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Editorial

As the world continues to grapple with the effects of climate change, the need for sustainable practices has become more pressing than ever. The environment is under threat, and it is up to us to take action to ensure that we leave a habitable planet for future generations. Hence, this Annual Volume III, Issue I of our National Level, Peer Reviewed Multidisciplinary Research Journal *Sophia Lucid* explores the theme of "Sustainability, Environment, and Climate Change", and the role that research can play in addressing these issues.

Sustainability is the practice of meeting the needs of the present without compromising the ability of future generations to meet their own needs. It is a concept that has gained increasing importance in recent years as the world has become more aware of the impact of human activity on the environment. The need for sustainable practices is particularly urgent in the face of climate change. Sustainability is not just about protecting the environment; it is also about ensuring social and economic sustainability. This means that we need to find ways to meet our needs without depleting natural resources or causing harm to communities. Sustainable practices can help to create a more equitable and just society, where everyone has access to the resources they need to thrive.

Climate change is one of the most pressing issues facing the world today. It is caused by the release of greenhouse gases, primarily carbon dioxide, into the atmosphere. These gases trap heat from the sun, causing the Earth's temperature to rise. This has a range of impacts, including rising sea levels, more frequent and severe weather events, and changes to ecosystems. The impact of climate change is already being felt around the world. In some regions, droughts and heatwaves are becoming more frequent, while in others, flooding and storms are causing widespread damage. These impacts are particularly severe in developing countries, where communities are often more vulnerable to the effects of climate change.

Research has a crucial role to play in addressing the challenges to sustainability, healthy environment, and even climate. It is very significant to embark on studying the impacts of human activity on the environment and identify ways to reduce our impact and develop sustainable practices. Researchers attempt to develop strategies to mitigate environmental degradation and its effects. This can influence policy decisions and encourage the adoption of sustainable practices in view of the future.

The first nine research papers in this volume take up the research methods of humanities to discuss issues relating to sustainability, ethics, environment, and climate change. "Beyond Tragedy, Environmental Failure, or Utopias: A Queer Ecological Reading of Noppharnach Chaiwimol's *Bad Buddy*" by Aditi Paul explores the intersection of queer theory and ecology, emphasizing the need to question normative futures. It discusses how Thai media, particularly

the show *Bad Buddy* by Noppharnach Chaiwimol, intertwines ecological concerns with queer narratives, offering a holistic view with new perspectives on climate and queer futurity.

The paper "Droughts and Floods: Reconfiguration of Nature and Culture through Water Narratives in India" by Dr. Elwin Susan John explores the need to merge the ramifications of nature and culture in narratives of water in India, and proposes the use of climate fiction or cli-fi to redefine our understanding of ecology. Cli-fi brings scientific facts to readers in a comprehensible narrative, humanizing the various aspects of science and bridging the gap between arts and sciences. The paper also looks at disaster narratives centering around water in the Indian sub-continent and addresses the interconnections between human, climate, and capitalism in India.

Dr Kamala Srinivas through her paper on "Environment Ethics: Theories and Discussions" emphasizes the need for fundamental changes in human values and institutions to build a sustainable global community by highlighting the importance of subjects like Environmental Philosophy and Environmental Ethics in resolving common environmental issues. The research paper aims to address three key questions: the moral relevance of entities other than human individuals, the approach environmental ethicists should adopt, and whether they should be ethical monism or pluralism, to understand different theoretical frameworks for addressing environmental issues.

Dr Kirti Y. Nakhare's "*Aranyak*: An Ecocritical Analysis" takes up Bibhutibhushan Bandyopadhyay's novel "Aranyak" that portrays the protagonist Satyacharan's transformation from a city dweller to an estate manager in a forested area, where he experiences a profound connection to nature. However, his job involves disrupting the forest to generate revenue, leading to inner conflict and a struggle against capitalist forces. The novel provides a compelling narrative of the tension between human development and ecological preservation, making it a rich subject for eco-critical analysis and the discussion of the concept of capitalocene.

Nishtha Dev's paper "On Reading and Writing Climate: A Few Notes on Parismita Singh's *The Hotel at the End of the World*" reviews the graphic novel by Parismita Singh, which frames nature as climate, offers a unique perspective on the Anthropocene and raises important aesthetic and political questions about the methods of critiquing both the humanist tradition and the Anthropocene. By subverting traditional Western and Romantic epistemological frameworks, the graphic novel highlights the potential of new and multimodal genres to challenge our understanding of literature and history, the author argues. According to her, this approach could lead to new ways of writing and reading climate, ultimately undermining human subjectivity and authorship as central to our understanding of these concepts.

"Alternate Climate Change Epistemologies in the Poetry of Mamang Dai" by Samrita Sinha explores how indigenous literary works from the Northeastern borderlands of India, particularly

the River Poems by Mamang Dai, contribute to imagining and addressing climate conservation and climate change issues. It emphasizes the importance of unearthing the knowledge and perspectives embedded in these works, asserting that they offer valuable insights that can enrich global discussions on climate crisis, distinct from Western epistemology.

"Reading *The Living Mountains: A Fable of our Times* through an Ecocritical Perspective" by Dr Sangita Kongre and Aqsa Khan throws light on ecocriticism as the interdisciplinary study of the connections between literature and the environment, aiming to analyze the representation of nature in literary works and the relationship between literature and the environment, with a focus on addressing contemporary environmental issues such as climate change and the destruction of natural habitats. It explores the interdependence of humans and the environment, emphasizing the need to rethink our relationship with nature and the potential consequences of our over-dependency and exploitation of the environment.

Dr Vaishali Pachunde's "Environmental Thought in Contemporary Hindi Poetry" translated by Nishtha Dev discusses the significance of nature in contemporary Hindi literature, where it is considered in the context of human values and scientific developments. The paper highlights the representation of various forms of nature and their exploration in Hindi poetry and literature, which serves as a reminder that literature often enables and forces society to find sustainable solutions to ecological and social problems.

Dr Zeba Siddiqui's paper "Ecological Degradation and its Impact on Human Lives as Reflected in Arundhati Roy's *The God of Small Things*" highlights that Arundhati Roy's novel *The God of Small Things* explores the destructive and damaging effects of human activities on the natural environment. The Meenachal River, which flows through the fictional town of Ayemenem, is a representation of both life and death as well as the damage that human interference has done to the environment. The river's decline reflects the broader deterioration of the natural world. The novel also highlights the connection between social injustice and environmental degradation, as well as the implications of human behavior and the destructive forces that affect the ecosystem.

The next five papers utilize the research methods of social sciences to analyse the issues on sustainability and environment. In "The 'Full-Stomach Environmentalism' of India's Climate Policy: An Analysis of the LiFE Mission", Aishwarya Sanas considers the 'Lifestyle for Environment' (LiFE) mission, announced by Narendra Modi, the Prime Minister of India, at the COP 26 summit and argues that it represents a significant shift in India's climate policy narrative from a co-benefit-driven economic dimension to a socio-economic and behavioural dimension. This paper analyzes the mission's origins, opportunities, and constraints, and its potential to foster greater policy engagement within the domestic inequity of carbon emissions framework. The researcher concludes that while the LiFE mission brings a significant change in the climate narrative, it is not a radical departure from the co-beneficial paradigm prevalent since 2009. The

author thinks, however, that it sets India on a path to strengthen its geopolitical game by posturing its seriousness in working towards climate action.

Discussing the legal provisions in support of sustainable development the paper on "Role of Supreme Court in Delivering Environmental Justice" By Prajnee Samedhini Sahoo posits that many domestic laws have been enacted to protect the environment, and that the Supreme Court of India has recognized the Right to Environment as part of the Right to Life under Article 21 of the Constitution of India. The author is of the opinion that though the Supreme Court has delivered many landmark judgments laying down guidelines for the protection of the environment, it is always faced with a dilemma as any environmental dispute will involve the fundamental rights of both sides, namely, the humans and the environment.

The paper titled "Sustainable Agriculture Practices: Case Studies from Maharashtra" by Dr Rashmi Bhure emphasizes the importance of sustainable agriculture practices and states that they are key to boosting farmers' confidence. The paper suggests sustainable agriculture practices will enhance water management and reduce farmers' suicide. Discussing a few case studies of sustainable agricultural practices in the context of Maharashtra, the researcher comments that Maharashtra has seen an increase in the adoption of regenerative or sustainable techniques in agriculture, with the aim of enhancing water management, reducing farmers' suicides, and boosting farmers' confidence.

Bringing in a sociological analysis Sukanya Menon in her paper "Climate Change and Refugee Crisis: The Double Marginalization of Environmental Refugees" elucidates the two major predicaments which have changed the world in the 21st century: the issues of climate change and refugee crisis. The author finds that while there are several social and political causes behind the same, the coming together of these two has resulted in another crisis-environmental refugees. She argues that the altering environmental conditions- and subsequent climate change- have led to massive displacements, resulting in the emergence of a new diaspora of environmental refugees. Sukanya's paper seeks to understand this growing crisis and discusses how the environmental refugees face double marginalization under these dual challenges and a lack of proper redressal mechanisms and policy reformations could result in the worsening of the same for the future.

Written from an Economics point of view the paper on "The Social Cost of Climate Change on Indian Economy" by Vinita Fernandes argues that India, a developing economy heavily reliant on natural resources, is highly vulnerable to climate change. According to her, the impact of climate change on agriculture, health, water resources, migration, and the widening gap between the rich and the poor pose significant challenges. To mitigate these risks, it is crucial to identify and implement cost-effective climate change adaptation approaches that can build resilience across various potential future climate risks. The author proposes an economic paradigm shift to accurately assess the value of our natural world and reevaluate our relationship with nature.

The last segment of this journal includes papers from natural sciences to explore the questions on sustainability and climate change. Ensuing the discussions on sustainability, from a science point of view, Dr Meeta Saxena, in her paper "Sustainable Future: A Fuel from Plastic Waste" proposes pyrolysis, gasification, and liquefaction as environmentally friendly techniques that converts plastic waste into liquid fuels like diesel oil and gasoline, addressing the issues of plastic pollution and energy shortage while minimizing the release of harmful gases. The paper discusses the advantages and disadvantages of each of these techniques in detail.

A biological perspective is unveiled by Vijay J. Vig in his paper "Climate Change and the Emergence and Reemergence of Viruses: A Threat in the Future?" The research endorses the following findings: climate change is exacerbating the risk of infectious viral diseases, leading to the reemergence of existing viruses and the potential emergence of new ones; warming at higher latitudes has allowed vectors and pathogens to survive winter, aggravating outbreaks of diseases such as Zika and dengue. It is shown that over half of all infectious diseases are being worsened by climate change, with 58% of 375 infectious diseases studied shown to be aggravated by it. The researcher observes further that the effects of climate change on mammalian viral sharing patterns are likely to lead to the future emergence of zoonotic viruses, increasing the risk of cross-species viral transmission. The following observations are also made by the research: (i) As global temperatures rise, deadly diseases that are a threat in other countries will increase, along with the risk of them being imported into new areas; (ii) Viral respiratory infections cause seasonal epidemics and pandemics, with their transmission influenced by climate conditions.

Discussions on sustainability should continue and it may be noted that a vision for environmentally sustainable practices for the future involves creating a world where every individual has access to basic needs such as clean air, water, and food, while ensuring that future generations can meet their own needs. A new environmental vision needs to be based on a combination of technological innovations, sustainability advancements, and the co-evolutionary pathways of social and ecological systems. Key aspects of this vision include: (i) adopting renewable energy sources that can reduce greenhouse gas emissions and create new opportunities for sustainable development, (ii) Sustainable Agriculture --practices that enhance soil health, increase crop yields, and improve food security are essential for a sustainable future, (iii) Policy Interventions wherein governments, corporations, and individuals would work together to shape them and drive systemic change towards sustainability, (iv) Developing and using Green technology to enhance provisions for efficient renewable energy sources and create environmentally friendly solutions, (v) Developing a Business Strategy where companies should establish a sustainability vision that guides their decisions and actions towards a more sustainable future, inspiring innovation, attracting conscious consumers, and fostering long-term growth, and (vi) Creating Smart Sustainable Cities designed with a long-term vision in mind, incorporating technological innovations and sustainability advancements. All these could be possible only with a mechanism imparting sound education and awareness wherein we have experts and policymakers who themselves are sound in education and who must themselves

commit to educate consumers and the public about the importance of sustainability and the role they can play in driving change.

Dr. T C Roy
Editor, Vol. 3, Issue 1

BEYOND TRAGEDY, ENVIRONMENTAL FAILURE, OR UTOPIAS: A QUEER ECOLOGICAL READING OF NOPPHARNACH CHAIWIMOL'S *BAD BUDDY*

Ms Aditi Paul
English Teacher, Sophia Junior College, Mumbai

Abstract: In an era of climate doomism, our futures seem bleak. Queer theory, as a field, has long pondered upon bleak futures and has thus interrogated normative futures that otherwise go unquestioned. Addressing ecology through a queer lens can therefore provide new perspectives to questions regarding climate futurity. Within the South-East Asian perspective, Thai media texts have successfully woven ecological concerns within queer narratives, questioning normative futures. Such narratives are not only queering ecology but also greening queer politics. Representations of our ecological presents provide us with possibilities of climate futures different from the ones we envision. This paper thus aims to explore climate futurity and queer futurity as two halves of one whole through the queer Thai show *Bad Buddy (2021)*. Directed by Noppharnach Chaiwimol, *Bad Buddy* situates its characters within ecological discourses and it is through an engagement with the politics of an ecologically sound future that the characters resolve their queer futures. The paper will also make references to *A Tale of a Thousand Stars (2021)* and *Our Skyy 2 (2023)*, both directed by Noppharnach Chaiwimol, in presenting a new consideration for a queer climate futurity from a South-East Asian perspective.

Keywords: *Queer Ecology, Climate Futurity, Queer Futurity, Bad Buddy, Queer Theory*

> Queerness is a structuring and educated mode of desiring that allows us to see and feel beyond the quagmire of the present. There here and now is a prison house… we must dream and enact new and better pleasures, other ways of being in the world, and ultimately new worlds… Queerness is essentially about the rejection of a here and now and an insistence on potentiality for another world.
>
> —José Esteban Muñoz, *Cruising Utopia*

> You asked why I didn't quit what I'm doing. What I do might not be able to change the whole world. But it surely changes my attitude towards this world. You might think one man can't change the world. But I want you to know that this world can't change someone like me either.
>
> —*Bad Buddy*, dir. Noppharnach Chaiwimol

In an era of climate doomism, our futures seem bleak. Queer theory, as a field, has long pondered upon bleak futures and has thus interrogated normative futures that otherwise go unquestioned. In the Preface to *Strange Natures: Futurity, Empathy and the Queer Ecological Imagination*, Nicole Seymour makes special note of an advertisement she came across as a graduate student. Asking

viewers to take action against power plants, the ad placed emphasis on the future. This future was centred around "the Child," a marker here of a heterosexual future. The threat to the environment was framed around a particular way of life—in addition to heterosexism, 'the Child' was a marker of whiteness and maleness. It was this child's future the ad urged everyone to band together and protect. Seymour raises a pertinent question: what about those who are most vulnerable to environmental problems: "people of colour, poor people and their children"? (viii) Within the South-East Asian perspective, Thai media texts have successfully woven ecological concerns within queer narratives, questioning normative futures. They present a new consideration for a queer climate futurity from a South-East Asian perspective. These texts raise a pertinent question: what of those who do not subscribe to the idea of a reproductive future? They argue that the future is not the inheritance of the few, but of all. In *Cruising Utopia: The Then and There of Queer Futurity*, José Esteban Muñoz asks a similar question: "Can the future stop being a reproduction of heterosexual reproduction?" (49) Can there be an ecologically sound future that is also queer? In borrowing from the works of the above-mentioned scholars and in presenting an analysis of select Thai media texts like the queer love show *Bad Buddy*[1], this paper seeks to ascertain the answer to that question as "Yes."

TOWARDS A QUEER FUTURE - *BAD BUDDY*

Bad Buddy is a 2021 Thai queer romantic comedy. The show is based on the Thai queer love novel *Behind the Scenes*[2] by Afterday and -West-.[3] Heavily influenced by Shakespeare's *Romeo and Juliet*, and referential to the Thai pastoral romance *Phlae Kao*[4], the show spins a tale of two students from feuding families and college factions who find themselves romantically attracted to each other. As a queer love story, the show challenges tragedy as a trope within queer narratives and in doing so, spins a modern tale of Shakespeare's classic. Directed by Noppharnach Chaiwimol, the show was one of sixteen of producer channel GMMTV's roster of titles for 2021. Parakul Siridechawat, who goes by Pran, is an architecture student, and class president of his student body. He has had a long-standing rivalry with his next-door neighbour Napat Jindapat, who is also known as Pat. He too is a student and is also the class president of the engineering faction. Pran and Pat have inherited not only the rivalry their parents share regarding their clashing businesses but also the age-old rivalry between their two faculties. Despite these circumstances, they overcome their misconceptions regarding each other and seek to pursue a romantic relationship against all odds.

Rife with tropes and cliches that are common within the Boy's Love (BL) genre of media popular within the Global South and Asia, the show is hailed as one of the few that urged a re-working

[1] All Thai texts mentioned are referred to by their translated or romanized names. The show is originally titled as: *แค่เพื่อนครับเพื่อน*, or *Khae Phuean Khrap Phuean*.
[2] *หลังม่าน* is the Thai title.
[3] These are presumably pseudonyms of the authors.
[4] The Thai title is *แผลเก่า*, literally translating into 'old wound.'

of the Thai BL genre. This genre is itself a derivative of the Japanese *yaoi* (known internationally as BL, the genre is locally termed as y-series, derived from its *yaoi* origins). While *yaoi*, and subsequently BL, have been known to fetishize queer romance along heteronormative standards, Thai BL dramas have tried to subvert the same. *Bad Buddy* is one of the first to subvert most of the confines of the genre; in doing so, it has challenged its queer and casual viewers alike. For example, tropes like the *seme-uke* equation, the ambiguous and hidden nature of relationships, assignment to heterosexual gender roles and subscribing to related stereotypes and the callous treatment of consent are all common facets of BL storytelling. *Bad Buddy* however, not only subverts but also addresses them, thus presenting a queer narrative that rings true for its viewers.

To achieve this, the creators have largely relied on parallel plots and sub-plots, along with an exploration of meta narratives and subtle set design. While the themes explored are multifarious, we will limit our exploration to the bounds of environmentalism and ecology for the purposes of this paper. Ecological motifs and settings become important in *Bad Buddy* as they allow the show to subvert the traditional plotline of a tragedy, and instead present a queer love story that advocates for a future that does not succumb to environmental failure or utopia. Therefore, the show consistently uses ecological settings as well as sustainability related projects as sites for resolution in the plot, leading to the 'happy ending' of the story. The show consistently questions normative futures. To this extent, the paper will focus on three such sites: a sustainable bus-stand project, the Zero Waste Village, and the beach, to show how queer ecology also aids in addressing queer and climate futurity.

A QUEER ECOLOGICAL READING: NATURE, RESISTANCE, EXPLORATION

When we speak of queer ecologies, it is important to acknowledge that ideas pertaining to queerness and ecology can and do feed each other. This is to say, theories within queerness and ecology are reciprocal in nature. On the one hand, queer ecology challenges heteronormative perceptions of nature and natural spaces (among all things ecological); on the other, it also posits that queer theory can gain from ecological perspectives. (Sandilands and Erikson 22) Nature then becomes a site of resistance and exploration.

This is not novel; literature (among other things) holds a long history of texts that explore the pairing of queerness with ecology. Although not as common as its obverse pair, such a queering of green politics comes with a history of its own. Sandilands and Erickson note this most succinctly, when they say "we note that both queer and environmental activists have long since insisted that the redrawing of conceptual boundaries is intimately linked to the transformation of material practices involving both human and more-than-human natures." (30) Nature as a site of resistance and exploration is a subtle tool within a media text like *Bad Buddy*, that, at first glance, seems to simply be a queer take on the classic enemies-to-lovers trope.

Bridging the Divide. One such subplot includes our protagonists and their friends working on an ecological project and exploring sustainability in practice within their respective fields of architecture and engineering. It is this project that blurs the lines of enmity and friendship and allows our protagonists to find a space of their own. We see that the architecture and engineering faculties have been feuding since the beginning of the show. Pat and Pran, upon realising they are dorm neighbours, choose to call a truce to their personal enmity and work on ensuring their respective student bodies do not face expulsion. Their efforts bear little fruit, and things come to a physical fight, where a campus bus stand is demolished. The architecture faculty is held responsible for the re-construction of the bus stand. This draws a rift between the protagonists but we see Pat take the first step in mending their relationship.

It is Pat who draws in funding by referring to an "Eco-Innovation Design Contest" and subsequently re-working the project to a completely sustainable bus stand, built using recyclable material and solar power. (*Bad Buddy*, "EP. 3") The coming together of the two warring faculties in the rebuilding attempts, although not the most cordial, is the first of various ecologically coded motifs we see interspersed in the series. Continually, Pat and Pran offer resistance to all facets of their 'rivalry.' A pivotal scene in the series is when Pat and Pran map the plans for the bus stand together. Blending the practical with the creative, they design a bus stand that can then be considered as a map for future projects. ("EP. 3") They design a sustainable bus stand in the present, while referencing to the queer future by role-playing as a queer-adjacent couple[5]. Thus, we see the first reference to futurity as a queer concept—refreshingly, it looks positive. By troubling nature, future and the environment, *Bad Buddy* ascertains Seymour's conceptualization of a queer future. As she notes, "queer values—caring not (just) about the individual, the family, or one's descendants, but about the Other species and persons to whom one has no immediate relations—may be the most effective ecological values." (27)

A Future in the Present. The next time we see Pat and Pran confront the reality of their relationship, they are working on yet another ecologically conscious project. Pat makes the active choice to join Pran on his study trip to the 'Zero Waste Village' with his cohort. ("EP. 6") At this point of the show, the protagonists have acknowledged their feelings for each other but are not on the same page regarding the future.

The Zero Waste Village begins with conscious decisions towards sustainability, when students are asked to get rid of any disposables they may be carrying with them before they enter the village. This ecologically conscious village stands as a proof of sustained practice. For the villagers, and its visitors, the eco-village stands amidst an ever-changing metropolitan landscape. Students can access the Zero Waste Village in less than a day's journey via bus. It is a utopian

[5] They begin with a hypothetical heterosexual couple, consider and reject role-playing as boyfriends, and ultimately act a married couple, where Pran refers to Pat as a "masculine wife." ("EP. 3 [3/4]" 8:27)

land, where our protagonists find their common ground. In participating with the various sustainability activities planned for the cohort, Pat and Pran also find ways to communicate with each other. Within the arc of the story, the trip to the Zero Waste Village provides a new yet neutral ground for the characters, where they can (and do) set their own terms. Thus, although they first enter the Zero Waste Village while on contentious ground with each other, it is here that they resolve their conflict to. When they take their leave from the Zero Waste Village, things have fundamentally changed between them. For the first time within the narrative, they begin to seek their own joy. Thus, an exploration of their identities and relationship is made possible only in an ecological utopia, and the impact of this reverberates throughout the narrative.

This Zero Waste Village is visited time and again across the story, in moments of sadness as well as joy. The Village is therefore an integral part of their personal journeys, and is acknowledged as so by the characters themselves. In these moments, the Zero Waste Village acts as a site of refuge, as well as resistance. Unwilling to terminate their relationship and under pressure to do so, they seek shelter here when they run away from home. Uncle Tong welcomes them sans questions, but immediately folds them into the way of life of the village. ("EP. 11") Pat and Pran spend their days exploring alternate ways of living, opposed to the urban lifestyle they have been used to—therefore the viewer sees them cooking and fending for themselves, sourcing their own food via ethical fishing, living on their own accord and sustaining themselves through small jobs.

For Pat and Pran, this 'honeymoon' period is a view into the domestic life they *could* share, if their relationship was not considered unnatural. This is juxtaposed with the hardships the residents of the village face, shown through Uncle Tong and his nephew Junior. Junior's reluctance to go back to the city at the end of his summer break is compounded by his mother's fears of what she perceives as the lack of opportunities and growth at the Village. She tells Pran, "It's always fun when he's young. But it's not easy to get a job here when he grows up. I barely see his future here. I grew up here. That's why I know… We can't take kids his age seriously." ("EP. 11 [2/4]" 10:28-42) An alternative way of life is thus not as easy as it seems. Therefore, too it is here that they begin to come together and also splinter apart. While domestic bliss is a dream, the subsequent break-up the viewer witnesses drive home the fact that it cannot be anything more than a dream. ("EP. 11") Once introduced, the Zero Waste Village and its residents (in particular, Uncle Tong) become a safe place for Pat and Pran.[6] It is here that crucial aspects of their future are explored and decided upon.

Queer futurity is most strongly implied in the arc of these last two episodes—Episodes 11 and 12. It borrows strongly from the idea of climate futurity we see in Uncle Tong's parting words on his continued perseverance at the Village—"You might think one man can't change the world. But I want you to know that this world can't change someone like me either." ("EP. 11 [4/4]" 12:05-13)

[6] We see this when Pat and Pran return to the Zero Waste Village to celebrate their graduation with Uncle Tong and Junior, clearly implying the maintained contact.

We are allowed to imagine a world beyond the present, a future that is yet to come. It also denotes that the future is queerness' domain. Much of their relationship is characterised by waiting – from the years of school when Pran was sent away to the years Pran spends on a job abroad, and four years of hiding their relationship. At every moment they are waiting to be free, aware that the present does not award them such a liberty. This wait however, is not tragic, although the narrative derives its plot from two tragedies. The queer narrative does not bind itself to a linear story; instead, the viewers bid time along with Pat and Pran, thereby granting them a happy ending – albeit nuanced. Uncle Tong's fierce stance towards ecologically conscious work and living is adopted by Pat and Pran when they understand that the rivalries may not subside in the wake of their love, but their love does not need to bear the compromise either.

The gap years between Episode 11 and 12 are addressed in the 2023 anthology series *Our Skyy 2*[7]. We glimpse Pat and Pran during their university years, yet to reveal their relationship to their parents and friends.[8] However, we also see them living together, collaborating across their faculties, and, once again, seeking a refuge from the pressures of an urban queer lifestyle in nature. ("Our Skyy Bad Buddy") While the beach-side Zero Waste Village was the site of resistance and exploration of their relationship, the mountain-side village of Phu Phan Dao becomes a site for their individual expressions of self without the other. In both regards, the queer self is given space and voice in settings that primarily assert themselves as built upon sustainability and environmental conscientiousness. The viewer is invited to sneak a peek into Pat and Pran's university years, with the knowledge that the original show ends in the future, where they continue to be in a relationship, yet are closeted. Through the *Our Skyy 2* episodes, the viewer realises the work it takes them to reach the 'happy ending' of *Bad Buddy*. Moreover, the viewer realises that the ending is but a moment in time. Thus, we see the strong association built between Pat, Pran and nature. More importantly, we see them seek ecologically conscious spaces to contemplate their present and future in.

The Liminal Beach. Strange Natures seeks to dismantle the commonly conceived notion of juxtaposing nature as ecological against the unnatural of queer relationships. It is not that this debate around nature and the natural has not been transversed before. Such ideas, Seymour notes, have previously been explored in the works of scholars like Jeffrey Weeks, Eve K Sedgwick and Muñoz. Seymour acknowledges these varied undertakings in queer scholarship across the years and, in *Strange Natures*, approaches this overlap head-on. Instead of trying to equate

[7] *Our Skyy 2* provides continuations to original endings of the eight shows it follows. Each show got two episodes in the sixteen-episode series. *Bad Buddy*'s episodes were presented in a crossover with another of director Chaiwimol's shows, *A Tale of Thousand Stars*, thus veritably spanning over four episodes in total. *A Tale of Thousand Stars'* original Thai title is *นิทานพันดาว – 1000stars*, or *Ni-than Phan Dao – 1000stars*.

[8] *Our Skyy 2* and its thematic considerations lend themselves fully to a reading of queer temporality, but that is a paper for another time.

"nature" as understood as the "threatened natural world" with "the threats of heteronormativity and homophobia," Seymour looks at the processes of construction of differing ideas of 'nature.' (5) In doing so, she notes that while it may not be possible to undo what is already considered as natural and unnatural, it is possible to investigate how they came to be, and "combat the kinds of naturalizations and denaturalizations that enable exploitation and discrimination." (6) *Bad Buddy* works towards a similar goal. It is a story not set or created by or for the West, but primarily for its local audience. While nature exists as a setting across queer love and BL dramas, it is relegated to being a motif towards the larger themes at play within the plot.

One such common motif is of the sea in Thai BL dramas. The sea acts as a horizon, a boundary, or the vast unknown of possibilities, depending on the drama in reference. This is not uncommon; historically, the sea or the beach has been a motif for liminality within queer narratives. This has been especially noted within Western media works – more importantly, films – where the sea acts as a site of sexual liaison, a site for 'cruising' and therefore connoting freedom with danger, and, among other things, as a site where the queer self wrestles with place and displacement. (Redmond 716) As Fiona Handyside, in exploring the beach motif in the works of François Ozon, tells us, '[t]he beach and the cinema […] share a range of characteristics as explorations of the border between life and death, stillness and movement, which has generally been neglected within studies of cinematic spatiality, in favor of the cityscape.' (672) However, these representations pay more attention to feeling and tactility, rather than the political connotations this idea of liminality can denote.

Bad Buddy attempts to bridge this gap by using the trope in its traditional mode, and allows the plot to work in constructions of nature and natural, that is then questioned by the characters. When Pat and Pran, having run away from home, seek refuge in Zero Waste Village, Uncle Tong does not ask for reasons and simply says "Teenagers. They come to the beach to get hot or get healed. Mostly for those two reasons." ("EP. 11 [1/4]" 9:13-18) In *Bad Buddy*, the beach is not used to depict sexual liaisons nor does it focus on feeling or tactility. Instead, conversations that could not be had elsewhere are given a voice and a space. It is at the beach that Pat and Pran start their relationship. It is here that they address their familial rivalry, the roots of it, and their own reluctance in being a part of it. It is at the beach that they 'break-up' and it is at the beach that they resolve their differences. The ecological nature gives space to the unnatural of a queer relationship. In doing so, the queer relationship is able to explore its nuances sans the pressures and eyes it is otherwise subjected to.

Thus, the tragedy the relationship seemed slated for—in the manner of its referenced texts *Romeo and Juliet* and *Phlae Kao*—is averted. Although the beach is liminal in that Pran and Pat realise they inevitably have to return home, this suspended time affirms for them the belief that has been echoing throughout their narrative – that they may not be able to change others, but they do not need to change themselves either. Resilience, and therefore the possibility of a queer future is repeatedly affirmed through motifs of nature.

CONCLUSION

In the end, we see queer themes run free in Chaiwimol's works. The idea of a sexual future that is queer in every sense possible is alive in most of his recent works. Queer here is thus in the sense of hope, in the sense of possibility, in the sense of inspiration over reproduction. Queer then is in the sense of considering our futures and fighting for it, despite bleak odds. Rather than skirt the thin line of a utopian idea of life, Chaiwimol presents in his story alternatives: the myriad of ways in which this so called 'utopia' can be pulled from fantasy to reality. These are future shaped by individual behaviour and everyday practices. *Bad Buddy* can thus be seen as a media text that goes against Muñoz's 'failures of imagination' and instead ascribes to Seymour's 'achievements of imagination' regarding the past, present, and future: "It [eco-conscious action] is invested in the ends (survival of the non-human alongside the human) but emphasizes the means (caring for the non-human alongside the human)." (11) *Bad Buddy* converses with queer ecology to present an alternate way of being. In the show, conversations around ecological criticisms and the lived reality of modern queer relationships are explored seamlessly together. Both run parallel to each other, while also providing space within themselves for the other.

A queer ecological ethic demands action in practice. Although the efforts one exerts may not be perfect, they are better than inaction. While harm cannot be undone, healing does not have to be at the cost of the future of the self or the world. Healing does not need to ring synonymous with a return to the past. Instead, healing equates harm undone, as far as possible, while new harm is prevented. This is achievable only when current ways of being are questioned and alternate—queer—ways of living are accepted, where we explore options beyond environmental failures or utopias.

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DROUGHTS AND FLOODS: RECONFIGURATION OF NATURE AND CULTURE THROUGH WATER NARRATIVES IN INDIA

Dr Elwin Susan John
Assistant Professor, Department of English, Sophia College for Women, Mumbai

Abstract: The written and oral histories of humankind have examined the roles performed by humans in different geological epochs before reaching what we now refer to as the Holocene and Anthropocene. While all these narratives are human-centric, the rhetoric on ecology appears to be advertently detached from its human encounters when we examine various narratives on global warming, ocean acidification, glacial melting, artic amplification etc. The onus of keeping the biosphere livable has been gradually shifted to 'nature' by 'culture'. This paper, on one hand is an attempt to humanize natural disasters or to merge the ramifications of nature and culture as they appear in narratives of water in India. On the other hand, this paper also proposes a case for climate fiction in India. The induction of climate fiction or what is popularly known as cli-fi redefines our understanding of the ecology. Cli-fi brings scientific facts to its readers as a comprehensible narrative. Therefore, when cli-fi writers represent environmental issues with its social, cultural, and political dimensions, they humanize the various aspects of the sciences. As a genre, it bridges the gap between arts and sciences. Cli-fi from India also questions the impact of imperialism on climate. Although climate fiction is mostly set in a dystopic future, we may have to reconsider it as a part of our present times that requires immediate attention and action. This paper particularly looks at the various disaster narratives centering around water in the Indian sub-continent. As the sub-continent witness furious water related disasters, it is a relevant exercise to redefine the 'human' in the Anthropocene from a South Asian perspective. Thus, this paper will address the interconnections between the human, climate, and capitalism in India.

Keywords: *nature, culture, ecology, Anthropocene, water*

Water bodies are pivotal to the existence of life forms on planet Earth. From the formation of biodiversity to the development of human civilization, water has been a central piece that has determined life and its continuity. Quite ironically, if not intervened judiciously, it could be the reason for the extinction of life forms on this planet. This essay is premised upon this volatile cultural location and context of history in relation to water. It is also important to contemplate on the proposition that the division between the cultures of science and humanities could be detrimental to a society's intellectual and practical progress. Keeping these statements as a launchpad, this essay begins by citing two seemingly distinct descriptions about water.

The opening scene of Terrence Malick's movie, *Tree of Life* is a series of cosmic and natural imagery, suggestive of the creation of the universe and the origins of life on Earth. It starts with visually stunning and breathtaking shots of swirling galaxies, nebulae, and celestial bodies accompanied by ethereal music and whispered voiceovers. The imagery then shifts to the natural world, with scenes of the Earth's formation, volcanic eruptions, and the emergence of life in the

form of microorganisms in the primordial oceans. This abstract introduction serves as a poetic prologue while it sets the stage for the film's exploration of the interconnectedness of all life and the mysteries of existence. This opening sequence is a beauty particularly for its depiction of water. The churning ocean waves, emphasizing the textures and movements of water stands for an elemental force, maybe symbolizing the primordial origins of life on Earth. The use of water is symbolic and metaphysical. The underwater shots depict the ancient origins of life, suggesting the evolutionary journey of species from the sea to land. While evoking a sense of wonder and mystery, water is used as an imagery to contemplate on the cyclical nature of creation and destruction.

Undoubtedly, water can be called as the liquid muse of nature's art or rather life itself. Malick's poetic rendition about water aligns with a scientific study conducted by Hao Wang on rivers:

> Rivers contribute to biodiversity in two dimensions: habitat and biology. As for biotopes, there are habitats, material channels, and barriers. As habitats, rivers are the first and foremost important places for organism survival and reproduction. Moreover, the hydrological rhythm, bed material, and width of rivers will directly affect the habitat function. (Wang 28)

Evidently, the two cases mentioned above echo that the unusual physical properties of water make it unique and an indispensable element which is crucial to sustaining all forms of life on Earth. Even on a speculative basis, a life without water would fundamentally alter the very nature of our planet and the biology of life as we know it. Without water, life forms will have to rely on an entirely different solvent to sustain biological processes such as respiration, digestion, and circulation. Even habitable ecosystems might be different. Instead of forests, lakes, and oceans, life might have to evolve to thrive in extreme environments like molten rock, toxic gases, or subterranean caves. The profound significance of water therefore underscores the importance of preserving and responsibly managing this resource.

Having located the significance of water for humanity, the first part of this essay analyses the conflict between nature and culture within the context of climate change. It will explore how nature while being 'nurtured', was layered by the various associations of 'culture' and how climate change has interacted with various cultural connotations. In Wang's terms, "rivers form a link between material and energy cycles on Earth. They shape Earth's geological features, foster biodiversity, and promote the development and progress of human civilization." (Wang 32) In the second part of this essay, the relevance of climate fiction will be discussed with the help of water narratives on droughts and floods in India. Quoting Wang's study again, "recently, the ecological function of rivers in many places has been degraded owing to human activities and climate change, resulting in the frequent occurrence of extreme conditions, such as droughts and floods." (Wang 32) The essay further contends the probable epistemic restructuring of the existing dialogue on climate studies.

LICENSES OF CONQUEST AND PRESERVATION

Charged with an innate capacity to fight for our rights, claim our position and exercise freedom, humans have interrupted the flow of natural life and order in irreparable forms. Interestingly, this abuse of environment for human needs is not the direct product of advance in technology and science. In other words, climate change cannot be interpreted as the product of technological determinism alone. Instead, it would be a discernible exercise to perceive the anomalies of history as it would offer poignant examples for human exploitation and destabilization of the natural ecosystem without the help of modern technology. Daniel Hillel's detailed study on the history of civilizations and its symbiotic relationship with soil and water has mentioned the dreadful cases of the ancient Mesopotamia and the Indus valley civilization. Hillel states that the present-day condition of these zones is not the consequence of multiple wars and climate change, but it is a reference to several other physical and biological factors. Simultaneously, it could not be an excuse for humanity to free themselves from any accountability.

> It is due in large part to the prolonged exploitation of this fragile environment by generations of forest cutters and burners, grazers, cultivators, and irrigators, all diligent and well-intentioned but destructive nonetheless. The once-prosperous cities of Mesopotamia are now *tells*, mute time capsules in which the material remnants of a civilization that lived and died there are entombed. (Hillel 4)

This quotation will set the tone of this section of the essay as it samples how nature while being cultivated with culture, has been bearing the brunt of all ecological misfortune. Using the profound multidimensional vectors of capitalism, imperialism, and technologization, this section will further analyze the impact of culture on nature. It can be contended that a case for climate studies lies at the heart of this debate between nature and culture and there can be resolution only if there is a systematic negotiation between the ideological barriers of culture and nature. The conflict can be traced back to the foundations of western epistemology that has an anthropocentric model and an ecocentric model. Each of these models, as the essay contends, have paved way to sanction licenses of conquest and preservation respectively.

The former model places humans at the centre of this ecosystem, both literally and metaphorically, with the belief that human interests, needs and welfare must be the primary focus of all decision making. Fundamentally, the anthropocentric model prioritizes human beings above all entities, be it plants, animals, minerals, or rocks. This perspective therefore justifies human actions even when it can have negative consequences on other entities or species. The supremacy and authority of human beings are preferred in this model. Such an entitlement to exploit and manipulate the natural world order for their own benefit has influenced policy making and implementation of several practices that are harmful to nature's equilibrium. The anthropocentric model can be therefore identified as a license for conquest through the examples from history.

