contaminated inputs like compost and sludge, and atmospheric deposition. Unlike aquatic systems where plastics may drift or degrade more quickly, in soils, these particles accumulate and persist for years, posing long-term risks to soil health and crop productivity.

1. Use of Agricultural Plastic Films and Microplastic Contamination in Soils: Plastic films are widely used in modern agriculture, particularly for mulching, greenhouse covers, and irrigation. In 2018, over 425 million tons of plastic products were produced globally, with 30% originating from China. However, less than 60% of agricultural plastic films are recovered after use, and the residual plastic becomes a significant source of microplastic pollution in soils. Several studies confirm that soils under plastic film mulch contain significantly higher concentrations of microplastics compared to uncovered soils. The duration of film use influences contamination levels. Given the global variability and increasing accumulation, there is an urgent need to develop a comprehensive database of agricultural film usage and related microplastic contamination, which will serve as a critical foundation for future risk assessments (Hoang *et al.*, 2024).

2. Fertilizers as a Source of Microplastics in Soils: Organic fertilizers, commonly produced by composting animal and plant waste, are widely promoted as environmentally friendly soil amendments. However, recent studies have shown that these fertilizers can be significant carriers of

5. Atmospheric deposition: Microplastic debris can also be transported through the air, and wind patterns significantly influence their distribution. Indoor environments tend to have higher microplastic concentrations-ranging from 1.00 to 60.0 particles per cubic meter, compared to outdoor air, where levels are generally lower. In urban areas, microplastics are found in atmospheric fallout, with concentrations reaching hundreds of particles per square meter per day. Microplastics can travel long distances through the atmosphere up to 95 km in just five months and have even been found in remote areas such as Arctic ice and snow. This highlights atmospheric deposition as a major source of soil microplastics. However, research in this area is still in its early stages and mainly focused on detection. Two main challenges hinder the study of atmospheric microplastics: first, the high variability of environmental conditions makes detection uncertain; second, other airborne particles like carbon-based or silica-containing pollutants can interfere with microplastic identification. (Fan *et al.*, 2023)

6. Landfill leachate: Another major source of microplastics in soil is untreated landfill sites. When plastic waste remains in the soil for long periods, it undergoes weathering and breaks down into microplastics. During this process, harmful additives such as phthalates can be released into the environment. In various landfill sites, especially in urban areas, landfill leachate has been found to contain microplastic concentrations ranging from less than 1 to over 20 particles per liter. Common types of plastics found include polypropylene (PP) and polyethylene (PE). Landfills are complex environments with high concentrations of organic matter, making it difficult for conventional treatment methods to fully remove pollutants. To minimize soil contamination from landfill leachate, it is essential to improve landfill management practices and prevent leachate from leaking into the surrounding environment (Fan *et al.*, 2023).

Effects of Microplastics on plant growth and human beings:

With microplastics entering agricultural soils through various sources such as sludge application, wastewater irrigation, atmospheric deposition, and polymer-coated fertilizers, their presence is no longer uncommon in farming systems. Once in the soil, microplastics interact with its physical structure, chemical composition, and biological communities, leading to harmful plant growth and ultimately affecting human health

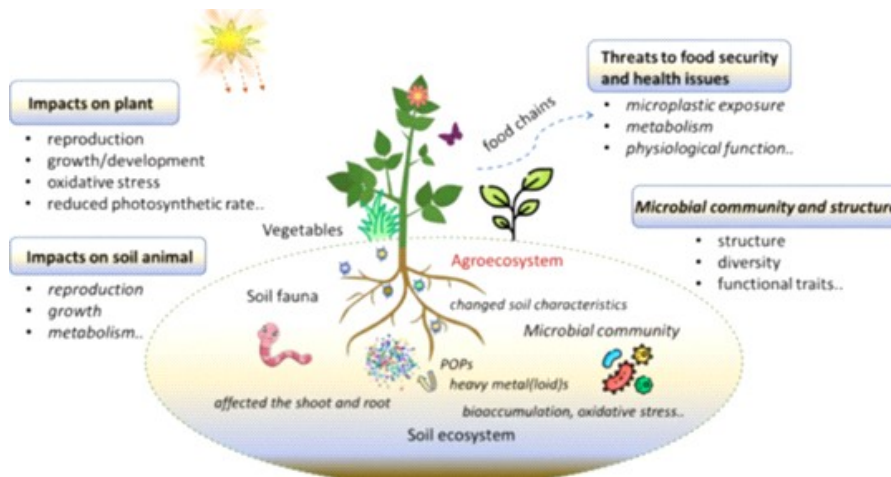


Figure 2: Effects of microplastics. Source: Hoang et al., (2024)

Effect of Microplastics in Plant growth and development:

Microplastics (MPs) in soil can interact with plant roots through a combination of physical, biological, and physicochemical processes, although their direct uptake largely depends on particle size and surface properties. Larger microplastics generally cannot penetrate plant roots because their size exceeds the pore limits of root cell walls. Instead, they adhere to root surfaces, especially around the rhizoplane and root cap, where root exudates and microbial biofilms promote attachment. With time, weathering and microbial degradation turn these particles into smaller micro- and nano-plastics capable of entering through root cracks or lateral root zones. These finer particles may move via apoplastic and symplastic pathways to the xylem, enabling upward translocation to stems and leaves. The different effects of microplastics on plant growth are listed below:

Hindered Root Growth: Microplastics can alter soil porosity and compact the root zone, limiting root penetration, water uptake, and nutrient absorption. This restricts overall plant development.

Reduced Seed Germination: The presence of microplastics in the seedbed can interfere with water absorption and seed-soil contact, leading to delayed or reduced germination rates.

Decreased Crop Growth and Yield: Due to impaired nutrient cycling, water retention, and root development, microplastic-contaminated soils often show reduced vegetative growth and lower crop yields.

Triggered Oxidative Stress in Plants: Microplastics can cause the buildup of reactive oxygen species (ROS) in plants, leading to oxidative damage, cellular stress, and weakened physiological responses.

Act as Vectors for Pollutants: Microplastics can adsorb and transport heavy metals, pesticides, and other harmful chemicals. These pollutants may be taken up by plant roots, increasing the risk of contamination in edible plant parts.

Health and Food Safety Risks: The accumulation of microplastics and associated toxins in crops poses potential risks to human and animal health through the food chain, raising concerns over long-term food safety.(Hoang *et al.*,2024)

POLYMERS	CROP	POTENTIAL EFFECTS	REMARKS	REFERENCES
Microplastics	<i>Lactuca sativa</i> L.(Lettuce)	High microplastic levels	Microplastic contamination of vegetables	(Canha <i>et al.</i> , 2023)
Polypropylene	<i>Solanum lycopersicum</i> (Tomato)	Impacts on nutrient uptake Affected root & shoot elongation	Decreased the translocation of macronutrients from root to shoot	(Shorobiet <i>al.</i> , 2023)
Polystyrene, Polyvinyl chloride	<i>Oryza sativa</i> (Rice)	Effects on growth & metabolism Oxidative stress and reduced photosynthetic rate	Needed strategies to reduce impacts Can influence food safety	(Ma <i>et al.</i> , 2022)
Plastic film residues	<i>Gossypium</i> (Cotton)	Affects the root system	Decreased cotton production	(Hegan <i>et al.</i> , 2015)
Polyethylene microplastic residue	<i>Triticum aestivum</i> (Wheat)	Affects reproductive and vegetative stage	Decreased production	(Qi <i>et al.</i> , 2018)
Microplastic residue	<i>Cucurbita pepo</i> (Zucchini, pumpkin etc.)	Reduction in leaf lamina & photosynthesis	Potential yield loss Risk of MPs entering food chain	(Colziet <i>al.</i> , 2022)

Table: Effect of microplastics on plant growth and development, source: Hoang *et al.*,2024

Human Health Risks and Food Chain Implications

Microplastics in agricultural soils do not just affect the environment—they pose a direct threat to human health through multiple exposure pathways:

Detected in Human Organs and Blood Vessels: Recent studies have confirmed the presence of microplastic particles in human lungs, bloodstream, and even vital organs, indicating systemic exposure.

Carriers of Toxic Chemicals: Microplastics can adsorb and transport hazardous substances such as bisphenol A (BPA), phthalates, heavy metals, and other endocrine-disrupting or carcinogenic compounds.

Disruption of Metabolism and Physiology: Microplastics can enter the human body through ingestion (via contaminated food or water), inhalation (airborne particles), and even placental transfer, affecting internal metabolic and hormonal processes.

Cardiovascular and Reproductive Risks: Microplastic exposure has been linked to inflammation, oxidative stress, hormonal imbalance, and reproductive toxicity—raising serious concerns for long-term health outcomes.

Trophic Transfer Through the Food Chain: Microplastics taken up by crops or accumulated in livestock tissues can transfer up the food chain, ultimately reaching human consumers.

Intergenerational Health Concerns: The detection of microplastics in human placenta suggests a risk of exposure to developing foetuses, with potential implications for foetal development, growth, and future health.(Hoang *et al.* ,2024)

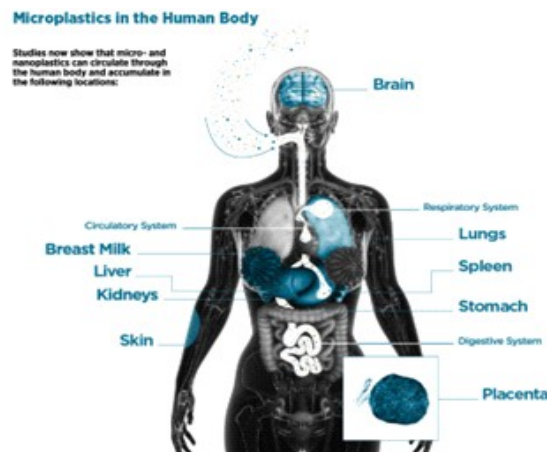


Figure 3: Microplastics in human body, **Source:** Center for International Environmental Law (CIEL, 2023).

Recommendations to reduce microplastics:

To effectively tackle plastic and microplastic pollution, we need a multi-phase strategy — starting from immediate actions to long-term structural changes.

1. Short-Term Recommendations:

- In the short term, governments can introduce regulations like bans or taxes on environmentally harmful plastic products — especially where safer alternatives exist.
- Efforts should also go into eliminating unnecessary packaging, like double-packaged products, and replacing them with eco-friendly options.
- Public awareness campaigns and better labelling can help consumers make informed choices. To shift industry behavior, incentives should be provided for using recycled plastics, and virgin plastic should face stricter penalties.(Prata *et al.*, 2019)

2. Mid-Term Recommendations:

- Over the medium term, we must change how we handle waste. Systems like “pay-as-you-throw” can encourage people to reduce waste.
- Alongside this, recycling should be prioritized, followed by feedstock recovery and waste-to-energy options.
- Landfills should be the last resort. Producers should also be made responsible through EPR (Extended Producer Responsibility), ensuring they manage the waste their products create.(Prata *et al.*, 2019)

3. Long-Term Recommendations:

- Long-term solutions involve transitioning to renewable energy sources for waste management.
- Products should be designed using Life Cycle Assessment (LCA) to ensure they can be reused, repaired, or recycled.
- We should also shift to bio-based plastics to reduce reliance on fossil fuels. However, we must avoid degradable plastics that break down into harmful microplastics.
- Biodegradable plastics should be used only where composting infrastructure is available (e.g., in agriculture).

- Lastly, e-waste recycling must be improved, and until then, waste-to-energy can be a transitional solution. (Prata *et al.*, 2019)

Future needs:

- **Understanding Multi-Pollutant Effects:** Microplastics often co-exist with fertilizers and pesticides. These interactions can either worsen toxicity or reduce pesticide effectiveness. New studies must explore these combined effects using system modeling.
- **Protecting Soil Health & Nutrient Cycling:** Microplastics may disrupt soil porosity, water holding, and nutrient mobility, especially for carbon and nitrogen. Integrative models linking Microplastics to microbial and biogeochemical processes are needed.
- **Ensuring Food Safety & Crop Resilience:** Microplastics can accumulate in crop tissues, especially leafy vegetables. They are hard to remove and may lower chlorophyll and nutrient uptake. We need threshold limits and crop screening to ensure food safety.
- **Global Change & System-Level Impacts:** Microplastics spread through air, water, and soil—crossing ecosystems. They can reduce pollinator and decomposer function and affect climate feedbacks. We need Microplastic tracking across media and climate resilience studies.
- **Strengthening Policy & Governance:** The UN and EU are recognizing Microplastic threats, but there are still no specific standards for agriculture. Future policies must regulate plastic use across the life cycle and include Microplastics in food risk systems. (Chen *et al.*, 2025)

Conclusion:

As we conclude, microplastics have silently become a persistent threat in our agricultural soils. These tiny particles may be invisible to the naked eye, but their impact is far-reaching and long-lasting.

They alter soil structure, disrupt microbial balance, and influence plant health and nutrient uptake—ultimately affecting the quality of the food we grow. More alarmingly, there is a potential risk to human health, as these particles move through the soil–plant–animal–human continuum.

Yet, when we look at the current efforts to manage microplastics, the response is scattered and reactive. There is no unified framework or coordinated policy in place, and what exists often fails to address the scale of the problem.

What we truly need is a holistic, interdisciplinary approach—one that combines innovative research, sustainable farming practices, and strong policy support. Only through such integration of science, technology, and governance, can we safeguard our soils, our food systems, and our future from the silent spread of microplastics.

References

1. Hoang, V. H., Nguyen, M. K., Hoang, T. D., Ha, M. C., Huyen, N. T. T., Bui, V. K. H., ... & Nguyen, D. D. (2024). Sources, environmental fate, and impacts of microplastic contamination in agricultural soils: A comprehensive review. *Science of the Total Environment*, 950, 175276.
2. Fan, W., Qiu, C., Qu, Q., Hu, X., Mu, L., Gao, Z., & Tang, X. (2023). Sources and identification of microplastics in soils. *Soil & Environmental Health*, 1(2), 100019.
3. Prata, J. C., Silva, A. L. P., Da Costa, J. P., Mouneyrac, C., Walker, T. R., Duarte, A. C., & Rocha-Santos, T. (2019). Solutions and integrated strategies for the control and mitigation of plastic and microplastic pollution. *International journal of environmental research and public health*, 16(13), 2411.
4. Fan, W., Qiu, C., Qu, Q., Hu, X., Mu, L., Gao, Z., & Tang, X. (2023). Sources and identification of microplastics in soils. *Soil & Environmental Health*, 1(2), 100019.
5. Frias, J. P., & Nash, R. (2019). Microplastics: Finding a consensus on the definition. *Marine pollution bulletin*, 138, 145-147.
6. United Nations Environment Programme. (2025). Beat plastic pollution: World Environment Day 2025 campaign. World Environment Day. <https://www.worldenvironmentday.global/>
7. Milan Polymer Days. (n.d.). *What are microplastics?* Available at: <https://www.milanpolymerdays.org/blog/what-are-microplastics> (Accessed on 8 January 2026).
8. Center for International Environmental Law (CIEL). (2023). *Breathing plastic: The health impacts of invisible plastics in the air*. Available at: <https://www.ciel.org/breathing-plastic-the-health-impacts-of-invisible-plastics-in-the-air/> (Accessed on 8 January 2026).

**An Ecocritical Reading of Bhupendra Chandra Deka's
Short Story 'Chipko'**

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Abstract :

Bhupendra Chandra Deka's short story 'Chipko' reimagines the ecological consciousness born from the 1972 Chipko Movement. It narrates the journey of a boy, Neelu, whose love for trees and memory of his grandfather's wisdom awaken in him a fierce sense of responsibility toward nature. The story portrays nature as a living organism, critiques the exploitation of the environment, and advocates for harmony between humans and the natural world. Expanding upon these themes, this paper examines Deka's portrayal of environmental responsibility, sustainability, and moral consciousness in the context of contemporary climate challenges. Through an ecocritical lens, 'Chipko' becomes both a local tale and a universal allegory of ecological ethics, reminding us that environmental survival depends on moral renewal and sustainable coexistence.

**Keywords: Climate, Chipko Movement, Ecocriticism, Nature, Short Story
The Ecological Consciousness of 'Chipko':**

Bhupendra Chandra Deka's 'Chipko' unfolds under the burning sun of a delayed monsoon- a setting that captures both the literal heat of summer and the metaphorical heat of ecological crisis. The story's title evokes the historical Chipko Movement, a landmark moment in Indian environmental activism where women physically hugged trees to prevent deforestation. Deka's narrative revisits this spirit through the experiences of two schoolboys, Papu and Neelu, situating the Chipko ethic within a modern generation facing environmental neglect.

From the start, the story bridges memory and action, philosophy and practice. It draws from a long Indian ecological tradition that sees nature not as inert matter but as sacred, living, and relational. The story's layers-its

depiction of the grandfather's wisdom, Neelu's moral awakening, and the family's eventual reconciliation- together articulate an ecohumanist vision rooted in empathy and ethical responsibility. From the first paragraph, the landscape in 'Chipko' breathes and suffers. The "air quivered like fire" and the "dusty road" appears scorched, suggesting that nature itself is reacting to human indifference. Dekka's descriptive precision personifies the environment as an organism in distress. The heat and dryness stand as symptoms of ecological imbalance, echoing the concept in ecocriticism that nature is not a static setting but an active participant in human existence.

Neelu's grandfather functions as the moral interpreter of this living world. His statement- "Cutting the trees would be like cutting the breath of this village"- frames trees as the lungs of the community. The metaphor fuses biological necessity with moral consciousness. The neem tree that "gives oxygen and shade to travelers" becomes a character of its own, embodying generosity and care. The grandfather's worldview aligns with deep ecological thought: that every organism has intrinsic value beyond its usefulness to humans. The forest, in this sense, possesses moral agency. The story's invocation of the Chipko women reinforces this view: their act of hugging trees is an embrace of the living planet. Dekka thus redefines the human-nature relationship as one of kinship rather than control. The story treats nature not as an inert background but as a living, breathing entity. The neem and krishnasura trees are given personality and spirit, protecting Neelu's family and cleansing the air around them. Such portrayal aligns with the philosophy of the Chipko Movement, where villagers, especially women, hugged trees to protect them, treating trees as companions and guardians rather than resources. Both the narrative and the movement remind us that nature has its own sacred vitality, inseparable from human existence. This perception aligns with deep ecological thought where nature possesses intrinsic value beyond human use, reminding us that the earth itself is alive.

If the story celebrates life in nature, it simultaneously exposes humanity's complicity in its suffering. The polluted road "littered with plastic and dust" and the delayed rains are consequences of environmental exploitation. The ecological crisis here is man-made, born of carelessness and greed. Papu's mention of the "frog marriage" ritual reflects humanity's

attempt to manipulate nature through symbolic gestures rather than ethical reform. Neelu's quiet critique- "What is the use if people keep cutting down trees?"- discloses the emptiness of ritual without responsibility. Exploitation, Deka implies, thrives where ritual replaces moral action. The intergenerational conflict between Neelu's father and grandfather dramatizes the moral dilemma of modern progress. The father's wish to fell trees for construction symbolizes the utilitarian mindset of modernity, while the grandfather's protest reflects ecological wisdom rooted in restraint. Their argument encapsulates the central paradox of development: the human desire for growth at the cost of environmental ruin.

Neelu's discovery of the felled krishnasura trees marks the narrative's emotional climax. The fallen trunks symbolize the severing of both ecological and familial continuity. His anguished cry- "These are my grandfather's trees!"- transforms personal grief into ecological protest. The scene recalls the original Chipko Movement's spirit: compassion transformed into resistance. Through this, Deka exposes the dehumanizing logic of exploitation, where the destruction of trees mirrors the destruction of empathy itself. The narrative strongly critiques human exploitation of natural resources. Neelu's father's decision to cut the trees for material convenience mirrors the larger global problem of deforestation and unrestrained urban expansion. The grandfather's resistance exposes how modernity often silences older wisdom rooted in ecological balance. The Chipko Movement also arose from a similar exploitation, where commercial logging threatened local forests. The story thus becomes an allegory of the human tendency to exploit rather than coexist, ultimately warning us of the spiritual and environmental costs of such greed.

After depicting conflict, Deka leads the narrative toward reconciliation. Neelu's defiance reawakens the dormant moral consciousness of his family and community. His father's realization- that his son mirrors the ecological conviction of his own father- suggests a rediscovery of harmony across generations. The family's decision to halt the cutting and plant new trees symbolizes the restoration of balance. The act of planting represents both remembrance and renewal. In that moment, "Neelu felt as if he had embraced the entire green world." The embrace becomes an emblem of restored unity between humanity and nature. From an ecocritical standpoint, this harmony

reflects the idea of ‘biophilia’ - the innate human tendency to seek connection with other living systems. Deka’s vision aligns with Gandhian environmental ethics and with the philosophy of Arne Naess, who argued that human fulfillment arises from identifying with the broader web of life. Harmony here is not sentimental but moral; it demands responsibility, sacrifice, and continuity.

The story urges us to see that true prosperity comes from harmony, not domination. Rainfall, fertility, and human health are interwoven with the survival of trees. This recalls the Chipko activists’ message that saving forests also meant saving soil, water, and climate cycles essential for rural life. Thus, the story pleads for symbiotic harmony between human beings and nature. The well-being of the family, the rhythm of rainfall, and the fertility of crops are interconnected with the presence of the ancestral trees. When humans preserve nature, nature reciprocates with sustenance and security. The narrative beautifully emphasizes that prosperity is not born from domination but from coexistence, and that true harmony emerges when human life flows in rhythm with natural cycles.

Environmental responsibility in ‘Chipko’ emerges as both a moral inheritance and a practical duty. The story’s progression- from ignorance to awareness- illustrates how ecological care must begin at the level of personal conscience before it can manifest as social change. Neelu’s transformation from passive observer to active protector marks the awakening of ecological citizenship. His defense of the trees exemplifies what ecocritic Lawrence Buell calls the “environmental imagination”- the ability to see one’s actions as ecologically consequential. Deka’s choice of a child protagonist underscores that environmental responsibility is not bound by age or authority but rooted in empathy and moral clarity. Sustainability, in the story’s moral architecture, is portrayed through continuity and regeneration. The decision to plant new trees in memory of the grandfather signifies that preservation must evolve into renewal. Sustainability is not mere conservation; it is an active process of replacing, nurturing, and maintaining balance.

Deka also critiques unsustainable human habits that disconnect people from their surroundings. The dusty, polluted street and absence of shade evoke the alienation of urban modernity. By contrast, the grandfather’s rural wisdom

and intimate knowledge of trees represent a sustainable relationship grounded in awareness and restraint. The act of planting a new tree becomes a symbolic contract between generations- a promise to maintain the ecological chain of life. The family's final decision to plant saplings marks a transition from destruction to sustainability and responsibility. Planting trees in place of the cut ones ensures continuity for future generations. The Chipko Movement similarly embodied this spirit of responsibility—villagers defended trees not only for themselves but for unborn generations. Both cases show that sustainability is not just an environmental policy but a moral duty, rooted in acts of care, sacrifice, and foresight.

Although 'Chipko' is set in a localized environment, it resonates deeply with global climate concerns. The delayed monsoon and unbearable heat mirror today's realities of unpredictable weather patterns, rising temperatures, and ecological imbalance caused by deforestation and carbon emissions. The boys' conversation about thirst and heat anticipates contemporary anxieties about water scarcity and heatwaves. The delayed monsoon is no longer mythic punishment but an environmental symptom of global warming. The story implicitly critiques the human tendency to attribute such crises to divine wrath or chance rather than to structural causes like industrialization and habitat destruction. By connecting the 1970s Chipko Movement to the present, Deka bridges historical activism and modern climate awareness. The women of Reni village fought for their "five Fs"-food, fodder, firewood, fibre, and fertilizer-demonstrating that ecological preservation is inseparable from livelihood and justice. Similarly, today's climate movements echo the same principle: human survival depends on ecological balance.

The story's imagery of fallen trees and the boy's grief prefigures the emotional toll of climate change—a sense of loss, helplessness, and ecological mourning. Scholars such as Glenn Albrecht describe this as 'solastalgia': the distress caused by environmental degradation close to one's home. Neelu's heartbreak becomes a literary expression of solastalgia- a child's encounter with ecological loss that mirrors humanity's broader grief for a wounded planet. By weaving in images of scorching heat, delayed rainfall, and desperate rituals like frog marriages, the story situates its concerns in current climate crises. These details reflect both local Assamese cultural practices and global

anxieties about climate change. Drought, ecological imbalance, and extreme weather patterns serve as a mirror of today's environmental emergencies. In doing so, the story bridges folklore, lived rural reality, and modern scientific warnings, making climate change an immediate and relatable concern.

The moral structure of 'Chipko' rests on the recognition that environmental awareness is inseparable from ethical responsibility. The story teaches that nature responds to human morality- when humans act selfishly, nature withholds its bounty; when they act with care, it returns balance and grace. Neelu's courage becomes the moral center of the narrative. By opposing the cutting of trees, he acts out of conscience rather than obedience. His moral compass, guided by his grandfather's words, demonstrates what environmental philosopher Aldo Leopold called the "land ethic"- a moral code that enlarges the boundaries of community to include soils, waters, plants, and animals. Deka also critiques moral complacency. The father's initial anger reflects the indifference of modern adults who see nature as property rather than kin. His transformation illustrates that moral responsibility begins with self-reflection and the courage to correct one's own mistakes. The narrative thus extends beyond environmentalism into moral philosophy. It asserts that ethical living is ecological living. The human spirit finds fulfillment not in domination but in stewardship. In contemporary times- when ecological crises are entwined with political, economic, and social injustices- the story's moral message gains renewed urgency. Perhaps the most moving aspect lies in the moral responsibility embodied by Neelu's protest. His resistance to the tree-cutters transforms him into a symbol of ecological conscience, echoing movements like Chipko where ordinary people defended forests with their own bodies. The lesson is clear: safeguarding nature is not the duty of governments alone but of every individual. Even the youngest member of society can become a moral voice for environmental justice. The story closes with a reminder that love for trees is not sentimentalism but a duty towards survival and future generations.