This has given rise to scientific anthropocentricism which validates the scientific studies on human health and well-being while neglecting the broader ecological context and interests of non-human entities. When more zoonotic diseases and other forms of pandemic are ready to take over humans, humanity has woken up to the situation and we are grappling with the ethical and environmental challenges posed by human actions. Núria Almiron and Marta Tafalla's study on climate deadlock observes:

> Scholars have identified four key dimensions of literal and interpretative climate change denial: (1) The warming of the earth and climate change (*trend scepticism*), (2) the attribution to human activities as the cause of climate change (*attribution scepticism*), (3) the severity of the consequences of climate change (*impact scepticism*), and (4) the strong scientific agreement on the reality and human cause of climate change (*consensus scepticism*). The study of these dimensions at the political economy level has unveiled the *denial machine* as organized by the US right-wing countermovement and its influence beyond. (Almiron 257)

This denial and skepticism can be perceived as the unethical distancing borne out of an anthropocentric model of human destiny. Similarly, projects on technologization and capitalism can be tied to this model which is proven to be egotistic in nature. What has emerged as narratives of freedom has merged into a capitalist mode of production which is also voicing out the present-day climate crisis. On one hand, capitalism has contributed to economic growth and prosperity and on the other hand, it can be associated with environmental degradation. Capitalism and its market driven economic growth is based on the use of fossil fuels. The burning of these fuels releases greenhouse gases which are the primary facilitators of climate change. Climate historian Dipesh Chakrabarty proposes,

> Marxists of various sorts – with all the internal differences that they would themselves regard as significant – attribute the origins of the climate crisis to the capitalist mode of production. The end of capitalism remains the most urgent goal even in the midst of climate change crisis: as climate change is only a symptom of capitalism, the best treatment for the symptom is to cure the disease. (Chakrabarty "The Human" 47)

Hence, this license for conquest is embedded within an innate pursuit of profit and resource consumption leading to high carbon footprints. This is where alternatives or a quid pro quo like green capitalism can be located. It argues that market-based solutions and economic incentives can be harnessed to drive sustainable practices and reduce emissions. Therefore, movements like green capitalism are in fact not stepping out of the capitalistic framework. This might come as a challenge to the notion that capitalism is inherently incompatible with addressing climate change.

The second existing model of human precarity is the ecocentric model which is couched within the propositions of preservation. The solution proposed in this model is not a return to nature or an exercise of a primitive mode of living. Evidently, there is no going back to a life without

progress or technological advancements, and a complete renunciation of materialism is completely ruled out. Moreover, as stated earlier in the essay, the present-day ecological crisis is not a product of technology determined progress alone, because historically, to begin with, humanity has never have had a peaceful, perfect, and pristine relationship with nature. We have been meddling with the course of nature, which increased gradually over the years. It is desirable to halt our narcissistic indulgences, as according to the ecocentric model, human species is not set above other entities. Humans are entrusted with a responsibility towards nature and this obligation to nurture and protect nature would act as a deterrent to the exercise of freedom and power at the cost of depleting natural resources. Quoting Daniel Hillel's study,

> We live in an age and culture that is very sensitive to human rights, but does not grant equal weight to human responsibilities. We insist on our prerogatives, and neglect our obligations. Our attitude toward the environment is marked by careless confidence and reckless self-indulgence. These are attitudes and actions that, in any individual, we recognize as childish. And just as a mature person must learn to consider the circumstances and needs of others, so a mature society must restrain its exploitation of re-sources and consider both the rights of future generations and the needs of other species. (Hillel 19)

Several examples can be cited here where historically and culturally, humanity have accessed nature's bounty for their own selfish gratification. Channeled through development projects and located within a capitalistic scheme of things, human civilizations have been flourishing through unsustainable environmental practices. Untenable irrigation projects have resulted in the pollution of groundwater which include excessive salinization of well water, penetration of chemicals into drinking water, percolation of metallic content to subsoil which could be residues of pesticides, fertilizers, sewage reservoirs etc.

> Salinization, erosion, denudation of watersheds, silting of valleys and estuaries, degradation of arid lands, depletion and pollution of water resources, abuse of wetlands, and excessive population pressure- all are now occurring more intensively and on an ever-larger scale. Added to the old problems are entirely new ones, including pesticide and fertilizer residues, domestic and industrial wastes, the poisoning of groundwater, air pollution and acid rain, the mass extinction of species and, finally, the threat of global climate change. (Hillel 6)

The Aral Sea in Central Asia was once the world's largest inland lakes. However, extensive irrigation projects in the 20th century diverted water from its two main sources. This further reduced the flow of fresh water and increased the salinity of the water. Gradually, the sea had dramatically shrunk causing severe ecological and public health crises. The case of Aral Sea basin is often quoted as one among the most severe man-made disasters. It resonates political undercurrents as the onus of protecting this area was scuttled around after the disintegration of

USSR. The environmental deterioration of the area also resulted in irreversible health crises. Philip Whish-Wilson's study about the environmental crisis in the Aral Sea area records,

> The infant mortality rates in the Aral Sea region are said to have increased from about 25 per 1000 live births in 1950 to 70-100 per 1000 in 1996 (Zetterstrom 1999). In parts of Karakalpakstan, the infant mortality rate is over 100 per thousand (Bakhvalov 1997). Low birth weight, growth retardation, delayed puberty, and psychoneural retardation are all considered to be much more prevalent than normal (Zetterstrom 1999). Acute respiratory diseases account for almost one half of all child deaths, whilst diarrhoeal diseases rank second. (Whish-Wilson 30)

Closer home, the Sardar Sarovar Dam on the Narmada River was intended to provide irrigation, drinking water and power to the state of Gujarat and neighboring areas. However, the project has been marred by controversies, including disputes over water-sharing with neighboring states, displacement of local communities without adequate compensation and rehabilitation, and concerns about the environmental impact on downstream regions. Ranjit Dwivedi's study concludes,

> The challenge of addressing the risks of the vulnerable in the Narmada valley should assume priority. In that context, and given the close links of such issues to the problem of displacement, the support of other action groups for the battleground of KMCS- *nevad* land, landlessness, adivasi identity could substantially strengthen the reworking agenda. (Dwivedi 75)

Having cited these examples, it is also relevant to mention cases of societies that have judiciously implemented irrigation policies. Daniel Hillel illustrates the cases of the irrigation-based societies in the arid regions of East, American Southwest, Egypt, Meso-America, China, etc who were diligent and had sustained itself for several millennia with a judicious management of soil and water.

Hence, history has recorded examples for this perennial debate between nature and culture through the lens of capitalism and technology. The opposing yet amicable concerns of conquest and preservation of nature can be further analyzed through a critique of the empire and imperialism. India, being at the centre of this equation, it would be imperative to analyze the connections between climate change and imperialism in the Indian context. Historically, wherever an outsider has exerted its control over a new region, it has been characterized by their interventions in shaping the environmental and social impacts of climate change. Amitav Ghosh observes,

> While capitalism and empire are certainly dual aspects of a single reality, the relationship between them is not, and has never been, a simple one: in relation to global warming. I

> think it is demonstrably the case that the imperatives of capital and empire have often pushed in different directions, sometimes producing counter-intuitive results. (Ghosh 117)

Imperialist powers have very often exploited the natural resources of colonized regions, including timber, minerals, and agricultural land. This exploitation has contributed to deforestation, soil degradation, resource depletion, environmental challenges, and increasing vulnerability to climate change in colonized areas. Extraction of timber was rather a lucrative business in India as it supported ship building, construction activities and railway infrastructure projects. The communities affected by such extraction policies have resisted and have organized movements to reclaim their rights and fair treatment in India. The Bastar Rebellion of 1910 was a tribal uprising against the British Raj. A tribal community in the Bastar region of Central India fought against the administration's exploitation of forest resources, particularly timber. The forced extraction of timber by the British disrupted the traditional practices and livelihoods of the local tribal communities. Writers like Amitav Ghosh, Arundhati Roy, etc have spoken about the cultural and environmental consequences of colonial resource extraction in India. An intensive study on social conflicts and resource extraction by Ramachandra Guha and Madhav Gadgil states,

> In the state of Travancore, bordering Madras on the Malabar coast, restrictions on village use of the forest stemmed from two sources: the desire to commercialize the forest and the sale, at extremely low prices, of vast expanses of woodland to European planters. These processes were interrelated. The development of a road and railway network to facilitate the export of tea, coffee and rubber also served to hasten the pace of timber exploitation. As a consequence, agriculturalists faced acute distress through the loss of green manure (extensively used in paddy cultivation) and other forest produce. Denied access to pasture, the population of sheep and goats declined precipitously in the years following forest reservation. (Guha 159)

Furthermore, climate change can exacerbate existing geopolitical conflicts and border issues as imperialist legacies have left behind unresolved territorial disputes and inequalities. These tensions may be heightened as competition for resources, including water and arable land, increases due to the impact of climate change. If this argument is stretched, climate change-induced rise in sea-level and droughts have led to the displacement and forced migration of vulnerable communities.

These examples exemplify the expanse and cultural variations of climate change through the lens of imperialism alone. However, as Amitav Ghosh also states, the present rhetoric of climate change is largely Eurocentric and hence the centrality of previously colonized regions in this narrative must be established in order to reinstate an egalitarian and sustainable approach to the study of ecological crisis. The problems faced by these regions and the challenges faced by different climate-induced displaced communities also vary. At the same time, there is always

space for the argument that developing nations should not be blamed entirely for the current crisis as the developed nations might have been more responsible for the carbon footprint that is already out there. However, a blame game will not be effective at this point of our climate crisis.

CLI-FI AND WATER NARRATIVES IN INDIA

Having set the premise for the proposed reconfiguration of nature and culture within the context of ecological crisis, this section of the paper will challenge the confined theoretical limitations of nature and culture. Through an epistemic restructuring of this historical debate along with the subjective references to water narratives in the Indian context, this essay contends a case for climate fiction in Indian literature. Contemporary scholarship has established that we are living in a geological epoch which will face the lasting effects of anthropogenic climate change. Marine scientist Paul J Crutzen proposed the term, 'Anthropocene' for this geological era.

In the previous section of this essay, it has been argued that the Anthropocene is a critique of the vectors of capitalism, imperialism, and technologization. Within humanist criticism, climate crisis is associated with the Great Acceleration of the post war period. Therefore, alternatively, it can be argued that Anthropocene is the price paid for trailing the narratives of freedom. The Great Acceleration of the 20th century has been characterized by the rapid expansion of human population, increased economic activity, energy consumption, and environmental degradation. The exponential growth of the global economy has been supported by globalization, urbanization, and consumption particularly in the post-WW II era. Probably Dipesh Chakrabarty offered a consolation when he wrote,

> It is true that human beings have tumbled into being a geological agent through our own decisions. The Anthropocene, one might say, has been an unintended consequence of human choices. But it is also clear that for humans any thought of the way out of our current predicament cannot but refer to the idea of deploying reason in global, collective life. (Chakrabarty "The Climate" 210)

Within this schematic, this essay proposes the urgency to 'humanize' natural disasters and to merge the ramifications of nature and culture. The term 'humanize' is used here to include the human contribution to natural disasters and to accept responsibility. The attempt is not to attach an emotional element to the natural disasters as it will further detach the innate aptitude of humans to be free from being held responsible for these disasters. In other words, this is the breaking down of natural and human history, which is one of the theses proposed by Dipesh Chakrabarty in his contribution to climate studies. Taking cue from the conflict between nature and culture, it is no more relevant to perceive them as two separate entities. Both nature and culture have been grappling with each other for so long that their elements and history are so well interconnected. Humanity can no longer assume that nature will replenish by itself no matter how we deplete its resources or abuse its bounty, because that would project itself as a terrible

gap in environmentalism. Therefore, nature and culture cannot exist as two disparate entities and its division must be dismantled. Moreover, it must be treated as a plea by nature towards culture to 'care'.

Climate fiction or cli-fi keeps humans at the centre of the current ecological precarity. In fact, these narratives reaffirm that a destabilization of anthropocentrism lies at the heart of climate studies. Unregulated activities like excessive sand mining, construction works in floodplains, improper waste disposal that can disrupt drainage systems, deforestation, etc are the primarily cited reasons for the recent floods in India namely, 2005 Maharashtra floods, 2015 Chennai floods, 2017 Bihar and West Bengal floods and the 2018 Kerala floods.

Nila Madhab's *Climate's First Orphans* is an award-winning short film on climate refugees from a coastal village in Orissa. The rising sea levels have wiped out an entire village leaving people homeless and it echoes their helplessness. It presents an active engagement between human narratives and scientific research on climate change. Similarly, the short film, *A Green Agony* by Geeta Singh and the documentary *Rising Water, Ebbing Life* by Dheeraj Sarthak presents the disappearing ecosystem around Sundarbans. Some of the islands have completely submerged while the rest are in the course of extinction. Along with these geographical regions, several communities that inhabited these regions have also disappeared. *Rising Waters, Sinking City* is a documentary released in 2022 depicting the situation of the city of Mumbai and how it has become severely prone to cyclones. The documentary focuses on the lives of the traditional Koli fishing community in Maharashtra and how the rising sea levels are impacting their livelihood and sustenance. The documentary *Living with Floods* by Sanjay Barnela and Samreen Farooqui, documents the lives of the farmers in the flood-affected Saran district in North Bihar. This narrative engages with the man-made reasons behind the extreme environmental changes in this region and the resulting pauperization of the affected communities.

Along with several projects on climate change and resilience by independent movie makers, several organisations are also at the forefront of humanizing natural disasters and to bring issues of climate and sustainability to the public realm. *Faces of Climate Resilience* has been a project undertaken by the research policy think tank, Council on Energy, Environment and Water (CEEW). It focusses on 16 stories from different parts of India and it narrated the lived experience of vulnerable communities who have been at the threshold of climate crisis in India.

The acknowledgement of a climate change induced by humans, which qualifies as a humanist history of this new geological epoch also calls for nuanced deliberations to unpack issues of climate change. Instead of limiting ourselves to the ascribed meanings of the Anthropocene, contemporary developments in humanist studies propose a range of possibilities to navigate through the climate conundrum. Environmental philosopher Jozef Keulartz in his research paper on how ecological design is courted by a technocratic approach suggests the concept of enlightened or prudential anthropocentrism. This concept attempts to strike a balance between

anthropocentrism and an understanding of the environment along with the well-being of non-human species. It acknowledges the importance of human well-being and recognizes the interconnectedness of all life on Earth. Nevertheless, Keulartz also wonders,

> One might seriously doubt if we are scientifically and technically able to design ecosystems, since our past experience and current knowledge are no longer valuable guides or reliable compasses for the future. One might also doubt if enlightened anthropocentrism will be sufficient to slow down or stop the alarming rate of biodiversity loss. (Keulartz 49)

While, Bruno Latour's Actor-Network Theory (ANT), a sociological and philosophical framework developed by him for the field of science and technology studies, challenges the traditional ways of explaining social phenomena. ANT emphasizes the role of non-human actors and the complex network of relationships that shape social reality. This framework will be beneficial to gain a more comprehensive understanding of how climate crisis is socially constructed, how power dynamics influence climate action, and how various actors and technologies interact to either exacerbate or mitigate the issue.

For the present climate crisis, the mediations suggested above as in prudential anthropocentrism, ANT, etc. and the inscription of an agential role to several contexts and conditions, as in imperialism, technology, capitalism, etc. will further push climate researchers to a Catch-22 situation. On one hand, it is evident that any model or proposition that keeps human at the centre will be self-defeating and therefore similar approaches will be within a circumscribed paradigm. And on the other hand, human species cannot be detached from their agential role for the current ecological crisis. Such counter-productive perspectives will have to be replaced by a more informed and interconnected system as suggested by Dipesh Chakrabarty,

> Both the planet's current ecology and human flourishing itself will be best served if we place humans and human needs in the context of the intertwined biological and geophysical systems that have supported complex life *in general* for hundreds of millions of years. (Chakrabarty "The Human" 47)

This idea is better known as the concept of Deep history which illustrates a case for climate studies by not limiting itself to recorded history of human past because it would be mainly humanist in nature. Therefore, an exploration to species history would be a more relevant exercise to record deep history. Here, human behaviour will be perceived as a combination of genetic and cultural changes through which humanity has gone through to reach where we are at present.

For example, the 2017 release *Kadvi Hawa* directed by Nila Madhab Panda is a sensitive and realistic portrayal of farmers grappling with the adverse impacts of climate change. It focuses on the harsh realities faced by them in the drought prone regions of India. On one hand, the movie

represents the resilience of the characters in the face of extreme vulnerability, desperation, and helplessness. At the same time, it also reflects the various natural and human factors responsible for the devastating impact of drought on the lives of rural communities. The movie humanizes the natural disaster with its language and cinematography. Kadvi hawa or 'dark winds' is a metaphor of the scorching heat that has affected the famine-hit regions in the movie.

The documentary *Project Thirst* by Vipul Singh is a harrowing narrative about water scarcity in India. Based on lived experience, this documentary represents the parched reality of families that had to depend on just one or two pots of water daily. Project Survival Media is a journalistic network dedicated to the reportage of climate crisis through photographs and videos. Its India Chapter has covered several documentaries on water scarcity in India like *In Search of Water* which depicts the scarcity of water faced by the inhabitants of Thar desert and their attempt to revive a traditional system of water harvesting to mitigate the prolonged dry spells of summer.

Cli-fi or using the broader category of narratives on climate crisis in India which as the essay had attempted to capture, splices the inherent power dynamics, systemic challenges, and the role of human species in the present-day ecological crisis. More importantly, climate crisis cannot be controlled or reversed by the effort of one community or one nation alone. It must be a common goal and a common challenge to every single individual and nation. Thus, to engage with the public domain, cli-fi serves as a valuable complement to the traditional scientific study of climate change. By presenting imaginative and speculative scenarios, cli-fi encourages to find solutions outside the box. Cli-fi is developing as a crucial component of climate studies as it raises awareness, explore consequences, develop an emotional connection, foster policy and decision-making and reflect on ethical, moral, and cultural bearings of climate crisis. It tries to merge the age-old debate between the two cultures of science and humanities.

A fascinating development within the intertwined biomes of our ecosystem is the appropriation of the rhetoric of climate change studies by Humanities and Social Sciences. The 'popular' discussions about climate crisis have started only towards the end of the 20th century. In other words, ecological crisis has become a matter of concern in the public realm only recently. Therefore, it is no more in the hands of the scientific world alone. This has been a beneficial move in reinserting the humans and their role in this planetary crisis, or rather to humanize the perils of climate change. Having said that, it would be relevant to quote Joshua Clover's response to Bruno Latour where he makes an unerring reference to the Foucauldian paradigm of biopolitics and the sovereign power. He suggests,

> We need to stop *fooling* around with theory and say, without hesitation, that capitalism, with its industrial body and crown of finance, is sovereign; that carbon emissions are the sovereign breathing; that *make work* and *let buy* must be annihilated; that there is no survival while the sovereign lives. (Clover S32)

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ENVIRONMENTAL ETHICS: THEORIES AND DISCUSSIONS

Dr Kamala Srinivas
Associate Professor, Department of Philosophy, SIES College, Sion, Mumbai

Abstract: The human personality is part of a vast evolving universe. The forces of nature make our life dynamic, constantly demanding, and challenging. Basic changes are needed in our values and ways of living. We must realize that when basic needs are fulfilled, we humans crave for more and never satisfied with what we have. There is sufficient knowledge and technology to provide for all. For building a sustainable global community, subjects of study like Environmental Philosophy and Environmental Ethics offer refreshing ideas to all of us Earth people to resolve common environmental issues. Both are comprehensive areas of study that are constantly interacting across various fields such as anthropology, geology, ecology, ethics, economics, law and many more. Environmental ethics is a highly contested field. It engages with key concepts such as moral status or responsibility, differing grounds of moral status and conflicting approaches in ethical theory. And raises questions such as, among many discourses on diversity about moral status, values, and theory, which one of them is the most appropriate to resolve growing crisis about climate change? Is there more agreement on these questions, and how desirable are these agreements? What does such gaps imply to environmental professionals in the field of environmental ethics? Is there a hope for any kind of methodological pluralism? The research paper shall focus on three pertinent questions: Are human individuals the only things that matter morally? If not, what else is of moral relevance, and why? What approach to ethical theory should environmental ethicists adopt? Should environmental ethicists be ethical monists or pluralists? The purpose of these questions is to focus on the underlying theoretical frameworks that may help to locate different approaches to various environmental issues. Therefore, there can be disagreements on two dimensions; environmental ethics can diverge both about what matters morally and about ethical theory itself.

Keywords: *Environmental Ethics, Environmental Pragmatism, Ethical Monism, Ethical Pluralism*

INTRODUCTION

"The human spirit is a creature pulled between two world views, an amoral, self-serving, material world and the ethical, service-oriented world of the conscient spirit," remarks Bhaktivinoda, a Vaishnava Acharya (1895: 233). In philosophy, as in life, there is always a choice. To a great degree, the goal is to enable humans to reach that choice. In the third decade of this century, our world faces new challenges, particularly, environmental, and economic, which share one common property – they are global, they affect everyone. Openness, adaptation, inter-cultural exchange of ideas, inclusiveness, being humble are the qualities/traits that are lacking today; hence they must be incorporated at various levels and into the systems of education. In this era of learning and co-learning, we can cater to these needs through studies conducted in Philosophy

as a discipline and a field of inquiry. Philosophy is the systematic study of ideas and issues; a reasoned pursuit of fundamental truths; a quest for a comprehensive understanding of the world and a study of principles of conduct, and much more. Philosophy also contributes uniquely to the understanding of other academic pursuits and fields of inquiry. Environmental Philosophy is one such discipline that studies the moral relationship of human beings too, and the value and moral status of, the environment and its fellow beings. It covers such a wide array of ideas such as, the connection of deep ecology, feminist environmental ethics, animism, and social ecology to politics; the attempt to apply traditional ethical theories, the preservation of biodiversity as an ethical goal; the broader concerns of some thinkers with wilderness, the built environment, and the politics of poverty; the ethics of sustainability and climate change, and some directions for possible future developments of the discipline.

For centuries, many visionaries have talked about One Earth, echoing Rabindranath Tagore's thoughts about global social conscience, reminiscing his words, "Everything comes to us that belongs to us if we create the capacity to receive it."[1] But the normal life in the world has brought us into such a condition where the future seems perilous. Today, everyone knows that things must change, and philosophical thought finds itself struggling to create within its domain something that emulates and advances the new spirit in all of us.

> Our worldviews and environmental attitudes are shaped by important historical developments. These developments include the rise of mechanism in the seventeenth century, the development of Enlightenment individualism in the seventeenth and eighteenth centuries, Darwinian evolutionary theory in the late 1800s and the advent of ecology as a distinct scientific discipline in the twentieth century and beyond.[2]

The list of critical historical development is illustrative pointing at the fact that human reflection on these past circumstances is intended to provoke more thoughtful consideration of the ways in which various social, political, economic, cultural, and scientific developments (in recent times through technological advancements) interact with our understanding of and outlook on the world and our place in it. It is also worth noting that human knowledge is within and a response to environments. Knowledge arises through human interaction with the environment; all knowledge is knowledge of parts of the environment in some respect. Humanity is part of a vast evolving universe. The forces of nature make existence a demanding and uncertain adventure. Fundamental changes are needed in our values, institutions, and ways of living. We must realize that when basic needs are fulfilled, we humans crave for more and never satisfied with what we have. We have the knowledge and technology to provide for all. Thus, a vast reorganization of

[1] Tagore, Rabindranath. Sadhana. London: Macmillan, 1913.
[2] Hourdequin, Marion. Environmental Ethics: From Theory to Practice. Bloomsbury Publishing. p. 11

society is called for—away from consumer materialism and toward a thrifty, deep ecology lifestyle, in which religious and ascetic lifestyles can be useful as a model. We should discipline ourselves to want less, not create more: true discipline. The condition of the fulfilment of our desires—which have been manipulated by those with narrowly economic values in the life of consumers—is a world in which desires can be fulfilled and objects of desire obtained. A dead world would end all desires. A life of virtue, not of desire is called for, an ethical life. We should revalue our lives in terms of a life worth living, whose measure is excellence—quality not quantity.

ENVIRONMENTAL ETHICS

Environmental ethics is not about stopping progress or immobilizing changes. It is about reflecting on what constitutes progress, the kinds of changes we should pursue, and how we should respond to the inevitable losses we produce through actions. Environmental ethics questions the status quo and subjects our actions to critical evaluation. It is a hopeful discipline as it is based on the conviction that we as humans can do better. As reflective, cognitive beings, we can learn from our successes and our failures. And as empathic, compassionate beings, we can consider the wellbeing of other fellow beings, other living beings and our planet as whole.

One of the hopeful strands of environmental ethics derives from the *Maha Upanishad,* an ancient Indian Traditional adage *Vasudeva Kutumbakam*, translated as "the world is one family," it embodies the idea of co-existence, interconnectedness of all beings, Although its practicality is questioned today, by stating such an idealist concept appears to promote values more than interest, it lacks the ability to develop common norms to address contentious issues ranging from climate change to obligations to future generation. However, it remains a decisive step in bringing everyone on to a single platform, from policy makers to educationist, from industrialists to world leaders, to evolve a philosophy of right living encouraging harmony, dignity, and accountability and has the capacity to improve the world through advancing sustainability, understanding the significance of coexistence and peace. By embracing this concept, we can work towards creating a better, more inclusive and harmonious world for all. This principle highlights the importance of embracing diversity and promoting peace, unity, and cooperation among all nations and cultures. In today's increasingly interconnected world, the message of *Vasudeva Kutumbakam* is more relevant than ever, as we face challenges such as poverty, inequality, and conflict. It is a powerful reminder that humans alone are not the only beings that morally matter, rather all beings remain as morally relevant today as it was in the past. Its true meaning encapsulates the essence of universal value of cooperation inspiring individuals and organisations to work towards creating a better, more harmonious world for all.

APPROACH TO ETHICAL THEORY

In the book *The Extended Phenotype*, Richard Dawkins, a sociobiologist uses the terms 'selfish' and 'altruism' in a technical way to present two fundamental lines of thought that participate in the development of 'biological' systems of ethics. First, it argues that humans need to be moral because they need to be able to work out how to balance conflicting interests in a flexible way. Second, if we are to make use of a sociobiological account of the origin of morality, we must build a theory which accounts for the genuine complexity of human moral choice.

Philosophical ethics consists of three main component areas of inquiry, Normative ethics, Meta-Ethics and Applied Ethics. Normative ethics, popularly known as normative theory, or moral theory, aims to find out which actions are right and wrong, or which character traits are good and bad. On the other hand, meta-ethics, is a study of the nature of ethics. A meta-ethical determines to study the meaning and objectivity of moral concepts of right and wrong, or good and bad. While, applied ethics as the name suggests, is the application of normative ethics to certain issues of practical concern such as abortion, euthanasia, cloning, animal rights, and criminal punishment, by specifically using the conceptual tools of meta-ethics. Normative ethics is prescriptive because we use either moral principle as standards of right action or virtues as standards of good character to determine which right action can be recognized eventually. The primary purpose that normative ethical theories serve is to articulate and advocate an ethical code, i.e., to provide justifiable and reliable principles to determine what is a moral and an immoral act. Normative theories seek to provide action-guides; procedures for answering the practical question "What ought I to do?"

The fundamental assumption in normative theory is that there is only one fundamental element of moral conduct, whether it is a single rule or a set of principles. There are four normative theories: 1) Utilitarianism with the principle of utility as the basic moral principle; 2) Deontological or duty-based ethics with categorical imperative as the fundamental moral principle; 3) Ethical intuitionism (in its methodological sense) with a plurality of moral principles; and 4) Virtue ethics with virtues as its focus. Each approach provides a unique way to understand ethics. An analogy to address one's personal wellbeing can be stated as: What is the best way to achieve a healthy life? One is through good nutrition, another is through exercise, and a third is through a spiritual discipline, and yet another stresses public health measures. Each is vital but inadequate by itself. It is bringing these—and other—approaches together that one can live to the fullest.

Similarly, in ethics, none of these approaches answers all the problems raised by social living. In most cases, all four approaches need to be considered to reach the best ethical decision. It is also to be noted that there are divisions and sub-divisions within each of the approaches. In tackling environmental problems, the challenge in the field of environmental ethics is pertaining to normative ethics, on one hand, moral pluralism demands the acceptance of more than one value

in determining whether an action is ethical or not. While on the other hand, there are some who are in favour of single value theory.

PRAGMATIC FOUNDATION IN ENVIRONMENTAL ETHICS

The main idea of pragmatism is that knowledge is related to human practice. Environmental pragmatism emerged in the 1990s as a distinctive approach to environmental ethics, emphasizing theoretical issues related to environmental problems such as species loss, climate change, and sustainability. Environmental pragmatism shares the classical pragmatist commitments to empirical inquiry, value pluralism, and democratic deliberation. It expands beyond ethical theory to apply epistemology and political theory to environmental decision-making. Environmental pragmatists engage with decision-makers and environmental practitioners, including land managers and farmers, to make philosophy relevant to addressing environmental problems. So, the issues related to environmental ethics, the environmental pragmatists accept multiple values. They thus take a position of moral pluralism. Moral pluralism is the view that acknowledges the existence of multiple values.

Eric Reitan in an article on Pragmatism, *Environmental World Views and Sustainability* states,

> "in order to create a sustainable human society embedded in a flourishing natural environment, we need to change how we think about our relationship with nature. A simple change in public policy is not enough. Modest social changes--such as increased use of public transportation or a growing commitment to recycling--are not enough. Nor is environmental education that stresses the dangers of current practices and the prudence of caring for the earth. Even appeals to moral duty--obligations to future generations and to the fellow creatures with whom we share the planet--are insufficient." (1998: 3)

More specifically, we need to change our view of nature and of our relationship with nature. Repeatedly, environmental thinkers persist on this point. Aldo Leopold, one of the prolific thinkers of the environmental movement, advocates the adoption of a "land ethic" which "changes the role of Homo sapiens from conqueror of the land-community to just plain member of it."(Leopold 1949) Deep ecologist such as Arne Naess advocate a process of deep questioning of our basic assumptions about nature and our relationship to nature, and they argue that unless we move away from "anthropocentric" conceptions of nature, and towards a more eco-centric view which accords value to all parts of the ecosphere, we will not want to do the things which need to be done to live sustainably in the natural world. (Naess 1988) Thomas Berry insists that "to be viable, the human community must move from its present anthropocentric norm to a geocentric norm of reality and value." (Berry 1987)

ETHICAL MONISM VERSUS ETHICAL PLURALISM

Since late Twentieth century, a recurring debate in contemporary environmental ethics has been taking place between Ethical Monists versus Ethical Pluralist.

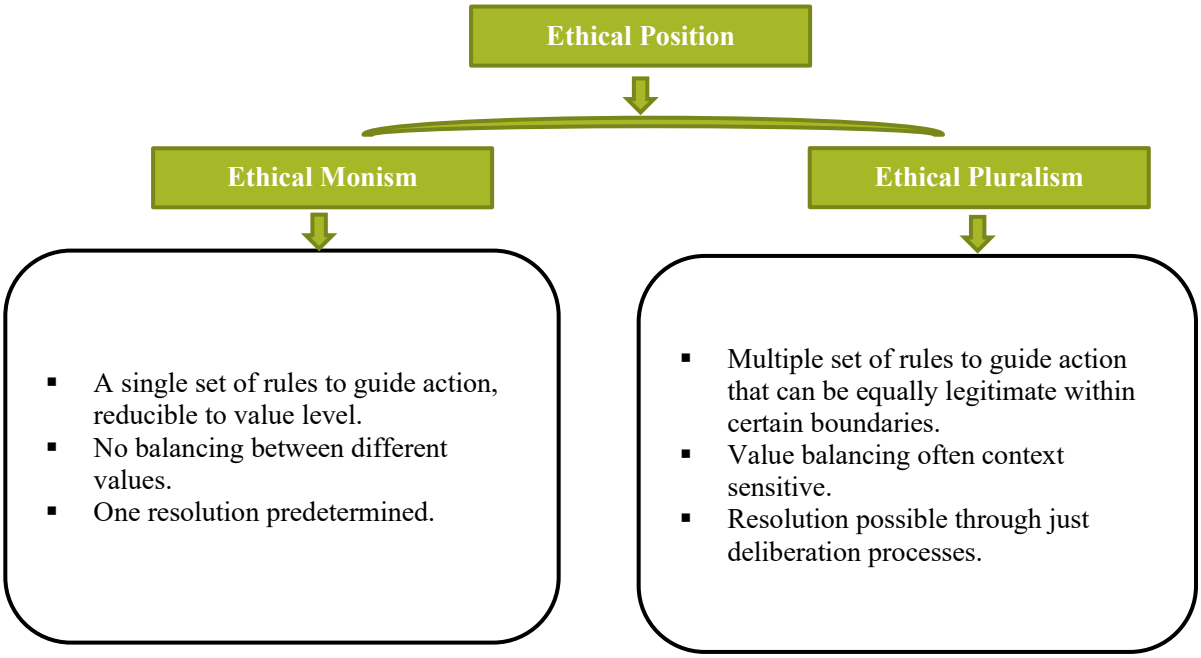

Fig. I Ethical positions held by Ethical Monist and Pluralist relative to values in environmental ethics.

Ethics as a discipline manifest a diversity of approaches to moral reasoning, represented by various theories regarding what makes an action right/good or wrong/bad when interacting with other humans and non-humans (Sandler, 2009). While conflicts between values and alternative actions might also emerge within unitary ethical views, the diversity of value propositions and competing moral principles will increase the likelihood of moral and value conflicts (Chapman et al., 2019; Ellis et al., 2019).[3] Some of these conflicts can be ethical dilemmas: situations where there are multiple conflicting demands or relevant moral values, none of which overrules the other, and none of the action options is good in all respects. For example, debates around wildlife trade regulations (e.g., banning or legalising trade in wildlife) might be driven by different and sometimes conflicting ethical positions, emerging from diverse contexts along supply chains. This may include a deontologist position opposing to e.g. wildlife farming because it violates a duty to treat animals in a certain way, while a consequentialist position may be

[3] Chapman, M., Satterfield, T., Chan, K.M.A., 2019. When value conflicts are barriers: can relational values help explain farmer participation in conservation incentive programs? Land Use Policy pp. 464–475.

supporting it with the argument that it will reduce harvesting on wild populations (Coals et al., 2019).[4] Notably, they both claim contributions to biodiversity conservation, but also violate some of the moral values or obligations important for the other position. These and other conflicts that emerge from conservation policies and actions can be conceived with a monistic, or a pluralist ethical view (Fig. 1).

Ethical monism regards that one moral theory is applicable everywhere and most appropriate for resolving what is morally right, including the resolving of conflicting claims by different actors (Fig. 1). Ethical monism can support both value monism and value pluralism. Ethical monism with value monism takes that all valuations are reducible to a single ultimate value, e.g. well-being, dignity, or utility (e.g. blanket restrictions to trade wildlife or increasing militarization to stop poaching of threatened species). Ethical monism can also acknowledge the existence of plural legitimate values or goods (Fig. 1), which could, however, potentially lead to ethical dilemmas according to the same principle/norm. While it is possible to consider only those positions monist that provide a clear ordering of principles so that dilemmas can always be resolved without a doubt, other approaches may consider that a monist position can also lead to unresolvable dilemmas. In the field of biodiversity, trying to identify a single moral theory is applicable everywhere, as in ethical monism, may lead to the debate on which ethical theory is the best one to resolve ethical dilemmas. (Cortes-Capano, et. al., 2022)[5] For example, act-based utilitarianism posits that morally relevant questions (e.g., biodiversity conservation related questions and conflicts) should be resolved by comparing the consequences of different alternative ways of action with a predetermined standard single or multiple value. A rights-based deontological approach, in turn, posits that all ethical questions should be addressed as questions of rights (or entitlements) and corresponding duties. Notably, there are ethical questions where different theories anyway lead to suggesting similar resolutions although for several reasons. In this sense, among the commonly suggested entitlements are those that create obligations of justice to secure the conditions of humans for a worthwhile human life. One might also propose that there are conservation related duties to non-human nature. These can include duties to sentient beings, living beings, or threatened species.

Ethical pluralism implies a different stance from ethical monism (Fig. 1). Contrary to ethical monism that aims at finding one ultimate high-level theory (often employing only one moral principle) for resolving normative questions, moral pluralism posits that diverse moral

[4] Coals, P., Burnham, D., Loveridge, A., Macdonald, D.W., 'T Sas-Rolfes, M., Williams, V.L., Vucetich, J.A., 2019. The ethics of human–animal relationships and public discourse: A case study of lions bred for their bones. Animals 9, 52.

[5] Cort´es-Capano, G., Toivonen, T., Soutullo, A., Fern´andez, A., Dimitriadis, C., Garibotto-Carton, G., Di Minin, E., 2020. Exploring landowners' perceptions, motivations and needs for voluntary conservation in a cultural landscape. People Nat. p. 2

theoretical approaches might be correct (Hinman, 2007; O'Neill et al., 2007).[6] This might give rise to diverging moral obligations and guidelines which can be equally legitimate and simultaneously theoretically defensible. Therefore, according to ethical pluralism, it is impossible to unify different theoretical approaches into a single theory or to point out 'the ultimate moral theory'. In the conservation context, moral pluralism recognises the existence of diverse legitimate ethical principles to guide conservation policies and actions in different contexts and administrative scales (from local to global). In the context of wildlife trade, for example, the identification of conservation actions aimed at reducing harvesting pressure on threatened species should consider the plurality of fundamental ethical principles and underlying values in the contexts of implementation. In this sense, trade bans may well work in certain contexts but fail in other where they clash with the fundamental ethical values or principles of local stakeholders (e.g., the autonomy of local people to make a living of their choice).

However, ethical pluralism does not mean moral relativism, where all normative stances are equally legitimate and true in the communities upholding them. Ethical pluralism recognises that conflicts should embrace intra- and inter-cultural criticism of practices, institutions, and traditions and calls for the definition of some criteria or sets of values that any justifiable ethical approach would accept. Therefore, moral theories and arguments are still exposed to critical evaluation, and insufficiently or inappropriately justified moral arguments are rejected (Hourdequin, 2015). In this sense, pluralism goes beyond recognising the empirical reality of difference (e.g., there might be multiple legitimate right ways to conserve biodiversity), to understanding that some differences will never come together and, therefore we should be open to differences while making connections across them through engagement.

CONCLUSION

In line with insights from environmental pragmatism (Katz and Light, 2013), embracing ethical pluralism to address the multi-faceted complexity of the biodiversity crisis provides opportunities to broaden the space for many practical solutions emerging from value and ethical diversity. As an example of the required approach, bioethics has established a set of mid-level principles grounded in shared values of human dignity and inherent worth. The proposed principles aim to be agreed across different ethical-theoretical standpoints and include: i) respect for autonomy (the value of self-direction regarding one's life and choices); ii) beneficence (the value of enhancing the welfare of others); iii) nonmaleficence (the value of avoiding imposing

[6] Hinman, L.M., 2007. Ethics: A Pluralistic Approach to Moral Theory. Hourdequin, M., 2015. Environmental Ethics: From Theory to Practice. Bloomsbury Publishing.
O'Neill, J., Holland, A., Light, A., 2007. Environmental values. In: Environmental Values. Routledge

harm on others); and iv) justice as treating equals equally (the value of according each person her due) (Beauchamp and Childress, 2019; Flynn, 2021).

From an ethico-political perspective, ethical pluralism can provide opportunities to identify aspects of agreements on the need for certain conservation actions despite disagreements at the ethical theoretical level. (e.g., about the intrinsic value of nature)

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ARANYAK: AN ECOCRITICAL ANALYSIS

Dr Kirti Y. Nakhare
Associate Professor in English, Department of Business Communication, S.I.W.S. College of Commerce and Economics, Mumbai.

Abstract: Bibhutibhushan Bandyopadhyay's novel titled *Aranyak* is a narrative written in the first person by the protagonist Satyacharan. Originally, a city dweller, Satyacharan is forced to take up a job as estate manager in Purnea district of Bihar, a place full of forests. His initial reluctance to live in forest, is replaced by an unknown attraction for it, which leaves him spell bound by its tranquil and peace. So much so, that he finds it difficult to stay for long in the city. A perfect companion to Satyacharan is Jugalprasad, who supports Satyacharan in planting many rare species of herbs and saplings. However, Satyacharan's job is to enable generation of revenue by reclaiming the forest land and earning money by distributing it amongst people. His job as estate manager entails disrupting the flora and fauna in the forest, albeit against his own wishes. Huge, gigantic trees, plants and herbs of rare species are eliminated in order to make way for human settlement. Guilt and sadness engulf Satyacharan; he is forced to give in to the larger machinery of capitalism of which he is a mere cog. An eco-critical analysis of the text will be undertaken and the concept of capitalocene will be discussed keeping in mind the capitalist forces that require elimination of forest lands in the name of development.

Keywords: *forest, subaltern, regenerative force, capitalocene, reclaiming, eco-criticism*

INTRODUCTION

> "So long as the earth is able to maintain mountains, forests and trees,
> Until then the human race and its progeny will be able to survive."
> *Durga Saptashati*, 'Devi Kavacham',54 (Krishna, Location 69 of 3642,1%)

Ideas expressed in the '*Durga Saptashati*', find resonance with eco critical thinkers who discern an interconnectedness between human culture and the physical world. This thought is pertinent to the context of the text *Aranyak*. 'Aranya' in general refers to forests, Nanditha Krishna suggests that the aranyas represented 'the feminine principle in prakriti' (Krishna, Location 422 of 3642,11%). The feminine principle of prakriti provides the backdrop to Bibhutibhushan Bandyopadhyay's novel, *Aranyak.*

Bibhutibhushan Bandyopadhyay (2017) paints a canvas of sharp contrasts, depicting the richness of the land that is blessed abundantly with natural beauty, against the dreary, poverty ridden lives of its inhabitants, enduring abuse at the hands of the sahukar, sarkar and zemindar trio. It is a place where, having 'rice' is considered luxury, which can be afforded by the zemindars, while the leftovers are a 'treat'. The entrenched caste system disallows the inclusion of the lower castes in the main stream. The landlords reign over the hapless, for whom the freely available forest produce comprises the staple diet.

The main protagonist Satyacharan, reminisces his six to seven-year-long sojourn at the Purnea district, in Bihar, where he is posted as manager to take care of ten to twelve thousand acres of land. Later, when Satyacharan is back to the humdrum of city life; the time spent at Lobtulia Boihar in Purnea district, and the places nearby seem unreal to Satyacharan. He fondly remembers the simple people, untainted by the pretence of civilized society, with whom he had come in contact during his seven-year long stint.

WRITING AS AN ACT OF REPENTANCE

The narrative is Satyacharan's act of penance, as he was a party in getting deals struck which involved cutting up the erstwhile forest land in pieces for sale. The serene forests were replaced with ugly settlements, which were unplanned and disgusting. Paying homage to the great and surviving forests of Mahalikharoop and the Mohunpura Reserve Forest, Satyacharan leaves with a heavy heart, full of repentance, expressing his feelings thus, "Please forgive my heinous acts if you ever could, Great Lords. Adieu!" (Bandyopadhyay, 348)

Satyacharan's act of repentance is fitting as, it is a crime to destroy forests. The *Rig Veda* 'very specifically expresses that forests should not be destroyed (VIII.1.13). According to the *Atharva Veda*: 'The earth is the keeper of creation, container of forests, trees and herbs' (XII.1.57-61); 'Plants and herbs destroy poisons (pollutants)' (VIII.7.10); and 'Plants possess the qualities of all duties and they are the saviours of humanity.' (VIII.7.4). (Qtd. in Krishna, location 476 of 3642.12%)

The necessity of maintaining the ecological balance is mentioned in the Vedas. A verse from the *Rig Veda* reveals, 'Thousands and hundreds of years if you want to enjoy the fruits and happiness of life, then take up systematic planting of trees.' 'These verses emphasize the importance of afforestation for survival, or else the ecological balance of the earth would be jeopardised.' (Qtd in Krishna, location 476 of 3642.12%)

RECLAIMING FOREST LAND, A LEAF OUT OF THE EPIC

Instances of having cleared spaces to reclaim land go back to the '*Mahabharata*', setting fire to the Khandava Vana to build a new capital Indraprastha for the Pandavas was an instance of man-made environmental havoc, resulting in migration of the remaining people led by Takshaka, out of the Khandava forest and the founding of the city Takshashila (modern Taxila). The conflict between forest dwellers who wish to retain their sylvan surroundings and politicians who want to acquire them for 'developmental projects', especially mining, continues even today in places like Jharkhand, Chattisgarh and Odisha. (Krishna, location 559 of 3642.15%)

'Urban settlements were created by burning down forests. Although Arjuna and Krishna revel in the destruction of the Khandava forest, the Pandavas treat the other forests that they visit during their years of exile with great respect.' (Krishna, location 559 of 3642.15%) Satyacharan's job is similar, although in a slightly different manner. Albeit, it leads to a similar outcome i.e. setting

up a hustling city, in place of sylvan environs. Harking back to the past, indigenous societies, the Australian aboriginal or the American Pueblos, had avoided environmental destruction. The single religious aim in the lives of the Australian Aborigines was to keep the land the way it was. This came in the way of progress, in this context, William Howarth's point of view, which throws light on the influence of Marxist theory on environmental history, where economics determines social history, thus capitalism becomes the source for all conflict, is pertinent.

Satyacharan is a cog in the wheel of capitalism, a 'capitalocene', so to say. He has to give into the capitalist forces. This is evident when he mentions to his friend Jugal Prasad that the zemindars have an obligation towards the government, when Jugal Prasad blames the Gangota tribes, inhabiting the Purnea district, for destroying everything. Jugal Prasad calls the Gangotas, uneducated nomads moving from one place to another, cutting down forests. This is when, Satyacharan stands by the Gangotas, and draws attention to the zemindars, who had to get them to clear lands. The zemindars too, had to do it as they had to pay revenue to the government, for which it was essential to make money from the land. It was a chain of events.

Land was viewed in terms of money and revenue that it generated. The concept of the capitalocene, is pertinent here. Bringing about changes in the landscape for material gain is the job of a capitalocene, who is driven by the hunger for accruing capital. Ellis sums it, succinctly, 'Capitalism not industrialization, caused Earth's transformation by producing massive social inequalities that supported 'audacious strategies of global conquest, endless commodification, and relentless rationalization'. (Ellis,136) Paradoxically, the initial reluctance and fear that Satyacharan harboured about the forest and the love and belongingness that came about it later, can be attributed to the awakening of environmental consciousness in Satyacharan. Satyacharan's organic growth from a distant and disinterested observer, to a hands-on eco-warrior, can be distinctly seen, as the narrative progresses.

THE BEGINNING

At the beginning, Satyacharan finds the shift to the interiors of the country difficult to adjust with, "The prospect of living a life of poverty in Calcutta seemed a far better option than earning money living in a forest. At least, I felt, I would be a part of civilization. And that meant I could live a sane life." (Bandyopadhyay,16) However, the treasurer of the estate, Goshtha Babu, had a different take on the situation, "The forest will beguile you. You shall prefer to steer clear from the humdrum of the city life. Wherever you are, you will want to come back to this sanctuary at the earliest opportunity. I am not joking Manager babu. It has happened with me. Last month I had to travel to Munger for a couple of days on account of a court summon. The day I reached I felt like counting hours before I could be back here again." (Bandyopadhyay, 17)

The initial dissonance in Satyacharan's mind can be surmised thus, "Let me resign while there is still time, for this attitude is nothing but the surest of all signs that the forest actually drives one

insane. I should be long back in Calcutta before something like this happens to me." (Bandyopadhyay,18)

As time passes by, the forest weaves its charm around Satyacharan, he compares the moon light falling on top of trees making the tree tops look surreal and silvery like the beautiful work of the Japanese painter Katsushika Hokusai. That along with the cool breeze flowing which helped Satycharan overcome his anger and anxiety at coping with the situation that he is in.

This takes one back to the Vedas, which speak of harmony that establishes a balance, 'The Vedas were composed in the Indus-Sarasvati region. In these texts, there is a fundamental sense of harmony with nature, which, in turn, nurtured a civilizational value. Forests were the primary source of life and inspiration, not a wilderness to be feared or conquered.' (Qtd in Krishna, location 439 of 3642.11%)

POVERTY, PROGRESS, CASTE DISCRIMINATION-A LAND OF CONTRASTS

As Satyacharan begins to find his ground at his new posting, he is introduced to poverty and its manifestations. The incidence of 'wanting' to possess an iron wok by Muneshwar Singh as a 'life mission', and a simple note written by Satyacharan enabling him to do so, speaks volumes about the penury that the people face. He is introduced to the fact that, people around him were simple and had simple dreams, which was not known to him so far.

The plight of the subaltern of whom Satyacharan was in a way in charge of, was hapless. Satyacharan's job was to take care of tens of thousands of acres of land, most of which was forested. A torrential river ran around it, which often changed its course disadvantaging people residing on the banks of the river to settle elsewhere. It took a whole ten years for the river to follow its original course and the land that was inhabited by people was now viewed as marshland. The original inhabitants came by to lay their claim on it. The zemindars were reluctant to part with it as they were initiating new contracts with new parties, that were ready to pay a higher rent for the fertile land. This left the rightful claimants high and dry, in spite of their tears and efforts before the officers. The zemindars hired goons to put these claimants in place. The price of land was raised so high that disposing it at those rates was a herculean task. (Bandyopadhyay, 26) The land was leased out to graze cattle, and the forest area of wild berries was leased out for cultivation and breeding of lac producing insects.

Satyacharan was enamoured by the forests with every passing day, so much so that he dreaded returning to the city. He expresses his anxiety thus, "With every passing day I became more and more beguiled with the woods. There was something about the green curtain that made everything look so fresh and peaceful. There was indeed something intoxicating about the setting sun painting the tops of the trees golden every evening before night set in. I cherished the silence and the peace that was in perfect harmony with my surroundings. I began to strongly believe that city life was not for me anymore…God forbid, I ever had to return." (Bandyopadhyay, 32)

The Gangota people occupied the estate majorly. They were mainly cultivators and cattle herders. Ganu Mahto, being one of them. Owned five buffaloes who had to be grazed, for whom, he was ready to live all alone. Not having bought anything from a shop, mainly because it is beyond his reach. Ganu Mahto ate local and locally grown fruits and vegetables, literally with a pinch of salt. He knew the forest like one would know one's kin.

The instance of receiving an envelope superscribed with Air Mail, in the forest of Bihar was an irony of sorts. These inconsequential events, that are taken for granted in the city, gained a great deal of relevance in the area where Satyacharan resided. Satyacharan was a benevolent individual, he did not discriminate against the Doshads, the lowest of all castes. He included them as part of their foundation day celebrations. Rather, he went out of his way to make them feel at home by inviting the Doshad women and their children separately, for a special treat in lieu of the foundation day celebration, as the food served to them had become soggy because of the rain water.

The people of Purnea district were simple, and adaptable. Crop failure in the southern region led to starvation and the people were in a terrible condition. People of the region had to resort to song and dance and travel from region to region to earn their living. Satyacharan's humane side is revealed once again, when in spite of the headman Muktinath Singh's requests, to not to pay more than what was asked for the performance, as that would raise their expectations and they would lose business in future. Satyacharan disregarded the headman's suggestion and pays the people handsomely with two rupees as opposed to the four annas asked by them and also hosts dinner for the entire troupe of eighteen men.

ECO WARRIORS AND DIE-HARD ENVIRONMENTALISTS

Satyacharan came across people like Raju Pandey who were not wanting to wound the land for personal benefit. Although, he asks for a piece of land for cultivation from Satyacharan, all that he does is reap grain from grass which he happily consumes. Even Maize is not sown for commercial benefit. Raju Pandey has three sons, two daughters and a widowed sister, yet he is resigned to destiny.

He expresses his thoughts that arise on cultivating the land, "…The good God created it with so much love and patience. So many beautiful flowers bloom here and so many animals, large or tiny, call it their home. The environment is so pure here that the Gods themselves live in the woods. Once you think of commercialising the forest, about the profit and loss, the ambience starts to turn venomous. The Gods do not like it. So, every time I try to strike a tree with my axe, they come and whisper such things in my ears that I drop my weapon and sit down to contemplate on it. My mind wanders away from everything that is materialistic and a serene feeling of spirituality flows instead." (Bandyopadhyay, 106)

Satyacharan drills some sense in Raju Pandey's head by asking him to buckle up and start earning for his family that is dependent on him. He also threatens him to terminate the lease prematurely, if he does not start working seriously on the patch of land.

The contrast between progress and stagnation is brought about by referring to technological advancements made by human beings with the Industrial Revolution on the one hand and the lives led by natives of Papua New Guinea, the aborigines of Australia and the tribals of our own country which was stark. They are still stuck at the point where the race for advancement had begun.

Besides Raju Pandey, Satyacharan comes in contact with a passionate lad, Dhaturia and is deeply moved by his desire to learn the Chhakkarbaji dance from the veteran Bhitaldas in Gaya. Nobody outside his family had approached Bhitaldas earlier. It was a family legacy that was kept alive through generations. Dhaturia was the only one to acquire the legacy with the intention of introducing it in Calcutta, which sadly does not take place, due to Dhaturia's premature demise.

Just like Raju Pandey, Satyacharan is introduced to an innate eco-warrior in Jugal Prasad, who was related to the Collector Banoarilal. Jugal Prasad secretly procures seeds of colourful creepers and plants them in the jungle of Lobtulia. "I have been doing this kind of work for a long time now, Sir. The jungle of Lobtulia was really colourless. Most of the flowering creepers that you can see now have been planted by me over the last decade. I feel glad when I see how they have multiplied, especially in the berry bushes." (Bandyopadhyay, 156)

It is Jugal Prasad's dream to convert the forest of Lobtulia Boihar, which is a magnificent place, bloom with colour. Jugal Prasad had identified a best piece of land near Saraswati Kundi. The quality of the forest and the waters of the lake could support the growth of lotuses. Satyacharan and Jugal Prasad join hands on the crusade of beautifying the area with lovely creepers. Satyacharan appoints the well-educated Jugal as clerk so that he would have a steady income to support his crusade. Both of them are against planting the Bougainvillea as they did not want anything even remotely urban to be associated with the pristine jungles.

Jugal Prasad and Raju Pandey were unknowingly staunch followers of principles expressed in the *Atharva Veda* (V.28.5) which reads as follows: 'The earth provides surface for vegetation which controls the heat build-up. Herbs and plants having union with sunrays provide a congenial atmosphere for life to survive.' (Qtd. In Krishna, location 485 of 3642.13%)

DOBRU PANNA THE SANTHAL WARRIOR, A UNIQUE ENVIRONMENTALIST

Dobru Panna the Santhal freedom fighter and the warrior king expressed, "Farming is demeaning for us," … "The main form of livelihood is hunting and that too with a spear. Hunting with bows and arrows is not the mark of a brave man, but putting an animal down with a spear is. My son recently purchased a gun from Munger. I have never even touched it. A true hunter hunts face to

face with his quarry with a spear in hand." (Bandyopadhyay, 216) Wounding the land was not what Dobru Panna believed in. He believed in upholding family values. Although, financially the king was drained and experienced namesake kingship. Traditions and festivals were celebrated with as much pomp and splendour possible. The Jhulan festival was celebrated by the tribal king and his kin. Dobru Panna proudly proclaimed, none of the girls of the family consumed mahua wine as part of the festivities. It would be appropriate to quote Krishna in this context, who mentions the grove, called *vana khandi*, maintained by the villages as places for religious observance, festivals and recreation. Recreation, such as singing or dancing or jhulan (swinging on a seat suspended from the branch of a tree). (Krishna, location 567 of 3642.15%)

WHEN THE FINAL AXE FALLS

Satyacharan's job was to cut up the forest land and sell it. He tried his best to delay the process, for which he was taken to task by his supervisors for not having expedited the process of land allotment. He was purposely delaying it as the tenant's axe would completely destroy the gorgeous woodland. Satyacharan didn't want the forests to become a replica of the unplanned cities of Patna or Purnea where there was only dirt, filth and unkempt city folks besides uncovered drains. Heaven would be replaced with hell, in the name of progress. Satyacharan feels such a large endless stretch of forest cover should have been considered as a national asset. And converted to a National Park with proper conservation of its flora and fauna.His love for the land and the forests is expressed thus, "I loved the forests from the bottom of my heart, yet I had to play a decisive role in its destruction. Within the next two years this pristine woodland would be converted to settlements, dirty and unplanned." (Bandyopadhyay, 272)

Accordingly, the lands of Nara Boihar and Lobutulia had been allocated to the claimants. The dense forests were now a thing of the past. Whatever Mother Nature had created over decades and nurtured over centuries had been wiped away with one stroke of the axe in a single day. Gone were the great stretches of woodlands, where the fairies danced on enigmatic moonlit nights, and where the king God Tnarboro reigned like a strong bulwark protecting his wild subjects.

Allotting the land surrounding Saraswati Kundi was delayed purposefully by Satyacharan. He expresses, "…in any other country such an area would have been conserved as a national asset. Examples galore: The Yosemite National Park of the US, The Kruger National Park of South Africa or the Park National Albert of Belgian-Congo, to name a few. Our Indian zemindars do not have the eyes to appreciate the landscape; all their brains are programmed to do is to calculate the profit and loss margins from the land revenue." (Bandyopadhyay, 295)

REACHING THE GOLDEN MEAN

To make best of the situation, Satyacharan and Jugal Prasad reach an agreement of planting new trees in the hills, the valleys of Mahalikharoop, which would remain the way they were. Jugal

Prasad identifies eight to ten species of flowering plants which thrive on hills and were not found on the plains. Jugal Prasad was committed to the 'green cause', "… Jugal Prasad did not participate in conversations that involved worldly matters like land, cattle and other material possessions. He did not like talking about them and hence didn't participate in such conversations." (Bandyopadhyay, 311)

Soon the stretch between Lobtulia and Nara Boihar was getting filled with permanent homes built by the settlers. However, the hills of Mahalikharoop and the hills inhabited by the Santhal warrior's clan Dhanjhari would remain green.

CONCLUDING WITH CONSERVATION IN MIND

Satyacharan rues the loss of forests and expresses, "Maybe there shall come a time, in our country, when people would not know what a forest meant as there would be none left. In its stead, there shall be a tremendous multiplication of farmlands, jute mills, cotton mills and chimneys emitting smoke. It is then that they shall come here to see what is left of this rare resource. They shall come here looking for peace like people visit sanatoriums and shrines to satiate their mind, body and soul. It is for the future generations, for sustainable development that these woodlands should remain untouched by the unappeasable greed of mankind." (Bandyopadhyay, 340)

In a short span of six to seven years the face of Lobtulia had changed. Settlements had replaced the forest that it was. The only ray of hope is by making the best of what is at our disposal. Just like Jugal Prasad, we need to turn green, the piece of land or valleys that are accessible. Integrating environmental consciousness, is the way forward. As Ellis aptly expresses, 'There is still a chance for each one of us to write a better future into the permanent rock records of Earth history.' (Ellis,160) As occupants of this planet, awareness of our duties towards its conservation by consciously bringing about change, can make a difference.

Also, acknowledging the contribution of 'sacred groves', by respecting their cultural and environmental significance would help in maintaining and perpetuating huge green patches of forests, filled with rare and precious species of flora and fauna. Consistency and consciousness are key as depicted by the author through characters like Jugal Prasad and Raju Pandey. Just as Satyacharan undergoes a transformation and falls in love with the forests, it is within reach for each of us to cultivate a small garden in our balconies, which would help in keeping our inner sanctum joyous and at the same time would send a reassuring green wave to abate the raging environmental crisis.

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ON READING AND WRITING CLIMATE: A FEW NOTES ON PARISMITA SINGH'S *THE HOTEL AT THE END OF THE WORLD*

Ms Nishtha Dev
Assistant Professor, Department of English, Sophia College for Women, Mumbai

Abstract: This paper proposes that the contemporary Graphic novel, being a multimodal text, can be potentially read as signifying a possibly posthumanist critique of the Anthropocene. Set on the theoretical foundation built by Dipesh Chakrabarty, the paper, and following the line of enquiry inaugurated by his works, the paper attempts to introspect the ways in which analysis of the contemporary Graphic novel in India is enabling us, at a discursive level, to view the limits of humanist articulations and representations of nature and climate. Does the Indian graphic novel lead us to contemplate the creative potential of language itself- can it move beyond the humanistic tradition within which it has been traditionally located to adequately express alternative subject-positions? This paper intends to engage with these epistemological and ideological questions, while resting its analysis on the Graphic novel *The Hotel at the End of the World* by Parismita Singh.

Keywords: *climate change, graphic novel, Anthropocene, posthuman*

INTRODUCTION

Dipesh Chakravarty, in the essay "Post-colonial Studies and the Challenge of Climate Change", inaugurates a possibility of an epistemological enquiry about the method of historiography. How do we write about spaces in the pasts and presents that escape or evade our perception and understanding? Referring to the work of Australian social and environmental historian Tom Griffith who wrote on the uninhabitable Antarctica, Chakravarty contemplates whether this may be attempted with human language and visual resources and records to "bring its ice within the grasp of human experience"(Chakrabarty, 2012). This idea of writing as a way of approximating and imagining reality does not only create an overlap between fiction and history, it also highlights language as a resource through which distant can be made proximal, and the unseen, visible. This paper, therefore, acknowledges language- both visual and verbal- as a resource through which the contemporary Graphic novel addresses, directly and indirectly, issues that are of contemporary social and cultural relevance and brings to the fore ideological and political issues that may go unheard and unseen.

Scholarship of the Graphic novel particularly in its Indian avatar too has highlighted the element of protest and socio-political critique as a feature integral to any understanding of the Indian Graphic novel (Nayar, 2016). However, this scholarship also reads protest largely within the humanist tradition of dissent, even while offering a reading of the Graphic novels which through their constitution seem to go beyond the humanist tradition in the utilization of visual expressive resources. This paper proposes that the contemporary Graphic novel, being a multimodal text,

also leads us to contemplate the creative potential of language itself- can it move beyond the humanistic tradition within which it has been traditionally located? (Skwarzyński, 2019) Can it adequately express alternative subject-positions? These questions have far-fetching implications on creative and ideological potential of new domains of inquiry like Climate Studies. In its critique of the Anthropocene, Climate Studies, seeks to position writing and reading as praxis outside and against the humanist tradition. (Chakrabarty, The Climate of History: Four Theses, 2009) How far can it distance itself from the humanist tradition and talk for "climate"? Is a divorce between these two positions possible? How far can writing bring climate "within the grasp of human experience", how far can it critique the Anthropocene?

This paper intends to engage with these epistemological and ideological questions, while resting its analysis on the Graphic novel *The Hotel at the End of the World* by Parismita Singh. It is a story of Pema and her tragic life, of the misadventures of Kona and Kuja, of the unreal experience of the little girl and a testimonial of the wisdom of the blind prophet. In addition to its human protagonists, it also narrativizes the natural- material context within which these characters are situated. (Singh, 2009)It is possible to view it as a tale of nature and that of nature framed as climate. In this context it intends to analyse the ways and possibilities of reading and writing climate. The paper proposes that it does so, firstly by critiquing the romantic and capitalist frameworks of understanding nature, and then suggests through visual and verbal metaphors, the alternative perspectives within which nature could be framed, and the ideological pathways such a move inaugurates. The most significant of these possibilities this paper explores are the potentialities of reading "nature as climate".

CRITIQUE OF THE ROMANTIC PERSPECTIVE OF NATURE

Scholars have suggested that the Romantic movement within literature and philosophy can be read as one of the most significant critiques of the Enlightenment idea of man and world. Holderlin, in "Preface" to *Hyperion*, writes,

> "We have fallen out with nature, and what was once (as we believe) One is now in conflict with itself, and mastery and servitude alternate on both sides. It often seems to us as if the world were everything and we nothing, but often too as if we were everything and the world nothing." (Holderin, 1794)

In expressing a sentiment ubiquitous within Romantic criticism, Holderin comments upon the duality between reason and sentiment that has been imposed upon man and by modern science, that has separated, or, even alienated man from nature. The reduction of nature to matter, devoid of holistic unity, self-organization and life depicted an increasing sense of man's alienation from his natural surroundings. Creating a polarised binary between man and nature, the Romantics, in their works, represented a moment of epistemological crises- how can one think about man and nature? To this end the romantics aspired to balance a strictly calculative, quantitative and

mathematical use of reason that is characteristic of modern science with a perspective "When no more numbers and figures feature/As the keys to unlock every creature". (Ofterdingen) Prescribing a more holistic method uniting practical reason with sensibility, feeling, imagination, they saw these diverse and contrary ideas uniting in a poetic, Romantic science. However, this discourse on the relationship between man and nature, in its radical critique of the enlightenment view of man and nature, largely remained within the humanistic intellectual tradition.

Parismita Singh's Graphic novel positions itself as a critique of the romantic position by inverting the hierarchy between man and nature implicit within the romantic critique of the Enlightenment. The graphic novel grants a certain autonomy to nature, especially while it frames it as 'climate'. The seasonal and climactic changes are represented as independent of humanistic intent or motivation. The Graphic novel, in many panels may be seen as representing Nature away from man. In the latter half of the novel, many panels have no human protagonist or even verbal text (Singh, 2009). Additionally, the panels that also represent nature and climate through verbal and visual signifiers attribute a primacy to climate as something that determines human activity, habitation and existence in a powerful manner. (Singh, 2009) Unlike the Romantics, nature is not deified as a symbolic entity, but as 'climate' grated an animated existence through which the human existence can be revisited. Parismita Singh's Graphic novel gives nature and climate an "agentive presence". (Chakrabarty, The Climate of History: Four Theses, 2009) It is no surprise that at the heart of Parismita Singh's novel lies the myth of the floating island that is viewed as much as myth and fiction. The individual and collective voyages of the characters of the novel are structured by this "enigma" at the heart of the graphic novel. (Barthes, 1975) This mythical floating island is attributed an individuality and unpredictability without subduing its animation to human logic and causality. Neither does the island get elevated to assume the position of a Romantic symbol, nor does it get subdued to human interests. Its elusiveness is crucial to its unpredictability and metaphorically ties it to the very idea of climate as a critique of the Anthropocene.

A CRITIQUE OF THE SCIENTIFIC AND CAPITALIST PERSPECTIVES OF NATURE

Contemporary scholarship suggests the predominance of the apocalyptic discourses in an anthropogenic understanding of human history with respect to climate change. (Chakrabarty, The Climate of History: Four Theses, 2009) It further suggests that such a discourse disrupts the humanist binary between human history and natural history. When man becomes a geological force along with a biological force, according to contemporary scholarship, it forces us to understand the relationship between man and nature in a new way. In a world governed by technologies that are having an impact on the life of the planet itself, Parismita Singh's Graphic novel sustains the distance between natural history and human history by giving nature and climate an authority to affect human life in way that cannot be possibly explained through a historical or even a scientific perspective.

Climate studies scholars have suggested that the critiques of climate change very often get contained and limited as critiques of a capitalist globalization. Such critiques, are also viewed as being restrictive as they are founded upon an acknowledgement of global history of capital as the predominate lens through which the species history of the planet could be studied. In this aspect they appear limited in their critique of the Anthropocene, as they fail to understand that the history of the planet precedes, the history of capitalism and globalization. (Chakrabarty, Climate and Capital: On Conjoined Histories, Autumn 2014) The setting of Singh's Graphic novel is crucial in this regard and is depicted through complex web of vague and open-ended signifiers where even national identities lose their significance. Nations, Like India and China, mentioned in the text lose their political and geographical significations as their situatedness and location are consistently shrouded in mystery. Kona and Kuja's voyages to China never end and they get lost midway. It is there that they hear the stories of the mysterious floating island, which is both seeped in a human history of wars and territorial disputes and is a part of deep planetary history whose true beginnings are largely still a matter of scholarly discussion. Singh's Graphic novel, thus, critiques the Anthropocene by representing nature and climate as ideas that have multiple origin stories, and varied intellectual trajectories that are impossible to predict. The, Graphic novel in this sense attempts to transcend the conflict between the global and planetary histories that the Anthropocene enables us to view as the predominant lenses through which human and climactic life can be understood.

The aforementioned enigma around which the subversion of the capitalist and the romantic perspectives on nature and climate respectively is best exemplified through the image that appears in the last few pages of the novel. The mysterious floating island is represented as a private subjective vision of a selected few characters. The frameworks through which the island can be looked at are purely subjective and its narrativized through the tropes of a classical mystery. For instance, it's only the blind prophet who has seen it, and the only other character who has seen it is a small girl who has remained rather silent for the entire text. This uncertainty about the floating island mirrors the uncertainty of climate as it is represented in the Graphic novel. It is also in direct contrast with the certainty through which technology, science and war are represented in the Graphic novel. Nature and climate are never deified or appear as reified categories. They are consistently positioned in opposition to the images, symbols and ideas that connote a certain stability and predictability. The unpredictability attributed to nature framed as climate, enables us to read its representation as subversive to the Anthropocene.

NATURE AND CLIMATE, NATURE AS CLIMATE

Pema's story in the graphic novel is central to the critique of the Anthropocene represented in the Graphic novel. Her father is depicted in the text as a quasi-messenger of death, who has the responsibility of taking lives and perhaps also of ferrying the dead. The trope of myth, therefore, predominates in the representation of Pema's younger years in the novel. Whenever the novel represents Pema's father's transformation into the agent of death, he becomes disembodied. At

multiple instances, he is described as physically asleep bodily, but existing out of his body performing the task of ferrying the dead that he was destined to do. Visually, at such instances in the Graphic novel, the 'human' figure of Pema's father metamorphoses into the shape of a cloud with the face of a human, or a bolt of lightning showing mere deformed glimpses of his face. (Singh, 2009) The 'human' character at such instances appears as a natural force or even a myth that determines human life in the most powerful ways. The representation of the figure of the father as an unpredictable torrential climactic condition is crucial because it symbolically gives an agency to nature that animates it as 'climate'. Simultaneously, locating this mythical existence as outside the domain of human control and understanding suggests a subversion of the Romantic hierarchy between man and nature.

This interaction between a climactic force and man is premised upon an idea of man and nature that transcends the humanist tradition of viewing them as either romantic or apocalyptic. The ontological categories of life and death are subverted in the Graphic novel when the dead-yet-alive human subject appears as natural force of death. Where do we then place this character? It, perhaps is almost posthuman in its positioning. It blurs the line between man and nature while it animates nature as climate.

As discussed before, Romantic criticism's framing of nature characterised it with a certain statis, undermined only through the verse of the Romantic poet which animated this statis with energy and movement. Parismita Singh's novel, by showing nature as animated and mutable transcends the Romantic conceptualisation of nature as statis, and presents nature constituted by life and agency which is beyond the scope of human understanding. It is however important to note that such an animation does not really lead to a deification of primitive fetishization, but provides, perhaps a new framework within which nature as climate could be located. Conceptually, then, the novel perhaps proposes the potentiality of reading nature and climate as contrasting categories and as not only overlapping ones. Such a reading also contributes to the critique of the Anthropocene as it places nature not only within the dynamics of human-centric approaches to reading and understanding nature. When framed as climate, nature is animated with a vigor through which its agency, without any human control, can be reclaimed.

CONCLUSION

The Graphic novel by Parismita Singh, through framing nature as climate, opens many possibilities of reading nature as a critique of the Anthropocene. By doing so, it also raises important aesthetic and political questions about the very methods through which a critique of both the humanist tradition, and the Anthropocene could be understood. Subverting the traditional, western, and Romantic epistemological frameworks of reading and writing climate, it also highlights the directions that new and multimodal genres like the Graphic novel signify. Perhaps then- to answer the questions with which this paper began- Climate could be written

and read in new ways, in ways that lead us to undermine human subjectivity and authorship as central to our understanding of literature and history.

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ALTERNATE CLIMATE CHANGE EPISTEMOLOGIES IN THE POETRY OF MAMANG DAI

Ms Samrita Sinha
Assistant Professor, Department of English, Sophia College for Women, Mumbai

Abstract: Climate change has currently become a buzz word of urban existence. All across the globe as planet earth is reeling under natural catastrophes, environmental activists and media foreground climate change as the reason with utmost alacrity. So significant has the implications of the word become that fiction writers like Amitav Ghosh have ethically undertaken to explore the issue in their non-literary works even as their literary works have a strong focus on this burning issue. In short, climate change is a humanitarian crisis plaguing our times. In this context, this paper argues that in most explorations of issues of climate change, what is often overlooked is the anthropocentric ethos of urban development. Writers like Mamang Dai and Temsula Ao who belong to indigenous tribes from Arunachal Pradesh and Nagaland and who live close to nature, have the advantage of their location from where they critically interrogate the Anthropocene. This paper will focus on select literary works written by the aforementioned writers from the 'Northeast' India to argue that the hermeneutics of climate change is rooted in colonialist developmental politics.

Keywords: *climate change, Anthropocene, anthropocentric, 'Northeast' India, humanitarian crisis*

Climate change has currently become a buzz word of urban existence. All across the globe as planet earth is reeling under natural catastrophes, environmental activists and media foreground climate change as the reason with utmost alacrity. So significant has the implications of the word become that fiction writers like Amitav Ghosh have ethically undertaken to explore the issue in their non-literary works even as their literary works have a strong focus on this burning issue (Ghosh 1-10). In short, climate change is a humanitarian crisis plaguing our times. In this context, this paper argues that in most explorations of issues of climate change, what is often overlooked is the anthropocentric ethos of urban development. Writers like Mamang Dai who belongs to indigenous tribes from Arunachal Pradesh and live close to nature, have the advantage of their location from where they critically interrogate the Anthropocene. This paper will focus on select literary works written by the aforementioned writer from the 'Northeast' India to argue that the contemporary lexicon of climate change is fueled by West-induced geopolitical optics.

Before exploring the ethos of what "climate change" entails in the context of the Northeastern borderlands of India, it is important to understand that debates surrounding climate change with its western imperatives is a discourse that has evolved in the Western consciousness. Certain Indian scholars like Ramachandra Guha are deeply suspicious of this West-induced morality of privilege surrounding eco-critical debates around concepts like "Deep Ecology". Guha argues that in the West with its sparse population and plenitude of resources, it is convenient for scholars to talk about ecological conservation which is a prerogative of the privileged (Guha 71-73). In the

Indian context however, indigenous communities are dependent on nature for their survival and sustenance and such communities often share a symbiotic harmony with nature. To then talk about climate change becomes a matter of geopolitical issue as well as human rights. In the West with their repository of resources often mined from extracting other underprivileged economies as the phenomenon of Petro-capitalism proves, the discursive ethos of climate change studies becomes another anthropocentric phenomenon whereby the interests of the Western world are preserved and global indigenous communities are hegemonically made to submit to their moral high-ground.

In the Indian context, as scholars of Adivasi studies and Tribal studies like G.N. Devy, Virginius Xaxa have pointed out, indigenous communities like the Adivasi communities and the tribal communities that of the hills of the Northeast states of India like Manipur, Nagaland, Mizoram, Arunachal Pradesh, Meghalaya and Sikkim who live close to nature are dependent on it for their sustenance and livelihood. Nature is also constitutive of their religious beliefs and as such constitutes their everyday ontology. In the context of this, lexicons of climate change are often generated in the context of the urban populace with respect to urban developmental policies, affecting this particular category of the demography. The focus is therefore on the discomfort to the urban populace and never on the repercussive corollaries of dislocation and displacement that the urban developmental machinery has on the tribal communities in the context of India. In the light of this, the objective of this paper is to read select poems of poets like Mamang Dai and Temsula Ao whose works represent the tribal community's affective relationality with nature that foregrounds a tribal ontology of climate anxieties not from a Western moralistic ethos but from an internal perspective of a community of people whose affective emplacement in nature adds a different dimension to the global discourse of climate studies, dismantling the Western optics that have so far shaped the discourse of climate studies as stated by scholar, Ramachandra Guha.

Mamang Dai's collection of poems, *River Poems,* is a poetic evocation of tribal legends, myths and ritualistic practices that are anchored in nature. Veiled in clouds, these hills of Arunachal Pradesh with an aura of timeless mystery screen ancient tribal ways of life from the gaze of the outside world. In Sanskrit Arunachal Pradesh means "land of the dawn-lit mountains" and once known as the North East Frontier Agency (NEFA), Arunachal Pradesh became a union territory in 1972 and acquired the status of a full-fledged state in 1987 (Mackenzie 2-10). It is the largest among the seven Northeastern States and boasts of twenty-six tribes. Mamang Dai is a celebrated author, poet and journalist from Arunachal Pradesh who writes in English. She has also written one novel, *Stupid Cupid* (2009), a collection of short stories, *The Legends of Pensam*, two children's books, *Once upon a Moontime* and *The Sky Queen*. Her works on non-fiction are *Arunachal Pradesh: The Hidden Land; Mountain Harvest. The Hidden Land* is an ethnographic documentation of the culture and customs of that part of Northeast India which is relatively unknown to most Indians. *River Poems* marks her out as the most intensely poetic voice from Northeast India. Dai was chosen for the prestigious Padma Shree award in recognition of her immense contributions in the

field of literature and education. The first female I.A.S officer from her tribe i.e. the Adi tribe, she left the service to pursue a literary career. Presently Mamang Dai is a member of the North East Writers Forum, an organization dedicated to the cause of promoting the literature from Northeast India. In the *River Poems,* Mamang Dai demystifies the hills of the Northeast India that had been colonially constructed as an abode of savage like people and warring tribes. During colonial times, colonially scripted ethnography had demonized tribal history and marginalized their myths and rituals as primitive and infantile. A replication of colonialist mechanisms of governance by the Indian nation further put the tribal history of the Northeast under erasure (Pachuau 6-10)

The very first poem "The Missing Link" introduces us to the majestic riparian world of the Siang which dominates the landscape of the valley in Arunachal Pradesh inhabited by the Adi tribe. The mystification of the river Siang flowing tirelessly through their land is symbolic of their lost history as it alludes to the colonization of their ecumene since the British times. Dai tells us that "The Siang river of Arunachal Pradesh was referred to as 'the missing link' by the Survey of India before it was established that the Siang is the connecting channel that links the Tsangpo river of Tibet with the river Brahmaputra of Assam" (Dai 26-30).

> There are no records.
> The river was the green and white vein of our lives
> Linking new terrain,
> in a lust for land brother and brother
> claiming the sunrise and the sunset,
> in a dispute settled by the rocks
> engraved in a vanished land.

"Vanished land" is an oblique reference to the colonial ethnographic mystification of Arunachal Pradesh. The geopolitics of the terrains of the Northeast of India, a land with a complex history of people has been constructed by colonialist narratives. Hence, the poem "The Missing Link" is a poem of resistance as it foregrounds that the mysterious course of the river Tsangpo of Tibet had always baffled British cartographers and surveyors who assumed that the Brahmaputra of Assam and the Tsangpo River were one and the same. It was generally believed that the Siang was the connecting channel between the two great rivers covering some 300 miles of unknown, unexplored territory in the land of the Adis. Every attempt of the British to conduct a survey of this river which originates from the plains of Assam had been thwarted by the serendipitous complex course of the river itself.

The river, mountains, the sun and the moon are the loci of affective emplacement for the tribal people. Nature is anthropomorphised in her poetry. The Adi tribe dwells in a mode of peaceful cohabitation with nature. As the depiction of nature in these poems tell us, the Adi community is emotionally anchored in nature that is not only material in sustaining the needs of the people

but also spiritual as it affectively sustains the tribal community. Mamang Dai talks about this union of man and nature which, this paper argues, advances an Indian lexicon of climate studies from the indigenous perspective of the Adi tribe's beliefs as opposed to the discursive lexicon of privileged Western academia that has shaped climate studies.