Conclusion:

Ecocritically, 'Chipko' aligns with what Cheryll Glotfelty defines as the study of "the relationship between literature and the physical environment." Deka's story enacts this relationship through the lived

experiences of ordinary people. The physical act of hugging or saving a tree becomes a metaphor for restoring empathy between the human and the nonhuman. By personifying nature and dramatizing its exploitation, Deka creates what Timothy Morton calls an “ecological thought”- an awareness that all beings are interconnected within a single web of existence. His narrative integrates the personal, the social, and the ecological, showing that environmental harmony begins within the human heart. Ultimately, ‘Chipko’ is both elegy and prophecy. It mourns the destruction of trees but also prophesies regeneration through compassion. The boy’s small act of defiance becomes emblematic of a larger global necessity- the need for moral courage to resist ecological ruin. Through its fusion of emotion, memory, and action, Deka’s ‘Chipko’ transcends its local setting to offer a universal lesson: the earth is a living organism whose survival depends on human responsibility. To protect nature is to protect oneself. To embrace the tree is to embrace life itself- its breath, its balance, its belonging.

References:

Primary Source:

Sofura: A Monthly Magazine for Children

Secondary Source:

<https://en.wikipedia.org/wiki/Ecocriticism>

<https://en.wikipedia.org/wiki/Solastalgia>

Ethnobotanical Use of Wild Plants in the Food Culture of the Mishing Tribe

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Abstract: For survival of human beings, food is the most essential item besides being an important identity of a particular community. Besides survival food also gives about the geographical location of particular community and about the various edibles, animals, poultry found there and about their food habits. Food habits depend on the availability of food stuffs, climate conditions, social and religious practices of a particular community. Same way, the food habits of the Mishing tribes of Assam give them a particular identity. The Mishing tribes are the second largest plain tribes of Assam mostly found in upper Assam, residing along the bank of river Brahmaputra. Mishing tribes are culturally rich ethnic tribe of Assam and depend mostly on nature for their livelihood. Rearing pigs, poultry and planting edible wild plants in every household is a part of customs for the Mishing people. Recently, the food habits of the Mishing tribes have undergone many changes due to modernization and religion changes but still to some extent they practice their own traditional food habits. Special food habits can be seen in different festivals and religious practices. The Mishing tribes also include various wild plants in their food habits which have medicinal values. The paper deals with the food practices of the Mishing people- the method of preparation of various food items, food items prepared in festivals, marriages and in religious practices, wild plants used as edibles and their methods of preparation.

Key words: Mishing, Wild Plants, Food Habits, Medicinal, Culture, Tradition, Rice Beer.

Introduction:

A brief history of Mishing people of Assam

The Mishings (Miri) are one of the most colourful tribes of North-East India. They are also one of the Major communities of Assam. The Mishing now residing in the riverine areas of upper Assam are originally a hill tribe inhabiting with the Abor, Miri and Mishmi hills of present-day Arunachal.

They came down to the plains in small numbers presiding the advent of Sukapha in early part of the thirteenth century. The cause of migration of the Mishings to the valleys is not known clearly. There is no recorded history, reliable accounts, supported by factual evidence analysing the cause of migration of the Mishings. However, it can be guessed that the economic reason is the main cause of migration of this peace-loving community of various sub-tribes now known as Mishings, to the plains. They occupy mainly the low-lying areas to cultivate paddy which is their staple food. Probably, inter-tribal feud was also another reason of migration of the people to the plain. Mishing people inhabited mainly the low lying, fertile and paddy growing areas of Dhemaji, Jonai, Dhakuakhana, Lakhimpur, Dibrugarh, Sivsagar, Jorhat and Golaghat districts of Assam and East Siang, Lower Debang Valley and Lohit District of Arunhchal Pradesh bordering Assam. The Mishings are racially one of the great Mongoloid stock. With the hill Miris they have a close affinity. But this affinity is only ethical, cultural and linguistic reminding a past of the Mishings in the hills. Now a days the Mishing are a stable, peace loving people, tradition based group of people having brotherly relations with all plain people. Mishing is now a distinct nationality closely related with Mynirngo, Pasi, Padoms and some other hill tribes of Arunachal who worship Doyi (sun) and Polo(Moo), call themselves 'Ami' or 'Tani' which mean 'man'. Ethnological, linguistic, cultural and literary studies reveal that the Mishings had a very close relations with the Adis, Padoms, Myniongs and Pasis of Arunachal Pradesh. Mishings claim to be the 'man who live in the riverine area'. Mi-suggests man and 'shing' suggests water or river. Mishing hence suggests a community of men living in the riverine areas.

Physical Feature

Various anthropologists described Mishings as- Mongoloid in physical appearance. Various scholars have described the Mishing people as yellow or yellow- brown. However, some black skinned Mishing people are seen intermixed with the yellow people. Black haired, with black or dark brown narrow eyes with specific mongoloid feature, the Mishing people are distinctive. And are generally medium featured and beautiful.

Food And Drinks Of The Mishing Tribe

Rice is the staple food of the Mishing people. Pigs and fowls are their delicacies. They cultivate all sorts of vegetable and preserve fishes for long

period, the preserved fish is known as Namsing. In certain period, there are some taboos on food. Eating meat is a taboo when a member of a family dies until purificatory ceremonies is completed.

Fishing and hunting are traditional sports of the Mishing, however with the change of time, group hunting and fishing is becoming almost extinct. But whenever there is possibility, the tribe practice group fishing in the winter and group hunting in summer. They used all sorts of weapons including firearms in group hunting. In group fishing they use many traditional fishing gears like Dibang (a five to six meters long bamboos with metal spearhead), Zurlei, Chaloni, Diorang, Porang, Si-Zamborak (A type of crossbow)

Mishing people produce ‘Apong’ a special rice beer. Apong is considered to be the most prestigious item for entertaining the guest and every family should keep some apong to entertain guests. Preparation of apong is solely the women business.

Objectives

- To identify the wild edible plants traditionally used by the Mishing tribe of Assam.
- To explore the medicinal and nutritional values associated with these wild plants.
- To highlight the role of food culture in preserving the tribe’s cultural identity and traditional knowledge.

Methodology

- The study is qualitative and descriptive in nature.
- **Data Collection:** Primary data were gathered through field visits, direct observation, and informal interviews with elders, women, and traditional healers (Mibus) of the Mishing community.
- **Secondary Data:** Additional information was collected from books, research articles, and online ethnobotanical sources.
- **Study Area:** The research focused on selected Mishing-inhabited regions of Upper Assam, particularly along the banks of the Brahmaputra River.
- **Documentation:** Local names, botanical names, edible parts and medicinal uses of wild plants were documented. Photographs were taken both from fieldwork and reliable internet sources.

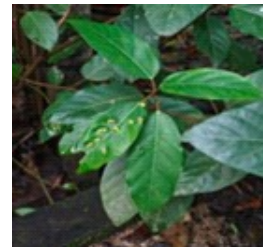
Wild Plants Used By The Mishing Tribe And Its Medicinal Benefits:

It is found that Mishing people use to eat more than twenty wild plants leaves and their various parts. Following are some if the wild plants used by the tribes. Most of the food items were prepared by the women folk and sometimes guided in preparation by the Mishing priest khowns as Mibu.

1. Fig

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Tajig	<i>Ficus racemosa</i>	Fig

In Assamese language it is known as Dimoru. Tender leaves are used for cooking with pork and chicken. Tajig adds a unique tangy and umami flavor, helps in preservation, and improves digestibility. Tajig-based dishes are often prepared during festivals like Ali-Aye-Ligang and Po:rag. The process of making Tajig is usually done by women and considered a skill passed down generations. Tajig remains an essential link between food, tradition, and identity in Mishing cuisine.



2. Duggal fibre tree

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Ombe(M)/Mesaki(As)	<i>Sarcochlamyspulcherima</i>	Duggal fibre tree

The edible leaves are cooked with pork and the leaves have many medicinal and nutritional values. These plants are found in every Mishing people's residence. In Assamese it is known as Mesaki. Ombe is valued for its taste, aroma, and nutritional benefits. It is rich in vitamins A and C, iron, calcium, and dietary fiber. For the Mishing tribe, it represents both daily nourishment and traditional identity. Ombe grows naturally in riverbanks, and its young leaves and stems are often cooked fresh. Among the Mishing tribe, Ombe dishes are a symbol of traditional knowledge and self-sufficiency. It represents the community's practice of growing and consuming organic food. Dishes made



from Ombe are served in family gatherings, community feasts, and during traditional celebrations. Ombe is rich in antioxidants, iron, calcium, and fiber. It strengthens the immune system, helps in digestion, and is considered beneficial for blood circulation. The Mishing tribe prefers preparing it in natural ways, using minimal oil and spices to preserve its nutrients.

3. Black berry night shade

Vernacular.

Botanical Name.

English Name.

Bangko(M)/ Tita Bekuri (AS) *Solonum Indium lin* Black berry night shade

In Assamese it called Tita Bekuri. The edible parts are the fruit. It is either boiled or roasted. Sometime it is mixed with roasted fish. Among the Mishing people, Bangko fruit dishes are especially popular during the monsoon and winter seasons, when the fruit is abundantly available. Its tangy flavor not only adds taste to their daily meals but is also believed to aid digestion and cool the body.



4. Pea Eggplant

Vernacular.

Botanical Name.

English Name.

Sita bango(M)/Hati Vekuri(AS) *Solonumtorvum* Pea Eggplant

It is a bushy, erect and spring perennial plant. The edible parts are the fruit which is bitter in taste. Sita Bangko fruit — a wild edible fruit known for its sweet-sour taste and rich nutritional value. The fruit is used in both raw and cooked forms and features in various traditional dishes prepared during different seasons. The Mishing people employ indigenous cooking techniques such as boiling, roasting, fermenting, and stewing to prepare dishes from Sita Bangko fruit. In Mishing households, Sita Bangko dishes are an integral part of seasonal diets. The fruit's versatility allows it to be used in both sweet and savory



preparations. During community feasts and local gatherings, roasted or boiled Sita Bangko is often served alongside traditional dishes like namsing, smoked fish, and apong (traditional rice beer). The preference for natural and minimal ingredients showcases the Mishing tribe's eco-sustainable food culture and indigenous culinary wisdom. Sita Bangko fruit is rich in vitamin C, natural acids, antioxidants, and dietary fiber. It helps improve digestion, strengthen immunity, and prevent common colds. The fruit is also believed to have cooling and detoxifying properties, making it suitable for consumption during hot and humid seasons. The Mishing people traditionally use it as a natural remedy for stomach discomfort and dehydration.

5. Wild Nongmangkha

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Kone oying (M) / Titaphul (As)	<i>Phlogacanthuscurviflorus</i>	Wild Nongmangkha

In Assamese it is known as Titaphul. A shrub with large leaf, with red or light rose flowers and capsule about an inch long. The edible parts are the tender leaves. It is cooked with pork, chicken fish. The Mishing people often gather the edible part from nearby forests or riverbanks. Besides their culinary value, these leaves are also believed to have digestive and medicinal properties, helping to cool the body and improve appetite.



6. East Indian Walp Glory Bower

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Pakkam(M)/ Nephaphu (As)	<i>Clerodendroncolebrookianum</i>	East Indian walp glory bower

It is a shrub or small tree. The edible parts are the tender leaves. It is roasted or fried with potato and pork. It is also boiled and taken with rice. Pakkam leaves, commonly consumed by the



Mishing community, are known for their high nutritional and therapeutic properties. These leaves are rich in iron, calcium, vitamins A and C, and dietary fiber, which help in improving digestion and maintaining good health. Traditional Mishing healers also believe that Pakkam leaves possess cooling and detoxifying effects, which are beneficial for treating stomach ailments, skin irritation, and mild inflammation. The regular inclusion of these leaves in their diet not only provides essential nutrients but also helps maintain body balance, especially during the hot and humid seasons. The use of Pakkam leaves thus reflects the tribe's deep understanding of food as medicine, an important aspect of their indigenous knowledge system.

7. Meliosma

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Gurban(M)/ Hingori(As)	<i>Meliosma simplicifolia</i> (Roxb.)	Meliosma

The edible part of this plant is the leaf. It is cooked with pork and fish. These plant has some medicinal values. Gurban leaves hold a special place due to their unique taste and nutritional value. In Mishing households, dishes made from Gurban leaves are highly valued for their natural taste and health benefits. The cooking techniques—boiling, roasting, and steaming—demonstrate the community's sustainable and health-conscious approach to food.

Gurban leaves are known for being rich in vitamins A and C, iron, and antioxidants. They are believed to aid digestion, improve eyesight, and detoxify the body. Traditionally, the Mishing people use these leaves to prepare light dishes that help maintain body balance during changing seasons. The use of Gurban leaves thus highlights their deep indigenous knowledge of food as both nourishment and natural medicine.