> The traditional belief of the Adi community to which I belong is full of this union. Everything has life…rocks, stones, trees, rivers, hills and all life is sacred. This is called Donyi-Polo, literally meaning Donyi-sun, and Polo-moon as the physical manifestation of a supreme deity, or what I like to interpret as "world spirit". Yes, in this way it is a set of values like ancient Indian philosophy or ancient Mayan/Aztec, Northern Europe, Egyptian, Chinese beliefs where similarities between ancient civilisations and the first glimmerings of man's quest for faith are tied together. We also have a rich oral tradition with narrative ballads of birth and creation of man and his surroundings that can last for many days, chanted by special priests. (Dai 2013)

Donyi-Poloism as practised by the Tani tribes is a monistic faith that believes in the sanctity of all life and is the universal spirit inhabiting the natural world. Donyi is Apollo, the sun god, whereas Polo is the lunar deity. Interestingly the tribes associate these cosmic elements with the physical manifestation of the Supreme Being. The tribes believe that the sun is an agent of feminine divine energy and the moon is symbolic of masculine power (Dai 2-10). These hills which are at the centre of the Adi community's ontology however have been the site of violence and tells us about the history of insurgency and state generated militarism. In the poem "Remembrance" Dai says,

> This summer it rains more than ever.
> The footfall of soldiers is drowned and scattered.
> In the hidden exchange of news, we hear
> that weapons are multiplying in the forest.

In these lines, Dai talks about the history of violence and conflict that have colonized their beautiful hills and mountains. Such warfare has been state generated since the institutionalization of AFSPA in the neighbouring states of Assam, Manipur and Nagaland. As border regions between India and China, these hills are perpetually geopolitically vulnerable to eruptions of violence as for the nation state, these hills and their complex geospatialities are looked at only as national borders that need to be securitized. The political corollary of this is continual army brutalities that the people of these regions are constantly subjected to (Goswami 56-70). It is such a sense of foreboding that Mamang Dai expresses in the above lines.

The poems of *River Poems* are steeped in the religious beliefs of the Adi tribe which further signifies how nature, land and topography are articles of deep spirituality. The material interest of capitalist and anthropocentric ethos of urban developmentalism that mines nature, land and topography for gains and self-interests of humans has entailed in climate degeneration. As

opposed to such an ethos, the tribal consciousness towards nature is one of deep affective bonds and spiritual connection where they are sustained by nature and also sustain nature themselves. The poem "Song of the Dancers" refers to the ritual 'ponung' dance of the Adis performed by young girls of the tribe for many days and nights during the festival of 'Solung'. The 'ponung' is performed in accompaniment of the chanting of the priests of the sacrosanct legends of birth and creation. The ritual of 'ponung' is a celebration of creation myths. Interestingly as opposed to the Hindu Brahmanical creation myths that anthropomorphize gods, Vishnu, Brahma and Shiva, the creations myths of the Adi tribe venerate nature as their creator and God. This core sensibility that is one of veneration is what opens up alternate spaces of contestation of the Anthropocene while paving newer ways to imagine climate conservation -

> We danced so long
> we broke all our bracelets to please a fancy.
> In the dark I heard all your stories, listened to your songs,
> in empty space dreaming desire
> vivid in the sun's embrace
> once, our eyes beheld vast lakes of fire.

In this poem, the tribal dance is not only representative of a ritualistic practice but also is an embodiment of pure joy and the yearnings of the soul brought about by oneness with nature. In these lines the sun's embrace and the vast lakes of fire refer to the imbrication of feminine desire with male power. In this particular poem Dai refers to the festival of 'Solung' which is about the spoken word. It revolves around the practice of 'Aabang' which is the art of storytelling performed by the priest (Miri) who creates an atmosphere of reverence by the power and magic of words. This continues for three days in the community long house (moshup) in the accompaniment of dancing by women. On the first night the pantheon of gods is invoked, and the evolution of animals and the birth of the mithun (yak like animal) and of the gods' brood is retold in order to perpetuate man's faith in the cosmic mysteries. On the second night, a long journey is undertaken in which the Miri leads the dancers through unknown villages and across rivers to the faraway lands of alien tribes to introduce their souls to the element of the unknown. The dancers must all remain awake and must not fall behind the rest of the group lest their soul is lost in these travels into the realm of the underworld (Dai 12-15)

Such rituals tell us the extent to which these tribes go in order to propitiate the animistic spirit residing in the hills and the rivers. Finally, when the green young shoots of paddy are coming up the last rites of 'Solung' are performed. This is a symbolic ritual involving only women as a mark of gratitude to the goddess of agricultural bounty. It is more akin to the universal harvest festivals practiced all over India. Offerings of rice paste, wine and the blood of a sacrificed animal are made, and the goddess of grain 'Kine Nane' is invoked and supplicated for her bounty to humankind. All these legends abound in the union of the male and female, signifying a perfect cosmic balance. Dai's poetry celebrates the very fecundity of the female, be it the fertility of the

lush green hills or the women of her land. The mysteries associated with the legends of creation are once again represented in the poem "Birthplace".

> We are the children of the rain of the cloud woman,…..
> The first drop of water gave birth to man.
> From red sheath to green stem
> and the spreading wind.
>
> We descend
> from solitude and miracles.

In her book, *Arunachal Pradesh: The Hidden Land* (2009), Mamang Dai has recorded in greater detail the tribal beliefs about creation. These beliefs also inform the poems in the collection, *River Poems.* These poems can be read as embodiment of a spirit of resistance against climate degeneration at the centre of global humanitarian crises. The eco-humanistic spirit embodied in the Adi tribe's sensibility itself is a site of resistance and politics. The emphasis is on the non-Brahmanical paradigm of religious outlook that is also non-anthropocentric in spirit as the following lines from *Arunachal Pradesh:The Hidden Land* further tell us

> "At first there was no earth nor sky, but only cloud and mist. From it a woman called Khupning-Knam was born in the form of a cloud. In time she gave birth to a girl and a boy who had the appearance of snow. When they grew up they married and from them were born a girl called Inga (earth) and a son called Mu (sky). Inga was mud, and Mu, a cloud. Together they had a boy called Imbung, the wind. When he was born he blew so strongly that he raised the cloud, his father, into the sky and dried up his mother, the mud. In this way heaven and earth were made." (Dai 25-31)

The Arunachalees believe that creation ensued from the union of the earth and the sky. In conclusion, this essay postulates that indigenous literary works as written by poets and writers from the various tribal communities of the Northeastern borderlands of India, open up multiple possibilities of imagining ways of climate conservation. They epistemologically contribute to the debates around climate change issues which have become global humanitarian crises. In the context of this, it is imperative to unearth the wealth of ontological epistemes that such works carry. This paper concludes by asserting that works such as Mamang Dai's *River Poems* foreground newer debates around climate crisis by advancing Indian optics of thinking about such issues delinking them from the hegemonic modalities of Western epistemology.

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READING *THE LIVING MOUNTAINS: A FABLE OF OUR TIMES* THROUGH AN ECOCRITICAL PERSPECTIVE

Ms Aqsa Khan[a] and Dr Sangita Kongre[b]
a.*Assistant Professor, Department of Financial Markets, M D College, Parel, Mumbai*
b.Associate Professor, Department of English, M D College, Parel, Mumbai

Abstract: Ecocriticism aims to study the literature and environment from an interdisciplinary point of view to analyze the environment and brainstorm possible solutions for the correction of the contemporary environmental situation with the hope that we can take action against modern environmental phenomena such as climate change and the destruction of natural habitats. It is the study of representations of nature in literary works and of the relationship between literature and the environment. Since the very beginning of existence, man and the environment have co-existed and have always been interdependent, whereas humans have always been far more dependent on nature than vice versa. This paper aims to read The Living Mountain: A Fable of our Times a parable by Amitav Ghosh and study the relationship between humans and the environment, our over-dependency on nature, and our insatiable thirst for exploiting the environment. This parable is a prophylactic tale mixing magic and reality, forcing us to rethink our relationship with nature as the clock ticks down.

Keywords: *Ecocriticism, environment, Amitav Ghosh, Mountains*

The term 'ecocriticism' was coined in 1978 by William Rueckert in his essay "Literature and Ecology: An Experiment in Ecocriticism" The term Ecocriticism is an amalgamation of the words 'Ecology' and 'Criticism'. Ecology is defined as "the branch of biology that deals with the relations of organisms to one another and their physical surroundings." It can also be defined as "the study of the relationships between living organisms, including humans, and their physical environment." On the other hand, Criticism in the study of literature is the comparison, analysis, interpretation, and/or evaluation of works of literature. Thus, Ecocriticism interprets and elucidates the interconnection between Humans and the Environment in works of Literature.

In an era defined by escalating environmental challenges and growing awareness of humanity's impact on the planet, literature has emerged as a potent medium for exploring the complex relationship between humans and the natural world. Ecocriticism, an interdisciplinary approach, provides a valuable lens through which to analyze literary and cultural texts, delving into their ecological themes, the representation of nature, and the ethical implications of human-nature interactions. In this research paper, we embark on an ecocritical journey into the enchanting world of 'Living Mountains – A Fable of Our Times,' a compelling work of fiction that invites readers to reevaluate their connection with nature.

Living Mountains: A Fable of Our Times is a mesmerizing fable crafted by an anonymous author, where allegory and vivid storytelling intertwine to offer profound insights into our

contemporary ecological predicament. As we immerse ourselves in this fable's narrative, we will explore the myriad ways in which it evokes ecological consciousness and sheds light on humanity's responsibility towards the environment. By employing an ecocritical perspective, we seek to analyze the fable's portrayal of nature, its ecological ethics, and the potential eco-spiritual dimensions embedded within its textual fabric.

HISTORY OF ECOCRITICISM

Ecocriticism was officially heralded by the publication of two seminal works, both published in the mid-1990s: The Ecocriticism Reader, edited by Cheryll Glotfelty and Harold Fromm, and The Environmental Imagination, by Lawrence Buell. Emerging in the 1980s on the shoulders of the environmental movement that has begun in the 1960s with the publication of Rachel Carson's Silent Spring, ecocriticism has been and continues to be an "earth-centered approach" (Glotfelty xviii) the complex intersections between environment and culture, believing that "human culture is connected to the physical world, affecting it and affected by it" (Glotfelty xix). Ecocriticism is interdisciplinary, calling for collaboration between natural scientists, writers, literary critics, anthropologists, historians, and more. Ecocriticism asks us to examine ourselves and the world around us, critiquing the way that we represent, interact with, and construct the environment, both "natural" and manmade. (Pardue Online Writing lab, n.d.)

We may also observe even less "literary" works, like Thomas Jefferson's Notes on the State of Virginia (1785) to get a sense of the value colonial America prescribed to the natural environment surrounding them. "The Natural bridge," writes Jefferson, "the most sublime of Nature's works, though not comprehended under the present head, must not be pretermitted." The keyword used by Jefferson is sublime. It speaks to how people (writers, artists, wanderers) saw the beauty of nature — of the landscape — as something so powerful and inspiring that it could uplift them. Then, emerging in the 1820s and 1830s — influenced by the British Romantics like Wordsworth and Coleridge, who leaned on nature in their writing — American transcendentalists (like Thoreau) wrote intimately through and about nature and how it could influence society's spiritual and intellectual growth.

Even though 'Nature' or 'Environment' as a theme has always been a part of literature, where authors and poets appreciated nature ignoring the exploitation and harm inflicted, this new outlook on Environment has revolutionized our perspective towards the environment, making it more realistic, practical and pragmatic in its approach. Thus, this form of criticism has been relatively successful keeping itself away from the moral and philosophical disputes compared to the other forms of criticism. The work and efforts of Glotfelty played a significant role in convincing other scholars for using this term to refer to the line of studies known as 'Green Studies' previously. Due to her efforts, this field of criticism gained recognition and popularity as a theory. Therefore, scholars acknowledge her as a major contributor to the emergence of this name as a theory with a broad scope. (A Simple Guide to Ecocriticism, n.d.)

Several scholars have divided Ecocriticism into two waves (Buell)(Glotfelty), recognizing the first as taking place throughout the eighties and nineties. The first wave is characterized by its emphasis on nature writing as an object of study and as a meaningful practice (Buell). Central to this wave and the majority of Ecocritics still today is the environmental crisis of our age, seeing it as the duty of both the humanities and the natural sciences to raise awareness and invent solutions for a problem that is both cultural and physical.

The second wave is particularly modern in its breaking down of some of the long-standing distinctions between the human and the non-human, questioning these very concepts (Garrard 5). The boundaries between the human and the non-human, nature and non-nature are discussed as constructions, and ecocritics challenge these constructions, asking (among other things) how they frame the environmental crisis and its solution. While the exact features attributed to each wave may be disputed, it is clear that Ecocriticism continues to evolve and has undergone several shifts in attitude and direction since its conception. (Pardue Online Writing lab, n.d.)

Ecocriticism, a relatively recent field of literary criticism, has rapidly gained prominence due to its ability to engage with environmental concerns through the lens of literature. As we embark on this ecocritical exploration of 'Living Mountains,' we recognize that ecocriticism is not merely limited to assessing how nature is depicted within the text; it extends to exploring the ethical and moral dimensions that guide human interactions with the natural world. Our analysis will be grounded in the conviction that literature can inspire environmental awareness and catalyst transformative shifts in human attitudes towards nature.

The primary aim of this research is to unravel the ecological intricacies woven into the fabric of "Living Mountains," employing Ecocriticism as a methodological approach. By scrutinizing the narrative through an ecocritical lens, we seek to unveil the underlying environmental themes, ethical considerations, and portrayals of human-nature relationships within the fable. The paper intends to dissect the initial harmony between the valley inhabitants and the Living Mountain, examining how this balance is challenged with the arrival of the Anthropoi. Through a nuanced analysis, the research aims to shed light on the fable's reflections on contemporary ecological dilemmas and the potential lessons it imparts regarding humanity's responsibility towards the environment.

THE LIVING MOUNTAINS: A FABLE OUR TIMES BY AMITAV GHOSH

The Living Mountains is a short parable that begins with a virtual interaction between an unnamed narrator and his friend called Maansi where they are fixing up their year's reading list which is 'Anthropocene' Maansi confesses to reading about the word, where she encounters stories that give her nightmares. Thus, the story begins where she pens her nightmares which begin in the valley of the Himalayas.

The story begins when Maansi (who is now a narrator) finds herself as a young girl growing up in a valley overlooking the majestic snow-clad mountains called 'The Mahaparbat – The Great Mountain'. Despite the differences that people had amongst themselves, they shared a certain reverence for the Mountain, where the people of the valley believed that the mountain was alive and protected and looked after them and worshipped the mountain by singing and dancing for it but "always from a distance". (Ghosh, 2022) These skilled dancers of the valley were known as the Adepts. The people of the valley shared a certain paganist reverence for the Mahaparbat and believed that mountains gave them all kinds of gifts such as Honey, Mushrooms, delicious fruits, etc which Eldermen and Elderwoman of the village traded with the people outside for essentials. The people of the valley guarded their coveted gifts at the mountain pass which was defended by a great portcullis.

The peace and tranquillity of the valley disappear as soon as it is invaded by the Anthropoi, who decide "to conquer the Great Mountain" (Ghosh, 2022) Even though the people of the valley put up a great fight, they were overpowered, conquered and subjugated. Some of them, the narrator says, were "reduced to quiescence" (Ghosh, 2022) with drugs. With this begins the ascend of the Anthropoi to the Great Mountain and the downfall of the people of the valley. Among the Anthropoi were ferocious soldiers called the Kraani who ill-treated the Varvaroi (people of the valley) and hence were feared by them. The initial fear and domination of the Varvaroi were very soon replaced by astonishment and amazement when they found ascending the mountain is more exciting than protecting it. Soon reverence shared by the Varvaroi "slowly shifted from the Mountains and attached itself instead to the spectacle of the climb" (Ghosh, 2022), and their hearts "burned with the desire to ascend those slopes" (Ghosh, 2022) themselves. This continues as the Varvaroi begin their ascent of the Mahaparbat and all the difficulties they encounter as they climb and soon begin to realize that they are all advancing towards their doom.

THE WRATH OF THE MOUNTAINS - AN ECOCRITICAL PERSPECTIVE.

At the beginning of the story, the reverence that the people of the valley shared for The Great Mountain speaks volumes about their relationship with the nature and environment around them. Not only do they appreciate the Great Mountain but also love it and share an immense amount of respect for it. "We loved to listen to stories about our Great Mountain and our amazing trees; we loved to sing our songs; and we loved, most of all, to dance." (Ghosh, 2022) but along with it also came fear where the people were afraid to set a foot on the mountain and worshipped it "always from a distance" (Ghosh, 2022)

At the beginning of the story, the author, Ghosh, vividly portrays the deep reverence that the people of the valley have for The Great Mountain. Their relationship with nature and the environment is characterized by a profound sense of admiration and respect. The people not only appreciate the magnificence of the Great Mountain but also have a genuine love for it. This love

is expressed through various means, including storytelling, singing songs, and dancing in celebration of the natural wonders surrounding them.

The act of listening to stories about the Great Mountain and the amazing trees indicates that the people have a strong cultural connection to the land. Through storytelling, they pass down their ecological knowledge, wisdom, and experiences from one generation to another, reinforcing their bond with nature. These stories might include mythologies, histories, and ecological lessons, further deepening their understanding and reverence for the natural world.

Moreover, the singing of songs and the joy of dance demonstrate an emotional connection with the environment. Music and dance are often integral parts of human rituals, and in this context, they become forms of worship and celebration of the natural world. Through these artistic expressions, the people express their gratitude and joy for the abundance and beauty of their surroundings. However, the passage also alludes to a sense of fear and awe that the people hold for The Great Mountain. Despite their love and respect, there is an inherent awareness of the mountain's power and grandeur, which can be overwhelming and even intimidating. This fear is manifested in the caution they exercise when approaching the mountain. The act of worshipping it "always from a distance" suggests that they understand the importance of maintaining a certain level of distance and humility in their interactions with nature.

This combination of love, respect, and fear in their relationship with The Great Mountain reflects a deep ecological awareness. It showcases an understanding of the mountain's majesty, the interconnectedness of their lives with the natural world, and the need to approach it with a sense of reverence and caution. By appreciating and preserving this delicate balance between admiration and caution, the people in the valley demonstrate their recognition of the intrinsic value of nature and their place within the larger ecological web.

As the story progresses, it is interesting to see how the dynamics of this relationship with nature evolve and how the characters' interactions with The Great Mountain shape the narrative's broader ecological themes. Analyzing these aspects from an ecocritical perspective will offer deeper insights into the fable's portrayal of human-nature relationships and its exploration of ecological values and ethics.

Apart from this, the people of the valley firmly believed in protecting it from strangers. "Even though we Valley People fought over many things, we were all in agreement on one matter: strangers would never be allowed to enter our Valley." (Ghosh, 2022) thus the gates of the valley were guarded and defended by a great portcullis. The fable depicts people's unwavering commitment to protecting their valleys and mountain from outsiders. Their sense of belonging and attachment to the land is so strong that they unite in agreement to keep strangers away. The guarded gates and the great portcullis serve as physical representations of their determination to preserve the sanctity of their home and maintain the delicate balance of their ecosystem. This

exclusivity signifies their deep-rooted understanding of the fragility of their environment and the desire to shield it from potential harm caused by external influences.

The people of the Valley also held their precious mountain in very high regard "The most important thing in our Valley,' the Elderpeople told him, "It's something that cannot be traded our living mountain, Mahaparbat.'" (Ghosh, 2022) The people of the valley hold Mahaparbat in the highest regard, considering it the most important aspect of their lives. The phrase "living mountain" suggests an appreciation for the animistic qualities of the natural world, where the mountain is seen as a living being with its consciousness and volition. This appreciation of the mountain's inherent significance emphasizes a spiritual bond between people and nature in addition to its material value. The people's opposition to commodifying nature and using it as a mere resource for profit is best demonstrated by their reluctance to trade or exchange their living mountains.

There is a lovely reciprocity in the relationship that exists between the people and the mountain. The mountain rewards the inhabitants with magnificent gifts in exchange for their care and adoration of the mountain. This mutually beneficial relationship encourages a strong sense of thanks and contentment among the populace. The natural riches and bounties the valley receives, which maintain and nourish their life, could be represented by the presents from the mountain. Because of their sense of thankfulness, people are more inclined to take care of their surroundings and assure their continued plenty.

The story depicts a culture that has passed down and retained its ecological knowledge and wisdom over the years. The Elders' role in transmitting the legends and lessons about the living mountain shows how ecological knowledge has persisted across cultures. This understanding ensures that people can continue to coexist in harmony with nature and maintains the people's peaceful relationship with the environment. And in return, the mountain blessed them with gifts so exquisite that it only made the people prouder and content. They also shared a belief that the Great Mountain was alive and it also communicates with them through their Adepts. "'What is happening? What is our Mahaparbat telling us?' The Adepts put their ears, and their feet, to the ground and listened as they had never listened before." Thus, we observe a remarkable bond that people share with their beloved mountain.

When the Anthropoi first arrive in the valley, the locals are filled with dread and hatred for these strangers. The environment of the valley is currently in a state of established balance, but the Anthropoi represent a novel presence. The residents of the valley, who have strong ties to their environment and culture, view outsiders with distrust and are cautious of the hazards they can offer. Given that strangers can introduce unanticipated changes and challenges to their way of life, this initial reaction illustrates the protective emotion that the valley people have for their home and the living mountain.

The exhilaration and euphoria of the climb overpowered the sense of duty and respect that people had not just toward the mountain but also towards their friends and family. Their climb on the Mahaparbat resulted in a series of deadly avalanches and landslides which killed many of their friends and family in the valley. "We put our dead kin out of our minds - they were poor anyway, and there were so many of them that a few would not be missed." This statement conveys emotional detachment from their kin. The thirst for materialism taking over their conscience overpowering their sense of belonging towards their fellow kin, holds up a mirror to our contemporary society.

The climbers keep moving forward enthusiastically until they realize they could go no farther, and moving ahead would mean losing everything that they have acquired. There was a moment where everyone including the Anthropoi and Varvaroi were equally baffled about what step do they have to take up next. That's when they turn back to the Mountain recollecting that The Mountain had been very much alive and playing an important role in the turn of the events. Hence, they decide to request the Mahaparbat and ask for directions, only to realize that they have now forgotten their old ways and culture. Everyone including the people of the valley confessed that they no longer remembered the songs or the dances that they would sing to the mountain. "But, to our dismay, we found that we had forgotten the old stories and songs and dances. We too had come to believe that they were foolish and fantastical and had no place in the Age of the Anthropoi."

After much searching, they found an old woman who was an Adept and she starts dancing and the mountain starts reverberating as if communicating with the climbers. The novel ends with the mountain expressing its anger and wrath through the adept. This parable is the perfect representation of Human's relationship with nature, where initially nature is revered and respected, until greed and thirst for materialism take over and systematic exploitation begins when finally, reality hits and people begin recognizing their folly only to realize that's it too late and they must experience the wrath of nature, tearing them down.

EXPLORING THE ETHICAL STANCES OF CHARACTERS AND THE NARRATIVE

Living Mountains: A Fable of Our Times unfolds against the backdrop of a valley community deeply entwined with its natural surroundings. The ethical stances of characters emerge as critical elements that shape the narrative's discourse on the environment. At the outset, the valley people exhibit a profound sense of eco-ethics, portraying a harmonious relationship with the living mountain. Their reverence, protection of the valley from outsiders, and commitment to maintaining a delicate balance suggest a collective ethic that prioritizes the well-being of the natural world. However, with the arrival of the Anthropoi, an ethical shift occurs. The characters' responses to the strangers and their aspirations to climb the living mountain introduce a complex interplay of values, challenging the established eco-ethics of the valley community.

The initial portrayal of the valley people emphasizes a sense of responsibility and stewardship towards the environment. This sets the stage for a moral lesson about humanity's role as caretakers of the natural world. The consequences of neglecting this responsibility, as potentially seen with the Anthropoi's arrival, may serve as a cautionary tale.

As characters become enamored with the prospect of ascending the living mountain for material gain, the narrative imparts a moral lesson about the pitfalls of unchecked greed. The shift from a harmonious coexistence to a desire for external wealth highlights the dangers of prioritizing material interests over ecological ethics. The narrative unfolds in a way that disrupts the initial harmony between the valley people and the living mountain, it may convey a moral lesson about the consequences of human disconnection from the natural world. This theme aligns with broader environmental discourse that emphasizes the perils of severing the ties that bind us to nature.

The fable might underscore the moral lesson of interconnectedness, emphasizing that human well-being is inseparable from the health of the natural world. Actions that disrupt this interconnected balance could lead to adverse consequences, serving as a reminder of the interdependence of all living things. The Elder people also play a significant role in passing down ecological knowledge, the narrative emphasizes the moral lesson of valuing and preserving cultural wisdom. This could underscore the idea that sustaining a harmonious relationship with the environment requires an intergenerational continuity of ecological understanding.

ASSESSMENT OF CONTEMPORARY ENVIRONMENTAL ISSUES

Living Mountains: A Fable of Our Times provides a lens through which we can assess its engagement with contemporary environmental issues. While the fable may not explicitly mention issues like climate change, deforestation, or pollution, it likely embeds broader ecological themes that resonate with the challenges facing our modern world.

The fable may draw analogies or metaphors that mirror the dynamics of climate change. For instance, shifts in the valley's ecological balance with the arrival of the Anthropoi could symbolize disruptions analogous to the impacts of climate change on ecosystems. The fable incorporates elements of deforestation, these might be symbolic or literal. The consequences of altering the natural landscape, such as the ascent of the living mountain, could be indicative of the broader issues surrounding deforestation and habitat loss. Pollution, even if not explicitly mentioned, could be symbolized through changes in the valley's environment. The degradation of the pristine ecosystem might serve as a metaphor for the broader consequences of pollution on natural habitats.

POTENTIAL SOLUTIONS

While the fable may not explicitly propose solutions, it could implicitly guide readers toward reflections on responsible environmental stewardship. The emphasis on the elder people passing down cultural and ecological knowledge could suggest that the preservation of cultural wisdom is a means of addressing environmental challenges. This implies that maintaining a connection to cultural and ecological heritage is essential for sustainable living. The fable might suggest that solutions lie in reconnecting with nature. Through characters' experiences or realizations, the narrative underscores the importance of fostering a harmonious relationship with the environment, avoiding exploitative practices. The consequences faced by the valley community might underscore the narrative's message about the collective responsibility of communities in addressing environmental issues. This could encourage readers to consider the broader implications of individual and collective actions on the environment.

In conclusion, "Living Mountains" likely addresses contemporary environmental issues by weaving them into its narrative fabric. The fable's exploration of causes and consequences, even if metaphorical, invites readers to reflect on the parallels with real-world environmental challenges. The potential solutions embedded in the narrative emphasize the importance of cultural preservation, reconnecting with nature, and recognizing the collective responsibility of communities in fostering sustainable relationships with the environment.

EXAMINATION OF CHARACTER INTERACTIONS WITH NATURE

Living Mountains: A Fable of Our Times portrays a spectrum of human-nature interactions, revealing the characters' attitudes, behaviors, and relationships with their natural surroundings. The initial portrayal of the valley people suggests a harmonious coexistence with nature. The characters engage in activities that reflect a deep connection and respect for the environment. This could include rituals, dances, or storytelling that celebrate the living mountain and the surrounding ecosystem. The characters might be depicted as living in symbiosis with nature, deriving sustenance and cultural richness from their surroundings.

With the arrival of the Anthropoi, there are instances of exploitation and dominance over the natural world. The newcomers express a desire to ascend the living mountain, reflecting a mindset that views nature as a resource to be conquered or exploited for personal gain. This shift in attitude could be mirrored in the characters' actions, such as deforestation, habitat destruction, or attempts to extract resources, symbolizing a departure from the initial harmony.

The fable describes cultural practices of the valley people that showcase their deep connection with nature. This could involve ceremonies, rituals, or storytelling that honor the living mountain and other elements of the environment. Such practices reinforce a narrative of living in harmony with the natural world. Characters also exhibit behaviors indicative of environmental stewardship, acting as caretakers of their ecosystem. This could involve sustainable practices, protection of biodiversity, and a sense of responsibility towards maintaining the balance within

the valley. Instances of characters receiving gifts from the living mountain, and in turn, cherishing and respecting these gifts, illustrate a reciprocal relationship. This reciprocal dynamic reinforces the idea that the characters recognize the value of their environment and reciprocate with care and gratitude.

The arrival of the Anthropoi and their expressed desire to ascend the living mountain may symbolize a shift towards dominance over nature. This could be driven by motives such as greed, a quest for power, or a utilitarian view of the environment as a means to an end. The narrative includes scenes depicting the alteration of the landscape by the Anthropoi. This could involve activities like cutting down trees, clearing land, or other actions that signify a disregard for the natural balance and an attempt to reshape the environment according to human desires. The consequences of dominating nature might be depicted in the narrative. This could manifest as ecological disruptions, changes in the behavior of the living mountain, or other adverse effects that symbolize the repercussions of exploiting the environment.

By comparing instances of living in harmony with nature and those of exploitation and dominance, the fable invites readers to reflect on the consequences of different human-nature interactions. The contrasting portrayals illuminate the choices characters make and the impact of those choices on the ecological equilibrium of the valley. This exploration serves as a narrative vehicle for conveying broader messages about the significance of respectful and responsible human-nature relationships in the face of potential environmental degradation.

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ENVIRONMENTAL THOUGHT IN CONTEMPORARY HINDI POETRY

Dr Vaishali Pachunde[a1]
(Translated by- Ms Nishtha Dev[b])
a. Assistant Professor, Department of Hindi, Sophia College for Women, Mumbai
b. Assistant Professor, Department of English, Sophia College for Women, Mumbai

Abstract: The paper, through literary and cultural analysis, explores the relationship between the world of nature and the human world, and the consequences that such an interaction have produced for us. Through literary analysis of seminal works of Hindi poets, the paper desires to instill a sensitivity towards nature and ecology. It also enables the readers to re-examine their place in the larger ecological system, urging them to act in a more environmentally sensitive and responsible manner. The works of Hindi poets have been analyzed to nurture in the readers a spirit of individual and cultural introspection.

Keywords: *nature, ecology, Hindi, poetry*

The 'environmental' often implies a larger ecological context within which humanity exists. It is a medley of both the living and the non-living elements that affect humanity deeply. Nature, in this context, is very crucial for human existence and many have compared the relationship between man and nature to that of the mother and child. Unfortunately, at times, humans forget that they are only a part of this larger ecological system, and their hubris often leads them into believing that they are its makers.

Not only does nature reflect human actions, it also inspires and supports humanity. It is also a moral guide to human beings and serves humanity endlessly. Therefore, actions that harm nature are considered inhuman, even evil, by many. Mankind has developed in proximity with nature, but as soon as it detached himself from nature, it undermines its own claim to humanity. It is man's duty to preserve nature as these very natural elements constitute humanity. Thus, this age demands that humanity work towards its preservation. Mankind's greed and indiscriminate technological and infrastructural development is destroying our environment and nature. The natural resources are depleting every day. In addition to this, the rising population, unending industrialisation, rampant urbanisation, anti-environmental policy making, infrastructural growth and deforestation etcetera are too creating an imbalance in nature. In fact, man had started harming nature within a few thousand years of the beginning of human civilisation. Cutting trees for fuel and for farming, hunting animals for pleasure, setting up of industries that polluted the environment were a first few steps in the process of nature's degradation. With the rise in

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population, such activities only speeded up. It is evident that man, who is only a part of nature and not its maker, is selfishly exploiting natural resources to fulfil his own selfish needs.

The figure of the poet has been seen as prophetic in Indian classical aesthetics. A poet can foresee epochal turns and create epochal sensibilities. Across ages, many Hindi writers have represented the world and its natural and environmental concerns in a realistic manner. Even contemporary poets have pointed to the relevance of such problems in the current age and have tried to create social awareness about environmental issues. Environmental preservation is the need of the hour. To love nature implies that we try to protect it as well. These poets have represented the delicate relationship between man and nature while representing the ways in which man has altered nature as well. The modern Hindi poem, therefore, also represent a call for preservation of nature. Casting a glance at Hindi literature, we realise that the poems of the Romantic age have represented nature as the core of humanity itself and elevated it to the levels of a spiritual entity.

The romantic poet, Sumitranandan Pant, has been called a youthful poet of nature. It was around 1938 that the progressive poetry movement began in Hindi literature. These poets painted incomparable portraits of nature and natural beauty in their works. However, these works largely remained human-centric in content and explored beauty largely in the human domain. After these movements, the works of experimental poets who tried to innovate the aesthetics and the form of poetry gained popularity.

The experimental poets have painted detailed portraits of the middle-class life and values. Their sharp and pointed verse represented the internal conflicts, and the diversely conflicted internal landscape of the middle class with a microscopic detail. Gradually, these two trends in poetry merged together in the “Nayi Kavita” and brought with them, a new value system and a new aesthetic sensibility. “Nayi Kavita” placed the experiences of the ordinary middle-class life and the ideas of aesthetic perception within a simple humanistic context. This new sensibility appeared at its creative best in the 1970s. The themes emerging from the complexity of modern life and the prevalent inhumanity and social injustices drew the attention of these poets. The poems that represented life as it existed, and expressed its nature, therefore appeared as contemporary poetry. This was seen by many as the golden age of poetry. Many writers and critics, however, believed that this new trend made poetry restricted in terms of themes and concerns, as it seemed to ignore the metaphysical, spiritual, natural, and beautiful aspects of human existence. Nature, they believed was a source of beauty, which “Nayi Kavita”, did not always see as a source of spiritual satisfaction. Such scholars wondered if poetry that could not appreciate the ultimate beauty of human life could be called poetry in the first place. Such writers, therefore, included such ideas in their poems, to retain what they considered the “essence” of poetry. The plight of nature, and its current state, thus, became a thematic concern in such poetry. Ramdarash Mishra writes,

> "Here it is written,

'Plucking Flowers is Strictly Prohibited'
But I wonder
Where have the flowers vanished?" (Sumesh, 2020)

The poet has described realistically, the danger that looms upon nature in these two lines. When compared to its literary predecessor, the contemporary, modern Hindi poem, is entirely devoted to representing life in its irreducible variety. In these poems, the poets attempted to understand man in his entire and expansive context. This led them to direct their gaze towards the corruption, conflicts and intellectual concerns of the time, and represent them realistically. Poets like Trilochan, Kedarnath Singh, Ramdarash Mishra, Arun Kamal, Ashok Vajpayee, Chandrakant Devtale, Gyanendrapati, Liladhar Mandloi, Shishupal Singh, Nirmala Putul have highlighted problems of river pollution, air pollution, ecological imbalance, and deforestation in their poems. While reading their poems today, one realizes how future generations might not even see or experience the beauty of rivers or listen to the musicality of the winds rustling the leaves of tress in the forests.

We have to brave, and are struggling to overcome water, air and sound pollutions. Increasing water pollution has caused a perpetual water crisis in the country which seems to be getting graver every day. The river water is undrinkable, and all the rivers are extremely polluted. Gyanendrapati in his poem 'River and Soap' has highlighted this issue. While contemplating the current state of rivers he writes,

O River!
Why have you shrunk?
You appear dirty....
Who robbed you of your blue? And muddied your ripples.... (Joseph, 2020)

The poem titled "Polythene" which appears in his anthology 'Gangatat', directs our attention to the dangers of plastic usage. Each polythene packet that is thrown in the Ganges, pollutes its water, the poet observes. The creatures that dwell in river waters too die due to this practice. The poet writes,

Polythene! Polythene!
I worry seeing Polythene
the earth shrinks for its creatures
shrinks for its seeds
The omniscient polythene
holds markets in its fist
Just like the markets hold us in theirs (Joseph, 2020)

Nature appears degraded due to the excessive usage of polythene. It has a dangerous effect on rivers, flora, and fauna and on all living creatures. In the poem 'Gangasnan' in this anthology the

poet has represented an old, wrinkled and weak woman, expressing a desire to bathe in Ganga as her last wish before death. This old, dying woman's spirit is lit by the belief that her last bath in Ganga, will gurantee her salvation. But the poet seems reluctant to accept this as he knows that the water of the divine river is dirty now. He writes,

> That old woman/bathing in the Ganga....
> is purifying her existence
> Presenting herself before this great river,
> with wobbly feet,
> little does she know
> the pure river is just not there for her anymore. (Joseph, 2020)

These lines are hard-hitting and unforgettable. Within Hinduism, Ganga is a powerful symbol of both life and moksha. It is treasured within the Indian belief system. Inspite of being a powerful symbol of tradition and religious structure, its existence is endangered now. It is a blow to the existence of all humankind. The poems of Kedarnath too express such environmental concerns comprehensively. Poems like 'The afternoon', 'The realisation', 'The song of the arrival of spring', etcetera represent the many facets of nature. In his poem 'The nameless river', Kedarnath Singh has highlighted the ways in which humans and a consumerist culture have exploited them. He writes,

> Splintering my village
> much before the first human
> that thin river has flown, quietly
> when someone dies somewhere
> people lift the body
> and dump it where the river seems quiet
> and alone. (Pillai, 2020)

Due to the poisonous chemical emissions from the factories and industries the levels of heavy chemicals like arsenic, cadmium etcetera is increasing everyday. This, in turn, harms the humans themselves. Expressing his concern and worry in this context, Binu Bhatnagar writes in "How Does one Live?",

> Ganga Yamuna are not pure
> their water mixed with poisonous chemicals,
> the underground water too poisoned,
> like the water in the wells
> will damage our internal organs
> and one can barely survive (Ranjit, 2020)

The rivers are also getting polluted in the name of religious and recreational tourism. Today, the names of rivers have been incorporated as mineral water brands. The names of rivers like Ganga, Kaveri, Periyar appear on commercial water bottles. It is not only rivers, but wells, ponds, and sea are too getting polluted. Kedarnath, in his poem, "Water's Prayer" has shared the perspective of the very water which is getting polluted. In his poem, water feels alienated from its essence. He writes,

> Oh Lord! I, water, on earth
> its oldest citizen
> wishes to seek your permission....
> But I- water who has been blessed by your touch, here on earth
> is close to becoming extinct. (Sindhu, 2020)

Gyandendrapati also considers the well a significant part of the environment. Therefore, in his poem "A Thirsty Well" he writes,

> The one which quenched the thirst of many for generations
> that well
> knew of thirst, when,
> the water levels dropped all of a sudden
> the one that quenched, now thirsty itself
> that well, waited for months…
> is now a bottomless bin
> its dry sobs can be heard even now
> if one stands quietly near that ageing well (Joseph, 2020)

Even Kedarnath Singh considers wells and integral part of the ecosystem. In his poem titled "The Well", while expressing his grief over the altered form of the well, writes,

> The grass has covered the well
> its only a monument of grass
> which will now not survive
> Then what should we do about these wells?...
> leave them as they are
> let them sink in the ground
> let them fall. (Pillai, 2020.)

Nowadays, water is sold in bottles. Ekant Shrivastav, shocked at the cold-water machine installed at a crossing in Delhi, writes,

> At a crossroad in Delhi
> I was scared to see

that which falls from the skies for free
and flows in rivers in abundance
that water is now being sold
in the marketplace...
we have fought for food
and now will fight for water (Joseph, 2020)

Sudhir Ranjan Singh, while viewing the scarcity of water as one of the most significant crises of our times, writes,

There was no water in the city
The lake that made the city shine
was now like an eyesore
people now came here to see the dust that remains (Joseph, 2020)

Dr. Lakhanlal Singh too observed the changing trends linked to the rising pollution levels in the country and envisaged a link between these changes and the struggles of everyday existence. In his anthology titled "The Darkness of Music" he has described the damaging effects of rising pollution levels. In one of the most significant poems in this collection, 'Yet to dry' he writes,

The river in my village has dried up
it doesnt flood in the rains
The peepal tree has dried up
even during the spring
it does not sprout new leaves" (Joseph, 2020)

Air pollution, like water has also troubled humankind. In ancient India, most of the land was covered with forest, but the planning for meeting the increasing needs of a rising population lacked a comprehensive vision and immaculate planning which eventually led to unprecedented deforestation. The natural balance on earth can only be maintained when at least 33% of land on earth is covered with forests. At the beginning of the 20th century, it was only 30%, which reduced to 19.4% at the end of the century. It is reducing every day. The forests also regulate and maintain seasonal balance. They do not only beautify our surroundings, but also remove its impurities. The cutting down of trees therefore presents a dire warning for the coming times. In addition to this, it also affects the national economy and the future of its development. A country which can boast of resplendent forests is worthy of being called a prosperous nation. By cutting trees, humans have cost themselves valuable resources. Ashutosh Kumar Jha in the poem titled "What will Happen When" writes the following lines about the significance of trees,

When it grew up
Unaware of its generosity
It feasted many on its fruits.