8. Worm head tree

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Dermi(M)/Dhapapatia(As)	<i>Meliosma Pinnata Roxb</i>	Worm head tree

The leaf is the edible part and it is mostly cooked with fish. In Assamese it is known as Dhapapatia. The tribe traditionally believes that green leafy vegetables like Dermi help in maintaining good health and internal balance. Dermi leaves are known for their high iron, calcium, and vitamin content. They are believed to aid digestion, improve blood circulation, and act as natural detoxifiers. Among the Mishing people, Dermi leaves are also used in traditional home remedies to relieve stomach problems and boost immunity. Their frequent inclusion in daily meals reflects the community's indigenous knowledge of health and nutrition.



9. Queensland Cherry

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
SomkongEsing(M)/Heloch(As)	<i>Antidesmebuniusspreng</i>	Queensland cherry

In the Mishing language, "SomkongEsing" refers to a type of wild edible herb commonly found near wetlands, paddy fields, and riverbanks. The edible part of the plant is the fruits and is cooked with fish and other green vegetables. The plant has soft green leaves and a mild, earthy flavor. It is valued for its medicinal and digestive properties, often used in traditional diets to maintain health and balance during seasonal changes. SomkongEsing is not only a food ingredient but also a traditional herb that supports digestion and boosts immunity. Mishing elders believe that consuming this herb during monsoon and early winter prevents stomach



ailments. Its inclusion in fish or pork dishes enhances both the taste and nutritional value.

10. Pellitary

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Marsang(M)/ Jati Malkathi	<i>Spilanthesacmellalins</i>	Pellitary

In Assamese it is known as Jati Malkathi. The edible part is the whole plant. It is boiled with chicken and taken as soup for remedy from cold and fever. It is mostly consumed by women after childbirth to help relieve post-delivery pain.



11. Indian Chestnut vine

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Nekung	<i>Polygonum assamicumgandoger</i>	Indian Chestnut vine

In Assamese it is called Nol- tenga. The taste is sour and it mostly cooked with fish pork sometime it is prepared with grained rice. The leaves are believed to possess medicinal properties that help in improving digestion, purifying blood, and maintaining overall health. They are mostly found in forest areas. They are often used in traditional remedies for stomach and liver problems.



12. Rattan cane

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Yeying Tayo(M) /Betghas(As)	<i>Calamus tenuis/ Rotang/ erecta</i>	Rattan cane

In Assamese it is known as Betghas. It is bitter in taste. The tender shoot is the edible part. It is either roasted, fried or boiled. Mostly it is use with roasted namsing (Dry fish). Yeying Tayo refers to a type of tender cane shoot widely used by the Mishing community. In the Mishing language, *Tayo* means cane shoot, while *Yeying* denotes its young and tender form. These shoots are typically



collected from forests, especially during the rainy season when they are at their most tender and suitable for consumption. In some households, Yeying Tayo is also sun-dried or fermented for long-term preservation, known as Eypo Tayo.

13. Elephant Apple

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Champa(m)/O-Tenga(As)	<i>Dilleniaindia, lin</i>	Elephant Apple

The O-tenga, or elephant apple, is a large, greenish fruit with a tough rind and soft, juicy pulp inside. It is sour in taste and used primarily to add tanginess to dishes. In Mishing households, O-tenga is used in both vegetarian and non-vegetarian preparations. The fruit is believed to aid digestion, cool the body, and provide relief from stomach problems. It is mostly boiled with fish and pork. The inner gum like substance is use as samphoo for washing hair by the women folk.



14. Colebr

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Risut-rubu (M)/ Hingjuri (As)	<i>Buettneria aspera</i>	Colebr

RisutRubu is a traditional leafy plant commonly found in Mishing villages near riverbanks and fields. The leaves are slightly bitter and aromatic, often used for their digestive and healing properties. They are rich in vitamins and minerals and are believed to cleanse the body of toxins. The edible part is the tender shoot. It is mainly cooked with fish only. The leaves help in digestion, purify the blood, and strengthen immunity.



15. Plantains

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Kopak	<i>Musa sapientum, lin</i>	Plantains

The plantain or banana plant—holds a special place. Almost every part of the plant, including its fruit, stem (shoot), and flower (blossom), is used in their cooking. The Mishing people prepare various nutritious and flavorful dishes using these parts, often combining them with fish, meat, or other natural herbs and spices. The shoot is the edible part. The shoot is chopped into small pieces and mixed with chicken while cooking. It is mainly use in ritual practices. The Mishing people use the plant as a multipurpose food source — the stem and flower are cooked, while the leaves are often used for wrapping and steaming food, giving it a natural aroma. The banana stem juice is considered a natural remedy for kidney stones and urinary problems. The banana flower is believed to boost iron levels and improve immunity, especially for women.



16. Black Galangal

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Taling(M)/Tora (As)	<i>Alpinia nigra</i>	Black Galangal

These leaves are used for various purposes. It is mainly use in preparation of purangapin which is main item of the festival ali-ai-ligang. The leaf is used as wrapper for meat or fish while roasting. The tender shoots of Taling are edible and have a slightly tangy, earthy flavor. The leaves are sometimes used to wrap fish or meat before roasting on fire or steaming. This method enhances the aroma and keeps the food moist and flavorful.



17. Spiny Coriander

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Yumrangori (M) /Maan dhonia(As)	<i>Eryngium Feotides</i>	Spiny Coriander

Yumrang Ori, or Maan Dhonia, is a wild variety of coriander found abundantly in rural and forested areas of Assam. The leaf is mostly use as spice while cooking meat or fish. The leaves resemble ordinary coriander but have a stronger aroma and slightly peppery taste. It is used as both a seasoning and a medicinal plant. Yumrang Ori is not just a flavoring herb but also a traditional medicine used to treat stomach ailments and colds.



18. Eagle fern

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Bilongoni (M,AS)	<i>Polypodium Spplin</i>	Eagle fern

The tender leaf of the plant is boiled with chicken and it is served to the new born baby's mother for the enhancement of milk. The leaves are also used while preparing apong (Rice beer). In Mishing cuisine, Bilongoni leaves are used to add tanginess to curries, especially fish-based dishes, and to make light, healthy soups. Apart from their culinary use, they are also believed to aid digestion and reduce heat in the body. Bilongoni leaves are commonly used in the summer months for their cooling and digestive properties. They are rich in vitamin C and natural acids that stimulate appetite.



19. Bamboo Shoots

Vernacular Botanical Name English Name.

Ei-Kung/Bha Gaaj *Bambusa vulgaris*

Bamboo shoots are a mainstay in Mishing cooking and are especially valued when used in fermented forms. The Mishing people's traditional eating habits and strong bond with nature are reflected in the utilisation of bamboo shoots. Like other Assamese clans, the Mishing tribe prepares and eats ekung, a type of bamboo shoot. A distinct, acidic flavour is added during the fermenting process and is frequently paired with fish or pork.



20. Fiddlehead Fern

Vernacular. Botanical Name. English Name.
Okan/Dehkia *Diplazium esculentum* Fiddlehead Fern

Dhekiya holds a special place in the Mishing household diet. It grows abundantly during the spring and monsoon seasons near paddy fields, riverbanks, and forested areas. The community prefers using freshly plucked Dhekiya as it retains its unique earthy flavor and tender texture. It is rich in iron, calcium, and antioxidants, making it both nutritious and delicious. For the Mishing tribe, food is not merely sustenance but an expression of cultural identity. Dhekiya-based dishes are often served during community feasts, marriages, and festivals. The method of preparing Dhekiya reflects their traditional knowledge of natural food and sustainable living. Dhekiya is considered beneficial for digestion, blood purification, and maintaining healthy skin. It is low in calories and rich in minerals, making it ideal for a balanced diet. The traditional cooking methods used by the Mishings help retain its nutritional quality without excessive use of oil or spices.



21. Taro

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Enge/Kachu	<i>Colocasia esculenta</i>	Taro

Khosu, known scientifically as *Colocasia esculenta*, grows abundantly in the moist and fertile lands of Assam, especially along riverbanks and paddy fields. The plant is versatile — its leaves (Khosupaat), stems (Khosu lota), and roots (Khosu aloo) are all edible when properly cooked. The Mishing people have mastered the art of preparing Khosu in ways that neutralize its natural itchiness and enhance its earthy aroma and taste. The Mishing people use alkaline water (khardona) or lemon juice to reduce the itchiness of Khosu during cooking. Cooking in bamboo tubes or earthen pots enhances its flavor, a traditional method still practiced in some Mishing villages. Khosu-based dishes are an essential part of Mishing daily meals and festive feasts. They reflect the tribe's connection to their land and water resources. The simplicity of Khosu recipes symbolizes the Mishing people's sustainable and nature-centered food culture. Khosu is rich in carbohydrates, fiber, iron, and vitamins. It aids digestion, provides energy, and is believed to help in maintaining healthy skin and bones. The Mishing community values Khosu not just as food but as a medicinal plant used in traditional healing.



22. Indian Pennywort

<u>Vernacular.</u>	<u>Botanical Name.</u>	<u>English Name.</u>
Manimuni (M,AS)	<i>Centella asiatica</i>	Indian Pennywort

Manimuni leaves (known in English as *Centella asiatica* or Gotu Kola) hold a special place for their medicinal and nutritional properties. The leaves are believed to purify the blood, aid digestion, and improve memory. The Mishing community incorporates Manimuni in several simple, healthy, and flavorful traditional dishes. It's used to treat digestive problems, fever, and fatigue.



flavorful traditional dishes. It's used to treat digestive problems, fever, and fatigue.

These are some of the wild plants used by the Mishing Tribals, which have many medicinal values and good for health.

Changing Trends Of Food Habits Of The Mishing People.

Due to modernization and deforestation some sort of changes have come in food habits of the Mishing people. Before, the use of mustard oil was limited but present most of the edible items are cooked in mustard oil. Use of packed spices have become common. Now a days tea and coffee is served instead of Apong. Apong the rice-beer is commercialized at present which was a prestigious traditional drink. Now a days foreign liquors are also consumed in various festivals. And due to deforestation many wild plants are now hardly to be found, which has made it difficult for the Mishing people to hold grip of their traditional eating habits.

But still in Mishing villages some sorts of wild plants are found and most of the wild plants, herbs, shrub etc are planted by the Mishing people within their compound. Though modernization has taken over, the community still practice their traditional festivals, ceremonies and food habits to some extent.

Conclusion

The study reveals that the Mishing tribe possesses rich indigenous knowledge about wild edible plants and their nutritional and medicinal properties. Their traditional cooking practices are eco-friendly, healthy, and deeply connected to their natural surroundings. Despite modernization and deforestation bringing changes in lifestyle and food habits, the community continues to preserve many of its traditional food practices. By cultivating and conserving these plants within their compounds, the Mishing people not only ensure food security but also sustain their cultural and ecological heritage. However, while the Mishing food culture is resilient and efforts are being made to preserve it, it faces significant threat from the convenience and cultural influence of a globalized world. Hence certain timely measures may be undertaken for future conservation of the food culture.

- Documentation of recipes and traditional knowledge related to cultivation and preservation of food, conducting scientific and in-depth studies and documenting traditional recipes along with preparation methods is essential to create a formal record of the Mishing culinary heritage which is currently largely based on oral tradition. This will also help in inter-generational knowledge transfer.
- Market availability: Ensuring the availability of traditional food ingredients is necessary for cultural continuity of traditional cuisine. Due to commercialization of agriculture, deforestation etc. many indigenous plants needed for Mishing cuisine are not easily available. Proactive steps should be taken to establish seed banks, indigenous plant nurseries, support local markets and create linkages for Mishing farmers to sell their produce. This can help in making traditional food ingredients accessible.
- Identity preservation by prevention of conversion to different religions done by force, coercion or allurements as this has led to the abandonment of some traditional food due to new food taboos or ideologies.

References

- Dutta, Gitamani: Wild food plants of Baruah and Ashalata Devi Mishing tribe An ethnobotanical survey.
- Gam N.K. and J. Gam: Studies on some wild plant species used by the Mishing (Miri) tribe of Assam in their traditional food items.
- Myers, Vanessa Richins: 1 species of Fig Trees for Indoor and Outdoor Gardening.
- Saikia, Dr. Pratisha Kumari: Food and nutrition A study of the Mishing of Assam.

An overview on river pollution in India, its Causes, Impact and Government Initiatives for Sustaining River Water-Bodies

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Abstract

River pollution in India has become a critical issue related to the environment and public health due to rapid urbanization, industrialization, and population growth. Untreated sewage, industrial effluents, agricultural runoff, and solid waste continue to be discharged into major river systems, including the Ganga, Yamuna, and Brahmaputra, causing serious degradation in water quality. This results in the loss of aquatic biodiversity and disruption of the riverine ecosystem, apart from increasing the risk of waterborne diseases in communities located along its banks. Despite policy interventions through initiatives such as the Namami Gange Mission, as well as more stringent pollution control norms, enforcement and infrastructure gaps persist, and a lack of awareness among the public is evident. Reviving the health of Indian rivers requires an integrated approach that merges efficient wastewater treatment with industrial regulation, sustainable agricultural practices, and the involvement of the community.