In scorching heat
many rested in its thick shade
found a resting place, and rest (Joseph, 2020)

In the poems of Pushpa Awasthi too we see an preoocupation with Natural balance and purity of the natural environment.In her poem "A Tale", she writes,

It withered in front of my eyes
and just like that
it was cut
into many pieces
As grief consumes human body
So it died.....
The tree which was a protector
is barren now
The savior of the nature is not there anymore (Babu, 2020)

One of the causes of air pollution are the carbon dioxide, carbon mono oxide, hydrogen sulphide and chlorine emissions from various cars and factories. Increasing air-pollution has also created holes in the ozone layer. This layer protects the earth from harmful ultraviolet rays. The increase in earth's temperature is endangering the ice caps which can potentially result in the increasing global sea levels. Many contemporary poets in Hindi have recorded these observations in their poems. Liladhar Mandloi in his poem titled 'Carbon Monooxide' writes,

Where does so much
Carbon mono oxide come from
Slowly, the ice melts
before it was due
the mountains slide
and slowly, life ends (Joseph, 2020)

Nature has determined how everyone will exist on earth, but in this race to modernise, science has been used to limit the growth of nature. Like Bonsai, it follows a pattern decided by humans and not nature. Amrita in her poem 'Trees without Roots' writes,

In my terrace stands
A rootless tree
to speak to the sun it will
stretch its neck
it will move its roots
to ask for water
no butterfly or bird will sit on it

it hangs, rootless, in the sky
it won't bear fruits or flowers
will stand as it is... (Ranjit, 2020)

All poets search for their spiritual states in and through their poems. They look for themselves in rivers, mountains and trees. According to Kedarnath Singh, everything in nature helps humanity and human life. Earth itself has great potential for human use, which is why we should be grateful for this immense resource. He writes,

When you take a bite of bread
first bow your head
to the wheat plant (Pillai, 2020.)

In ancient times, man feared nature and worshipped natural elements. He prayed to them for his sustainence and protection. He led life with close ties to nature. He had not yet controlled nature but remained as a part of it. In contrast to this, we seem to be challenging nature now. We are killing animals not just for food, but for pleasure. Hendry Morgan has called this wildness and barbarity. In this way humans consider themselves modernized. It tried to control nature, and its greed increased to such an extent that it resulted in natural disasters. This has in turn led him to seek solutions in nature. Hindi literature, across ages, has taught humans invaluable lessons in this context. It has urged humanity to look inwards and contemplate the reasons for such degradation of nature. All the significant aspects of nature like seasons, water, air have been adequately represented within the literary domain. Many works describe the effect seasons have on human life. By interfering with nature, humanity falls from the privileged space it holds on earth. The poet 'Anuragi' expresses the idea in the poem thus

The cutting of the wild forests
has made humans wild
the cutting of the mountains
has turned man's heart to stone
What has been lost is the sense of being human (Naritukkil, 2020)

The mordern man is doomed to live exiled from the simple beauty and pleasures of nature, and in proximity of the artificial life he has built for himself. Ramdarsh Mishra has expressed this idea in his poem titled 'The ones caught in concrete jungles', thus,

Till when will you wait for spring
behind closed doors
What you don't know is/that spring has arrived outside (Naritukkil, 2020)

Ethics, politeness, and emotions are losing their worth for the modern man. In his journey towards progress and development, it has given control of his life to technology and

industrialization. In this journey, he has become distant from nature and close to unnatural greed and cruelty. Modern man has no time for thinking beyond the sustenance of his own life, and about nature. All other zoological species have as much right on nature and environment, but man has monopolized his control without caring about anyone else. This is why the life of modern man is characterized by a restlessness and anxiety. Man's increased intervention in nature has now become a significant problem. This animality humans display is far greater than animals have ever presented. Therefore, wherever there is human reach, we find that the horrific scenes of murders and suicides appear before our eyes. Mishra in his poem "The Tree" writes,

> many kinds of birds flew and sang
> in harmony
> every tune matching the other
> in that tree which was music itself
> No one knows, what happened
> One day
> the people resting in its shade
> terrified of each other
> started breaking its branches
> killing one another and getting killed (Lobo, 2020)

The love for nature and environmental preservation does not imply that we regress, abondon civilisation and reside in the jungles. It imples that we must take responsibilty for the conservation for the very natural resources that we exploit for our own needs. Many problems that we face today are a result of this natural imbalance, increased industrialisation, and urbanisation. We all suffer from the blind eye that we turn towards these processes. The problems of drought, floods, tsunamis, earthquakes, shifts in weather cycles, depletion of ozone layers, melting of glaciers are not insignificant developments, and we have to bear the repercussions of all these developments for a long time. In modern times, capitalist ideology, globalisation, commodification etc. are resulting in a growing dehumanisation whose ill effects do not only affect human life, but the existence of other animals and plants as well. The destruction of our environment has become a global problem. It is the need of the hour that we do not cause further imbalance in nature. Let us not sacrifice trees, rivers, mountains to the altar of development. If nature is pushed to its limits and is unable to bear the burden of our expectations, it will result in disastrous consequences. It is important that we stop exploiting nature and understand the warnings it has been issuing for us. We now have the resources to understand the problems (like pollution) that plague both nature and our lives. The signs of an impending doom are now visible to all. Therefore, it is imperative that we look beyond our petty greed and selfish desires and think about future generations.

Beginning with Romantics, Hindi Literature today has represented nature and the environment in its beautiful variety. In contemplations about the environment in contemporary Hindi

Literature, nature appears to hold a special and unique place. It is being considered in modern contemplations about human values and scientific developments. The way the varied forms of nature, and their exploitation has been represented in Hindi poetry and literature, as described in the paper, reminds us, that literature, very often enables us and forces society to find sustainable solutions to ecological and social problems.

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ECOLOGICAL DEGRADATION AND ITS IMPACT ON HUMAN LIVES AS REFLECTED IN ARUNDHATI ROY'S *THE GOD OF SMALL THINGS*

Dr Zeba Siddiqui
Assistant Professor, Department of English, VIVA College, Mumbai

Abstract: Arundhati Roy is an Indian author, essayist, and political activist. *The God of Small Things* is her debut novel which was published in 1997. The book won the Man Booker Prize for fiction and brought her widespread acclaim. In *The God of Small Things* by Arundhati Roy, the environment plays an important role, particularly in relation to the social and political themes explored in the novel. The novel highlights the destructive and damaging effects of human activities on the natural environment. It depicts the consequences of deforestation, industrial pollution, and the exploitation of resources in the fictional town of Ayemenem. Arundhati Roy's novel, *The God of Small Things*, explores the intricate connections between ecological degradation and its impact on human lives, particularly within the socio-economic and cultural context of Kerala, India. The novel addresses several themes, and one of the prominent ones is the environmental degradation that has far-reaching consequences on the characters and the community. The Meenachal River, which flows through Ayemenem, is a representation of both life and death as well as the damage that human interference has done to the environment. The river's decline reflects the broader deterioration of the natural world. Several characters in the novel exhibit a deep connection and love for the natural world. Rahel and Estha, the primary characters of the novel, find solace and escape in the natural surroundings of their childhood, accentuating the importance of preserving and appreciating nature. Roy examines the connection between social injustice and environmental degradation. The novel also explores the theme of the loss of innocence, which is linked to the environmental degradation. The polluted river and the changing landscape serve as a backdrop to the traumatic events that shape the characters' childhood. The degradation of the environment becomes a metaphor for the loss of purity and the disruption of the characters' lives. The implications of human behaviour as well as the destructive forces that affect the ecosystem are discussed in the novel *The God of Small Things*.

Keywords: *natural environment, exploitation, environmental degradation, river, human behaviour*

INTRODUCTION

The term "nature", also referred to as the environment, encompasses the physical, biological, and non-living components of the Earth and its ecosystems. It encompasses all aspects of our environment, including the air we breathe, the water we drink, the land we live on, and the wide variety of microbes, animals, and plants that coexist with us. The environment is a complex and interconnected system where all living organisms interact with each other and with their surroundings. The natural environment consists of various elements such as forests, oceans,

rivers, deserts, mountains, and the atmosphere. The resources and services that these components offer are crucial for maintaining life on Earth. The environment is crucial for human life as well as the survival of many other species. We depend on the environment for a variety of resources, including food, water, energy, and others. Additionally, nature enhances our quality of life by offering leisure possibilities and having aesthetic and cultural significance. To preserve the long-term viability of our world, environmental preservation and protection are essential. The natural world that surrounds us is referred to as nature or the environment, and it includes all living and non-living components that interact and shape the Earth's ecosystems. It provides us with essential resources, supports biodiversity, and contributes to the welfare of both humans and the planet.

Suzanna Arundhati Roy, also known as Arundhati Roy, is an Indian author, actress, and political activist. She is best known for the award-winning novel *The God of Small Things* and for her involvement in environmental and human rights movements. She was born in Shillong, Meghalaya, India, on November 24, 1961. With the publication of her first book, *The God of Small Things*, in 1997, Roy gained international recognition. The book won the Man Booker Prize for Fiction and brought her widespread acclaim. In addition to her work as a novelist, Arundhati Roy is well renowned for her activism and political criticism. She has consistently criticized the actions of the Indian government, especially in relation to matters like the development of nuclear weapons, the building of dams, the violation of human rights, and environmental degradation. Her political essays and speeches have garnered both praise and controversy. Through her writings and activism, Roy has become an influential figure in advocating for social justice, equality, and the rights of marginalized communities. The novel *The God of Small Things* by Arundhati Roy examines a variety of subjects, such as politics, the environment, and social inequality. While the primary focus of the novel is not specifically on environmental issues, there are several instances and motifs that touch upon the topic of the environment.

ECOLOGICAL DEGRADATION AND ITS IMPACT ON HUMAN LIVES IN *THE GOD OF SMALL THINGS*

In Arundhati Roy's novel *The God of Small Things*, nature plays an important role in the story. The novel is set in the South Indian state of Kerala, and Roy gives a realistic description of its lush and colourful surroundings. The natural world plays a significant role in the story, acting as a backdrop, a symbol, and a mirror for the thoughts and feelings of the characters. Firstly, the setting itself, with its dense forests, winding rivers, and tropical climate, becomes a character. Arundhati Roy’s depiction of the natural environment create an intense and powerful sense of place, immersing the reader in the sights, sounds, and scents of Kerala. The novel opens with the beautiful landscape by giving description about the summer and monsoon in the Ayemenem. She begins her novel by portraying Ayemenem, a fictional place and the wild nature around it;

> May in Ayemenem is hot, brooding month. The days are long and humid. The shrinks and black crows gorge on bright mangoes in still dust green trees. Red bananas ripen. Jackfruits burst. Dissolute bluebottles hum vacuously in the fruity air. Then they stun themselves against clear windowpanes and die, fatly baffled in the sun. But by early June the south-west monsoon breaks and there are three months of wind and water with short spells of sharp, glittering sunshine that thrilled children snatch to play with. The countryside turns an immodest green. Boundaries blur as tapioca fences take root and bloom. Brick walls turn mossgreen. Pepper vines snake up electric poles. Wild creepers burst through laterite banks and spill across the flooded roads. Boats ply in the bazaars. And small fish appears in the puddles that fill the PWD potholes on the highways. (Arundhati Roy, *The God of Small Things*, 1997:1)

In the book several characters exhibit strong connection and love for nature. Rahel and Estha, the primary characters in the novel, find solace, comfort, and escape in the natural surroundings of their childhood, emphasizing the value and importance of preserving, protecting, and appreciating nature. Roy scrutinizes the connection between social injustice and environmental degradation. The interconnectedness of all components of the environment and the web of life is highlighted in *The God of Small Things*. The book demonstrates how actions that disrupt this fragile equilibrium have far-reaching effects on both the natural world and human society.

In the novel *The God of Small Things* by Arundhati Roy, Baby Kochamma is a central character who is integral to the plot. She is a member of the affluent Syrian Christian Ipe family. Baby Kochamma is also the grandaunt of the main protagonists, Rahel and Estha, and her given name is Navomi Ipe. She is a young woman who had rejected the material world and finds peace, tranquility, and solace in nature. She was thrilled when her father assigned her to take care of the front garden at the Ayemenem House, and she grew the garden to such a lovely state that visitors from as far away as Kottayam came to see it, which can be observed from the following paragraph;

> It was a circular, sloping patch of ground, with a steep graved driveaway looping around it. Baby Kochamma turned it into a lush maze of dwarf hedges, rocks and gargoyles. The flower she loved the most was the anthurium. Anthurium andraeanum. She had a collection of them, the 'Rubrum', the 'Honeymoon' and a host of Japanese varieties. Their single succulent spathes ranged from shades of mottled black to blood red and glistening orange. Their prominent, slipped spadices always yellow. In the centre of Baby Kochamma's garden, surrounded by beds of canna and phlox, a marble cherub peed an endless silver arc into a shallow pool in which a single blue lotus bloomed. At each corner of the pool lolled a pink plaster-of-Paris gnome with rosy cheeks and a peaked red cap. Baby Kochamma spent her afternoons in her garden. She

> wielded an enormous pair of hedge shears in her bright orange gardening gloves. Like a lion-tamer she tamed twisting vines and nurtured bristling cacti. She waged war on the weather. She tried to grow edelweiss and Chinese guava. (Arundhati Roy, *The God of Small Things,* 997:26)

The above passage demonstrates Baby Kochamma's strong bond with nature and her lovely garden. It is a place where she can hide her true emotions and frustrations, presenting herself as a refined, sophisticated, and composed individual. The garden serves as a kind of barrier, protecting her from the harsh truths of life and enabling her to project an image of stability and control. As the story progresses, the garden begins to represent the Kochamma family's internal conflicts and dissolution. But after lasting for more than half a century because of cruel, merciless and with un-careful attention, the beautiful ornamental garden had been abandoned which is evident from the paragraph that follows;

> Left to its own devices, it had grown knotted and wild, like a circus whose animals had forgotten their tricks. The weed that people call communist patcha (because it flourished in Kerala like communism) smothered the more exotic plants, only the vines kept growing, like toe-nails on a corpse. They reached through the nostrils of the pink plaster gnomes and blossomed in their hollow heads, giving them an expression half surprised, half sneeze-coming (Arundhati Roy, *The God of Small Things,* 1997:27)

The ornamental garden symbolizes a facade or artfully crafted image that Baby Kochamma portrays to the outer world. The garden's decline is a metaphor for Baby Kochamma and her family's crumbling facade of respectability. The reason for this sudden, unceremonious dumping was a new love. She had installed a dish antenna on the roof of the Ayemenem house. She presided over the World in her drawing room on satellite. It was not something that happened gradually. It happened overnight. This indicates how globalization has affected Ayemenem through a *television-enforced democracy* where Baby Kochamma and Kochu Maria are locked together in a noisy Television silence. Baby Kochamma was extremely joyful, but it had a very negative impact on Ayemenem and the Ornamental Garden which can be observed very clearly from the following lines;

> Blonders, wars, famines, football, sex, music, coups d'etat—they all arrived on the same train. They unpacked together… And in Ayemenem, where once the loudest sound had been a musical bus horn, now whole wars, famines, picturesque massacres and Bill Clinton could be summoned up like servants. And so, while her ornamental garden wilted and dies, Baby Kochamma followed American NBA league games, one-day cricket and all the Grand slam tennis tournaments. On weekdays she watched The Bold and The beautiful and Santa Barbara, where brittle blondes with lipstick and hairstyles

> rigid with spray seduced androids and defended their sexual empires. Baby Kochamma loved their shiny clothes and the smart, bitchy repartee.(Arundhati Roy, *The God of Small Things* , 1997:27)

From the above paragraph, Baby Kochamma was very elated with the television-enforced democracy. She enjoyed watching American NBA league games, movies and shows such as The Bold and The Beautiful and Santa Barbara. Through this Arundhati Roy critiques satellite, television-enforced democracy, repetitive television commercials and American soap operas and such modes of globalization that leads to cultural imperialism, cultural differences and social inequalities which is especially enforced by United States of America. Baby Kochamma first rejected the material world when she was young, but now that she is older, she is embracing it. She is also frightened by the BBC famines and Television wars that she comes upon while surfing the channel. With this her old fears of the Revolution and the Marxist-Leninist threat had been revived by more recent television concerns about the population's increasing desperation and disposition. This demonstrates the profound effects of globalization on Baby Kochamma.

In *The God of Small Things*, the Meenachal River is portrayed as a central character and is a source of spirituality, sustenance, and life. The river is considered sacred because the name Meenachal has religious connotations and is the river-form of the Goddess Madurai Meenakshi Devi. People rely on this river for necessities such as drinking water, and people go to the river's coast from all over the world to seek refuge in her arms. The river Meenachal is mentioned in the book and is portrayed as a significant but polluted and dying river in the narrative. Arundhati Roy has shown how the Meenachal River is experiencing environmental problems because of how humans have exploited nature in the name of progress and modernization. Because of the discharge of harmful waste materials such as plastic bags and other goods, industrialization and globalization are damaging the river and causing water pollution. The novel underscores the importance of the river in the lives of the characters and the ecosystem of Ayemenem. Arundhati Roy often depicts the characters, especially the twins Estha and Rahel, as finding refuge in nature. The children's encounters with nature and the beautiful descriptions of the environment emphasize the relationship between people and the natural world while contrasting it with the harsh realities of societal structures. Through this book Roy seeks to describe exploitation of nature in the form of excessive destruction of forests, construction of ditch checks, wattles, seawater dams along the river which are to blame for the extinction of marine life.

Roy exposes the pollution of the river. She tells the river water has become toxic due to the unadulterated manufacturing waste, washing of clothes and pots by women, and the over-farming because when a salt-water barrage is built on it. There was a time when Ayemenem was known for its beautiful nature, the gardens the un-polluted river but now it is totally

changed, when Rahel returns to Ayemenem after twenty-three years the river Meenachal greeted her with a ghastly skull's smile, with holes under where the teeth had been and a limp hand raised from a hospital bed. The Meenachal river is gradually urbanized which is evident from the paragraph that follows;

> Despite the fact that it was June, and raining, the river was no more than a swollen drain now. A thin ribbon of thick water that lapped wearily at the mud banks on either side, sequined with the occasional silver slant of a dead fish. It was choked with a succulent weed, whose furred brown roots waved like thin tentacles under water. Bronze-winged lily-trotters walked across it. Splay-footed, cautious. Once it had the power to evoke fear. To change lives… But now its teeth were drawn, its spirit went. It was just a slow, sludging green ribbon lawn that ferried fetid garbage to the sea. Bright plastic bags blew across its viscous, weedy surface like subtropical flying-flowers… The stone steps that had once led bathers right down to the water, and Fisher People to the fish, were entirely exposed and led from nowhere to nowhere, like an absurd corbelled monument that commemorated nothing… On the other side of the river, the steep mud banks changed abruptly into low mud walls of shanty hutments… On warm days the smell of shit lifted off the river and hovered over Ayemenem like a hat. Further inland, and still across, a five-star hotel chain had brought the Heart of Darkness (Arundhati Roy, *The God of Small Things*, 1997: 124-125)

Whereas Estha discovered the river;

> Some days he walked along the banks of the river that Smelled of shit and pesticide brought with World Bank Loans. Most of the fish had dried. The ones that survived suffer from fin-rot and had broken out in boils… Other days he walked down the road. Past the new, freshly baked, iced, Gulf-money houses built by nurses, masons, wire-benders and bank clerks who worked hard and unhappily in faraway places. Past the resentful older houses tinged green with envy, cowering in their private driveways among their private rubber trees. Each a tottering fiefdom with an epic of its own. (Arundhati Roy, *The God of Small Things*, 1997:13)

The twins are connected to nature through Pappachi's moth and now intertwine with the natural world through the Meenachal river, which also represents transgression of boundaries. Both Rahel and Estha are seen to be pining for the Meenachal river as a result of any terrible and dreadful incident. They are both inextricably linked to the river as a friend and this is proved from the novel in which Arundhati Roy writes;

> The first third of the river was their friend. Before the Really Deep began. They knew the slippery stone steps (thirteen) before the slimy mud began. They knew the afternoon weed that flowed inwards from the backwaters of Komarakom. They knew the smaller fish. The flat, foolish pallathi, the silver paral, the wily, whiskered koori, the sometimes karimeen… Here they studied silence (like the children of the Fisher Peoples), and learnt the bright language of dragonflies… But the middle of a respectable river, or the Other Side, was no place for children to Linger, Loll or Learn Things. Estha and Rahel accorded the second third and third of the Meenachal the deference it deserved. Still, swimming across was not the problem (Arundhati Roy, *The God of Small Things*, 1997:203-204)

In the novel, the Meenachal is also significant in relation to the History House. On the one hand, the River Meenachal, Ayemenem's lifeline, is polluted with deadly toxic waste material, while Estha and Rahel's childhood History House, a symbol of heritage, has been converted into a five-star hotel for the tourism industry. Estha and Rahel discovered that it is not just Ayemenem that has changed, but also the Ayemenem house, which was once known as the dreamy house, as evidenced by the following paragraph;

> It had little to do with people that lived in it. Like an old man with the people that lived in it. Like an old man with rheumy eyes watching children play, seeing only transience in their shrill elation and their whole-hearted commitment to life…the old car settled more firmly into the ground. Like an angular, arthritic hen settling stiffly on her clutch of eggs. With no intention of ever getting up grass grew around its flat tyres. The Paradise Pickle and Preserves signboard rotted and fell inward like a collapsed crown. (Arundhati Roy, *The God of Small Things*, 1997:295)

The above paragraph makes it abundantly clear that, because of the rising tourism business in the 1990s, rural Ayemenem has grown to the size of a small town. The concomitant degradation and deterioration of the environment, as well as the pollution of the Meenachal river with hazardous waste, is described by an adult Rahel as follows;

> The History House could no longer be approached from the river. It had turned its back on Ayemenem. The hotel guests were ferried across the backwaters, straight from Cochin. They arrived by speedboat, opening up a V of foam on the water, leaving behind a rainbow film of gasoline. The view from the hotel was beautiful, but here too the water was thick and toxic. No swimming signs had been put up in stylish calligraphy. They had built a tall wall to screen off the slum and prevent it from encroaching on Kari Saipu's estate. There wasn't much they could do about the smell. (Arundhati Roy, *The God of Small Things*, 1997:125)

The History House is the setting for the novel's pivotal events. And with this unequal development, Arundhati Roy wants to inform us that the natural environment is being disrupted by an increase in population, which has swelled in size, and that this rise in population puts more strain on natural habitat and natural resources, as well as their exploitation. Rahel recalls her childhood days, the peace, tranquility, and natural beauty which plants, rivers, water, and marshes gave twenty-three years back has all been gone now. Kari Saipu's estate known as the History House is changed into a five-star hotel called Heritage which is described as *Gods own Country* in hotel brochures. It was a beautiful house. White-walled once. Red-roofed. But painted in weather colours now. The History House where the dreams were captured and re-dreamed. Where an old Englishman ghost, sickled to a tree, was abrogated by a pair of two-egg twins- a Mobile Republic with a Puff who had planted a Marxist flag in the earth beside him is now transformed into *Heritage Hotel* by the blooming tourist industry where they create Toy Histories for rich tourists to play in and give out truncated Kathakali performances for the tourist small attention spans;

> Kari Saipu's house had been renovated and painted. It had become the centerpiece of an elaborate complex, crisscrossed with artificial canals and connecting bridges. Small boats bobbed in the water. The old colonial bungalow with its deep verandah and Doric columns, was surrounded by smaller, older, wooden houses—ancestral homes—that the hotel chain had brought from old families and transplanted in the Heart of Darkness. Toy Histories for rich tourists to play in. In the evenings (for that Regional Flavour) the tourists were treated to truncated kathakali performances. So ancient stories were collapsed and amputated. Six-hour classics were slashed to twenty-minute cameos. The Performance were staged by the swimming pool. While the drummers drummed and the dancers danced, hotel guests frolicked with their children in the water. While fathers played sublimated sexual games with their nubile teenaged daughters, Poothana suckled young Krishna at her poisoned breast. The back verandah of the History House had been enclosed and converted into the airy hotel kitchen. (Arundhati Roy, *The God of Small Things*, 1997:127)

Arundhati Roy also pays attention to the wooden boat and the boatworld which Estha and Rahel have found the grey old boatplant, boatflowers and boatfruit. And below it, a patch of wilted grass in the shape of a boats currying and hurrying boatworld by the Meenachal river;

> Dark and dry and cool. Unroofed now. And blind.
> White termites on their way to work.
> White ladybirds on their way home.
> White beetles burrowing away from light.

> White grasshoppers with whitehood violins.
> Sad white music
> A white wasp. Dead.
> A brittle white snakeskin, preserved in darkness, crumbled in the sun.
> (Arundhati Roy, *The God of Small Things*, 1997:202)

The twins' own discoveries of the little lives of animals and insects have been given special attention by Arundhati Roy in this passage. The boatworld is viewed as spaces of socialization where the development of relationships between humans and nonhumans enables environmental collectivity. Two-egg twins and two joyful hearts Estha and Rahel felt upset when;

> They looked across the river with old Boat eyes. From where they stood they couldn't see the History House. It was just a darkness beyond the swamp, at the heart of the abandoned rubber estate, from which the sound of crickets swelled (Arundhati Roy, *The God of Small Things,* 1997:204)

Arundhati Roy places a strong emphasis on the boatworld spider as a sign of the ecological advancement and global ecological currents. The novel's connection between the boatworld spider and the global ecological currents serves as a metaphor for the idea that small decisions and actions can have a significant impact on the broader world. The novel suggests that even choices and decisions that may appear insignificant or trivial can have a huge global impact, which is consistent with the concept of global ecological currents. Roy foregrounds the interconnectivity of our lives and the consequences of our actions by combining these symbols together;

> A white boat-spider floated up with the river in the boat, struggled briefly and drowned. Her white egg sac ruptured prematurely, and a hundred baby spiders (too light to drown, too small to swim), stippled the smooth surface of the green water, before being swept out to sea. To Madagascar, to start a new phylum of Malayali Swimming Spiders (Arundhati Roy, *The God of Small Things*, 1997:204)

The boatworld spider and the idea of global ecological currents serve as reminders that our own choices, decisions, and actions have the power to influence the world around us, having an impact on both our own lives and those of others. The novel touches on the effects of industrialization and urbanization in Kerala, which can lead to environmental deterioration and degradation. Rapid development and urban growth often come at the cost of natural resources and ecosystems. The novel's depiction of Kerala's changing terrain and the disappearance of traditional ways of life, which can be seen as a broader commentary on the impact of modernization on the environment and culture.

CONCLUSION

Arundhati Roy scrutinizes the ecological and environmental themes in the novel *The God of Small Things*. She has portrayed nature in this novel through River Meenachal, animals, mountains, trees, and bugs and has also additionally exhibited the centrality of water to ecofeminism and gender. Animals such as the drenched mongoose, the rat snake, and the bullfrogs are altogether referenced in the very beginning of the novel and this wallop the theme of the novel. She depicts the destructive impact of human activities on nature, such as the pollution and contamination of the river. In the social and political setting of the novel, the exploitation of the environment parallels the exploitation and oppression of certain people. In general, nature in *The God of Small Things* serves multiple functions, ranging from setting the stage for the story to symbolizing freedom, atonement, and the interaction between the natural and social worlds. Arundhati Roy emphasizes the strong bond between the characters and their natural surroundings as well as the negative effects of human behaviour on the ecosystem through her poetic and vivid prose. The novel touches upon the destructive forces that impact the environment and the consequences of human actions. The destruction of the river, deforestation, and the exploitation of natural resources reflect the broader theme of societal and environmental decay.

Given that humans have evolved into machines and that the natural world is being destroyed and exploited in the name of modernization and development, or in other words, our beautiful green treasure or the flora and fauna. Roy in her novel *The God of Small Things* is attempting to suggest and bring into consideration through the depiction of nature that there should be sustainable development to save the natural world. With them, she aims to make people aware that they should save, protect, conserve, and nurture our mother earth—our lovely nature—instead of devouring and destroying the natural resources to save the future. The novel emphasizes how environmental issues can have profound social, economic, cultural, and psychological consequences, and it invites readers to reflect on the impact of human actions on the delicate balance of nature.

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THE 'FULL-STOMACH ENVIRONMENTALISM' OF INDIA'S CLIMATE POLICY: AN ANALYSIS OF THE LIFE MISSION

Ms Aishwarya Sanas
Doctoral Candidate, Department of International Relations and Governance Studies, Shiv Nadar University, Delhi NCR

Abstract: The Lifestyle for Environment (LiFE) mission announced by the Indian leader Narendra Modi at the COP 26 summit is a significant juncture in the climate policy of India since 2015. With the 'individual' placed at the centre of climate action, the mission represents several things. One, a shift in the climate narrative from - one heavily based on a 'co-benefit-driven economic dimension' to a more 'behavioural dimension'. Two, a shift in focus from an exclusive production side of the economy to the consumption side. The paper intends to explore the place of the LiFE mission in the larger trajectory of climate governance in India and understand the impact of the formal discourses of the LiFE Mission on the sustainability narratives of India. It adopts discourse analysis to inspect the official documents of the mission and throws light upon its features and themes. The formal discourses are critically analysed using theories of climate justice, Dalit environmentalism and social movements in India. The paper relies on primary and secondary sources such as various government reports, expert interviews, opinions, and publications. It concludes that despite the seductive appeal of the LiFE mission, its well-timed announcement, and its apparent suitability in the post-2015 contours of climate governance, it threatens to dismantle the ideals that the sustainability narrative of India is built upon– such as climate justice, movements and voices of the subalterns, environmentalism of the poor and civil society advocacies. In its current form, the mission is unattentive to history, reductionist in its treatment of behavioural science theories and nonchalant to the Indian society's material dynamics. Finally, the behavioural science approach adopted by the mission is being applied blindly and needs to be attentive to the material realities. Having said that, the mission serves India's image and soft power globally as well, as a climate-responsible nation without having done much.

Keywords: *climate policy, climate governance, climate action, behavioural change, LiFE mission*

INTRODUCTION

The Lifestyle for Environment (LiFE) mission was inaugurated by the Prime Minister of India and the United Nations Secretary-General on the 20th of October 2022. With this mission, the climate policy of India[1] is at a significant juncture, abandoning its production-exclusive focus and foraying into the consumption side of the economic system; with the individual as the unit of change. Through a critical analysis of the formal and official discourses around the mission, the paper raises questions about the mission in light of some debates in the grand narratives of India's

[1] There is no officially announced climate policy in India. However, policy provisions across various sectors can be collated together and called as climate policy of the country.

sustainability model– a model that has been embellished with ideals of inclusivity, climate justice and 'environmentalism of the poor' (Guha and Martinez-Alier 1997). The paper is divided into four sections. First, I discuss the impact of the behavioural theories of societal change on climate policymaking in India and discuss the mission and its rationale. Following that, I throw light upon the challenges and effects of individualizing climate responsibility in the context of the LiFE mission and sustainability discourses in India. Finally, I place the mission within the larger trajectories of climate governance of India arguing that the post-2015 global climate governance regime has allowed for *socializing* national climate policies and discuss relevant debates around the mission.

THEORIES OF BEHAVIOURAL SCIENCE AND CLIMATE POLITICS

The language of climate politics is dominantly spelt in the vocabulary of the neoliberal economy[2] and the leitmotif of climate policies have been the high-carbon emitting sectors of the economy (Dubash, 2021: 406). In a narrow sense, national climate policy constitutes the pre-determined targets set by the government as part of its intended Nationally Determined Contributions (INDC) (Press Information Bureau, 2022)[3]. In a broad sense, it refers to the wide range of laws, executive orders, rules, statements, schemes, and regulatory and compliance-building mechanisms made at the national as well as the other levels of governance to achieve the pre-contemplated targets and objectives. At the receiving end of these policies, are the economic actors involved in the production of goods and services. For instance, the National Action Plan for Climate Change of 2009 (Press Information Bureau, 2021) is arching across eight missions, where several ministries govern specific sectors of the economy. The climate governance regime in India consists of state institutions, rules, norms and economic actors involved in various production processes creating a comprehensive structure of purposive (the most important), layered (directly involved), and latent (indirectly involved) institutions (Dubash et, 2018).

There has been a rise in the use of interdisciplinary approaches to finding ways to tackle the climate crisis (Schipper et al, 2021), some of which have emphasized the role of behavioural sciences. Policy is moving away from its exclusive focus on the production side of economic activities to the consumption side which includes social practices, economic and non-economic activities of individuals, communities, civil society and societal classes. Behavioural science traditions gaining traction across disciplines, influencing theory and practice have pitted the

[2] Climate Change discourse is heavily dependent on scientific calculation, climate data and economic models of cost-benefit analyses. This is to say that it is heavily spelt through the rational discourse.

[3] The NAPCC is the single most important national level policy on climate action of India. It was launched in 2009 through eight different missions operating under different Ministries. For more information, see https://moef.gov.in/en/division/environment-divisions/climate-changecc-2/national-action-plan-on-climate-change/

human dimension as very important in the attainment of any national goal[4] (Kenneth Prewitt and Robert Hauser 2019). Climate action policies originally meant for economic actors engaged in production processes rarely considered the human dimension, the role of individuals, and the use of behavioural science in bringing social change as a part of its comprehensive climate action strategy.

The lack of consideration of individuals in climate action strategy was due to three reasons. One, climate change was seen as a technical problem[5] that could be solved with the deployment of the right technology through the right market arrangements. Two, the individual was not of any great cause or consequence in the climate crisis in comparison to the economic units such as corporations, factories, and industries whose emissions measure in millions of tonnes[6]. Three, the individual was at the receiving end of the consumption processes of the economy and not an active participant. However, theories of behavioural science[7] emphasise the possibilities of bringing a large-scale behaviour change in individuals through various political techniques. Therefore, individual behaviour change was an underexplored nerve in India's climate policymaking and in this context, the LiFE mission becomes significant because it taps this underexplored nerve.

Although Indian environmentalism has a rich history of citizen-led social movements, protests and campaigns around the environmental crisis and consequences of unchecked industrial activities causing degradation of natural bodies have existed for many decades, the inculcation of the individual as a feature of India's climate action strategy is a new addition in the governance. In their work, C*hanging Our Ways: Behavior Change and Climate Crisis*, Peter Newell and others have argued that sustainable individual behaviour change is an important agenda in climate policy and needs to be unlocked for a social transformation to a low-carbon future (Newell, 2022: 1). Integration of behaviour change in policy discourse requires that individual not be treated as isolated from the underlying social and political forces. Earlier treated as inconsequential to technology and market mechanisms, individual-led action is emerging as an important and more governments are introducing individual behavioural changes as important pegs of climate action policies.

The mission stands for 'Lifestyle for Environment', its motto being- 'from mindless consumption to mindful utilization'. It was proposed during the 26th UNFCCC Conference of Parties held in

[4] It can also be argued that the climate policymaking is essentially influenced by methodological nationalism and hence an individual-perspective is missing and remains a neglected topic.
[5] See Stern (2007).
[6] Scholarship on climate action policies and governance widely adheres to methodological nationalism.
[7] Theories include nudge theory by Richard Thaler and Cass Sunstein, Environmental Citizenship Model by Hungerford and Volk, Ajzen's theory of planned behaviour, Stern's Value Belief Norm Theory, etc.

Glasgow in 2021 and launched on 20th October 2022 from Gujarat, India.[8] The mission intends to create a mass movement for promoting an environmentally conscious lifestyle; where people participate in climate action and lead a lifestyle that is 'pro-planet' (NiTi Aayog, 2021).[9] With a focus on the individual as well as collective action, it encourages ordinary people to take responsibility for climate action. With its maiden demonstration in India, the mission would then be taken to a global audience. It is a five-year program where the first year would be led by the NITI Aayog to incubate and the other four for implementation under the Ministry of Environment, Forests and Climate Change (MOEFCC) (Press Information Bureau, 2022).

The *Prayaas se Prabhaav Tak: From Mindless Consumption to Mindful Utilization* is a *dossier*[10] compiled by the Ministry of Environment, Forests and Climate Change and the United Nations Development Programme has spelt the aim and agenda of the mission. There is repeated use of terms like 'individual-led climate-action, 'pro-planet', and 'making choices'. It rests on the narrative that individuals are fundamental to climate action and have a climate responsibility to carry out. By deploying a critical discourse analysis on the official mission-related policy documents, I throw light upon the rationale and features of the mission. Since an isolated enquiry into these rationales and features is insufficient, I analyse them considering the larger debates around sustainability and climate governance in India.

INDIVIDUALIZING CLIMATE ACTION

Rationale means factors that legitimise the mission. Legitimacy sustains compliance and ultimately leads to the success of the policy. By emphasizing the 'cultural and traditional history' of the Indian civilisation, the mission portrays that historically societies have shared a conscious relationship with nature. Revival of memories of the past can serve as a positive reinforcement today for people to adopt sustainable practices. Similarly, the mission capitalises on traditional knowledge systems thereby promoting rural, tribal and other indigenous forms of knowledge-systems in the larger Indian sustainability discourse. One of the government officials from the MOEFCC has said, "Understanding the essence and inter-connectedness of indigenous practices and using that to shape future policies that guide people towards positive climate action at an individual level is the need of the hour" (MOEFCC and UNDP: 2022).

The other features that the mission capitalises upon are an increase in the overall awareness and literacy around climate change and sufficient strides in the production processes towards sustainable ways calling for a similar shift in the consumption side (Siddhique and Hossain, 2018). A longitudinal study conducted by the Yale Program on Climate Change Communication

[8] Taken from a government document- MoEFCC and UNDP. 2022. Prayaas Se Prabhaav Tak: From Mindless Consumption to Mindful Utilization

[9] LiFE Mission Brochure, NITI Aayog. https://www.niti.gov.in/sites/default/files/2022-11/Mission_LiFE_Brochure.pdf

[10] The document would be referred as dossier henceforth in the paper

(YPCCC) and the Centre for Voting Opinion & Trends in Election Research (CVoter) titled 'Climate Change in the Indian Mind' in 2012 and 2022 indicates an increased awareness towards climate change perceptions, global warming and action taken by countries. Interestingly, around 55% of people said the country should reduce its emissions immediately without waiting for other countries to act and 64% say the government of India should be doing more to address global warming (Leiserowitz, 2022). Moreover, several civil society actors have risen to fill the gaps in climate policy by providing education and capacity-building services to vulnerable communities (IIED, 2021). This has prepared people to alter their choices and purchase cleaner alternatives. Several enterprises and startups are exploring the sustainable market which points to the fact that the market is indeed changing. The mission, therefore, capitalizes on India's past along with favourable market conditions today (Kumar, 2022).

Many recent scholars have attempted to bridge the gap between climate politics and individual action but have found it difficult. Generally defined as a planetary problem warranting a planetary solution (The Climate Question, 2021)[11], the individual never featured in the planetary imagination of the climate crisis. Moreover, individuals have always been at the receiving end of the science-policy interface, fed with pieces of climate science and engaged through piecemeal responsibilities towards sustainable living such as 'save water', 'reduce plastic', 'save electricity', etc. Dale Jamieson (2014) in *Reason in a Dark Time: Why the Struggle against Climate Change Failed* explains that the reason for the failure of climate action is the immense complexity of communicating the science of climate to people. Climate action rests on a top-down approach, trickling down from national and provincial levels[12]. Individuals are seen as climate policy takers

The climate crisis is not a scientific problem but a political one. More science does not pre-evidently translate to better solutions. Moreover, science renews itself and humanity cannot wait until we achieve the perfect climate science. Humans have caused the crisis through their actions over a long time, but have gained a scientific understanding of it only recently (Mann and Wainwright 2018). There is a disconnect between science and how the public reacts to it. This is due to the lack of engagement between individuals and climate change issues. Placing climate change as a collective action problem (O'Neill, 2009) reduces it to a technical issue to be solved with cooperation and technology whereas placing it as an outcome of political, economic and social processes makes way for the inclusion of individuals in the analysis.