Keywords: India, Pollution, River, Sustainability, Water-Body.

Introduction:

Large river systems have long formed part of the cultural, economic, and ecological fabric of India—from the Himalaya-fed Ganga and Brahmaputra to the peninsular rivers such as the Godavari, Krishna, and Narmada waterways, which sustain drinking-water supplies, agriculture, industry, fisheries, and religious practices for hundreds of millions of people. Over the past few decades, however, rapid urbanization, population growth, and

industrial expansion have placed unprecedented pressure on these rivers. Untreated or partially treated municipal sewage, industrial effluents, agricultural runoff laden with fertilizers and pesticides, solid waste dumping, and sand mining have combined to severely compromise water quality in many stretches. Monitoring reports from government agencies consistently identify a large number of river stretches as “polluted” or “priority” segments based on biochemical oxygen demand and other indicators, reflecting the widening mismatch between pollution loads and treatment capacity. The ecological implications of such degradation are widespread. Increased organic loads and nutrient enrichment stimulate eutrophication, lower dissolved oxygen levels, and cause fish kills, whereas toxic metals and persistent organic pollutants bio accumulate through food webs and affect aquatic invertebrates, fish, birds, and mammals. Habitat fragmentation, altered flow regimes, and sediment contamination further reduce riverine biodiversity, putting both endemic and migratory species into danger. These impacts do not stay confined to water only; the communities dependent on river fisheries, floodplain agriculture, drinking water intakes, and riparian grazing face direct risks to health and livelihood, whereas changes in river ecology spill over to adjacent wetlands and terrestrial ecosystems. In response, the Government of India and state governments have launched several initiatives over time, including river-specific programmes like the Ganga Action Plan and later the National Mission for Clean Ganga; broader frameworks like the National River Conservation Plan; and more recent interventions that incorporate wastewater infrastructure expansion, industrial compliance, solid waste management, and community participation. Yet despite significant investments and some localized improvements in sewage treatment capacity and riverfront management, many rivers remain under stress, and new challenges like climate-driven flow variability, emerging contaminants, and continuing urban growth complicates restoration efforts.

This article examines river pollution in India from four interrelated dimensions: the main sources and causes of pollution, and their spatial patterns; the share of river stretches that are currently described as polluted, and the ensuing impact on ecological health; impact on the aquatic and terrestrial biodiversity and on human populations dependent on riverine

ecosystems; and the formulation, execution, and results of significant government programs with consideration for the contemporary state of river cleaning efforts. Through synthesizing recent data from monitoring, policy documents, and scientific studies, this paper aims to present a nuanced, evidence-based picture of the current scenario and to highlight the gaps and opportunities that remain for achieving ecologically healthy and socially just river systems in India.

1. Objectives:

- 1.1 To understand the reasons behind the cause of pollution in river water bodies.
- 1.2. To grow concern about the alarming deteriorated conditions of the rivers of India.
- 1.3. To develop an understanding of the impact of river pollution on both terrestrial and aquatic biological systems.
- 1.4. To know about different government schemes and policies for the betterment of the rivers of India.

2. Major causes of pollution in the river waterbodies of India:

2.1. Municipal wastewater or domestic waste: Municipal wastewater, or domestic sewage, is currently the main cause of river pollution in India. This reflects a structural mismatch between rapid urbanization and incomplete infrastructure to treat sewage from urban areas. According to information made available by the Central Pollution Control Board, an estimated 72,368 million liters per day of sewage are generated by urban areas, with installed treatment capacity at around 31,841 MLD, accounting for about 44% of the total load. For this reason, over half of the country's domestic wastewater flows into rivers and streams without or with partial treatment. When considered in terms of the treatment performance, the magnitude of this capacity gap becomes more striking. One such assessment carried out by NITI Aayog in collaboration with the CPCB estimates that an overall deficit of about 78.7% exists in domestic sewage treatment, which indicates that a significant share of the domestic effluent is escaping proper treatment and, eventually, reaches the receiving water bodies. National river water quality assessments further reflect the consequences of chronic under-treatment. The

CPCB's 2022 analysis, which employs biochemical oxygen demand (BOD) as an indicator of organic pollution, identified 311 polluted stretches across 279 rivers in 30 States and Union Territories, with domestic sewage recognized as the dominant source of organic loading in most urban and peri-urban segments. Contemporary syntheses of monitoring data suggest that, approximately, over half of India's 605 monitored rivers are currently polluted due to high levels of BOD and faecal coliform. These conditions can be principally traced to the municipal wastewater inflows from rapidly growing towns and cities lacking functional sewerage networks and sewage treatment facilities. Indeed, illustrative of these dynamics is the Yamuna, which, for a relatively brief 22-km segment—about 2% of the river's length—traversing Delhi, contributes nearly 80% of the total pollution load. This concentration of municipal discharges underlines how localized effluent sources can have disproportionate impacts on entire river systems. Collectively, these empirical observations and official datasets establish that municipal wastewater is not just one of the many causes contributing to river degradation in India but is, in fact, a structurally embedded core problem. Its resolution demands an integrated policy response that links expansion of sewage treatment capacity with improvements in sewer connectivity, operation and maintenance, as well as the implementation of decentralized wastewater management strategies in both metropolitan centers and smaller urban settlements.

2.2 .Industrial wastewater: Industrial waste remains a critical and persistent driver of river pollution in India, operating in tandem with municipal sewage and often acting synergistically to push numerous river stretches beyond acceptable ecological and public-health thresholds. The rapid pace of urbanization has manifested itself as a surge in wastewater release, with inadequately developed wastewater treatment. The CPCB estimates that sewage generation from urban centers is about 72,368 million liters per day (MLD), and installed treatment capacity is about 31,841 MLD, or approximately 44% of the total load. Thus, more than half of the domestic wastewater is discharged into rivers and streams without being properly treated or often with minimal treatment. The CPCB's 2022 analysis, using biochemical oxygen demand, an indicator of organic pollution, identified 311 polluted stretches across 279 rivers in 30 States and Union Territories,

with domestic sewage identified as the dominant source of organic loading in most urban and peri-urban segments. More recent syntheses of monitoring data indicate that approximately half of India's 605 monitored rivers are currently classified as polluted due to elevated BOD and faecal coliform levels, primarily attributable to municipal wastewater inflows from rapidly expanding towns and cities lacking functional sewerage networks and sewage treatment plants. Successive assessments by the CPCB identify hundreds of river stretches failing to meet basic "bathing quality" standards, largely due to elevated BOD, heavy metals, and toxic organic compounds originating from industrial clusters along river corridors. The 2023 CPCB assessment (data reported in 2025) identifies 296 polluted river stretches on 271 rivers across 32 States and Union Territories with effluents from industries and inadequately treated sewage noted as key degradation sources showing only marginal improvement from 2022 when 311 stretches were recorded. Industrially, estates associated with textiles, tanneries, pulp and paper, pharmaceuticals, petrochemicals, and electroplating units typically discharge complex effluents containing high BOD and chemical oxygen demand (COD), suspended solids, dyes, phenols, detergents, nutrients, and a suite of heavy metals (including chromium, lead, cadmium, and zinc). These contaminants deplete dissolved oxygen, threaten sensitive aquatic biota, and accumulate in sediments and biota, causing long-term ecological impairment and biomagnification within food webs. The situation is particularly acute in large river systems with dense industrial belts. For example, CPCB assessments of the Ganga basin identify pollutant clusters at Kashipur and Moradabad along the Ramganga, and at Meerut and Modinagar along the Kali, where paper mills, sugar factories, and distilleries discharge effluents that significantly raise BOD and color, rendering receiving stretches unsuitable for bathing or aquatic life. Similarly, the Sabarmati River in Gujarat, traversing industrial zones of Gandhinagar and Ahmedabad, is characterized as "mostly polluted" due to direct and often untreated industrial wastewater, with studies reporting elevated metal concentrations (Cu, Mn, Fe, Cr, Zn, Pb, Cd) at multiple sites, particularly downstream of industrial outfalls. The Yamuna, especially in the Delhi-Haryana reach, receives combined loads from industrial drains and common effluent treatment plants serving mixed industrial areas; recent inspections indicate continued non-compliance by over a hundred units in

the Barhi industrial area of Sonipat and high BOD in drains discharging into the Yamuna, highlighting gaps in effluent treatment infrastructure and enforcement. Estimates for the Ganga main stem suggest more than 500 million liters per day of industrial wastewater are released into the river, often partially treated or untreated, compounding the already high urban organic load. Although there has been a gradual national decline in the total number of polluted river stretches, CPCB continues to report hundreds of Priority-1 and Priority-2 sites where BOD levels exceed 30 mg/L and 20 mg/L respectively well above the 3 mg/L threshold deemed safe for bathing, reflecting severe organic and toxic pollution in rivers such as the Ganga, Yamuna, Sabarmati, and Sutlej near heavily industrialized zones. Overall, industrial waste causes chemical and biological riverine impairment and undercuts socioeconomic systems through the degradation of drinking-water sources, fisheries, and agriculture, while imposing health burdens on riparian communities. This problem persists despite a sound regulatory framework under the Water Prevention and Control of Pollution Act, 1974, and requirements for zero-liquid-discharge or effective CETP-based treatments across many sectors. Persistent non-compliance evidenced through CPCB and National Green Tribunal-linked reports, underlines that enforcement, monitoring, and technological upgrading of effluent treatment remain key challenges in the restoration of river health across India's industrial corridors.

2.3. Solid waste and Plastic pollution: Solid waste mismanagement, notably the leakage of plastics into drainage networks, has emerged as a major, discrete pathway through which Indian rivers are degraded, operating in concert with liquid effluents and sewage to modify hydrology, water quality, and riverine ecology. Contemporary modelling efforts and national assessments indicate that India is among the largest global sources of riverine plastic pollution: a 2024 analysis integrating international datasets estimates that India generates approximately 9–10 million tonnes of plastic waste annually and accounts for roughly one-fifth of global plastic pollution, reflecting high rates of mismanaged and dispersed municipal waste (Plastics For Change). A substantial portion of this mismanaged fraction reaches rivers through open dumping on floodplains, unlined landfills, and informal dumps along storm drains and tributary channels, particularly within rapidly urbanizing corridors. Global assessments of river plastic emissions

consistently place the Ganga basin among the top ten river systems worldwide in terms of plastic export to the oceans, with recent estimates indicating that the Ganga alone may discharge in the order of 0.1–0.12 million tonnes of plastic annually, contingent on hydrological conditions and waste management scenarios (PubMed). Empirical surveys along the main stem and tributaries of the Ganga corroborate these modelling results, documenting dense accumulations of macro-plastics (packaging, multilayered sachets, carry bags, food containers, and fishing gear) entrapped on sandbars, vegetation, and near-bank eddies, as well as high loads of microplastics in surface waters and sediments, signaling fragmentation and long-term persistence (IWA Publishing). Comparable patterns have been reported elsewhere in India: national authorities such as the National Green Tribunal and the Central Pollution Control Board (CPCB) have repeatedly identified heaps of solid waste and plastics obstructing conduits, drains, and outfalls along the Yamuna in Delhi and downstream stretches, thereby impairing flow, precipitating localized flooding, and delivering pulses of organic and inorganic contaminants during rainfall events (CPCB). More broadly, a 2020–2021 assessment by international researchers on mismanaged plastic waste indicates that India ranks among the top countries for riverine microplastic pollution, with tributaries of the upper Ganga and other Himalayan rivers already recording significant microplastic concentrations in freshwater environments (ScienceDirect). Ecologically, this burden of solid waste and plastics yields multiple cascading impacts: physical smothering of benthic habitats and spawning grounds; entanglement and ingestion risks for fish, turtles, birds, and aquatic mammals; and the formation of artificial “rafts” that transport invasive species and persistent organic pollutants along the river continuum. Microplastics and their associated additives- e.g., phthalates, bisphenols, and flame retardants-can adsorb heavy metals and hydrophobic organic contaminants, thereby acting as vectors for toxic substances that bioaccumulate in aquatic food webs and potentially enter human diets via fish and shellfish harvested from polluted stretches. Socio-culturally, the accumulation of mixed solid waste-including plastics, religious offerings wrapped in non-biodegradable materials, and discarded consumer items, visually degrades the aesthetic and ritual value of rivers like the Ganga and Yamuna, undermining

long-standing cultural relationships while imposing direct public-health burdens on riparian communities reliant on these waters for bathing, washing, and in many peri-urban and rural settings-drinking water. In this context, recent policy interventions-such as the Plastic Waste Management Rules (amended from 2016 onward) and phased bans on specific categories of single-use plastic-represent important but incomplete steps; CPCB status reports on plastic waste implementation highlight significant gaps in segregation, collection efficiency, and enforcement, suggesting that in the absence of rapid improvements in municipal solid waste governance and upstream reduction of plastic use, solid waste and plastic pollution will continue to be structurally embedded drivers of river degradation in India for the foreseeable future (CPCB).