Climate policies are giving increased attention to behavioural sciences, and individual and collective psychology. The United Nations Environmental Programme recognizes that applying

[11] This view comes from an ontological assumption that climate change is not an individual's prerogative but occurs at a scale far away from the individual. See, the impacts of the pictures of Earth called Blue Marble taken from the Apollo Spacecraft of NASA in 1972. See (Poole and Gruner, 2023)

[12] Even local levels in recent years.

a 'people lens' to sustainability is new, and timely and opportunities are great[13]. Although there is agreement that individual efforts are as important as a government's, there is very little being achieved.[14] Polasky et. al. (2018) has stressed the importance of studying economics combined with social and behavioural sciences for understanding how human behaviour towards achieving sustainable development be possibly transformed. Atteridge et al. (2012) write about the need for a synthetic framework where individual actors, institutions as well and ideas can play a role in decision-making. The report titled *Coping with Climate Change* from the Centre for Science and Environment talks about how community participation in climate action is missing. There is a lack of bottom-up thinking and even inclusion of vulnerable communities (Mathur, 2018). In one of the most authoritative works, Nicholas Stern (2007) argues that climate change warrants 'broad and deep participation across all the relevant dimensions of action'. While placing policy as an important instrument in bringing appropriate climate action, he further defines the three essential elements: "carbon pricing, technology policy and removal of barriers to behavioural change" (Stern, 2007).

Climate action needs to be broadly defined to encompass changes that individuals bring into their everyday lives by consuming less, purchasing nature-friendly alternatives, and sustainable ways of living in terms of their habits and market choices (YALI, 2016). The politics of individualizing climate change entails changing the economics of climate action. Climate action, with its methodological nationalism, contemplated in terms of emission reduction consists of complex technical schemes which traditionally did not have space for individual action. There is a dearth of technical knowledge as well as the political will to acknowledge individual carbon footprint as a unit of interest in policymaking. Accounting individual actions and their systemic consequences pose significant computational and mathematical questions.

Apart from substantive questions of accounting of individual carbon footprints, there are also important normative and legal questions. Many scholars argue that an individual is a very inconsequential entity. For instance, Ronald Sandler says, that even a person's entire lifetime impact on any longitudinal collective action problem is likely to still be inconsequential (Sandler, 2010). Similarly, Sinnett-Armstrong (2010) strongly believes that individuals do not have a moral responsibility and it is the responsibility of the government to address climate change. Individualising climate action would take the focus away from the systemic issues of emission reduction of carbon-intensive sectors, and decarbonization of sectors like mining, fossil fuel, automobile, textile, etc. Individual choice is also a product of the power dynamics of the political economy and has hardly any influence on the larger financial and economic architecture of capitalism (Movahed, 2016). Finally, state intervention in individual choices also raises legal

[13] Why Sustainable Lifestyles Matter, UNEP, https://www.unep.org/explore-topics/resource-efficiency/what-we-do/sustainable-lifestyles/why-sustainable-lifestyles

[14] The SDGs in Everyday Life, waterloo.ca.in. https://uwaterloo.ca/environment/research-stories/ sdgs/sdgs-everyday-life

concerns over the politicization of individual lives and whether the government is entitled to venture into the houses and habits of ordinary people.

HISTORICAL OR MODERN ROOTS OF SUSTAINABILITY?

There is a rich literature on environmental discourses of sustainability in the Indian context (Lele 1991, Lele et al 2018, Dasgupta et al 2021). While there is a widespread acceptance of sustainability, there is little consensus over what it connotes. The literature suggests two major strands of sustainability narratives in India. On the one hand, there exists a popular discourse that equates sustainability with indigenization and 'ideologies of economic self-reliance' which also enjoys significant state backing. This scholarship professes that India's sustainability claims lay in its rich past. They emphasize on making the traditions and cultures palatable in present-day scenarios. This includes self-reliance of locally available resources, use of natural alternatives and locally sourced products, 'vernacular architecture' (Sahai, 2022), reclamation of Indian techniques, etc. On the other hand, there exists an academic discourse that critiques the popular conceptions of sustainability as being historically blind, and irresponsible towards India's exploitative material past and social inequalities and defines sustainability as a modern-liberal construct that accounts for the domestic inequities of the Indian society. They relate India's sustainability narratives to the more modern liberal meanings and international norms such as the Sustainable Development Goals, other institutions, etc.

The LiFE mission has consequences on not only the climate policy (Mathur, 2018) but also the sustainability narratives. It places the individual in climate action and uses a behavioural science framework to implement it. Such a behavioural change needs to be defined for transitions that are grounded in the sustainability ideals of social justice (Newell et al, 2022: 2). An emphasis on the intersectionality of individual action and climate justice (Mikulewicz et al, 2023) is pertinent in India's context. India's past, as brilliantly portrayed by Madhav Gadgil (2003: 190), gives a fantastic illusion that the caste system relates to ecological prudence and a resource partitioning system hiding the deep atrocities. The discourse of bringing back this past for a sustainable future is blinded to the exploitative histories (Sharma, 2021).

Sustainability narratives in India have closely inculcated issues of caste-based discrimination, the injustices of developmental activities and the effects of industrialisation on less powerful groups such as the peripheral regions, the tribes, the indigenous, the hills communities, etc. Environmentalism in India ought to be attentive to this history and its material undercurrents, or it would risk falling prey to what Ramchandra Guha calls 'full stomach environmentalism' (Robin et al, 2013) which denotes an environmental movement where standards and values of the post-industrial societies are imposed on the Indian society. The mission, in its current form, seems to make these mistakes.

With the usage of 'mindless consumption of today', the mission criticizes the consumerist capitalist market and acknowledges its direct role in enhancing the climate crisis. However, this treatment of India's consumption as being universally mindless across all socio-economic classes and regions negates the diversity and differences in wealth, income, resources and means for a dignified life. The dossier quotes, "For example, about 6-8 percent of global emissions can be avoided if we simply stop wasting food. Transitioning from in-person to virtual meetings at work can substantially reduce the carbon footprint by 94 percent and energy use by 90 percent." (MOEFCC and UNDP, 2022). Such a blanket use of statistics is ignorant of the inequalities that exist in the food that is eaten and the varied meanings of work across different socio-economic sections of society.

POST-2015 SOCIALIZING OF CLIMATE GOVERNANCE

I argue that the shifts in the global climate governance regime post-2015 have created conducive conditions for *socialising* climate policies in India, this phase favours the adoption of bottom-up sustainability models that prioritize the domestic inequities and recognises differential responsibilities of the society. Works of Navroz Dubash (2018), Sunita Narain, Sharachchandra Lele, Aron Atteridge (2012), and Joachim Betz (2012), etc. have contributed immensely to the climate governance literature in India. They study the dialectic relationship[15] between the international and the domestic and the evolution of domestic climate policies because of international developments in global environmental norms. The first phase from 1991 to 2009 was dominated by diplomatic or political dimensions. Climate change here was seen as a largely diplomatic issue where India's narrative at the international conferences was around its 'southern and developing identity', putting the onus to act on the developed countries with an emphasis on the transfer of technology, finance, and capacities (Vihma, 2011).

The second phase from 2009 to 2015 was dominated by an economic dimension where India moulded its narrative with the co-benefits argument that climate action is not different from the economic development and poverty alleviation goals of the country and that both can be simultaneously achieved (Dubash, 2013). This was led by the Copenhagen Summit of 2009 which brought the high-carbon emitting countries to the forefront to commit to carbon emission reduction and India also recognized its responsibility to become a serious and responsible player (Sengupta, 2018). Finally, the third phase started in 2015 after the Paris Summit was concluded where countries were encouraged to submit their INDCs.

The shift was from international to domestic level planning and from a top-down to a bottom-up application of commitments (Dubash and Pillai, 2021). Therefore, countries like India were free to announce their contributions according to their abilities and their socio-economic needs. Thus, this phase has been heavily dominated by the socio-economic dimension. This dimension not

[15] Two Level Game propounded by Robert Putnam (1988)

only marks the continuation of the co-benefits approach but also gives space for a sense of sociality to be introduced in climate policy and for socio-economic conditions to be considered. Several policies made since such as replacing chulha with LPG cylinders, and installing residential and standalone solar plants have placed individuals at the receiving of the policy-making. One of the secretaries of the MOEFCC in an important comment says, "Individual consumption patterns have a key bearing on Greenhouse Gas emissions" also testifying to the fact of the matter (MOEFCC and UNDP, 2022).

The post-2015 phase along with the institutions of SDGs has been very interesting and important in the Indian climate policy making as it recognizes a bottom-up formula for international commitment. This meant greater flexibility and control over designing the national climate policy in the country and the apportionment of responsibility for action. The flexibility also meant that not only can policy focus on the high-carbon emitting industrial sectors engaging in economic activities of production but also on changing consumer lifestyles, fostering greater adoption of sustainable choices, and consumption styles and bringing social change; thereby *socialise* an otherwise technical climate policy (Lucas, 2012).

The LiFE mission is based on the idea behind nudging people to limit their consumption without addressing the vast inequalities present in consumption. Given the socio-economic differences in a country, with most people struggling to reach the comfort stage of consumption, there is a need for a differential application of the mission and its objectives. The objectives will not be uniform across all socioeconomic levels of consumption. They need it to be more stringent, and restraint-based for the high consuming section of society (McDermontt et al, 2019) and need it to be redistributive, accommodative, and welfare-based for the sub-consuming section of the society. This directly talks to the debate around the domestic inequity of consumption[16] which has been frequently discussed in the climate governance literature (Dubash, 2013). Thus, the LiFE mission needs to adhere to the socio-economic conditions to make a just transition.

CONCLUSION

To conclude, this paper analysed the LiFE mission and the formal discourses surrounding the mission by referring to the official government policy documents, interviews, and newspaper articles. Drawing upon the major themes portrayed in the policy documents, using a critical lens, the paper places the objectives of the LiFE mission in the context of the larger sustainability narrative in India and the climate governance framework. It argued that any mission that targets the society, needs to be attentive to the social fabric of the country, its historical and social sensibilities, and the underlying material contexts. The LiFE mission, in its current nascent form,

[16] This is to say that there cannot be an on-size-fits-all approach to individual emission reductions and behavioural change in India. It needs to consider the historical and socio-economic material inequalities to make socially just policies. For instance, Sunita Narain and Anil Agarwal have talked about luxury emission and survival emissions.

applies the precepts of the behavioural science traditions that seek to bring a large-scale behavioural revolution by nudging individuals to alter their individual consumption choices. This is a blind application of a theory based upon a universalised conception of consumption patterns in India. It is unattentive to the vast inequalities of consumption patterns in the country. Any attempt to direct individual choices must not go against the already marginal communities, their livelihoods, their liberties, and their choices. Narratives of India's environmentally conscious past hide behind the lack of socio-economic mobility and opportunities to marginal communities.

Similarly, behavioural traditions surely have important lessons for policymakers. However, the LiFE mission conflates individual consumption which is an economic activity to encompass all aspects of living. Sustainable lifestyles include not just economic acts of consumption but also non-economic activities that one engages in on a day-to-day basis. For this, environmental education in schools and colleges, awareness about climate change and what to do about it are important. However, the mission is silent about it. A societal change needs a widespread shift in the motivation of the people and reinvigorating India's past can only help so much. What is needed is a climate policy that addresses the socio-economic inequalities of the country and deploys norms of sustainability that are not only environmentally friendly but also emancipatory.

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ROLE OF SUPREME COURT IN DELIVERING ENVIRONMENTAL JUSTICE

Ms. Prajnee Samedhini Sahoo
Assistant Professor, VES College of Law, Mumbai

Abstract: Human beings and the environment have a very close and complex relationship. On one hand, developmental activities necessitate the destruction of the environment and on the other hand human beings are dependent on the environment for its survival. The natural environment necessary to sustain human life is degrading day-by-day due to human activities. Natural resources are depleting and the climate is undergoing change. The need to protect the environment has given way to concepts like sustainable development. Sustainable development is a development which fulfills the needs of the present generation without compromising the ability of the future generations to fulfill their needs. To protect the environment, many domestic laws have been enacted. Right to Environment has been recognized as part of Right to Life under Article 21 of the Constitution of India by the Supreme Court. The Supreme Court of India has been acting as a guardian of the Constitution of India as well as of the people's rights. In the past few decades, the Supreme Court has delivered many landmark judgments laying down guidelines for the protection of the environment. The Supreme Court is always faced with a dilemma as any environmental dispute will involve the fundamental rights of both sides. This research paper will analyse the Constitutional provisions for protection of environment and some landmark Supreme Court judgments to see how the Judiciary has delivered justice in environmental cases.

Keywords: *Environment, Environmental justice, Supreme Court, Sustainable Development*

INTRODUCTION

"Environment includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property."[1] This definition of the environment gives a clear picture of the important aspects that constitute it. Environment does not simply mean the natural resources. But it also encompasses within it the relationship between these natural resources, living creatures and human beings. The interdependence of each of them is important to be understood. Human induced climate change is the biggest challenge faced by the world right now. Human beings through their activities have been causing the degradation of the environment. The mindless use of natural resources, felling of trees and pollution have an adverse impact on our environment. The overall development of a country is necessary in today's time. But there is also a need to be mindful of the harm caused to the environment. Necessary steps need to be taken to protect and

[1] Section 2(a) of the Environment Protection Act, 1986

conserve the environment. The available natural resources need to be used sustainably. The principles of sustainable development recognised by the United Nations in the 1970s is the way any developmental planning should happen. Sustainable development is a development which fulfills the needs of the present generation without compromising the ability of the future generation to fulfill their needs.

Right to environment is now considered a part of Right to Life. Environmental justice is defined as the fair treatment meted out to all involved stakeholders and the proper implementation of various environmental laws for its protection. The Constitution of India has many provisions for the protection of the environment and peoples' rights. The Parliament has legislated many environmental laws for the conservation and protection of natural resources, wildlife and the environment. Further, the Supreme Court of India has been bestowed with power to act as the guardian of the right of the people. This research paper is an attempt to throw light on the active role played by the Supreme Court in delivering environmental justice. This research paper aims to analyse the various legal and Constitutional provisions available for the protection of Environment and to look at various Supreme Court judgments delivered in relation to Environment. This paper is doctrinal in nature and uses primary and secondary sources.

ENVIRONMENT PROTECTION AND CONSTITUTIONAL PROVISIONS

The Constitution of India is the supreme law of the land. It guarantees to the people certain basic rights which are necessary for their overall development. The Preamble of the Constitution declares that India is a socialist, democratic and republic country. Being a socialist country, the State is a welfare state taking care of its citizens. It ensures that the resources of the country are accessible and enjoyed by everyone. The resources are distributed in an equitable manner amongst the people. A democratic state ensures that the government is elected by the people and functions according to the needs and requirements of the people. India is a republic which means that the head of the State is an elected one. All these characteristics of the State ensure that it functions for the welfare of the people. It is their duty to protect the natural resources and ensure its efficient use.

Part III of the Constitution contains the Fundamental Rights of the people. Ideally fundamental rights also broadly include within itself the idea of the right to a clean and sustainable environment. However, there is no explicit mention of the right to environment under Part III. "Article 21 of the Constitution guarantees to the people the right to life and personal liberty. It is a right which can only be taken away according to procedure established by law."[2] The Supreme Court has held that the right to a pollution free environment is an intrinsic part of the right to life.

[2] Article 21 of the Constitution of India states that "No person shall be deprived of his life or personal liberty except according to procedure established by law"

Article 19(1)(a) of the Constitution gives the citizens the "freedom of speech and expression". But this freedom is not absolute. Article 19(2) provides the reasonable restriction which can be imposed on it. Article 19(1)(g) of the Constitution gives the citizens the "freedom to practice any profession or to carry on any occupation, trade or business." According to Article 19(6), the State can impose reasonable restrictions on this freedom in the interest of the public. This has been very useful in regulating the functioning of the factories discharging effluents and noxious smokes. The Supreme Court in numerous judgments have issued directions and guidelines for the same.

The Constitution (Forty-Second) Amendment Act, 1976 added two important provisions in the Constitution of India. It added Article 48A to Part IV of the Constitution of India. It imposes a direction on the State to take necessary steps 'to protect and improve the environment'. It also directs the State 'to safeguard the forests and wildlife of the country'. It also added Article 51A(g) to Part IV A of the Constitution of India. It imposes a duty on every citizen of India 'to protect and improve the natural environment including forests, lakes, rivers and wildlife' It also imposes a duty on citizens to have compassion for living creatures.

India is a federal State with a strong center. It is considered as 'sui generis', unique or one of its kind. The Constitution of India provides for the distribution of the legislative power between the Union and the States. This distribution is on two bases, viz., territory and subject matter. Based on territory, the Union Legislature or the Parliament is empowered to make laws for the whole or any part of the Country and the State Legislatures can make laws for the whole or any part of the State. The Seventh Schedule provides for three lists, viz., Union List, State List and Concurrent List. The Parliament can exclusively legislate on subject matters mentioned in the Union List. The State Legislatures can exclusively legislate on subject matters mentioned in the State List. Both Parliament and the State Legislatures can legislate on matters listed in the Concurrent List. The 42nd Amendment Act shifted the subject matter 'forest' from the State List to the Concurrent List owing to the realization of the importance of forests. Forest conservation requires common legislation to be implemented at the Union level with modification by State Legislatures according to their local needs.

"The Constitution directs that the State shall endeavor to respect international laws and treaty obligations."[3] Article 253 empowers the Parliament to "make laws for implementing any treaty, agreement or convention." Therefore, India is bound to implement the international obligations arising from any treaty to which she ratifies. There are many international treaties and conventions dealing with the environment to which India has given its assent. These further help in protection and conservation of the environment.

POWER OF THE SUPREME COURT

[3] Article 51 of the Constitution of India

The Supreme Court of India is considered as a guardian of the peoples' rights. The Fundamental Rights given under Part III are justiciable in nature. It means that these rights can be implemented. In case these rights are violated then the Constitution provides for appropriate remedies. "Article 32 of the Constitution provides for the Constitutional remedies for the enforcement of Fundamental Rights. It empowers the Supreme Court to issue any direction, order or writ for the enforcement of Fundamental Rights."[4] Furthermore, "Article 141 of the Constitution declares that the law declared by the Supreme Court shall be binding on all the Courts within the territory of India."[5] The Supreme Court has taken its role of being the guardian of the Constitution and the people and has delivered many guidelines with respect to the environment. These judgments show the Supreme Court's zest to enforce the Constitutional principles and its role in protection of the rights of people.

RIGHT TO ENVIRONMENT

The Supreme Court has delivered environmental justice in a plethora of judgments. It is impossible to enumerate all of them within the confines of this paper. But an attempt has been made to look at the role of the Supreme Court in some of the landmark judgments delivered by them in various environmental aspects. The Apex Court has upheld the right to a pollution free environment in numerous judgments. It has also recognized the right of people to livelihood as part of Fundamental Right and has tried to balance it with the right to the environment. It has not only protected the environment through these judgments but has also ensured that rights of people are taken care of through the various guidelines issued by them.

The **Rural Litigation & Entitlement Kendra v. State of UP**[6], popularly known as the Doon Valley case, may be regarded as one of the most important judgments delivered by the Supreme Court in the environmental law jurisprudence. The Apex Court recognised the right to environment as an intrinsic part of the Right to life of everyone. The case involved quarrying of the limestone mines situated in the Doon Valley in Uttar Pradesh, currently Uttarakhand. The conflict between the Fundamental Rights of the parties involved makes for the classic clash between the Fundamental Rights of the owners of such quarries and mines, the workers employed in such quarries and the right of people to have a pollution free environment and the quest to protect and conserve the environment. The Supreme Court ordered the closure of many mines. The Court also was conscious of the problems that will be faced by the workers who will be jobless if the mines are shut down. But the Court observed that it was a price to be paid for the protection of

[4] Article 21 of the Constitution of India

[5] Article 141 of the Constitution of India

[6] AIR 1985 SC 652

the environment. It directed the State Government to give preference to such lessors of quarries whenever quarries are opened in other parts of the State.

ABSOLUTE LIABILITY PRINCIPLE LAID DOWN BY THE SUPREME COURT

The **M.C. Mehta v. Union of India**[7], popularly known as the Oleum Gas Leak case is considered one of the landmark judgments due to the principles laid down by the Supreme Court. The Shriram Food and Fertilizers factory was situated in a densely populated area of New Delhi. The situation of such a hazardous factory amid a metropolitan city creates a serious risk to the life of people in case of any accident or leakage. Keeping this risk in mind, M. C. Mehta filed a writ petition in the Supreme Court. While the petition was pending, a leakage of Oleum Gas occurred in the factory which resulted in the death of one advocate. The case involved some important jurisprudential questions to be dealt with by the Supreme Court.

The Court investigated the ambit of its powers under Article 32 to pass an order of compensation. It also investigated the question of liability of the owner of the enterprise arising out of such an accident. It was realized that the principle of strict liability as laid down in the famous Ryland v. Fletcher case leaves scope for exception and it was used by the industrialists to escape liability. In case of an environmental accident, it is necessary to impose liability on the owners of such enterprises where the accident has occurred. It laid down the principle of Absolute Liability which gives no exceptions or escape from liability. The Supreme Court recognised the difficulty in closing an enterprise which is providing day to day necessities. In this case, Shriram was providing chlorine to the Delhi Water Supply. The Court allowed the factory to reopen by imposing certain guidelines to be followed by it.

SUSTAINABLE DEVELOPMENT

The Supreme Court has recognized the various principles of Sustainable Development in many judgments. Sustainable development is the development which satisfies the needs of the present generation without compromising the ability of the future generation to satisfy their needs. It recogises principles such as inter-generational equity, pollution pays principle, precautionary principle, etc.

In **Indian Council for Enviro- Legal Action v. Union of India**[8], a Public Interest Litigation was filed seeking directions from the Supreme Court for curbing environmental pollution caused by private industries. What is important to note is that the directions were sought against the Government and the State Pollution Control Board asking them to perform their statutory functions. A lot of chemical industries were in the village of Bichhri in the State of Rajasthan.

[7] AIR 1987 SC 965

[8] (1996) 3 SCC 212

These industries were involved in the manufacture of chemicals like oleum and H-acids. The toxic effluents discharged from these industries had penetrated the soil and was leading to the pollution of groundwater. It rendered the groundwater unfit for human consumption and irrigation purposes. Consequently, the soil becomes infertile. Even after the closure of some of the chemical factories, the effect of the discharge of effluents remained.

The Supreme Court directed the closure of all the industries and reiterated the principle of absolute liability laid down by them in the Oleum Gas Leak case. It held that it is the duty of the Court being the guardian of peoples' rights to ensure that the authorities discharge their duties and perform their functions efficiently. The Court also recognised the polluters pays principle and held that it is the onus of the polluting industries to pay compensation for the damage caused to the environment and for its restoration. The Court said that "the Government is empowered under the Environment Protection Act, 1986 to take measures necessary and appropriate to protect and improve the environment."[9]

In **M.C. Mehta v. Union of India**[10], popularly known as the Ganga Water Pollution case or the Kanpur Tanneries case, a lot of tanneries were operating near the Ganga River in the city of Kanpur. A Public Interest Litigation was filed to issue directions for prohibiting these tanneries from discharging their trade effluents into the river Ganga. It was alleged that these tanneries have failed to put an effluent discharge treatment system in place. So untreated effluents are directly flowing into the river. The Supreme Court observed that it is irrelevant if the tanneries are financially unable to set up these treatment plants in place. The Apex Court compared this situation to an industry which is unable to pay minimum wages to its workers. It observed that like an industry which cannot pay minimum wages to its workers should not be allowed to operate, similarly an industry unable to set up primary treatment plants should not be allowed to operate as well. The Court ordered the closure of those tanneries which are unable to establish these treatment plants. The Court also recognised the hardship faced by the workers by such closure. But the protection of the environment and ecology is of paramount importance.

In **Vellore Citizens' Welfare Forum v. Union of India**[11], popularly known as the TN Tanneries case, the Supreme Court once again recognised the principle of sustainable development. Similar to the above-mentioned case, a Public Interest Litigation was filed for issuance of directions against the discharge of untreated trade effluents from tanneries and other industries situated in the State of Tamil Nadu. This discharge of effluent had resulted in the unavailability of potable water for the surrounding areas. The effluent had contaminated the soil and the groundwater. The Central Government had also offered to give subsidies for setting up of the treatment plants.

[9] Section 3 of the Environment Protection Act, 1986

[10] AIR 1988 SC 1037

[11] (1996) 5 SCC 647

But still these industries did not construct the same and continued to create pollution. This case also highlights the apathy of the State Government in controlling the pollution created by these tanneries.

The Court recognized the importance of the leather industries in the country in generating foreign exchange. But at the same time, economic development of the country cannot come at the expense of the degradation of the environment. So, the continuation of these tanneries cannot be permitted without construction of the treatment plants. It also recognised that the twin principles of sustainable development, viz., the Precautionary Principle and the Polluter Pays Principle are important for the development of the country while at the same time protecting the environment.

In **M.C. Mehta v. Union of India**[12], the Precautionary Principle, one of the principles of Sustainable development was recognised. Prevention is better than cure and this is reflected in this Precautionary Principle. It necessitates the industry owners to take the necessary precautionary steps to mitigate any possible environmental pollution or hazards in the future which may be caused due to the functioning of the industry. The present case arose due to the factories which were using coal/coke as fuel functioning in and around the Taj Mahal also known as the Taj Trapezium zone. The effluents discharged from these factories were causing the deterioration of the Taj Mahal. Here also the Supreme Court recognised the right to livelihood of the workers and specified certain rights to which they are entitled to.

MAINTAINING BALANCE BETWEEN ENVIRONMENT AND DEVELPOMENT

There is always a conflict between developmental activities and protection of environment. Both are equally important. Many a times, the Supreme Court has to resolve a dispute where the fundamental rights of people are involved. On one hand we have the right to environment of people and on the other hand there is right to livelihood of the people working in the industries.

In **F.B. Taraporewala v. Bayer India Ltd.**[13], a question was raised before the Supreme Court regarding the financial burden incurred by the industrialist in case of any accident like the Bhopal Gas Tragedy. There were chemical industries operating in the populated area of Thane district in the State of Maharashtra. Some of the chemical manufacturers had approached the High Court seeking some directions for the same. The Supreme Court was of the opinion that the industrialists have two options, viz., either to purchase the area wherein their industries are located or to relocate their industries out of such an area. It was contended that purchasing the surrounding areas would be a huge financial burden. So, relocation was the only option left

[12] (1997) 2 SCC 353

[13] (1996) 6 SCC 58

available to these industries. The town Planning Authority was requested to investigate the matter and prepare a plan accordingly.

In **Indian Council for Enviro- Legal Action v. UOI**[14], popularly known as the Coastal Protection case, recognising the importance of coastal areas to the environment, the Supreme Court issued various directions. There were allegations of blatant violation of rules regulating the coastal zones and the industries to be set up in and around these areas. It was alleged that many industries were set up in coastal areas illegally. The Apex Court observed that any law is enacted to be enforced. If such a law is not being enforced then it is worse than having no law in place regulating such activities. The Court directed the implementation of the various rules and Government notifications protecting the coastal areas and ecology as well as the Fundamental Rights of the people.

In **Narmada Bachao Andolan v. UOI**[15], there was a challenge to the award given by the Narmada Water Disputes Tribunal and the displacement of people due to the construction of the Sardar Sarovar Dam. The Supreme Court held that once the award becomes binding on the parties, it is not open for challenge. The tribunal had decided the height of the dam to be constructed. The construction of the dam led to the flooding of some areas which resulted in displacing the tribal population residing nearby. The Court held that such displacement is not violative of Article 21 of the Constitution as provision is made for the proper rehabilitation and relief of the tribals. The Court observed that construction of dams are necessary to provide water to the people. Water being the necessity of people and of utmost importance for their survival, it is the duty of the State to provide them with a source of water. Right to water is a Fundamental Right as being part of Right to Life under Article 21 of the Constitution.

RIGHT TO FREEDOM UNDER ARTICLE 19 V/S RIGHT TO ENVIRONMENT

Article 19 of the Constitution enumerates six different freedoms available to the citizens. Sometimes the enjoyment of these freedoms comes in conflict with the right to environment as well. The Supreme Court has delivered judgments resolving this issue as well.

In Re, Noise Pollution (V)[16]**,** a writ petition raised an issue of noise pollution created using loudspeakers in religious and social functions or by political parties. The immediate cause of this petition was the unfortunate rape of a minor girl whose cries for help was not heard due to the loud music blasting from the loudspeakers. The girl later set herself on fire and consequently died of her injuries. The Supreme Court observed that the loudspeakers are being used in these functions without any regard to the time or locality. Open spaces which are meant to be utilized

[14] (1996) 5 SCC 281

[15] (2000) 10 SCC 664

[16] (2005) 5 SCC 733

by schools are being rented out for organizing marriage functions. The noise pollution created consequently disturbs the students during their examination. The petition demanded that the rules regulating use of loudspeakers and restricting noise pollution are rigorously implemented.

The Supreme Court reiterated that Right to Life does not mean mere animal existence but it is a life to be lived with dignity. Every person has the right to enjoy their lives within the four walls of their house. This right includes the right to avoid noise pollution. No one can claim the right to an unregulated use of sound for their own enjoyment even within their house. Such sound should not travel beyond the confines of their house to disrupt someone else's peace. A noise which interrupts the daily life of an individual as understood by a reasonable person will be considered as a nuisance. A plea of freedom of speech and expression under Article 19(1)(a) cannot be taken to justify unnecessary usage of loudspeakers at high volume. This freedom has reasonable restrictions imposed on it by Article 19(2) and a restriction can be imposed on the use of loudspeakers and amplifiers on the ground of public order and decency.

In **Sushila Saw Mill v. State of Orissa**[17], the Supreme Court has again reiterated that there cannot be a trade without restrictions. The ban imposed on saw mill business in the prohibited areas of the reserved and protected areas were not violative of any Fundamental Rights. This ban does not impose an arbitrary ban and also falls within the reasonable restriction imposed on freedom to practice any trade.[18]

On similar lines, in **Burrabazar Fire Works Dealers Association v. Commissioner of Police**[19], the Supreme Court held that no one can claim the freedom to practice any trade which causes pollution and poses a hazard to the safety of the people and their health. The petitioners were manufacturers of firecrackers. The Court held that no one can force people to listen to noisy and pollution making firecrackers. The reasonable restriction imposed on such a right in the name of public interest is justified.

RIGHT TO HEALTH

The right to health of people is of paramount consideration. Right to pollution free water and environment forms an integral part of it. The Supreme Court has upheld the right to health of people.

In **Murli S. Deora v. Union of India**[20], the Supreme Court held that smoking in public places violates the Fundamental Rights of the non-smokers under Article 21 of the Constitution.

[17] (1995) 3 SCC 363

[18] Article 19(6) of the Constitution of India

[19] AIR 1998 Cal. 121

[20] (2001) 8 SCC 765

Smoking is injurious to the smokers but it does not mean that those who are present nearby the smokers have to suffer the air pollution caused by such smoking. It directed the Central Government, State Government and Union territories to take necessary steps in prohibiting smoking at public places.

In **Subhash Kumar v. State of Bihar**[21], a Public Interest Litigation was filed to prevent the alleged pollution of the Bokaro river water from the effluents discharged from the Tata Iron and Steel Co. Ltd. factory. This discharge of effluents was posing health hazards to the people living nearby. The river also provided drinking water to these people. It was alleged that the sludge which is being deposited is also making the soil infertile. The Bihar State Pollution Board claimed before the Court that the company is adhering to all the directions issued by them. The Supreme Court held that the right to life includes a right to enjoy pollution free water. It is necessary for the full enjoyment of life as guaranteed under Article 21 of the Constitution. Although the Court acknowledged that the petition was filed with malafide intentions, it also observed that any person who genuinely wants to represent the rights of the people can approach the Court for appropriate remedies under Article 32 of the Constitution.

ARBITRARINESS OF THE AUTHORITIES

The Supreme Court has taken note of the arbitrariness and complete apathy of the public authorities in many cases. The authorities focus on development and ignore the cost it pays in the form of harming the environment.

In **Bangalore Medical Trust v. B.S. Muddappa**[22], the development scheme for the extension of the city of Bangalore had earmarked an area to be developed as a park. Later on, this area was directed to be converted into a nursing home. It was contended that the conversion of the user of land is well within the powers of the development authority and therefore is justified. The Supreme Court refused the contention and recognised the importance of open spaces and parks in cities. The Court observed that open spaces provide space for recreation and playgrounds for children. These amenities are a matter of public convenience and public concern. It cannot be sacrificed so that a private person can build an enterprise and earn profit. The decision of the Chief Minister directing the conversion of park was held to be arbitrary and violative of Article 14 of the Constitution.

In the **Municipal Council, Ratlam v. Vardhichand & ors.**[23], the Supreme Court recognised the liability of a municipality to fulfill its duties. The residents of certain highrises complained to the

[21] (1991) 1 SCC 598

[22] (1991) 4 SCC 54

[23] AIR 1980 SC 1622

Magistrate that the Municipality is not providing basic civic amenities. The drains were not being cleaned and there was a stench emanating from it creating discomfort for the people staying nearby. The unclean drainage was becoming a breeding ground for mosquitoes and water borne diseases. The municipality claimed lack of funds as its reason for being unable to clean the drains. The Supreme Court did not accept this excuse and directed the municipality to fulfill its obligations.

CONSERVATION OF FOREST

The Supreme Court has delivered many judgments for protection and conservation of forests. Forest is important for maintenance of ecological balance. Uninterrupted and unregulated cutting of trees is destructive to our environment. The Supreme Court has played an active role in ensuring that the forests are protected.

In **T.N. Godavarman Thirumalpad v. UOI**[24], popularly known as the Forest Conservation case, the Supreme Court issued many interim directions against the activities going on inside the forests. This is the most important judgment delivered by the Supreme Court in the field of forest conservation. The Court called for the immediate stoppage of any activity which is being undertaken inside the forest without the authority of the Central Government. Felling of trees was banned in some areas with the view to protect the forests. While sawmills were stopped from operation in other areas. The Court recognised the need for the timber industry to function but also held that these operations need to be regulated so that unrestricted felling of trees is restricted. The Court directed that new wood-based industries should not be permitted to be established for some years and that forest needs to be conserved in a scientific manner. It also directed the State Government to identify ecologically sensitive areas where felling of trees will be completely banned.

CHALLENGES FACED BY THE SUPREME COURT

The Supreme Court has done remarkable work in the protection of the environment viz-a-viz the rights of the people. But the road has not been an easy one for the Apex Court. The major challenge faced by the Court has been the task of balancing the various conflicting Fundamental Rights of the parties involved. The Court has to keep in mind that development of a country necessitates the operation of industries. They cannot take a stance where they turn a blind eye to this aspect and simply pass judgment favoring protection of the environment at any cost. It is also noticed that the concerned authorities established under various environmental laws have shown apathy towards the issue of industries violating the environmental rules and consequently

[24] (1997) 2 SCC 267

causing pollution. There is also ineffective implementation of the various environmental laws and rules which makes the Court's job more challenging.

CONCLUSION

The Supreme Court has so far done an effective job of protecting and conserving the environment at the same time recognising the rights of people. It has tried its best to maintain a balance between the development of the country and the conservation of environment through its various judgments. The Supreme Court has ensured that environmental justice is delivered by considering the needs of all the stakeholders. They have not ignored the right of one party to upheld the right of another. The Supreme Court has upheld the principles of Sustainable Development in numerous judgments. For the judgment to act as a deterrence, stringent environmental laws are required. The current environmental laws lack the desired levels of punishment for the environmental offenses. The big industrialists are hardly affected by the quantum of fine imposed by the various Acts for violation of different environmental standards. Moving forward, what is required is a blend of effective environmental laws and its implementation and an active role of the judiciary in the protection and conservation of the environment.

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SUSTAINABLE AGRICULTURE PRACTICES: CASE STUDIES FROM MAHARASHTRA

Dr. Rashmi Bhure
Vice-Principal & Head, Department of Politics, SIES College, Sion, Mumbai

Abstract: After independence, India faced a serious food crisis which compelled it to import food grains from the West. In a bipolar world order, India's dependency on Western countries was an enormous embarrassment. Thus, in the decade of 1970s, India embarked on a 'green revolution' which led to a remarkable increase in food production. The Indian farmlands were introduced then to a high-yielding variety of seeds, and excessive use of machines, chemical fertilizers, and pesticides. Within a few decades, the darker side of the green revolution was in front. The heavy toll on the environment was alarming. Problems such as groundwater depletion, reduction in soil nutrients, and excessive use of pesticides seriously affected human health and further created inequalities among farmers. The adverse environmental effects of the green revolution and the fast-changing climate conditions have motivated farmers towards sustainable agriculture. Conventional farming is still common, but more farmers from Maharashtra are now considering regenerative or sustainable techniques in agriculture. It is important to note that the road is too long to popularise sustainable methods of agriculture. This paper emphasizes the importance of sustainable agriculture practices and states that they are key to boosting farmers' confidence. If farming becomes profitable, even the young generation will return to farming. The paper suggests sustainable agriculture practices will enhance water management and reduce farmers' suicide. Finally, the paper will discuss case studies of sustainable agricultural practices in the context of Maharashtra.

Keywords: *Sustainable agriculture practices, green revolution, Maharashtra, farming*

BACKGROUND

In 1947, India embarked on a new journey. India's first Prime Minister, Jawaharlal Nehru, dreamed of transforming India into a modern nation, and he believed industrialization was crucial to achieving that goal. Yet in 1948 Nehru said, "I am all for industry. I am all for steel plants and this and that; but I do say agriculture is far more important than any industry. Anything can wait, but not agriculture."[1] India**,** since its independence**,** was struggling with agriculture and within a few years was facing the grave challenge of food shortage. Hunger became the reality of free India**,** though India had horrific memories of starvation in the past during the 1943 Bengal famine. India had the daunting task of overcoming the problem of hunger and thus the government desperately took measures to deal with it. India's attempts at land

[1] Excerpts from the A. Gopanna, Jawaharlal Nehru: An Illustrated Biography, Nava India Publications, 2018 in *The Making of Modern India*, https://frontline.thehindu.com/the-nation/article25436814.ece

reforms, cooperative farming, and community development failed in making it a food-secure nation.

The 1950s saw a continuous fall in food production in India and for its ever-growing population; the government was left with little choice but to import food grains to feed them. By the mid-1950s under the Public Law (PL) 480 programme, India purchased wheat, rice, etc. from the United States. This arrangement worked for India till the 1960s. Political tensions arose between India and the US due to India's opposition to the Vietnam War, concerns over wheat quality, and the government's refusal to accept US food aid conditions, which hindered imports. This resulted in the 'ship to mouth' crisis in India. The 1960s were tough for India with two wars[2] and consecutive droughts (1965 and 1966) that pushed the rain-fed agriculture of India into further crisis. This scenario pressed the government to bring in some major transformation in Indian agriculture. Hence, around 1966, India adopted the green revolution programme comprising high-yielding variety (HYV) of seeds, and increased use of fertilizer and irrigation methods to achieve higher food production (Somvanshi et al., 2020). Due to the availability of good irrigation and other facilities, the green revolution technology led to a bumper wheat crop in some Indian states in a short amount of time. Only a few states, such as Haryana, Punjab, Uttar Pradesh, and some southern states, experienced growth in agriculture production.

The government's objective then was to accomplish self-reliance in food production, which resulted in their unwavering support for the new agricultural approach. Indeed, India emerged as an exporter of food grains for the first time after independence in the 1970s (Sangha). Alas! The quantum jumps in food production came at a price. The Green Revolution led to surplus wheat and rice production in India but at the cost of destroying the traditional crop variety. The crops that were once commonly consumed in households became fodder crops in just a few decades (Nelson et al., 2019). The other major downside of the green revolution was excessive water usage and depletion of groundwater in India. Furthermore, chemical fertilizers and pesticides led to soil toxicity, reduced soil fertility, and added to water pollution.