2.4. Concerning issue of sand mining and modification of the riverbeds:

Large-scale riverbed modification and unregulated sand mining are among the major but generally unrecognized causes of river degradation and related pollution in India. Such stressors undermine the geomorphic and ecological integrity of river systems well beyond impacts on water quality. River sand and gravel play crucial roles in fluvial sediment budgets, channel stability, groundwater-surface water interactions, and habitat structure; heavy extraction disrupts these processes through deepening of the channels, steepening bed gradients, and acceleration of bank erosion. Consequently, such alterations enhance suspended sediment loads and turbidity, mobilize legacy contaminants stored in floodplain deposits, and destabilize aquatic habitats. A recent global synthesis of riverine sand mining indicates that instream extraction induces bed degradation, channel incision, lowering of water tables, and disconnection from floodplains, culminating in losses of fish spawning grounds, macroinvertebrate habitats, and riparian vegetation; Indian case studies feature prominently within this evidence base. In the Indian context, sand mining expanded rapidly in response to urban construction demand. Documents compiled by the India Rivers Forum and SandRP report chronic illegal and excessive extraction from rivers such as the Ganga, Yamuna, Narmada, Cauvery, and numerous smaller basins, frequently exceeding replenishment rates and contravening environmental clearance conditions. These practices not only degrade channel morphology but also contribute to a broader conception of “pollution”: the release of fine

sediments and associated nutrients or adsorbed pollutants into the water column by destabilized banks and freshly excavated beds increases turbidity and degrades physicochemical water quality. In addition, heavy machinery operating within channels leaks oils and lubricants and generates noise and vibration, which stresses aquatic biota. Incident-based evidence from the Yamuna illustrates the scale of physical alteration: inspections by the Haryana Irrigation and Water Resources Department in 2025 found that illegal sand mining at Asadpur in Sonipat district had markedly diverted the river's natural course and created unauthorized embankments and access roads, prompting formal action and highlighting risks of increased flood vulnerability and local scouring around infrastructure. A related 2025 order of the National Green Tribunal established an inter-state task force to monitor illegal sand mining along the Yamuna floodplain between Delhi and Ghaziabad, with directions to ensure compliance with national guidelines. Beyond individual rivers, policy documents such as the Sustainable Sand Mining Management Guidelines, 2016, and the Enforcement and Monitoring Guidelines for Sand Mining, 2020, issued by the Ministry of Environment, Forest and Climate Change, categorically state that indiscriminate extraction can have the effect of lowering riverbeds, inducing saline intrusion in coastal reaches, degrading the quality of groundwater, and causing damage to hydraulic structures, thereby transforming localized mining activities into basin-scale environmental hazards. These morphodynamic changes feed back into the dynamics of river-pollution: diminished base-flows and groundwater tables reduce the capacity of the rivers to dilute organic and chemical loads, while eroded banks and destabilized floodplains increase inputs from agricultural runoff and solid wastes. In conjunction with other drivers such as sewage and industrial effluents, changes induced by sand mining contribute to the decline of aquatic biodiversity and to the emergence of "polluted river stretches" documented in national assessments by the Central Pollution Control Board. Overall, sand mining and alteration of the riverbed in India need to be looked upon not only as issues of extraction of resources but also as structural pressures that magnify both the physical and chemical dimensions of river pollution. This calls for stricter enforcement, science-based extraction limits, and basin-scale planning to safeguard fluvial health.

3. Impact of river pollution on the environment and human life:

River pollution in India is restructuring riverine ecosystems and generating cascading impacts on water quality, aquatic life, riparian wildlife, and overall biodiversity integrity. CPCB surveillance in 2023 identified 296 polluted river stretches across 271 rivers in 32 states and union territories, largely based on biochemical oxygen demand (BOD > 3 mg/L), indicative of substantial organic loading and chronic hypoxic stress for aquatic organisms (nwda.gov.in). In stretches of the Ganga, Yamuna, Sabarmati, Mithi, Musi, and other rivers, the steady inputs of untreated municipal sewage and industrial effluents decrease dissolved oxygen, provoke algal blooms, and favor a limited set of pollution-tolerant species, while sensitive taxa, like many hill-stream fishes, aquatic insects, and mollusc-decline or disappear. Longitudinal observations in the Ganga basin document changes in ichthyofaunal communities, with several native species becoming rare and a greater proportion of assemblages comprising generalists or invasive species. Nationally, India hosts more than 3,500 fish species (marine and freshwater), representing over 10% of global fish diversity and a high proportion of endemic freshwater finfish, thus making river pollution a major threat to this globally important biodiversity hotspot. Toxic contaminants add to the effects of organic pollution: heavy metals, including iron, manganese, zinc, copper, nickel, chromium, cadmium, and lead, have been reported at concentrations above permissible limits in stretches of the Yamuna near Agra and elsewhere, and bioaccumulate in fish tissues such as muscle, liver, and kidney at levels which alter blood biochemistry, reduce growth, and impair reproduction with a possible trophic transfer of carcinogenic elements like Pb, Cd, and Cr to piscivorous birds, mammals, and humans (Nature). These stressors are driving broad ecological simplification: diversity of benthic invertebrates declines; plankton communities become dominated by a few tolerant algae and cyanobacteria; and the loss of diverse prey base impacts higher trophic levels, including otters, fish-eating birds, and the Ganges River dolphin. India's first-ever comprehensive river-dolphin survey (2021-2023) estimated around 6,327 Ganges River dolphins across the Ganga, Brahmaputra, and Beas systems, while underscoring that this aquatic apex predator faces severe survival threats from pollution, boat traffic, entanglement, and flow regulation. Local reports

of dolphin mortalities in the Brahmaputra and Ganga substantiate how degraded water quality and habitat fragmentation are eroding dolphin populations and the broader riverine ecosystem health . Contamination of irrigation waters and waters used for rearing livestock in riverbanks and floodplains results in the accumulation of metals and chemical residues in soils and crops, thereby altering soil microbial communities and affecting insects, amphibians, and terrestrial predators dependent on healthy riparian zones indirectly. In view of hydrological connectivity from headwaters to estuaries, inland pollution exerts ecological effects on deltaic and coastal ecosystems. Also, nutrient- and contaminant-rich discharges into the Ganga-Brahmaputra-Meghna and other deltas degrade nursery habitats for fish and crustaceans, threatening biodiversity associated with mangroves. Against the background of global evidence that the populations of migratory freshwater fish have declined by over 80% since 1970, with pollution identified as a key driver, India's polluted river network is not only a local environmental crisis but a meaningful contribution to the global erosion of freshwater biodiversity, hence undermining ecosystem services such as fisheries, natural water purification, and climate regulation that sustain the livelihoods of millions of people and numerous species.

Also, river pollution poses serious risks to human health, livelihoods, and economic growth. Millions of people rely on rivers like the Ganga and Yamuna for drinking, bathing, irrigation, fishing, and religious practices. The Ganga supports about 400 million people in its basin but is overwhelmed by untreated sewage and industrial waste. In cities like Varanasi, around 200 million liters of untreated sewage flow into the river every day. This causes exceptionally high levels of faecal coliform, making the water unsafe for direct contact. Studies of Indian rivers reveal that many monitoring sites show biochemical oxygen demand (BOD) and coliform counts that exceed safe limits. This indicates widespread water contamination affecting domestic use and agriculture. Consequently, polluted river water significantly contributes to India's heavy burden of waterborne disease. National estimates show that approximately 37.7 million people suffer from water-related illnesses each year, with over 10,000 deaths occurring between 2017 and 2022 due to diseases like cholera, diarrhoea, typhoid, and viral hepatitis. Many of these are linked

to contaminated surface and river water. Historical and recent outbreaks, such as the hepatitis E-driven jaundice epidemics in Delhi (1955–56) and Shimla (2015–16), have been directly linked to sewage-tainted river water entering municipal supplies. This highlights how failures in river and wastewater management lead to public health crises. In addition to acute diseases, long-term exposure to heavy metals and toxic pollutants in rivers used for irrigation and fishing seen in sections of the Yamuna and other rivers creates ongoing health risks, including kidney damage, neurological issues, and cancer. It also undermines food safety as contaminated water affects crops, milk, and fish consumed by local communities. The economic impact is significant. The World Bank estimates that health issues from water pollution in India account for roughly 3% of the country's GDP. This loss reflects decreased productivity, healthcare costs, and reduced earning capacity, making river pollution both an environmental crisis and a serious human development challenge.

5. Government initiatives:

5.1. Namami Gange :The Namami Gange Programme is one of the most ambitious river rejuvenation programmes ever undertaken in India. The programme has been conceptualized as an integrated conservation mission to restore the ecological integrity of the Ganga River basin. The government-approved Flagship Programme in June 2014 allocated ₹ 20,000 crore for this purpose, reflecting the national priority for the revival of this iconic river. Two major objectives have been set before the programme abates pollution in the river at every juncture, and to rejuvenate the Ganga on a long-term basis in its natural course asset worth crores in cultural, ecological, and economic terms. The Namami Gange programme integrates policy reforms, infrastructure development, scientific research, community participation, and inter-state cooperation on a single platform, thereby adopting a multi-layered approach for sustainable and quantifiable restoration of the health of the National River Ganga.

Achievements:

- **Creating Sewage Treatment Capacity :**One of the major components of the programme has been the expansion of sewage treatment capacity along the Ganga basin. So far, sanctions have been made for 200 sewerage infrastructure projects, including one decentralized modular system, with an

overall investment of ₹ 31,810 crore. Of these, 116 projects are already complete and operational, while the remaining ones are progressing through different stages of construction and implementation.

- **River Surface Cleaning :** Targeted efforts have been made to remove floating solid waste from the river surface and adjoining ghats. In all, dedicated river-surface cleaning mechanisms have been deployed across 11 key locations, with adequate measures for routine collection and safe disposal of debris in order not to further degrade the water quality.
- **Biodiversity :** One of the long-term goals of the Namami Gange programme aims at bringing back the native life of the river: species that once thrived along the Ganga, which are now restricted or endangered. The mission focuses on restoring such species for them to again play their natural role in maintaining a balanced ecosystem of the river. In this direction, science-based conservation plans are being jointly developed and implemented by the WII, CIFRI, and Uttar Pradesh Forest Department. Surveys conducted by WII have identified stretches of the river where biodiversity is still relatively strong, and these areas are now being prioritized for protection. They have also set up rescue and rehabilitation centers for injured or displaced aquatic animals and trained a network of local volunteers known as Ganga Pahari's who help monitor and protect these stretches of the river. Public awareness has also been made part of the mission. Interpretation centers like Ganga Tarini and Ganga Darpan have been developed to make people understand the ecological importance of the river and species dependent on it. Work at CIFRI has focused on fish populations. They have mapped fish diversity across the Ganga using GIS tools and initiated tagging programmes to track the migration of species such as Hilsa. They also have fish ranching and awareness activities in support of the revival of species like Indian Major Carps and Mahseer, which are of ecological and livelihood value. Meanwhile, the Uttar Pradesh Forest Department is expanding conservation-breeding programmes for freshwater turtles and Gharials at the Kukrail centre in Lucknow. The aim of this is to gradually rebuild stable populations of these iconic species within the Ganga basin.
- **Afforestation :** Afforestation has been treated as a central pillar of the Ganga rejuvenation programme because a river's health is inextricably linked

with the health of the forests that feed it. To reinforce this linkage, Dehradun-based Forest Research Institute prepared a detailed project plan covering more than 1.34 lakh hectares across the Ganga basin states: Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. The ₹ 2,293 crore project details where and how new green cover should be created to support the river system. The plan approaches the riverscape through four lenses: natural landscapes, agricultural landscapes, urban landscapes, and conservation-focused interventions. This structure allows the project to work not only in the forested upper catchments but also along the farmlands, towns, and degraded patches that influence the river's flow and quality. The afforestation initiative fundamentally strives to enhance the ecological resilience of the river in terms of its natural flow, or *aviralta*. The program seeks to reduce soil erosion, improve groundwater recharge, and reconstruct the general ecological processes that give life to the Ganga through the restoration of natural vegetation and riverbank stabilization. These interventions have been implemented by the State Forest Departments in all five basin states since 2016–17, with financial support from the National Mission for Clean Ganga. Their work ranges from planting native species and protecting riparian zones to maintaining green corridors that help reconnect fragmented habitats along the river.

- **Public engagement :** Public engagement was an important pillar of the program, which had its own set of outreach activities at large in order to build awareness and strengthen community participation. Events such as seminars, workshops, rallies, cleanliness drives, plantation campaigns, exhibitions, and school-level competitions were carried out across multiple states. These efforts were supported by a coordinated IEC strategy that deployed mass media—television, radio, newspapers, and digital platforms—to broaden the reach of the programme. A theme song on Ganga was also shared widely on digital media to enhance visibility, while NMCG kept its social media presence active on platforms like Facebook, Twitter, and YouTube for uninterrupted public engagement.