The severe impact is also seen on human health. Several studies have shown that indiscriminate pesticide usage has led to several health effects on human beings in the nervous, endocrine, reproductive, and immune systems (John & Babu, 2021). Women in India make up approximately 50% of the agricultural workforce and are therefore at a high risk of being exposed to toxins, which can have detrimental effects on their children too (John & Babu, 2021). A study conducted in rural Punjab revealed that the excessive level of pesticides in water and vegetables is one of the primary reasons for the high number of cancer cases (Thakur et al., 2008).

[2] In the decades of 1960s India fought two wars -the India-China war in 1962 and the India-Pakistan war in 1965.

Farmers were also trapped in high capital costs due to the green revolution technology where they had to purchase expensive HYV seeds, fertilisers, and pesticides to get increased agriculture production. Farmers borrowed money and did not leave their farmland fallow to restore its fertility. Instead, they rushed to produce surplus crops to pay back the loans.

M.S. Swaminathan, the principal architect of India's green revolution, had put forth the precautionary principle 'Exploitative agriculture offers great dangers if carried out with only an immediate profit or production motive. It is important that the emerging exploitative farming community in India become aware of this. Without preserving soil fertility and structure, intensive cultivation would eventually result in the emergence of deserts. Irrigation without arrangements for drainage would result in soils getting alkaline or saline. Indiscriminate use of pesticides, fungicides, and herbicides can upset the biological balance and result in an increase in cancer and other illnesses due to toxic residues in grains or other edible parts. The unscientific trapping of underground water will result in the rapid depletion of this precious resource, which has been conserved through generations of natural farming.

Replacing diverse, locally adapted crops with a few high-yield varieties over large areas could spread devastating diseases, leading to the decimation of entire crops, as seen in the Irish potato famine of 1854 and the Bengal rice famine in 1942. Therefore, without understanding the consequences and building a solid scientific and training foundation, starting exploitative agriculture can lead in the long run, to a disastrous future for agriculture than prosperity' (Kesavan & Swaminathan, 2008). The nation was so excited about the agriculture boom that the people completely ignored the long-term effects of this new technology and the precautions given by M.S. Swaminathan. With the negative effects of the green revolution on biodiversity and human health and the added challenge of climate change, Indian agriculture is now dealing with multiple complex issues. Thus, the farmers' suicide has become the dark reality of rural India. Therefore, there is a need to change farming practices and adopt sustainable agriculture in India. This paper is centered around the sustainable agricultural practices implemented in Maharashtra, the state with the highest number of farmer suicides in recent years. The paper suggests that sustainable farming practices can create a profitable and engaging future for agriculture, even attracting the educated youth.

WHAT IS SUSTAINABLE AGRICULTURE?

According to the United Nations, sustainable agriculture "is farming that meets the needs of existing and future generations, and ensures profitability, environmental health, and social and economic equity. It favours techniques that emulate nature–to preserve soil fertility, prevent water pollution and protect biodiversity" (A Beginner's Guide to Sustainable Farming, 2021). In short, sustainable agriculture sustains both ecology and farmers. In 2015, the United Nations declared the 2030 Agenda for Sustainable Development with an aim to save the planet today and for the coming generation. Sustainable agriculture can contribute to achieving some of the United

Nations Sustainable Development Goals (UNSDGs), particularly emphasizing the zero-hunger objective.

In India, sustainable agriculture is achieved through practices such as agroforestry, biodynamic farming, crop rotation and intercropping, conservation agriculture, cover crops and mulching, contour farming, floating farming, integrated farming systems, natural farming, organic farming, permaculture, rainwater harvesting, (Gupta et al. 2021) drip irrigation, watershed development, and management, etc. In recent years, the government of India has taken many initiatives to promote sustainable agriculture. In 2015, the *Paramparagat Krishi Vikas Yojana* (PKVY) was started to promote organic farming, the National Mission for Sustainable Agriculture (NMSA) has been formulated to make agriculture more productive, sustainable, remunerative and climate resilient by promoting location-specific Integrated/Composite Farming Systems (National Mission for Sustainable Agriculture). To adopt comprehensive soil health management practices based on soil fertility maps, soil test-based application of macro & micronutrients, and judicious use of fertilizers are introduced (National Mission for Sustainable Agriculture).

CHALLENGES BEFORE THE AGRICULTURE SECTOR IN MAHARASHTRA

The state of Maharashtra is the second most populated state in India, with almost 45.2 percent of its population living in urban areas (Economic Survey of Maharashtra 2017-18, 2018). Yet Agriculture and allied activities are one of the prime sectors of Maharashtra's economy, accounting for an average 12.1 percent share in the Gross State Value Added (Agriculture and Allied Activities). Agriculture in the state depends on the monsoon and the geographical conditions are such that one-third of the state is under the rain shadow. Marathwada, North Maharashtra, and Vidarbha are mainly the semi-arid regions in the state. Further climate change has heavily impacted the rainfall in these areas, making it repeatedly drought-prone hit regions. Other parts of Maharashtra, also because of the challenge of climate change, have been experiencing erratic rains. Limited water availability and the risk of soil erosion during floods are both major concerns for farmers.

Maharashtra's agrarian crisis resulted from the shift in the farm landscapes since the 1980s from indigenous crops like millets to cash crops such as cotton, sugarcane, sunflower, soybean, etc. The change in the cropping pattern in a short while gave farmers high dividends as compared to the traditional crops. On the downside, growing cash crops cultivation had negative consequences, leading to environmental problems like the exploitation of groundwater and subsequently its depletion, and soil fertility loss due to the excessive use of chemical fertilisers, and pesticides. Maharashtra's high number of small landholders are vulnerable to vicious debt traps due to crop failures, expensive production costs[3], and market uncertainties. Loan cycles are never-ending, but sadly, what ends is the farmer's life and a new struggle for the survival of his

[3] Production cost increases because of hybrid seeds, fertilisers, and pesticides.

family. Even if in a particular year the crop production is high, the farmers face the issue of not getting a fair price. Many onion growers in the past preferred to throw onions on the road rather than sell them at the lowest price in the market. The catastrophic effect of all this is rising farmer suicides. According to the data of the Maharashtra government, 1023 farmers ended their lives between July 2022 to January 2023 (Deshpande, 2023). Maharashtra has unfortunately witnessed the maximum number of suicides over the last ten years, highlighting the harsh reality of rural distress in the state. Hence, the agriculture sector requires urgent attention and a paradigm shift. It is essential to address the fundamental issue or tackle the root cause. The government regularly needs to have a farmer's happy index. These surveys will uncover many intricate issues related to the social, psychological, and economic factors that farmers encounter. For this critical issue, both short- and long-term solutions have to be implemented. The government frequently declares short-term measures, like farm loan waivers, drought relief packages, and compensation for farmer suicides. Though these quick measures are much needed, the broader focus should be on sustainable measures that sustain farmers and agriculture. Thus, agriculture must become sustainable, climate resilient, profitable, and attractive.

There is a need to launch a massive awareness campaign to encourage the adoption of sustainable agriculture practices. Parallelly awareness about government schemes and initiatives such as Maharashtra State Mission on Millets, *Rashtriya Krishi Vikas Yojana*, *Punyashlok Ahilyadevi Holkar Nursery Scheme*, National Food Security Mission (NFSM), Sub-Mission on Seeds and Planting Material (SSPM), National Mission for Sustainable Agriculture(NMSA), *Paramparagat Krishi Vikas Yojana* (PKVY), *Pradhan Mantri Krishi Sinchayee Yojana* (PMKSY), Nanaji Deshmukh Krishi Sanjeevani Prakalp (Project on Climate Resilient Agriculture -PoCRA) and many more needs to be undertaken so that maximum number of farmers can take the benefit of these schemes (Agriculture and Allied Activities).

SUSTAINABLE AGRICULTURE PRACTICES IN MAHARASHTRA

Zero Budget Natural Farming (ZBNF)- 'Zero budget' farming aims to tackle the agricultural crisis and support small-scale farmers by cutting production costs, which will eliminate their reliance on loans and end the cycle of debt. 'Zero Budget' denotes refraining from using credit and avoiding expenses, while 'Natural farming' indicates farming without chemicals and in harmony with nature (Zero Budget Natural Farming in India). In India, the ZBNF practise was established by Padma awardee Subhash Palekar of Maharashtra. The Subhash Palekar Natural Farming (SPNF) approach is today practised by several farmers in Maharashtra and other states of India. The primary aim is to cut production costs for farmers who switch from chemical-based farming to sustainable or natural practices. Subhash Palekar aims to make natural farming a mass movement. SPNF is based on four ideas:

1.*Jiwamrita and Ghanjiwamrita*- Use of *jiwamrita* in the farm a fermented mixture of water, local cow urine, dung, jaggery, and pulses flour, is the mainstay of ZBNF. It improves soil

microorganisms and creates a microclimate that makes the soil fertile, productive, and lively (Palekar, 2021). To avoid high water consumption in preparation of *jivamrita*, Subhash Palekar developed an alternative for drylands and semi-arid areas called *ghanajiwamrita.* It is a solid mixture made with indigenous cow dry dung which is sprinkled with *jiwamrita* and then fermented. Small-scale farmers can find these ingredients easily without spending a lot of money. The natural farming budget is virtually non-existent because the microclimate enriches the soil with nutrients and promotes a symbiotic relationship between plants and weeds or wild plants, which eliminates competition for food.

2. *Bijamrita*- is the process of treating seeds to prevent seed-borne diseases such as bacteria, fungus, virus attacks, and to enhance germination of seeds for high yield and healthy crops. *Bijamrita* is made of water, local cow urine, dung, and edible lime. This mixture is fermented overnight and then sprinkled over the seeds. The application of *bijamrita* controls many diseases that would otherwise spoil the crop.

3. *Mulching*- Mulching means covering the top soil surface. Soil microorganisms requires mulching to decompose the natural straw and produce humus, which makes the soil fertile. Moreover, it protects earthworms they in turn create holes in the soil through which water is percolated and retains as a reservoir deep into the soil (Palekar, 2021). Thus, mulching aids in water retention and reduces water stress in semi-arid regions. Further, the thick layer of mulch also prevents weeds, which reduces the production cost. To remove weeds, either many labours are required or farmers use chemical-based weedicides.

4. *Crop protection*- The SPNF focuses on increasing the resistance power of crops so that they can sustain climate change. SPNF recommends homemade bio-pesticides to manage water, soil, and air-borne diseases besides protecting crops by producing humus. *Neemastra* is made of water, cow urine, dung, and neem leaves. This mixture is fermented for 3 to 4 days and then used as a pesticide. Similarly, *bramhastra* is made of cow urine and with bitter taste leaves, *agni-astra* is made of cow urine, neem leaves, tobacco powder, chilly and garlic pulp, *dashaparni kashayam* is made from water, cow urine, dung, turmeric powder, ginger pulp, asafoetida powder, *sapta dhanyankur kashayam* consists of water, cow urine and seven seeds or grains such as sesame seeds, green gram seeds, black gram seeds, cowpea seeds, moth beans, Bengal gram, wheat. All these natural pesticides are sprayed on plants which not only control varied pest attacks on the crops but also produce healthy crops. The use of pesticides, herbicides, or weedicides is not required in the farm as the SPNF promotes inter-cropping or companion planting which is expected to break the habitat and act as a barrier to insect pests and diseases (Anshu & Chaddha, 2021).

The usage of SPNF techniques is a major advantage for small and marginal farmers in Maharashtra, as it decreases production costs, boosts farm output, and enhances the profitability of agriculture. Above all these sustainable agriculture practices will support India's initiative to

attain the United Nations Sustainable Development Goals (UNSDGs) of zero hunger and ensure healthy life and well-being of all.

Saguna Regenerative Technique (SRT)- The Saguna Regenerative Technique (SRT) was created by Chandrashekhar Bhadsavle for conservation agriculture at Saguna Baug, Neral, Dist. Raigad, Maharashtra, which is also known as the no-till method of farming which is climate-smart, increases the organic carbon of the soil, considerably increases the productivity of the land, and thus adds to the happiness & confidence of the farmer (Saguna Regenerative Technique (SRT), a no-till conservation agriculture method of rice-based farming).

SRT is popularly used today for the cultivation of rice, millet, cotton, oilseeds, and vegetables by more than 5,000 farmers from Maharashtra, Gujarat**,** and Himachal Pradesh (Bhadsavle, 2023) SRT is based on four principles:

1. *Zero-till of land and permanent raised beds*- Traditionally rice cultivation used to be labor-intensive and time-consuming because of the elaborate process of ploughing, puddling, and transplanting rice seedlings to beds. The long process added to production costs. With SRT, farmers can cut down on the backbreaking work and the labour cost as farmers do not have to plough, puddle, or hoe in this method. By almost 40% the production cost is decreased **(**Saguna Rice Technique-SRT). Permanent raised beds are used in this method. They facilitate ample oxygen supply to the root zone area while maintaining optimum moisture conditions there (A Brief Report on Paddy Productivity Enhancement Through Saguna Rice Technology**).** This system is advantageous for arid and semi-arid regions of Maharashtra. Since puddling is not required in SRT cultivation, water consumption is reduced by almost 40% (S. R. T.- A No Till, Regenerative Agriculture Technique for crop production, 2023), and additionally, erratic rainfall due to climate change does not become a major challenge for the farmer. Thus, SRT proves to be a climate-resilient method and the farmer is confident of the crop.

2. Regenerative soil- Tillage disturbs the soil structure, loss of important silt, and leads to soil erosion, ultimately affecting the soil fertility. To overcome all these issues SRT recommends no-tillage in farming and improves or regains the soil health, resulting in better yield and profits, while being eco-friendly and beneficial to farmers.

3. Crop residues and leave weeds to decay- Crop residues are a rich source of plant nutrients and, hence have the potential to improve the resource use efficiency along with the sustainability of the agro-ecosystem. (Kumar et al., 2023). Hence, in SRT, they leave the crop residue and weeds to decay so that soil nutrients will be retained and the soil will be enriched. Moreover, crop residue burning has become an environmental and health hazard. Every year this issue is creating problems in the states of Punjab, Haryana, and Delhi it can be avoided with the implementation of SRT.

4. Crop rotation for biodiversity- For around 25 different crops, the farmers have implemented SRT. SRT promotes the idea of crop rotation for the good health of soil. Varied crops give soil microbes, which are required to enhance the quality of soil.

CONCLUSION

Maharashtra is the second most populous state in India, thus the demand for food is high here. On the other side, the farmers are dissatisfied because of climate change, crop loss, volatile markets, high production costs, and little to no profits, resulting in mounting debts, and causing them to consider leaving agriculture. This is not a promising scenario, as it will subsequently impact food security and create major distress in Maharashtra. What are the possible quick fixes that need to be implemented?

First, the farmers need to move from water-intensive crops to more sustainable and climate-resilient crops such as millet. It is time that farmers in the state change crop patterns. Second, the government has to positively intervene to stabilize the market and give a fair price for crops. Third, extensive campaigns are necessary to increase awareness about sustainable agricultural practices. The SPNF and SRT models have been proven to be climate resilient and suitable for semi-arid regions of Maharashtra. These models also help save water and produce quality food free of chemicals.

It is important to give wide publicity to the success stories of farmers practising SPNF or SRT to convince others that sustainable agriculture practices can be profitable and liberate farmers from debt traps. These methods will make farming a dignified and highly paying profession or enterprise, which will inspire educated youth to return to farm fields. The adoption of SPNF, SRT, and other sustainable agriculture practices have to become a mass movement for which it's vital to have a shift in mindset.

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CLIMATE CHANGE AND REFUGEE CRISIS: THE DOUBLE MARGINALIZATION OF ENVIRONMENTAL REFUGEES

Ms Sukanya Menon
Assistant Professor, Department of Sociology, Sophia College for Women, Mumbai

Abstract: Two major predicaments which have changed the world in the 21st century, has been the issues of climate change and refugee crisis. While there are several social and political causes behind the same, the coming together of these two has resulted in another crisis-environmental refugees. The altering environmental conditions- and subsequent climate change- have led to massive displacements, resulting in the emergence of a new diaspora of environmental refugees. Research reports by organizations such as Red Cross and UN indicate that the number of environment refugees could be higher than the number of political refugees, and the situation is only expected to worsen in the years to come. This paper seeks to understand this growing crisis and how the environmental refugees face double marginalization under these dual challenges and looks at how a lack of proper redressal mechanisms and policy reformations could result in the worsening of the same in the years to come.

Keywords: *Environmental Refugees, Climate Change, Refugee Crisis, Displacement, Marginalization*

INTRODUCTION

The world and society around us are changing on a massive scale today. One of the major challenges of the 21st century has been caused due to climate crisis and the subsequent changes in the environment and our surrounding eco-system. News about floods, wildfires, earthquakes, rising sea levels and other environmental changes have been more frequent in the last couple of years. Alongside, another pressing issue that has been of concern is that of the ever-increasing refugee crisis. Statistics show that over 10 million people have been impacted due to the same in the last decade alone (UNFCCC), and the number is only expected to rise in the upcoming years. While there are several reasons as to why and how people become refugees, one of the major reasons have been the change in the climatic conditions across the world, which has threatened the livelihood of many communities and increasing the possibility of them being refugees. This group is often termed as environmental refugees and unless action-plans and legislations can be set, the grievances and concerns of this group will only continue to grow in the years to come.

The world and its structure may be studied and understood through several paradigms. One such way of studying the world is based on the changes in rock strata and the makeup of the fossils; this is then used to mark the boundaries between formal intervals of geologic time. Currently, we are living in what geologists and anthropologists refer to as the Anthropocene

Epoch.[1] An unofficial unit of geological time, this recent period in Earth's history differs from the earlier stages due to the significant impact that human activity has had on the planets climate and eco-systems. The human activity in question, ranges from the Industrial revolution, massive urbanization and the constant conflict over political, economic, and social issues which have hindered several States, and subsequently altered their environmental conditions. The alterations in the eco-systems have been argued to reach a point of no-return (Rafferty), and the various social and structural factors seem to further aggravate the problem. This can be associated with an increase in natural disasters as well as threats to basic resources like water, food, and shelter, which then destabilizes the ecosystems. As Dunlap and Brulle write-

> "The rapid anthropogenic climate change is dramatically disrupting the bio-physical conditions which make the Earth a suitable home for natural species including human beings… and thus threatens the future of society." (Dunlap and Brulle 7)

Contemporary discussions tend to view climate change as a global environmental problem and many of the policy decisions and frameworks have been undertaken keeping the issue detached from its social context (Bjurstrom and Polk). However, it is clearer than ever that the environmental crisis is not only a concern for the natural sciences and policy makers, but it is time for the issue to be analyzed from the social and structural perspectives it is bound by. This can be placed and analyzed within the post-political perspective. As argued for by scholars like Eric Swyngedouw and Bjurtstrom and Polk (Dunlap and Brulle 9), the nature of framing climate change is evidenced in official reports largely rooted in natural sciences; it depoliticizes the issue, leaving the discussion devoid of political, economic, social, and cultural contestations that the discussion largely reinforces the existing socio-politic-economic status quo (Dunlap and Brulle). It thus highlights, how the dominant scientific framings of climate change are incomplete and partial, which thereby extends itself into inadequate policy proposals.

This intersection of climate change and refugee crisis can be placed into what scholars refer to as a 'polycrisis'- a term which was popularized by historian Adam Tooze (Knight and Henig). The 21st century has seen multiple interconnected threats and challenges which have threatened global stability. They interact in such a way, that the "overall impact exceeds the sum of each part, and the issue can thus, not be reduced to a single common denominator" (Whiting). Climate change thus poses a formidable challenge, not only in impacting the migration patterns, but it has also added to the poor political crisis which is at the helm of the refugee crisis. The depletion of natural resources and the fight to grab these resources have led to massive conflicts which has further exacerbated the problem. This paper looks seeks to understand the emergence of

[1] The Anthropocene is an unofficial unit, since it is still being discussed and contested by scholars across the globe. While some argue about how the world has moved from the Holocene (the preceding stage) to the Anthropocene, several others contest that we are already well into the Anthropocene Epoch, as the role of humans in the ecosystem is that significant and pronounced.

environmental migrants or environmental refugees and throws light on why legislations and actions must be created soon to combat the pressing concerns and challenges faced by them.

CLIMATE CHANGE IN THE 21ST CENTURY

According to the UNHCR, climate change has been stated as being "the defining crisis of our time" (Gaynor). In 2018, the US National Climate Assessment concluded that because of human activities, Earth's climate was changing more rapidly than any point in the history of modern civilization (Jay). The impact of the climate crisis on the environment and the eco-system around has been written about and discussed in great length. While there have been on-going debates on the Anthropocene Epoch and its beginning, this paper looks at climate change from the end of the 19th century, and how the concentration of greenhouse gases has altered the atmospheric conditions in unchangeable ways. Since the onset of the industrial revolution, human actions have led to an increase the greenhouse gases (such as CO2, Methane, Nitrous Oxides, Chlorofluorocarbons) found in the atmosphere (Dietz et al.) This has led to changes in the long-term patterns of weather- resulting in higher temperatures, changes in precipitation levels, rising sea levels, storms, and floods. This leads to changes within the ecosystems and the larger biophysical environment. As it unfolds and these processes intersect with other environmental changes, it will lead to a loss of bio-diversity, widespread dispersion of chemicals which adversely impact the eco-system and many of the resources which humans depend on. This has multiple repercussions (Rosa et. al.). It not only leads to a loss of resources, but it also extends itself to the larger conflict, as people attempt to grab and capitalize the depleting resources for their personal gain.

THE GROWING REFUGEE CRISIS

The growing refugee crisis has been a major predicament of the 21st century. The UN Refugee Agency (also known as the UNHCR or United Nations High Commissioner for Refugees) defines refugees as "someone who has been forced to flee their home because of persecution, war, or violence. Most likely, they cannot return home or their lives would be put at risk." (UNHCR). The term refugee was officially defined at the 1951 Refugee Convention as a response to the refugee crisis which followed the second World War and which left over 50 million forcefully displaced worldwide. As per the Convention, a refugee was defined as "someone who is unable or unwilling to return to their country of origin owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion." (UNHCR). Before delving further into the crisis of the refugees, it is important to understand the meanings and differences between some of the terms which are relevant to this discussion.

Humanity has been on the move, since the earliest of time. Some people move in search of new economic opportunities and horizons, others to escape armed conflict, poverty, food insecurity,

persecution, terrorism, or human rights violations and abuses. Several others do so in response to "the adverse effects of climate change, natural disasters (some of which may be linked to climate change), or other environmental factors. Many move, indeed, for a combination of these reasons." (New York Declaration for Refugees and Migrants). When people leave their homes in search of better opportunities, better livelihood, and for other personal reasons, then such a process would be known as migration and those who take part in this movement would be known as emigrant or immigrant. As per the UNHCR, "A migrant is someone who chooses to move, not because of a direct threat of persecution or death, but mainly to improve their lives through work opportunities, education, family reunification or other reasons" (UNHCR). This is an integral distinction, as unlike refugees who cannot safely return home, migrants face no such impediment to return. If they choose to return home, they can do so, and still receive the protection of the government.

A term which is equally critical to this discussion is IDP, i.e., an internally displaced person. By definition "an internally displaced person (IDP) is someone who has been forced to flee their home but never cross an international border. These individuals seek safety anywhere they can find it—in nearby towns, schools, settlements, internal camps, even forests and fields." (UNHCR). Among the large (and ever-increasing) number of refugees in the world today, IDPs are one of the largest sub-groups identified. What separates them from the refugees is that, since the IDP's are legally still under the jurisdiction of their own state- and thereby the government- they cannot be protected by international laws neither are they eligible to receive any kind of aid from these organizations. IDP primarily includes people who are displaced by internal strives and natural disasters.

The critical factor connecting all these terms is the notion of displacement. A migrant, refugee, and an IDP are displaced from their homes. The crucial difference lies in whether it is forceful or not. A refugee and an IDP would fall into the former category- their movement is forceful, often due to reasons which they are not directly responsible for. Some of the possible reasons could be due to persecution- on social, political, national, or religious grounds. A closely connected factor is War. Most of the refugees in the world come from states which have been undergoing some form of civil war or conflict. The largest group of refugees presently come from Syria, where civil war has been ongoing since 2011, which has left over 5 million refugees, and over 6.3 million IDPs (CNN). A similar scenario was seen in Iraq and Afghanistan in 1990s and 2000s. As per current statistics provided by the UNHCR, there are over 108.4 million people worldwide, who are forcefully displaced, of which over 29 million are categorized as refugees by the UNHCR mandate, and over 62 million people are IDPs.

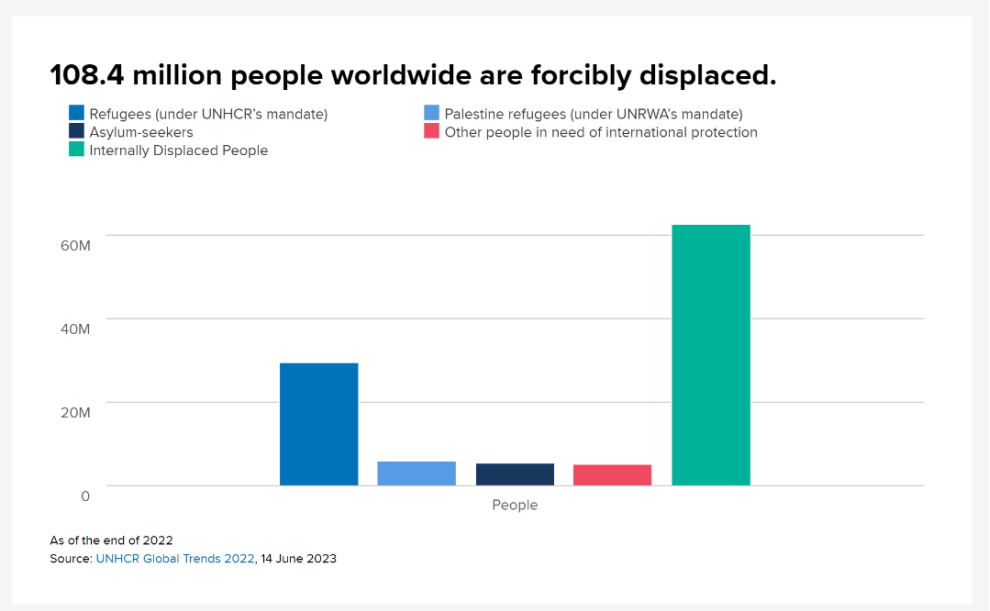

Fig. 1.1 Global Displacement Statistics
Source: UNHCR Global Trends.

Another reason for the refugee crisis has been the lack of stable food sources which have come in because of widespread drought- as seen in countries like Somalia, Sudan, Nigeria, and Yemen. It has been estimated that across the African continent, there are over 20 million refugees and over 17 million IDPs (Wintour). This can also be coupled with rising problem of climate change. Research shows that in the next 50 years, there could be a shocking 13 million people who are displaced from coastal towns due to the temperature increases, melting of the ice glaciers, and the rising sea water levels which threaten their livelihood (Wintour).

A deeper analysis of these factors shows us that the refugee crisis can be connected to climate change and the subsequent changes which are brought forward by the same. The term 'environmental refugee' was coined by the United Nations Environment Programme in the 1980s. It refers to a group of people who are forced to leave their community of origin due to the changing environmental factors around them. This could be the soil erosion, drought, floods, which are then coupled with poor socio-economic conditions, thus resulting is an unstable and insecure environment around them. These can lead to deterioration in the quality of agricultural land, natural disasters, or unnatural/human-made destruction due to war or conflict, which further adds to the environmental scarcity (Wintour).

While these terms etymologically have different meanings and implications, it is interesting to note that they are interchangeably used in most of the publications. While literature in this emerging field tends to use environmental refugees and environmental migrants in exchangeable

ways, this paper emphasizes on the usage of the term environmental refugees (which also includes the IDPs) for an appropriate understanding of the issue.

THE INTERSECTION OF CLIMATE CHANGE AND REFUGEE CRISIS: THE ENVIRONMENTAL REFUGEES

In the 2018 Global Compact on Refugees, the UN officials stated that three major factors were the drivers of refugee movements, namely- climate change, environmental degradation, and disasters. Within this polycrisis, it becomes increasingly difficult to find safe and sustainable solutions as climate change adds to the degraded environmental conditions around the refugees. While one may argue that nature does not discriminate, it is evidently seen that the vulnerable people living in the conflict-affected countries tend to be disproportionately affected. (UNFCC)

There are several ways by which a community could be facing environmental scarcity. Supply-induced scarcity is a result of the natural resources being depleted. Demand-induced scarcity occurs because of population growth or increase in the consumption of a resource. The third category is structural scarcity, which is a result of the resource being unequally distributed socially. These causes could occur in combination with one each other or occur simultaneously. The real danger lies when these factors get coupled with other environmental and social influencers (McGrath).

An example could be the humanitarian crisis in Yemen. The ongoing conflict in Yemen has reached its ninth-year, with over 4.2 million IDPs (UNHCR). The country has been marred by the political conflict between the two major groups, who have claimed to constitute the official government as well as several other independent groups like the Houthis, Islamic State, Al-Qaeda, and several other local non-aligned forces. According to the 2023 YFCA Report, Yemen in one of the world's most vulnerable countries to climate change, and the least prepared to mitigate or adapt to its impact. The country has been threatened with massive climate change related impacts such as droughts, sudden disease outbreaks, sea level rising- all of which have added to the fragile state of the country. This has led to a major famine in Yemen which has been worsened by the unpredictable and intense climate in the region; ranging from intense and short-lived heavy storms to flash floods which result in the degradation of agricultural land, soil erosion, and uprooting of the vegetation. This has in-turn impacted the economic conditions in Yemen, as these conditions led to the desertification of agricultural products, leading to reduced yield of crops. Additionally, the rising sea-levels have led to saltwater intrusion making the coastal waters undrinkable and exacerbating the water-scarcity issue.[2] The impact of climate

[2] The increase in the sea levels, will subsequently lead to a rise in the water levels along the coasts, thus leading the saltwater to move onto the land. Known as saltwater intrusion, this occurs when storm surges or high tides overtop areas low in elevation. It also occurs when saltwater infiltrates freshwater aquifers and raises the groundwater table below the soil surface, thus making the

change has led to a significant threat to country's food security, further depriving the people of Yemen. Thus, environmental problems place an additional burden to areas which are already under pressure (Poornima and Ramesh). Similar situations have been seen in countries like Haiti, Mozambique, and Egypt (Cappelli, Federica, et al.).

According to the records released by the World Bank's Groundswell Report, "By 2050, Sub-Saharan Africa could see as many as 86 million internal climate migrants; East Asia and the Pacific, 49 million; South Asia, 40 million; North Africa, 19 million; Latin America, 17 million; and Eastern Europe and Central Asia, 5 million." (2023)

Statistics have shown that environmental refugees predominantly come from developing countries and areas which are most vulnerable to the climate change and natural disasters. Data from the Center for Disease Control and Prevention show that most of the relief missions for the refugees came from less developed countries; those with inadequate access to resources, or which have already been stained by on-going socio-political conflicts, which further jeopardize their lives. Climate change has thus gone hand in hand with several social problems to exacerbate the social tensions in many regions. According to the Global Trends in Forced Displacements Report of 2020, "95% of the conflict displacements occurred in countries vulnerable to climate change." One of the earliest and most prolific writers on environmental refugees, Dr. Norman Myers, in his 2002 paper spoke about how there was a growing rise in environmental refugees, compared to those fleeing political or religious prosecution (Myers). Yet, there remains very little reliable data and statistics to back the same in the current era. The number of people seeking environmental refugee also get grossly underestimated, as many of them are internally displaced within the country.

There are several distinct sets of challenges with regards to the displacement of the people. For the internally displaced persons, displacement from their homes or communities to another region could sometime imply a similar environmental threat. A case in point could be the emergence of Sand Dunes in Mali. Lake Faguibine sits in northern Mali, 80 kilometres from Timbuktu. In the 1970s, following increasingly disastrous periods of drought, the lake began to evaporate, gradually leading to sand dunes replacing the farming land and water expanses. Today, the region's inhabitants have to make do with a rainy season of just three months, from July to September. For the rest of the year, temperatures approach 50°C. The emergence and subsequent expansion of these sand dunes, have not only changed the environment around, but the lack of resources- especially water- which is required to sustain the community, implies that these individuals have no other alternative but be displaced to a newer area. From July 2018 to January 2019, many localities in the region around Timbuktu were affected by floods, rising waters and erosion- which accelerated desertification and silting. The risk of disasters has led to

groundwater undrinkable, and altering the soil characteristics which in turn impacts the agriculture.

internal displacement, swelling the ranks of migrants and "climate refugees." (UNICEF). However, the sand dunes continue to encroach into the areas, hence displacement of large scale is the only possibility left for these individuals to escape this threat (ICRC). Similar situations are seen in places like Somalia and in the Sahel. These areas have been weakened by conflict and fragility and the unpredictable climate and environmental degradation have made the lives difficult- especially for those within the fringes of the society. These are further eroded by the violence and conflict in these regions, leading to a cyclic chain of instability.

Another concern unfolds when the changes in the climate and the subsequent depletion of resource acts as the catalyst in the creation of a conflict. This was what unfolded during the conflict in Darfur, Sudan- a conflict which was labelled by the then UN General Secretary Ban Ki Moon as the 'first climate change conflict'. While the Darfur conflict is discussed as a political ethnic conflict between the Arab militias against the black rebels, the root of the issue can be found in the ecological crisis which has arose, at least in part due to climate change. The violence in Darfur erupted during the droughts- a consequence of the man-made global warming, which resulted in disrupting seasonal monsoons, rising temperature of the Indian Ocean and a decline in the average precipitation by some 40%. Prior to this changing climate, the Arabs who were nomadic herders, shared good relations with the black farmers. However, with the changing climatic conditions, the farmers fenced their land to stop the herders from passing. Poor arid conditions implied that there was longer enough food for both the groups, resulting in fights, which eventually became a full-fledged war in 2003 (Moon). While world organizations have attempted to solve the political crisis through ceasefire, the root of the problem remains the classical Malthusian Catastrophe. With an increase in the population, and a depletion of natural resources (land, in this case), what solutions can be tendered towards those displaced? In other words, where will all these people go if there is no land or other resource left for them?

An additional issue is about the problems faced by the refugees or those who have moved to across the border. In the case of refugees, this becomes two-fold. As of 2023, there exists no legal protocol or law by which other nations are legally compelled to recognize environmental refugees. Since they cannot be offered legal asylum or protection, they enter the country as illegal immigrants. An analysis of the Mexican migrants in USA, throws light on such a scenario. Land in Mexico is degraded due to the soil erosion, thus leaving over 4,90,000 acres being rendered unproductive. Unable to find an alternative to sustain themselves, and the lack of financial support imply that many of them leave their homes, seeking better opportunities in the neighbouring country.

Even if granted entry as a political refugee, there exists little to no policy which can adhere to their livelihood and most often, refugees are taken to overcrowded refugee camps, which are no more prepared to sustain the population than the land they are escaping from. Many of these camps are situated in 'climate hotspots' where they do not have the necessary resources to tackle

or adapt to the hostile environment (UNHCR). Most of these refugees never resettle and must live the rest of their lives migrating from place to place, looking for land that can sustain them.

The climate crisis which is driving displacement makes it even more difficult for those who have sought refuge. The vulnerable- those living in the most fragile and conflict-ridden areas thus get disproportionate affected, with climate change acting as a 'threat multiplier' exacerbating the conflict and creating potential grounds for greater social tensions.

THE POLITICS OF ENVIRONMENTAL REFUGEES

What is significant to observe here is the politics behind the environmental refugees. Climate change is invariable intertwined with the global patterns of inequality (World Bank). Cases across the world show that the poorest and most vulnerable sections in the society (and also within the World order) are those, bear the brunt of it. Let us revisit the case of Yemen. Despite being one of the least countries contributing to GHG emissions, Yemen is highly vulnerable to climate change-related impacts such as drought, extreme floodings, pests, sudden disease outbreaks, changes in rainfall patterns, increased storm frequency/ severity, and sea level rise that threatens the already fragile state of the country. As given by the Groundswell Report, there exists clear disproportion to the challenges faced by the socially marginalized groups- in terms of their access to resources, livelihood security and about their cultural identity (World Bank).

The island-country of Tuvalu- which was found to be vulnerable to climate change due to its low-lying land levels- eventually proclaimed that it would be uploading a virtual version of itself on the meta-verse. This drastic decision was taken due to the failure of the outside world to combat global warming, and the possibility that Tuvalu would be submerged by the end of the century. Kiribati, is yet another country facing a similar crisis (Needham).

It is also interesting to note that most of the states when addressing to the issue of those who have been adversely impacted by the environmental changes tend to refer to these groups as environment migrants. While climate activists have been demanding for those impacted by this crisis to be called refugees, the term remains associated largely with those facing political persecution. Governments around the world may be choosing to do so, in a fear of attaching a legally coded label to the problem could hold them more accountable to the looming humanitarian crisis. It was only in 2018 that the UNHRC adopted an outcome to discuss about those whose human rights was violated, yet it did not fit under the title of an environmental 'refugee'.

THE WAY AHEAD

Despite the gravity of the situation and the high chance of this number increasing in the coming years, there is still no legal statute or framework to help these individuals. The current system of

international law does not protect these climate migrants, since no legally binding agreement obliges countries to recognise and support them (Bose and Singh 2021).

While climate change impacts all parts of the world in varying degrees, research has found that refugees from South Asian and Middle Easter countries are at greater risks of facing double marginalization. While several collaborations such as SAARC[3], BIMSTEC[4] and MERC[5] exists between several of these countries, these organizations are yet to find a solution to what could possibly be one of the biggest threats to their population.

The Global Compact on Refugees was created in 2018 by an overwhelming majority in the UN General Assembly to directly address this concern. The United Nations High Council for Refugees provides legal aid and guidance to develop enhanced protection for those displaced by climate change. Furthermore, newer mechanisms like the Refugee Environment Protection Fund and other operational supply chains have been created to prepare for the unfolding crisis. In November 2022, the United Nations Climate Change Conference (COP'27), a historic decision was made with the creation of the Loss and Damage Fund. After decades of pressure from climate-vulnerable developing countries, the fund aims to provide financial assistance to nations most vulnerable and impacted by the effects of climate change.

While similar changes have been done by the UNICEF and the World Bank, it is critical to note that the principle of non-refoulment still does not apply and extend itself to climate refugees. Aside from the adoption of the Agenda for the Protection of Cross-Border Displaced Persons in the Context of Disasters and Climate Change in 2015, no policy element has been introduced in the international forum for environmental migrants. The 2030 Agenda on Sustainable Development revitalized interest in the nexus between environmental threats and migration. In 2016, New Zealand became the first country to get a request for asylum on account of climate refugee from a person from Kiribati. Although New Zealand declined the person asylum on the grounds of the person's life not being under 'imminent threat', the case paved way for further discussions on the same and the pressing need to incorporate and understand the needs of the environmental refugees.

There is an urgent need to clarify and compile data on the refugees and IDPs so that mechanisms may be created to protect them. The first step is to acknowledge that climate change fuels displacement and migration, and then collectively develop a lasting solution based on the scale of the problem. It is imperative that these solutions are human rights- based and sustainable in the longer run to not create political and economic externalities (Bose and Singh). The overall lack

[3] SAARC: South Asian Association for Regional Cooperation
[4] BIMSTEC: Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
[5] MERC: Middle East Regional Cooperation

of commitment from states shows that there is still a long way to go, and a delay in addressing this issue could result in grave consequences in the years to come.

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THE SOCIAL COST OF CLIMATE CHANGE ON INDIAN ECONOMY

Ms. Vinita Fernandes
Assistant Professor, St. Paul's Institute of Communication and Education for Women, Mumbai

Abstract: Severe reductions in greenhouse gas emissions may not stop the global climate from changing in the future. Depending on their sensitivity, capacity for adaptation, and vulnerability, various sectors and regions will be affected by climate change in different ways. Climate change has the potential to place additional burdens on the agriculture and health sectors, water resources, migration, and the growing wealth and poverty gap for a developing nation like India, which primarily depends on natural resources. Therefore, it is critical to identify and put into practice strong climate change adaptation strategies that are affordable and contribute to resilience building across a range of potential future climate risks. A paradigm shift in the economy is desperately needed so that people can properly determine the value of our natural environment. Reassessing how we see and interact with nature is where we need to start. In terms of the severity of the effects, this paper emphasizes how vulnerable India is to climate change and how the biggest risk to the Indian economy is not mitigating or adapting to it. The study recognizes that there is a strong link between climate change and extreme weather, which could eventually result in natural hazards.