5.1.1 Ganga Gram :

A major component of the program relates to the development of rural sanitation in villages falling directly on the banks of the Ganga. The Ministry

of Drinking Water and Sanitation selected 1,674 Gram Panchayats in Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal as priority areas. For promoting basic sanitation infrastructure, ¹ 578 crore was provided for toilet construction in these riverbank villages. Out of the targeted 15.27 lakh household units, 8.53 lakh toilets have already been completed, marking substantial—though not yet comprehensive—progress in reducing open defecation and limiting faecal contamination of the river system. A consortium of seven IITs has prepared the Ganga River Basin Plan and further adopted 65 villages distributed among 13 IITs to develop them as model settlements. These model villages provide a testing ground for integrated interventions in sanitation, waste management, and ecological restoration. Further, the United Nations Development Programme (UNDP) has been engaged as the implementation partner for the rural sanitation component in Jharkhand, with a project outlay of ¹ 127 crore aimed at developing the state as a demonstration model for community-driven sanitation reforms.

5.2. International and Inter-Ministerial Collaborations :

NMCG has increasingly framed river rejuvenation as a knowledge-driven, globally informed endeavour. Countries with established experience in river restoration, like Australia, the United Kingdom, Germany, Finland, and Israel, have shown interest in partnering with India, which underlines how the Ganga's revival has taken on an internationally relevant ecological dimension. Within the country, too, NMCG has tried to reinforce cross-sectoral coordination by signing Memorandums of Understanding with various central ministries, such as Human Resource Development, Rural Development, Railways, Shipping, Tourism, AYUSH, Petroleum, Youth Affairs and Sports, Drinking Water and Sanitation, and Agriculture. The idea behind the collaborations is to ensure a smooth flow of expertise, integration of different institutional capacities, and coherence across various interventions from infrastructure to cultural outreach activities.

5.3. National River Conservation Plan :

The National River Conservation Plan is a central government scheme begun in 1995 to clean up rivers throughout India with national coverage. Based on the earlier Ganga Action Plan, it expanded the scope from a single river to multiple major river systems. The programme aims to reduce the pollution

load entering the rivers and bring their water quality to a level that supports ecological health and safe human use. Under the scheme, the Union Government partners with the states and Union Territories by providing not only financial support but also technical guidance for implementing sewage treatment, sanitation, and other pollution-control measures.

The National River Conservation Plan has extended the reach of river conservation from the Ganga basin to include other major river systems in the country, and it is expected to play an increasingly important role in India's environmental and socio-economic future. Its main accomplishments have included the building up of a sewage treatment infrastructure with a combined capacity to handle 2,522.03 MLD, thereby removing a substantial amount of pollution load in urban rivers. This intervention not only improves water quality but also contributes to the restoration of aquatic ecosystems and supports the conservation of riverine biodiversity. Economically, cleaner rivers translate into reduced incidence of waterborne diseases, which implies a lesser load on the healthcare system. They have also ensured better-quality irrigation water, boosting agriculture-related productivity. Improved riverfronts and cleaner water bodies boost the tourism potential of urban river cities, adding a cultural and economic dimension to the programme. The NRCP, therefore, further strengthens social and cultural outcomes by preserving rivers of religious and historical significance, promoting community development through associated infrastructure projects, and enhancing water security for millions of residents dependent on these waterways. On the policy and governance front, the plan has reinforced the institutional mechanism for water management, improved coordination between central and state authorities, and provided a replicable model for other river conservation initiatives in India.

5.4. One District-One River Initiative in Uttar Pradesh

The Uttar Pradesh government has launched a complete environmental campaign, "One District – One River," to restore the health of rivers across all 75 districts of the state. It addresses river pollution, drying water bodies, and the restoration of ecological balance, improving the recharge of groundwater, revival of biodiversity, and thus improvement in the quality of life for communities reliant on these rivers. By integrating scientific planning,

technological tools, and community participation, this program aspires to create sustainable water management practices that can be replicated across the state.

Under this scheme scientific and community-based approach is applied in a unique in many aspects, as scientific planning is combined with grassroots involvement. For guiding the districts in drawing up river-specific revival plans, prestigious technical institutions like IIT Kanpur, IIT BHU, IIT Roorkee, and BBAU Lucknow were tapped. Hydrological studies, channel mapping, ecological assessments, and riverbank evaluations provide the basis for these plans so that restoration happens in a way that is effective and sustainable

Also, several other rivers in Uttar Pradesh have similarly benefited from this initiative or related schemes:

I. Malin River: It was once a clean river in the Bijnor District. This river had shrunk due to the encroachment, pollution, and deforestation taking place over the years. Its restoration involved comprehensive desilting, cleaning, and afforestation on the embankments. Additional measures, such as check dams and rainwater harvesting, helped recharge groundwater and reinvigorate local ecosystems, providing both agricultural and ecological benefits to surrounding communities.

II. Chhoti Gandak: It is a tributary to the Ghaghara River and has degraded due to siltation, waste dumping, and unabated farming along the banks. A multi-phase rejuvenation plan was implemented for this river that involved removing illegal encroachments, check dam construction, and community-led monitoring systems. Pollution control efforts managed to bring back the river's flow and overall ecological health, thereby allowing it to perform its various environmental and social functions once again.

III. Matuka River, Varanasi District: At one time, the Matuka River played an important role in both ecosystem services and in cultural practices. However, it lost its vitality through urbanization. Restoration in this regard covers cleaning and realignment, source wastewater treatment, and planting trees on riverbanks for erosion control and habitat reconstruction. These activities have successfully brought back both the ecological and cultural significance of the river in Varanasi.

6. Discussion :

The present study has shown that river pollution in India is the consequence not of a single cause but of the cumulative effect of many interrelated anthropogenic activities. The identified causal factors reveal that untreated municipal wastewater, industrial effluent, agricultural runoff, solid waste, and sand mining practices together press upon the river systems. This multidimensional character of pollution suggests that fragmented interventions cannot ensure sustained improvements. For instance, even if industrial discharges are regulated along discrete segments, the ongoing influx of untreated sewage and plastic waste can continue to degrade water quality and aquatic habitats. The documented impacts on human health, livelihoods, and ecosystems further stress the urgent need for an integrated river-basin approach. Pollution of rivers is compromising drinking-water security, raising the incidence of water-borne diseases, and adversely impacting agriculture and fisheries reliant on steady, clean flows. Ecologically, processes such as declining dissolved oxygen, eutrophication, and contamination by heavy metals and organic pollutants lead to biodiversity loss and disruption of food webs. More critically, these effects disproportionately affect vulnerable communities living along riverbanks, with limited alternatives and a reliance upon river water for domestic and occupational needs.

The discussion of various large-scale river rejuvenation programs, enhanced effluent standards, sewage-treatment infrastructures, and so on reveals both progress and persistent gaps. On the one hand, these schemes underscore a policy-level recognition that river health is central to sustainable development, public health, and cultural heritage. On the other hand, these are beset with implementation challenges, including inter-agency coordination, operations and maintenance of treatment facilities, and inadequacies in monitoring and local community involvement, which limit effectiveness. In many instances, institutional and financial mechanisms have not kept pace with the scale and complexity of the problem. Put together, the findings show that technical measures alone are not enough. Controlling river pollution in India has to be done with strong regulation, trustworthy infrastructure, and community-level engagement. Indeed, public awareness, change in waste disposal habits, strict enforcement of already existing environmental laws, and local stakeholders'

participation at the levels of both planning and monitoring should go hand in hand with different government schemes. Research areas may include detailed case studies regarding specific rivers, datasets of long-term water quality, as well as socio-economic analyses regarding river-impacted communities to better identify which interventions are most effective and how these can be scaled. Thus, this study reinforces the view that restoring and protection of India's rivers are not only ecological imperatives but also a social-economic necessity needing sustained, coordinated, and science-based action.

7. Conclusion

River pollution in India is not only an environmental problem but also a social, economic, and public health one. The causes, from untreated municipal sewage and industrial effluents to agricultural runoff and solid waste, to sand mining, have cumulatively overwhelmed the intrinsic self-purifying capabilities of most rivers. The manifestations of this degradation are evident in the form of deteriorating water quality, increased disease burden among river-dependent populations, loss of biodiversity, and disruption of productive activities like fishing and agriculture. Government initiatives like the Namami Gange Programme, National River Conservation Plan, and related initiatives at the state level demonstrate a significant rise in both policy attention and finances spent, with some visible local successes under specific conditions. However, the success of the above programs depends essentially on effective enforcement of pollution standards, adoption of science-based river basin management, and participation of local communities and other stakeholders. Reconceptualizing rivers as ecosystems of dynamic character, rather than water conduits, underlies any meaningful attempt at the restoration of India's rivers. The combination of a framework for stricter regulatory mechanisms, improved infrastructure in the form of wastewater treatment, sustainable land-use practices, and behavioral change at both the individual and institutional levels is necessary. These measures, if pursued with urgency and accountability, hold the potential to progressively restore river health, secure water resources for future generations, and preserve the cultural and ecological heritage that India's rivers have sustained for centuries.

References

- CPCB (2021). Inventory of Sewage Treatment Plants in India. Central Pollution Control Board, Ministry of Environment, Forest and Climate Change, Government of India. CPCB (2022). Status of Sewage Treatment in India (including sewage generation and treatment capacity statistics).
- NITI Aayog & CPCB (2019/2021). Report on Wastewater Management in India/Composite Water Management Index (CWMI) – sections on sewage treatment capacity deficit and urban wastewater.
- CPCB (2022). Rivers Stretches for Restoration of Water Quality – Polluted River Stretches in India. Central Pollution Control Board, New Delhi.
- CPCB (2022). Water Quality Status of National Aquatic Resources (BOD and faecal coliform based classification of monitored rivers).
- National Mission for Clean Ganga (NMCG) & CPCB (various years, e.g. 2018–2022). Assessment of Water Quality and Pollution Load of River Yamuna (with Special Reference to Delhi Stretch).
- CPCB (2015/2018). Water Quality Monitoring of River Yamuna – data on the 22-km Delhi stretch contributing ~80% of Yamuna’s pollution load.
- Ministry of Jal Shakti (2021/2022). Annual Report – chapters on urban wastewater and river pollution.
- NITI Aayog (2021). Urban Wastewater Management in India: Policy and Practice (for framing municipal wastewater as the dominant structural driver).
- Central Pollution Control Board (CPCB). Report on Status of Sewage Treatment in India (around 2021 data). Summarized in: Press Information Bureau, Government of India. “Wastewater Management for Efficacious Use of Water” (19 December 2022).
- NITI Aayog & CPCB. Urban Wastewater Scenario in India (2022).

Cross-Cultural Comparative Reading of Asian Animated Movies *Ponyo* and *Dashavatar*

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Abstract:

Environmental awareness in Europe gained significant momentum in the twentieth century, particularly after the publication of Rachel Carson's influential works. In contrast, many non-European cultures have long embedded ecological consciousness within their worldviews and everyday practices. Yet these traditions were often sidelined by dominant European "theologico-ideological" frameworks that prioritised industrial progress and rationalist thought over indigenous ecological wisdom, considering them as superstition. This study adopts a comparative approach, examining animated films from two Asian cultures to highlight how indigenous narratives contribute to global environmental education. The analysis focuses on *Ponyo*, which reflects Japanese cultural attitudes towards the natural world through a magical lens, and *Dashavatar*, which draws on Indian spiritual traditions to portray the environment as sacred. Though the modes of representation differ—*Ponyo* emphasises a material and emotional connection with natural beings, while *Dashavatar* situates the environment within a divine and spiritual framework—both converge on the same principle: the need to honour ecological cycles and recognise humanity's reliance on the natural world. The study argues that such indigenous perspectives, too often overshadowed by European industrial and ideological dominance, offer vital alternatives for rethinking environmental responsibility. By foregrounding these cultural narratives, the research challenges Eurocentric hegemony and demonstrates how Asian traditions, through storytelling and myth, nurture a holistic respect for the environment.

Keywords: European Hegemony, Environmental Consciousness, Japanese Magical World, Indian Spiritual Wisdom, Comparative Study.

Introduction:

The beginnings of Indian cinema can be traced back to the silent film era of the 1910s, marked by the release of Dadasaheb Phalke's *Raja Harishchandra* (1913). From the outset, Indian films were deeply influenced by the country's cultural heritage, particularly its folk traditions, epics, and classical literature. Many cinematic narratives drew directly from mythology and folklore; for instance, the first full-length Indian film, *Raja Harishchandra*, was based on the *Mahabharata*. The period between the 1940s and 1960s is often regarded as the golden era of Indian cinema, during which filmmakers such as Satyajit Ray revolutionised the art of storytelling and cinematography. Ray's *Apu Trilogy* (1955–1959), adapted from Bibhutibhushan Bandyopadhyay's novels *Pather Panchali* (1929) and *Aparajito* (1932), became central to this cultural moment. Similarly, Shyam Benegal's *Charandas Chor* (1975) was influenced by the folk tales of Vijaydan Detha. As Singh notes, just like mainstream cinema, Indian animation has also drawn extensively from mythological traditions. (Singh 10) Popular animated series such as *Little Krishna*, *Bal Ganesh*, *Hanuman*, and *Dashavatar* are all re-creations of mythological narratives. These examples show how Indian films and cartoons act as reservoirs of cultural memory, continually revisiting ancient myths and classical texts. Such adaptations, however, do not necessarily strip these works of their "aura". (Benjamin 2) For mere commercial use. Instead, by bringing them onto digital platforms, these stories are revitalised, becoming accessible and meaningful to younger audiences. Walter Benjamin's concept of "mechanical reproduction" (Benjamin 2) suggests that repeated reproductions risk diminishing the unique historical essence, or 'aura,' of cultural works. This idea resonates with Jean Baudrillard's notion of the simulacrum, in which copies or representations no longer reflect reality but instead replace it, creating a hyperreal world where the distinction between the real and its representation collapses. (Baudrillard 370-378) Yet, Benjamin also points out that reproduction increases accessibility, especially for audiences distanced from the original context. This positive potential is evident in certain animated adaptations that reinterpret myths to highlight contemporary issues, including environmental concerns. In such cases, simulation becomes a bridge connecting ancient values with modern social needs, fostering ecological awareness alongside cultural preservation.

These adaptations not only preserve but also reimagine the ‘grand narratives’ of ancient India to respond to present-day challenges. This reworking aligns with Lyotard’s critique of the authority and linearity of grand narratives, showing how they can be fragmented and recontextualised within modern contexts. Moreover, drawing from Lyotard’s idea of the commodification of knowledge, these animated texts function as cultural products designed to market both traditional values and ecological consciousness to specific audiences—primarily children and young people. Importantly, the narratives also appeal to parents in nuclear families, who often seek content that combines education with cultural enrichment. By embedding ecological lessons within mythological frameworks, these cartoons serve both cultural continuity and consumer demand.

Discussion:

This is an age of environmental devastation and carbon supremacy. From 2019 to 2025, the world has experienced fluctuations in the graph of human beings’ unnatural death rates. There were several reasons behind this fluctuation in the graph, whether it was Covid-19, a tsunami, an earthquake, or an Amazon forest fire. All these diseases and natural calamities are the result of the human attitude towards the environment throughout history, starting from the Industrial Revolution to the present. Ignoring a biased view, whether it is India, European nations, or Japan, the pedagogy of every indigenous culture of the world has ecological consciousness, which the urge for economic progress has undermined. Considering the alarming call by the environment, it is high time to deterritorialize the indigenous environmental pedagogies of particular nations, and reterritorialize the contemporary environmental pedagogies by incorporating indigenous environmental pedagogies of the nations around the world. In the present society, animation has become a significant pedagogical tool for environmental consciousness because, unlike the real world, the hyper-real world of animation provides liberty to the creators to incorporate animistic and new materialist illustrations of the environment. The animated movie of a nation resembles the cultural aspects of that nation because, along with adults, animated movies are a pedagogical tool for the cultural education of children.

The magical world of Studio Ghibli's *Ponyo*¹ explored the desires and destiny of a gold fish Ponyo, who wanted to become like her human friend Sosuke. Her striving to accomplish her desire unites the animism and the new materialistic approach to the environment in the narrative. Indigenous Indian animism is rooted in the belief in reciprocal relationships between humans and non-human life forms, a perspective that aligns closely with contemporary ideas of eco-spirituality and deep ecology, both of which emphasise ethical and sustainable engagement with the natural environment. (Naess 188-190) Within the postcolonial Indian context, however, these animistic principles have long been marginalised by dominant 'theologico-ideological' frameworks established through both colonial and postcolonial hegemonies. During colonial rule, British missionaries and administrators frequently dismissed animistic practices as superstition or paganism. (Bordoloi 194-197) This dismissive classification played a significant role in undermining indigenous knowledge systems, privileging Eurocentric models that drew on monotheistic theology and scientific rationalism, each of which treated nature as inert matter or exploitable resource rather than as a living, interconnected system. Nevertheless, in the present, these once-suppressed animistic traditions are re-emerging as vital resources for ecological thought. By emphasising interdependence and respect for all life forms, indigenous worldviews offer alternatives to anthropocentric paradigms and resonate with global ecological discourses seeking to restore balance between human societies and the environment (Naess 188–190; Bordoloi 194–197). In this way, what was once dismissed as superstition is now being recognised as a valuable philosophical and ethical framework for addressing contemporary ecological crises.

The narrative raises one important question: whether human invasion into nature's territory is just for the environment? The narrative explores deep ecology's concept of species interconnectedness through animism. Animism is the indigenous cultural belief that views nature as alive and imbued with spirits and magical forces. The narrative deterritorializes and reterritorializes animism to incorporate the indigenous ecological pedagogies with contemporary ecological principles. In several aspects, the cultural environmental pedagogy of *Ponyo* aligns with Indian indigenous environmental pedagogies evident in the Indian mythological animated movie,

Dashavatar. In setting of *Ponyo* is on the ocean, which is occupied by ships resembling a human invasion of the water body for transportation and resource extraction. In the narrative, Sosuke rescues Ponyo from a bottle in the ocean and decides to domesticate her. The army of water waves follows the order of the sea guardian, Fujimoto - who is also the wizard father of Ponyo, and follows Sosuke to bring Ponyo back to her original home – the ocean – from the artificial home of Ponyo- the bucket - created by Sosuke. As a guardian of the sea, Fujimoto has to preserve the lives of the aquatic creatures, and he was trying to do the same with Ponyo. As an anthropocentric practice, human beings tend to domesticate wild flora and fauna to accept them in human society. Human creates an artificial space for the domesticated creature, forcing them to accept this alien space as their home. In the magical world of *Dashavatar*, when Rama tried to dry out the ocean, the ocean spirit ‘Jal Devta’ restricted him from doing this and informed Rama about Jal Devta’s duty to preserve the life of aquatic creatures. Fujimoto and Rama’s behaviour towards humans when humans try to invade the ecosystem of the ocean becomes a pedagogical tool to raise the concerns of blue humanities among the audience. Cultural animism is reterritorialized by these magical figures to incorporate it into the ethical concerns of the blue humanities. Similar to *Ponyo*, the narrative of *Dashavatar* can be interpreted as a critique of domestication. As Sosuke struggles to domesticate Ponyo in the bucket, *Dashavatar* Satyavat rescues a magical small fish and decides to domesticate it in a pot, but after multiple tries, he finally fails to domesticate the fish in an artificially created space. This failure of Susoke and Satyavat symbolically resembles human beings’ failure in constructing an artificial natural space for the domesticated creatures. Domestication alienated the creatures from their natural space, impacting the ecological balance of the Earth.

Disruption in the ecological balance of the ocean leads to natural calamities, as illustrated in the narrative of *Ponyo* and *Dashavatar*, giving light to the deep ecology’s concept of interconnectedness. In *Ponyo*, Ponyo’s transformation into a human being synchronises with the imbalance in the ocean ecosystem and natural calamities like a tsunami, destroying ships and towns, the fall of the human satellites, and the moon getting closer to the Earth. Fijimoto was afraid that if Ponyo completely transformed into a human, she would disturb the natural order and the water body would destroy and

take over the human territory. This is visible in the latter part, where ocean water has invaded human territory, and an ancient extinct aquatic creature was revived because of the purification of the water body. These incidents lead to Ponyo's complete transformation into a human being. Ponyo's complete transformation into a human being symbolically represents human beings' complete invasion – or can be interpreted as human beings' destruction – of the ocean body. This concept of destruction leading to revival purity is also evident in the Indian indigenous cultural belief system. In *Dashavatar*, when the Earth turned impure due to human cruelty, Lord Vishnu ordered the destruction of human life through the flood, leading to the birth of a new generation and the revival of purity on Earth. A small gold fish, Ponyo's desire to become human in *Ponyo*, and human beings' torture of other minor beings in *Dashavatar*, lead to natural calamities and mass destruction. This sheds light on the interconnected trait is the environment.

Conclusion:

Deterritorialization and reterritorialization of the territory of culture, manner and narrative style, the ecological message of both *Ponyo* – a Japanese animated movie - and *Dashavatar* – an Indian animated movie- can be brought into one pedagogical frame. The storyline of these narratives illustrates an individual species' rhizomatic relationship with the other creatures and with the environment. They teach human beings to accept the environmental creatures and nature in their purer form. *Ponyo*, incorporating its Japanese culture, teaches this by constructing a friendship relationship with nature and other creatures; whereas *Dashavatar*, by incorporating Indian culture, teaches this by constructing a spiritual relationship with nature and other creatures. After reterritorialization of these two cultures from their spatial territory, we can adhere to one ecological principle: human intervention into nature's territory and changing nature for human needs will lead to disturbance in the ecosystem. This disturbance can destroy in the form of natural calamities and diseases. Because the moment Ponyo becomes a hybrid creature due to human intervention, natural calamities start. But as soon as the water goddess, who is Ponyo's mother, transforms Ponyo into a pure human being, ecological balance is restored.

References:

- Baudrillard, Jean. *Simulacra and Simulation*. Translated by Sheila Faria Glaser, University of Michigan Press, 1994.
- Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." *Illuminations*, translated by Hannah Arendt, Schocken Books, 1969.
- Bordoloi, Mridul. "Where the Cobbled Path Leads." *Asiatic: IIUM Journal of English Language and Literature*, vol. 18, no. 2, no. 2, Dec. 2024, pp. 194–97. [journals.iium.edu.my](https://doi.org/10.31436/asiatic.v18i2.3430), <https://doi.org/10.31436/asiatic.v18i2.3430>.
- Naess, Arne. "The Shallow and the Deep, Long-Range Ecology Movement." *Inquiry*, vol. 16, no. 1, 1973, pp. 95–100.
- Ponyo*. Directed by Hayao Miyazaki, StudioCanel UK, Walt Disney Pictures, Toho Co. Ltd., 2008, Netflix. Animation.
- Singh, Dr. Dhruva Bhushan. *Media Discourse and Indian Society*. Kaav Publications, 2017.

Acknowledgement

This book would not have seen the light of the day without the invaluable support of many people. At the very outset, we take this opportunity to express our deep sense of gratitude to Dr Lok Bikash Gogoi, Principal, Duliajan College and member-Advisory Board, North-East India Forum of Green Studies, for his constant encouragement, guidance and unwavering support, without which this book would not have been possible. We sincerely thank the distinguished personalities who graciously contributed their good will messages for the book, adding immense value and intellectual depth to this publication.

We are profoundly indebted to the members of the Peer-Review Board for their meticulous scrutiny of the papers and valuable academic insights, which have greatly enhanced the quality of *EcoVisions: Volume 1*. Our heartfelt thanks are also due to all the contributors for their scholarly submissions, cooperation and patience throughout the editorial process.

We extend our sincere appreciation to Duliajan Printing Works for printing the book and giving it its final form with professionalism and care. Finally, we acknowledge the support of everyone who, directly or indirectly, contributed to the successful completion of this book.

Regards,

Editors: *EcoVisions*

Editors' Bio

Ms. Jyoti Singh Pathak is an Associate Professor of English with over 35 years of distinguished teaching experience. A dedicated academic, she currently serves as the Vice Principal and Head of the Department of English at Duliajan College. Her scholarly foundation was laid at Gauhati University, where she completed her Post Graduation in English Literature with a specialization in Victorian Literature, followed by a B.Ed. This dual academic focus has deeply informed her pedagogical approach, blending literary expertise with effective teaching methodology. A committed researcher, Ms. Pathak has contributed to the academic discourse through several research articles published in both national and international journals. Her editorial work on this volume is guided by her extensive experience in the classroom, her administrative leadership, and her sustained engagement with literary scholarship.



Mr. Gaurab Sengupta is an Assistant Professor in the Department of English, Duliajan College. He has completed his Masters in English Literature from the Department of English and Foreign Languages, Tezpur University in the year 2018. He has carried out his M.Phil Research work in the topic 'Reading Abnormal Psychology in Contemporary Fiction' from the Department of English, Dibrugarh University. He has presented papers in various National and International Conferences and has also published articles in Peer Reviewed and UGC-CARE listed journals. His areas of interest are History of British Literature, Literature of the Renaissance Period, Modern and Contemporary/Postmodern fiction, Literary Theory, Medical and Health Humanities. An ardent Murakami fan, Mr. Sengupta is presently carrying out his Ph.D from the Department of English, Dibrugarh University under the able guidance of Prof. Mridul Bordoloi and his area of research is phenomenology and the writings of Haruki Murakami. Besides academics, Mr. Sengupta finds solace in music and exploring new places.



Ms. Rajashree Boruah is working as an Assistant Professor in the Department of English, Duliajan College since 2022. She completed her post-graduation from Tezpur University in the year 2021. She has done her specialization in American Literature. Ms Boruah has a number of research papers published in various peer reviewed and UGC-CARE listed journals and a collection of papers presented in international and national seminars. She has an avid interest for research and is carrying out her Ph.D research from the Department of English, Dibrugarh University. Her areas of interest include Posthumanism, Gender, North-East writings, Translation Studies and Creative Writings.