Keywords: *Capitalism, poverty trap, displacement, vulnerable population, climate sensitive*

INTRODUCTION

The term 'climate change' has gained a lot of attention lately. Although this term was never given much thought, it is now urgently necessary to take the necessary actions to mitigate and, in some cases, adapt to the changing climate due to changing weather patterns. Simply put, a rise in sea level, gradual changes in precipitation, and temperature would all contribute to climate change, which would alter the frequency, severity, and length of extreme events. Depending on their sensitivity, capacity for adaptation, and consequent vulnerability, various sectors and areas will be affected by climate change in different ways. Studies have indicated that if action is not taken now to address the issue, climate change will have disastrous effects.

Climate change poses a threat to the fundamental components of life, including agriculture, forestry, coastlines, water resources, human health, the economy, and basic habitation, which are crucial to the Indian economy, which is primarily dependent on natural resources. India's susceptibility to climate change needs to be assessed, and domestic efforts to reduce greenhouse gas emissions need to be carefully examined. There has been much discussion and study on how to lessen the effects of climate change and the necessary transition, but the real issue should be the cost of making the change because there is another future that would lead to one that is more sustainable. It is imperative that we unite as a global community to achieve net zero emissions

and allocate sufficient financial resources to steer toward a sustainable future before we suffer greatly damaging effects on the environment of our one and only planet.

A natural disaster is one of the major dangers to the Indian economy that it faces today. The combined effects of climate change and natural disasters will be extremely costly for the Indian economy. Following a natural hazard event, a community or society is negatively impacted by a natural disaster. A natural hazard that impacts a vulnerable population so strongly that it significantly damages society or results in significant deaths is called a climate-related natural disaster. The effects of a natural hazard event on a nation are contingent upon its socioeconomic status, degree of development, and inherent susceptibility to natural disasters.

LITERATURE REVIEW

Parnell, Simon, et.al (2007), work on natural disasters caused due to increased human activity has highlighted the need for a deeper examination of the root causes of such disasters. The paper also examines the vulnerability of the large, disproportionately poor, and chronically vulnerable human settlements of the global South. Park (2015), suggests the need for an economic paradigm shift that would enable us to assess the value of our natural world more accurately. Understanding the drawbacks of capitalism with regards to its influence on climate change, and the need to re-evaluate our relationship with nature.

Cavallo, Eduacrdo Noy, Ilan (2009), study suggests that disasters can have positive and neutral effects on the economy. There are welfare costs associated with short-run disasters and the short-run disasters have wide negative effects on the GDP of an economy. Millner and Dietz (2015), proposes that developing countries are vulnerable to the adverse effects of climate change, yet there is disagreement about what they should do to protect themselves from anticipated damages. The problem faced by developing countries to know the optimal balance is between investments in traditional productive capital and investments in adaptive capital. Despite being vulnerable to the adverse impacts of climate change, there is no precise agreement about the possible solutions to protect themselves against such climate-related disasters.

Chinnammai (2014), focuses on how the rising fuel prices and shortage in future could raise concerns about the security of energy supply needed to sustain our economic growth. The utilization of non-conventional energy will not only help in meeting energy development but also help further development. Manieniyan & Thambidural (2009), show how the steady increase in energy consumption coupled with environmental pollution has promoted research activities in alternative and renewable energy fuels.

Guan. Y, Yan. J. et al (2023), suggest that unaffordable costs of energy and other necessities would push vulnerable populations into energy poverty and even extreme poverty. According to this study understanding how global energy prices are transmitted to households through global supply chains and how they are affected is crucial for effective and equitable policy design.

Ozili, P & Ozan, E. (2022), writes that energy transition has focused on how to make the energy transition while it is also important to see whether the timing is appropriate and how economic and non-economic events might affect the global energy transition to clean energy and this crisis will have wide impacts on consumer welfare and the economy.

SCOPE OF THE STUDY

1. To comprehend the possible socioeconomic effects of climate change and natural hazards.
2. The expense of adapting to reduce potential socio-economic effects, as well as determining which combination of investments and policies is most likely to have the greatest effect on lowering those effects.

LIMITATIONS AND FUTURE SCOPE OF THE STUDY

The article provides a broad overview of how natural disasters and climate change affect different Indian economic sectors. It is crucial to thoroughly examine every sector and find funding sources to support the new measures that have been proposed to determine the best course of action and reach a consensus on how to mitigate any potential harm brought on by climate-related natural disasters. The questions that need to be addressed in future studies is to understand what can one do to simultaneously address the issue of climate change as well as ensure energy security worldwide.

METHODOLOGY OF THE STUDY

The research for the paper is based on the author's attendance at the Impact and Policy Research Institute course, "Understanding the nuances of Climate Change in the Indian Sub-continent," as well as secondary data sources. The IPCC Report and news articles are the other sources used in addition to research papers.

In November 2017, the Climate Science Special Report, the first volume of the Fourth National Climate Assessment, was released by the US Global Change Research Program. The attribution of extreme weather and climate events has been an emerging area in the science of detection and attribution, according to the report's main finding. Extreme weather events' correlation with a changing climate is currently a significant and widely acknowledged aspect of climate change. Strong and Positive relation between Climate change and Natural disasters: extreme precipitation, high tide flooding and increased storm surge, extreme heat, parched soil, extreme rainfall.

CLIMATE CHANGE AND INDIA

The issue of climate change is not one of Indian descent. A significant factor in the climate change crisis is the trajectory of development. Our cities cannot be planned without consideration for nature. It is not sustainable to just keep building on development trajectories. Historically,

developed nations have contributed to CO2 emissions. Even now, the developed world has a larger carbon footprint than developing nations, even though its population is smaller. It is important to understand that all people share this common yet distinct responsibility. The economic and climate crises are currently the two largest problems facing the economy. The excessive CO2 emissions that are changing the planet's climate are not the fault of developing nations. However, because of their lack of diversification and increased reliance on a small number of sectors for employment and economic growth, developing nations are more susceptible to the effects of climate change. The emerging nations are paying the price for a crime they did not commit. The main disasters caused by climate change are flooding, shortages of food and water, and intense heat waves. Although mitigation measures hold significant importance, adaptability is a critical need in the Indian subcontinent.

Compared to their developed counterparts, developing economies such as India can suffer catastrophic financial setbacks from disasters because they cause disruptions to short-term financial and economic management, which calls for significant realignments in spending plans, adjustments to economic targets, and policy changes. Long-term effects of these disruptions can be detrimental to economic growth, development, and the fight against poverty. Because they have less resources for prevention, mitigation, adaptation, and coping mechanisms, developing nations suffer losses from disasters that are 20 times higher (as a percentage of GDP) than those in industrialized nations, accounting for over 95% of all disaster-related deaths. Much of India's projected economic expansion and rise to prominence in the world economy will depend on how the country handles natural disasters. India's economy is growing quickly, but there is still a lot of inequality and a significant backlog in human development. 320 million people, or about 28.6% of the population, are estimated to be living in poverty (UNDP, 2007a). The Eleventh Five Year Plan of India aims for inclusive growth, which would be compromised if the incremental risk of climate change were placed on top of this significant development deficit.

India is already struggling with a large population and fast urbanization. By 2020, there are projected to be 1.4 million people living in India. The population of cities is increasing more quickly than that of rural areas. Millions of people are at risk of storm and flood disasters due to the increasing population pressure, sea level rise brought on by climate change, and intensifying cyclones. Many people are forced to relocate to safer areas because of the fast industrialization, urbanization, and development of coastal areas, which is making more people vulnerable to climate-related disasters. According to estimates, 142 million people may live along India's coast in 2050, and the country's total population of flood zone refugees may range from 20 to 60 million, with a conservative estimate of 30 million (Myers, 1993). For their subsistence and way of life, almost 700 million rural Indians rely directly on climate-sensitive industries like agriculture, forestry, and fisheries as well as natural resources like water, biodiversity, mangroves, coastal zones, and grasslands. The nation's food security may be threatened by the changing climate. Coastal communities, forests, and dry-land farmers have poor adaptive capacities.

As stated in the Indian Governments' National Communication to UNFCCC on Climate Change, climate change is anticipated to influence all natural ecosystems in addition to health and socioeconomic systems. Climate change is predicted to have a significant impact on India's economy, health, internally displaced people, water, energy, and food supplies. It might intensify a lot of ongoing disputes. It might also lead to fresh strains, disputes, and tensions. One of the main concerns in India's bilateral relations with its neighbors may be climate change. Mass disruptions brought on by disasters can influence how individuals, groups, and organizations that support them behave. Catastrophic events damage vital utilities and services, severely damages the built environment and physical infrastructure, and destroys crops, causing food shortages, famines, and localized conflicts over resources.

Due to their financial circumstances, the impoverished are frequently the ones who are most at risk from natural disasters. Their lack of resources makes it difficult for them to take precautions against the possibility of natural disasters. Most of the vulnerable population lives in areas with a high risk of disasters. There will be more disasters in the future if current urbanization trends continue and impacted societies' resilience is not significantly improved. The issue of climate change is one that the entire world is dealing with, and research indicates that it negatively impacts a nation's citizens.

When a nation's citizens exercise their social, economic, and cultural rights, they encounter certain limitations. There will be both direct and indirect effects of climate change. The right to life and other human rights are immediately threatened by direct nature; this is frequently the case during extreme weather events like heat waves, floods, storms, and droughts. Human rights are gradually impacted by indirect nature, as seen by the increasing strain on healthcare systems. People in the impacted areas will have less access to food and water, and their security will decrease due to climate change. Flooding and rising sea levels will have an impact on housing costs, force internal relocations, and in certain situations, population displacement.

People now must bear the brunt of global climate change because of the developed countries' emissions. At the macro level, countries have historically overused resources for the sake of growth and development, which has resulted in resource exploitation and a reduction in the number of resources available today. The impoverished, weak, and low-income individuals are the ones who, on a micro level, bear the brunt of the changing climate scenario; they are not, in fact, the real culprits behind climate change and the degradation of the environment. However, since climate change alters the frequency and severity of extreme weather events, these individuals really bear the brunt of disaster losses.

The impoverished are unable to defend themselves against the ever-changing circumstances, and when calamity befalls them, they become entangled in the never-ending cycle of poverty because they are unable to prevent disasters and are not fully capable of recovering from them. Therefore, the government must act appropriately to support society, which is the real engine of the Indian

economy. In addition to paying the impacted party, the issue at hand is how to enhance his welfare and increase his capacity to purchase goods and maintain a reasonable standard of living. It is said that the two immediate responses available to the public and government to address the issue of climate change are mitigation and adaptation. Always trying to lessen the issue will be preferable to trying to adjust to the changing situation.

CONCLUSION

Research has indicated a positive correlation between climate change and natural disasters. It should be noted that while we are not claiming that climate change is the reason behind disasters, we can argue that it will make natural disasters more intense and frequent. These disaster episodes will occur more frequently in future, which will have an impact on the economy and society. We now know that while natural disasters primarily affect high-risk, exposed areas, they also have a significant impact on all sectors of society and every individual due to the rapid changes in the climate. Localized action is required. How can a nation ready itself to prevent a hazard from turning into a catastrophe?

Although post-disaster management has received more attention, our resources should be directed toward preparedness. To lessen the effects of climate change and prepare for natural disasters, we must identify areas that are vulnerable and take appropriate action.

Our goal should be to reach net zero emissions. Humans must cease adding greenhouse gases to the atmosphere to stop global warming and prevent the worst effects of climate change, which will be extremely severe.

- We must reach zero to prevent a climate catastrophe.
- We must use the resources we already have—such as solar and wind power—more quickly and intelligently.
- To get the rest of the way, we must develop and implement ground-breaking technology.

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SUSTAINABLE FUTURE: A FUEL FROM PLASTIC WASTE

Dr Meeta Saxena
Assistant Professor, Department of Physics, Sophia College for Women, Mumbai

Abstract: The widespread use of plastics, lauded for their convenience and versatility, has resulted in a significant environmental burden i.e., plastic waste. This highly durable material persists for centuries, posing threats to ecosystems and global ecology. Recognizing the urgency, the article explores effective methods for managing plastic waste. Traditional recycling methods often involve incineration, releasing harmful gases and contributing to carbon emissions. However, innovative solutions like pyrolysis, gasification, liquefaction etc. offer a promising alternative. This thermochemical process decomposes plastic waste at high temperatures in an oxygen-free environment, converting it into usable fuels like diesel or gasoline. Pyrolysis not only tackles plastic pollution but also alleviates energy shortages, offering a dual benefit. The article emphasizes the need for further research on diverse plastic types and alternative recycling techniques like depolymerization and biodegradation to create a more sustainable waste management system. Pyrolysis emerges as a potential solution, addressing both plastic pollution and energy scarcity. However, ongoing research and innovation are crucial to develop environmentally friendly methods for managing the diverse range of plastic waste effectively.

Keywords: *plastic, plastic waste, pyrolysis, recycling, biofuel*

INTRODUCTION

Plastic, once hailed as a revolutionary material for its durability and convenience, has become a modern-day scourge. Its ubiquitous presence, from single-use bags to complex electronics, offers countless benefits in our daily lives. However, the very properties that make it so useful – its resilience and resistance to degradation – also create a significant and growing environmental threat: plastic waste. Domestic wastes generally contain many kinds of waste plastics, including polyethylene (PE), polypropylene (PP), polystyrene (PS) and polyvinyl chloride (PVC), which account for 70% of total waste plastics [Zechen Jin et al (2018)].

The sheer scale of plastic production is staggering. Over 8.3 billion tons of plastic have been produced globally since the 1950s, with an estimated 380 million tons added annually. This relentless production translates to a monumental waste problem. Only a minuscule fraction (around 9%) is recycled, leaving the vast majority to accumulate in landfills, pollute our oceans, and infiltrate our natural ecosystems. The consequences of this plastic pollution are far-reaching and devastating.

Landfills: Mountains of plastic waste occupy vast swathes of land, leaching harmful chemicals into the soil and contaminating groundwater. This disrupts ecosystems, reduces biodiversity, and poses health risks to surrounding communities.

Oceans: An estimated 8 million tons of plastic enter the oceans annually, transforming them into plastic soup. Marine life ingests plastic debris, leading to entanglement, starvation, and poisoning. This disrupts marine ecosystems, threatens food security, and ultimately harms human health.

Microplastics: Plastic fragments degrade into microplastics, tiny particles that infiltrate our food chain and water supplies. The potential health impacts of microplastics on humans and ecosystems are still being studied, but the concerns are significant.

Beyond the immediate environmental damage, plastic pollution also carries significant economic costs. Cleaning up plastic waste, managing landfills, and addressing the health impacts are all financially burdensome. Additionally, plastic pollution harms tourism and fisheries, impacting livelihoods and economies dependent on healthy ecosystems. The urgency of tackling this problem is undeniable. This requires a multifaceted approach, including:

- Reducing plastic consumption: This involves promoting reusable alternatives, encouraging responsible consumption, and implementing policies that discourage single-use plastics.
- Improving recycling infrastructure: Expanding and optimizing recycling systems to handle diverse plastic types and ensure proper waste management.
- Investing in innovation: Exploring new technologies like pyrolysis, which can convert plastic waste into fuel or other valuable products.
- Promoting public awareness: Educating individuals and communities about the impact of plastic waste and encouraging responsible behavior.

Plastic offers undeniable convenience; its sheer volume and durability render traditional waste management methods inadequate. Landfills, once seen as a solution, are reaching capacity and leaking harmful chemicals into the environment. Incineration, while reducing landfill volume, releases toxic fumes and contributes to greenhouse gas emissions. Recycling, often touted as the answer, faces its own hurdles. Many plastics are difficult or impossible to recycle due to complex compositions or contamination. The existing infrastructure often lacks the capacity and technology to handle diverse plastic types effectively, leading to low recycling rates and missed opportunities.

Furthermore, traditional methods fail to address the growing problem of microplastics – tiny fragments generated from plastic degradation. These escape current infrastructure, contaminating water bodies and entering the food chain, posing immense environmental and health risks. These limitations highlight the urgent need for innovative solutions. We must move beyond managing plastic waste and explore alternatives like waste-to-fuel technologies or bioplastics that degrade naturally. Only then can we truly tackle the plastic crisis and build a sustainable future.

Amidst the mounting plastic pollution crisis, innovative solutions like pyrolysis offer a glimmer of hope. This thermochemical process, unlike traditional waste management methods, does not just manage plastic waste; it transforms it into valuable resources**.** Pyrolysis heats plastic waste in an oxygen-free environment, breaking it down into various products. One of the most exciting outcomes of pyrolysis is the production of synthetic fuels like diesel or gasoline. This not only provides a cleaner alternative to fossil fuels but also diverts plastic waste from landfills, reducing their environmental impact. Imagine powering vehicles or generating electricity with fuel derived from discarded plastic bottles!

Pyrolysis process also yields valuable byproducts like syngas and char, which can be further processed into chemicals, waxes, or even new plastics. This circular economy approach maximizes resource utilization and minimizes waste generation. Compared to incineration, pyrolysis offers significant environmental benefits. It releases fewer greenhouse gasses and eliminates the risk of toxic ash production. Additionally, by diverting plastic from landfills, it reduces harmful leachate contamination of soil and water bodies. Despite of some the challenges, pyrolysis holds immense potential to revolutionize plastic waste management. By turning trash into valuable resources, it offers a sustainable and circular solution to this global problem. Further research and investment can unlock the full potential of this technology, paving the way for a cleaner and more sustainable future. Pyrolysis, gasification, and liquefaction are advanced processes that hold significant potential in addressing the plastic waste crisis while concurrently contributing to sustainable energy generation. These methods are instrumental in the transformation of plastic waste into valuable fuels and chemical feedstocks, reducing the environmental impact of plastic waste disposal.

PYROLYSIS

Radical chain mechanism involves in pyrolysis reaction. Thus, the reaction is divided into chain initiation reactions, chain transfer reactions and chain termination reactions. Municipal solid wastes (MSWs) contain waste plastics of various types. Therefore, it is necessary to study the co-pyrolysis process of various plastics. [Y.B Liu et al (2010)]. They found that polypropylene (PP) accelerated the pyrolysis of poly ethylene (PE), whereas poly vinyl chloride (PVC) decelerated the pyrolysis of PE and PP due to the intermolecular transfer of free radicals.

Conversion of waste plastics into biofuels involves various thermochemical and biological processes. Among these, pyrolysis is most appropriate method because it has several advantages viz easy optimization, variety in product formation, complete utilization of feedstocks, and diversification in feedstocks (both biodegradable and non-biodegradable). [Chowdhury Zaira Zaman et al (2017)]. Pyrolysis is a thermal decomposition process that subject plastic waste to high temperatures, typically in the absence of oxygen. The product of pyrolysis reaction gives three categories of products: bio-oil (liquid), biochar (solid), and fuel gas [Aysu Tevfik et al (2016)]. Under these conditions, plastic polymers break down into their constituent components.

[Lei Zhao et al (2012)]. In the pyrolysis process of plastics, solid plastic particles firstly absorb heat, melt into liquid, and then absorb heat for pyrolysis and the heat energy ratio in the two stages is about 1:4 [Lei Zhao et al (2012)].

This process results in the production of various products, including gas, liquid, and solid residues. The liquid fraction, often referred to as pyrolysis oil or plastic oil, holds promise as a source of renewable fuel. It can be further refined into products such as diesel, gasoline, and other chemicals, making it an attractive alternative to conventional fossil fuels. Moreover, pyrolysis reduces the volume of plastic waste significantly and mitigates environmental pollution. The advantages include,

- Versatility: Pyrolysis is versatile and can handle a wide range of plastic types, including mixed plastics, making it suitable for a variety of waste streams.
- Energy Recovery: The process efficiently converts plastic waste into a liquid product that can be refined into valuable fuels, such as diesel, gasoline, and aviation fuels.
- Waste Reduction: Pyrolysis significantly reduces the volume of plastic waste, helping to alleviate pressure on landfills and the environment.
- Lower Emissions: Compared to traditional waste disposal methods, pyrolysis typically results in lower greenhouse gas emissions.

Whereas the limitations are,

- Emissions: Pyrolysis can produce emissions of various pollutants, depending on the feedstock and process conditions, which may require emission control technologies.
- Energy-Intensive: The process can be energy-intensive, affecting the overall energy balance.
- Feedstock Quality: The quality of pyrolysis oil as a fuel source can vary based on feedstock composition and processing conditions.

GASIFICATION

Gasification is another innovative method for converting plastic waste into energy. In the gasification process, plastic waste is exposed to high temperatures (typically >700 °C) without combustion and a controlled environment, typically in the presence of a limited amount of oxygen or steam. The resulting gas mixture is called syngas (from synthesis gas) or producer gas and is itself a fuel due to the flammability of the H2 and CO of which the gas is largely composed. Power can be derived from the subsequent combustion of the resultant gas, and is considered to be a source of renewable energy if the gasified compounds were obtained from biomass feedstock [National Non-Food Crops Centre (2009)].

This transforms the plastics into a synthetic gas known as syngas, which consists of carbon monoxide and hydrogen. Syngas is a versatile energy source that can be used directly in heat and

power generation, or further processed into liquid fuels and chemicals. Gasification offers high energy efficiency and environmental benefits as it minimizes greenhouse gas emissions compared to traditional waste disposal methods. The advantages of this process are,

- High Energy Efficiency: Gasification offers high energy efficiency and produces a clean syngas, which can be used for various energy applications, including power generation and heat.
- Fuel Flexibility: It can process a variety of feedstocks, not limited to plastics, and can also handle mixed waste streams.
- Carbon Capture Potential: Gasification can integrate carbon capture and utilization (CCU) technologies, making it a potential option for carbon dioxide reduction.
- Lower Emissions: Like pyrolysis, gasification results in lower emissions compared to traditional waste disposal methods.

And the limitations include,

- Complexity: Gasification systems are complex and require careful engineering and operational expertise.
- High Capital Costs: The initial investment and operational costs for gasification facilities can be relatively high.
- Ash Production: Gasification generates ash, which may necessitate proper disposal or utilization.

LIQUEFACTION

In material science, liquefaction, is a process that generates a liquid from a solid or a gas. It is a less common but emerging technique which involves dissolving plastic waste in a solvent to break down the polymer chains. The result is a mixture of liquid hydrocarbons, often referred to as biocrude or plastic oil. This biocrude can be refined similarly to pyrolysis oil to obtain valuable fuels and chemical feedstocks. Liquefaction has the advantage of being able to process a wide range of plastic waste, including mixed plastics, making it a versatile option for waste-to-fuel conversion.

Each of these processes offers distinct advantages and may be suitable for different applications and types of plastic waste. Pyrolysis, gasification, and liquefaction are promising avenues for addressing the plastic waste problem while simultaneously contributing to sustainable energy production, fostering a circular economy, and reducing the environmental burden of plastic pollution. However, they also require careful consideration of environmental and safety aspects, as well as technological advancements to achieve optimal efficiency and minimize emissions. The various technologies for converting plastic waste into fuel, namely pyrolysis, gasification, and liquefaction, come with their own set of advantages and limitations. The advantages would be,

- Mixed Plastic Handling: Liquefaction excels at handling mixed plastic waste, which is often more challenging for other methods.
- Energy Recovery: It produces a liquid biocrude that can be refined into fuels, providing an avenue for both waste reduction and energy generation.
- Reduced Sorting: Liquefaction can reduce the need for extensive plastic sorting, simplifying waste processing.

And the limitations include,

- Relatively New Technique: Liquefaction is a relatively new technology and may require further development and optimization for widespread use.
- Energy Consumption: Like pyrolysis, liquefaction can be energy-intensive, affecting the overall energy balance.
- Limited Scale: Commercial-scale liquefaction facilities are still limited in number, and achieving economies of scale can be challenging.

In conclusion, each of these technologies offers a promising solution to the plastic waste problem, and their suitability depends on specific factors like feedstock composition, energy efficiency, and local infrastructure. Advancements in these technologies, coupled with a focus on emission control and energy optimization, hold the potential to address plastic waste issues while contributing to a more sustainable future.

The selection of a specific technology often depends on a combination of these advantages and limitations in each context. The promising solution for the plastic waste is pyrolysis, a thermochemical process decomposes plastic waste in the absence of oxygen and generate various products, including valuable fuels. There are various types of pyrolysis techniques.

- Slow pyrolysis: Occurs at moderate temperatures (400-500°C) and produces mainly liquid oil alongside gas and char. Studies like Sharma et al. (2020) highlight its effectiveness in generating high-quality fuel oil from mixed plastics.
- Fast pyrolysis: Employs higher temperatures (500-800°C) and yields primarily gas and liquid hydrocarbon vapors. According to He et al. (2021), this method efficiently converts polyolefins (common plastics) into fuel-like syngas.
- Vacuum pyrolysis: Operates at lower pressures and temperatures (300-400°C) compared to conventional methods. According to Kim et al. (2018), this approach offers high liquid oil yields and minimizes char formation.

Various research articles indicate promising results in fuel conversion efficiency. Rahimi and Whitman (2011) report oil yields ranging from 50% to 80% for various plastics depending on the pyrolysis type. Moreover, studies like Açıkkaya et al. (2019) suggest that pyrolysis-derived fuels can have comparable energy content and heating values to conventional counterparts. The benefits of pyrolysis extend beyond conversion rates. Compared to incineration, it releases fewer

greenhouse gases and eliminates toxic ash production (Ingrao et al., 20 Plastic waste can be converted into a variety of fuels through processes like pyrolysis, gasification, and liquefaction. The types of fuels produced from plastic waste include:

1. Pyrolysis Oil: Pyrolysis is a common method for converting plastic waste into liquid fuel, known as pyrolysis oil or plastic oil. The composition of pyrolysis oil can vary depending on the plastic feedstock and process conditions, but it generally contains a mixture of hydrocarbons. The main components of plastic pyrolysis oil were alkanes, alkenes, naphthene, and aromatics. The intermolecular hydrogen transfer between two radicals were the main reason for the formation of alkanes, whereas β-scission of the radicals was the main reason for the formation of alkenes [Seth E. Levine et al (2009)]. This oil can be further refined into valuable fuels such as diesel, gasoline, and aviation fuels.

2. Syngas: Gasification is another technology that converts plastic waste into a gaseous product known as syngas, which is primarily a mixture of carbon monoxide and hydrogen. Syngas has various applications, including power generation and heat production, and it can also be used as a feedstock for the synthesis of liquid fuels and chemicals.

3. Biocrude: Liquefaction is an emerging plastic-to-fuel process that yields a liquid product referred to as biocrude. This biocrude has properties similar to crude oil and can be further refined into a range of liquid fuels, including gasoline, diesel, and jet fuel.

These fuels have the potential to serve as sustainable alternatives to conventional fossil fuels, reducing greenhouse gas emissions and reliance on finite resources Stegmann P et al, (2022). Moreover, they offer a means of recycling plastic waste, contributing to a circular economy. Quantifying the energy potential of plastic-to-fuel processes is crucial for assessing the feasibility and sustainability of these technologies. Understanding the energy inputs, conversion efficiencies, and energy outputs provides valuable insights into the environmental and economic impacts of converting plastic waste into fuel.

Energy Inputs: The energy potential begins with the energy required to collect, transport, and preprocess plastic waste. This includes the energy associated with shredding, sorting, and preparing the plastic feedstock for conversion. The energy inputs can vary based on the type and condition of the plastic waste, as well as the specific technology employed.

Conversion Efficiency: Conversion efficiency determines how effectively plastic waste is transformed into energy-rich products. The efficiency of processes like pyrolysis, gasification, and liquefaction depends on various factors, including temperature, pressure, residence time, and the type of plastic feedstock. Higher conversion efficiencies result in a greater energy yield from the same quantity of plastic waste.19).

Additionally, it diverts plastic w Energy Outputs: The energy potential is realized through the production of energy-rich products, such as pyrolysis oil, syngas, or biocrude. These products can be used directly as fuels or further refined into transportation fuels, chemicals, and electricity. The energy content of these products can be quantified and compared to the energy inputs, allowing for the determination of net energy gain.

Quantifying the energy potential of plastic-to-fuel processes involves conducting comprehensive energy balances that consider both the energy inputs and outputs. Such assessments often use Energy Return on Investment (EROI) as a key metric to determine the net energy gain. EROI is the ratio of energy delivered by the process to the energy input, and a value greater than one indicates a net energy gain. Understanding the energy potential of plastic-to-fuel processes is crucial for making informed decisions about waste management and energy production. It helps identify the most efficient and sustainable approaches to dealing with plastic waste while reducing the environmental impact and reliance on fossil fuels.

Despite its advantages, challenges remain. Optimizing process parameters for different plastic types, ensuring clean product outputs, and addressing potential emissions require further research and development. Additionally, large-scale implementation necessitates economic viability assessments (Song et al., 2020).

CHALLENGES AND BARRIERS

Regulatory and policy challenges in the context of plastic-to-fuel technologies encompass a range of issues that impact their implementation and environmental compliance. Addressing these challenges is essential for ensuring that these processes meet sustainability and safety standards.

1. Environmental Regulations: Plastic-to-fuel processes are subject to environmental regulations that govern emissions, waste management, and the protection of air and water quality. Compliance with these regulations is crucial to mitigate environmental impacts.

2. Waste Management Policies: Waste management policies and regulations vary by region and can affect the collection and handling of plastic waste feedstocks. Integration with existing waste management systems and compliance with local waste policies are essential.

3. Energy and Fuel Standards: The quality and properties of the fuels produced should meet energy and fuel standards to ensure their compatibility with existing infrastructure and vehicles. Chow et al (2021)

4. Health and Safety Regulations: Occupational health and safety regulations govern the operation of plastic-to-fuel facilities and the protection of workers. Compliance with these regulations is vital to ensure safe working conditions.

5. International Agreements: International agreements, such as the Basel Convention (an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries), can impact the transboundary movement of plastic waste. Compliance with these agreements is critical for global waste trade.

Navigating these regulatory and policy challenges necessitates close collaboration among technology developers, regulators, and stakeholders. Striking a balance between environmental protection, resource conservation, and energy recovery is vital in ensuring the sustainable integration of plastic-to-fuel processes.

CONCLUSION

The key findings and insights gleaned from examining plastic-to-fuel technologies reveal their potential as sustainable waste management solutions and energy sources. These processes, including pyrolysis, gasification, and liquefaction, offer the means to reduce plastic waste while producing valuable fuels and chemicals. However, challenges such as emissions control, varying feedstock quality, and the need for robust infrastructure must be addressed. Moreover, economic feasibility and compliance with environmental regulations are central to their success. By navigating these hurdles and emphasizing energy efficiency, plastic-to-fuel technologies can contribute to a circular economy, reduce greenhouse gas emissions, and promote a cleaner, more sustainable energy future.

Plastic-to-fuel conversion holds immense potential as a sustainable solution to address the twin challenges of plastic waste management and energy needs. These technologies can transform discarded plastics into valuable energy resources, reducing the burden on landfills and curbing environmental pollution. The process offers a circular economy approach, where plastic waste is repurposed into fuels and chemicals, minimizing the demand for fossil resources. While challenges remain, including emissions control and economic viability, the potential for reducing plastic pollution and contributing to a cleaner, more sustainable energy future is a driving force behind the continued development and implementation of these innovative technologies.

The realization of a sustainable future through plastic-to-fuel technologies hinges on a three-fold approach involving research, policy, and public awareness. Research endeavors aim to enhance process efficiency, reduce environmental impact, and find innovative ways to tackle challenges. Continued advancements in plastic-to-fuel technology can lead to more efficient processes, cleaner emissions, and the development of new markets for eco-friendly fuels and products. Supportive policies and regulations are fundamental to creating an enabling environment for these technologies. Governments can incentivize investment in plastic-to-fuel facilities through tax breaks and subsidies, while also setting emission standards and environmental criteria to ensure safe and sustainable operations. Policies can promote the use of eco-friendly fuels in the

transportation sector, creating a market for the products generated. Public awareness campaigns are crucial in changing attitudes and behaviors. When the public understands the environmental hazards of plastic waste and the potential benefits of plastic-to-fuel technologies, there is greater support for recycling, responsible plastic use, and embracing sustainable solutions. Public demand for cleaner energy sources can further drive the adoption of plastic-to-fuel processes. [Ghulamullah Maitlo et al (2022)].

Together, these three elements form a holistic approach towards achieving a sustainable future. By fostering research, implementing effective policies, and raising public awareness, we can harness the potential of plastic-to-fuel conversion to reduce plastic waste, curb emissions, and contribute to a more environmentally responsible and sustainable world. Pyrolysis presents a promising technology for converting plastic waste into valuable fuels. While challenges exist, ongoing research and advancements can pave the way for a more sustainable future where plastic waste becomes a resource, not a burden.

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CLIMATE CHANGE AND THE EMERGENCE AND REEMERGENCE OF VIRUSES: A THREAT IN THE FUTURE?

Mr Vijay J. Vig
Assistant Professor, Department of Microbiology, Sophia College for Women, Mumbai

Abstract: The present-day scenario of climate change is posing a humongous challenge to humans and the environment. There is a high possibility of climate change giving rise to new infectious viral diseases and the reemergence of already existing viral diseases. In the past few years, we have seen the reemergence of viruses such as the Zika virus. There is evidence of an increase in infections caused by arboviruses such as Dengue virus, Zika virus, and Chikungunya virus due to climate change and natural events. In future, the climatic conditions may cause an increase in mosquito/vector-transmitted viral infections. Influenza viruses have the potential to cause pandemics, and avian influenza viruses can spread due to migratory birds. Climate change is likely to result in the migration of birds and animals from one geographical location to another, increasing the possibility of human exposure to new viruses and virus spillover. There is a high risk of the emergence of new viruses in the future which have never infected humans. Bats can play a major role in the emergence and reemergence of viruses. Some of these viruses will be capable of causing epidemics and pandemics, giving rise to a global concern. There is also a fear of the return of eradicated viruses such as variola. It will be a daunting task to prepare vaccines against newly emerged viruses as detailed research is required to study the virus structure and immune response.

Keywords: *climate, reemergence, Zika virus, Dengue, Chikungunya, migration, influenza*

INTRODUCTION

Viruses live among us, or it will not be wrong to say we live in a world of viruses. Viruses are microorganisms that are very small, with a size of nanometers and are not visible to the naked eye. They have a simple structure consisting of a protein coat called a capsid and their nucleic acid. Some viruses have an additional lipid layer called an envelope. The protein coat capsid encloses the nucleic acid, thus protecting it. Viruses are obligate intracellular parasites and cannot reproduce without an active host. The diversity of viruses is dramatic, as there are so many different types of viruses on the planet. They have either DNA or RNA as their genetic material. Double-stranded DNA is the genetic material for most living beings on the planet, including humans, animals, plants, insects, and microorganisms such as bacteria, yeast, fungi, algae, and protozoa. As said earlier, some viruses also have DNA as their genetic material, which can be single or double-stranded, linear, or circular depending on the virus.

The presence of RNA as a genetic material is unique, and it is exclusively in RNA viruses. The RNA can be single or double-stranded. RNA viruses are very diverse and show us that the biology and evolution of viruses is very fascinating. They cause a wide variety of infections. The current SARS-coronavirus 2 pandemic showed us how unstoppable they are. They are the perfect examples of someone with minimal materials who can manipulate, hijack, and command the host cell to make multiple copies of them after the infection of the cell. A disease caused by a new virus that did not exist before is called an emerging disease or infection. When an incidence of an already existing disease increases, it is called a re-emerging disease. Climate change will have a huge impact on the emergence and reemergence of viral diseases in future.

CLIMATE CHANGE AND ARBOVIRUSES

In the recent past, we have seen the reemergence of arboviruses such as Zika virus, Chikungunya virus, Dengue virus, and West Nile virus. Arboviruses are viruses that are transmitted by arthropod vectors.

Zika, West Nile, and Dengue viruses belong to the family Flaviviridae and genus Flavivirus. They are enveloped viruses having positive single-stranded RNA as their genetic material. All three of them are transmitted via mosquitoes. Flaviviruses code for three structural proteins - Capsid C, Premembrane/membrane PrM, Envelope E and seven non-structural proteins NS1, NS2A, NS2B, NS3, NS4A, NS4B and NS5. The life cycle of Flaviviruses includes the following: The virus attaches to the molecules present on the surface of the host cell called receptors via its surface ligand proteins. It is then endocytosed into the host cell.

Endocytosis is a process where a pit or invagination is formed at the surface of the host cell, and the virus is engulfed into the host cell. The vesicle which is engulfed is called an endosome. Endocytosis is a mechanism used for transport and ingestion of molecules into the cell, and it is also used in immune mechanisms. Viruses have evolved to exploit this endocytosis to enter the human host cells. Endosomes have low pH, and this acidic pH makes a conformational change in the viral glycoproteins, which mediates the fusion between the viral and the endosomal membrane resulting in the disassembly of the virus and the release of the viral RNA in the cytoplasm of the host cell.

The genome of Flaviviruses is positive-sense single-stranded RNA. A positive sense RNA is RNA, which acts as messenger RNA and can directly be translated into proteins. The central dogma says that genetic information is stored in the DNA (for most living beings except RNA viruses), which is copied into messenger RNA (mRNA) during the process of transcription, and the information stored in the mRNA is copied into a polypeptide in the process called as translation. The sequence of genes in the DNA decides the sequence of mRNA, which in turn decides the

sequence of amino acids in the proteins as three nucleotides in the mRNA called a codon code for one amino acid. So, the Flaviviruses and the other positive sense RNA viruses do not have to follow this two-step process as their genome itself is their mRNA and can directly be translated into proteins after uncoating without the requirement of doing transcription. The positive sense vRNA is translated into a polyprotein, a single protein containing multiple proteins within it, which is cleaved into individual proteins by viral and cellular proteases, enzymes capable of cleaving proteins. The RNA-dependent RNA polymerase (RdRp), which is the replicase enzyme, replicates the genome. The positive-strand RNA genome cannot be replicated in a single step.

When the replicase enzyme uses the positive/plus-strand RNA as a template, a complementary single-stranded RNA is made, which is the negative strand RNA, also called the replicative intermediate or the antigenome. The same replicase enzyme uses the negative strand RNA antigenome as the template to make the positive strand RNA genome. Several copies of the genome are made. After replication, the viral assembly takes place at the endoplasmic reticulum membrane, where the capsid proteins enclosing the viral positive single-stranded RNA genome take up the envelope and the glycoproteins from the ER membrane to form immature virus particles. The viral envelope (lipid membrane) is acquired from the host cell itself, in this case, from the endoplasmic reticulum membrane. The virus is still immature at this point. The immature virus particles are transported, and the cleavage of the pRM protein in the trans-Golgi network (TGN) of the host cell results in the maturation of the virus. The matured virus is released from the cell to infect other cells (Back and Lundkvist, 2013).

Zika virus - Zika virus (ZIKV), an arthropod-borne virus is transmitted by Aedes mosquitoes, namely Aedes aegypti and Aedes albopictus. It was isolated in 1947 in Uganda from a rhesus monkey in the Zika forest. The first human infection of the Zika virus was seen in 1954 in Nigeria. The first reported outbreak of the Zika virus took place on the Western Pacific Island in the Federated States of Micronesia in 2007, which was followed by an epidemic in French Polynesia in the South Pacific in 2013-2014 with 30000 infections. This was followed by many outbreaks in various countries. Earlier, the Zika virus infections were mild, but neurological complications and congenital malformations have been observed in the past few years. The virus can be transmitted sexually i.e., via sexual intercourse. It can also spread from a pregnant woman to her baby, and it gives rise to birth defects such as microcephaly in the newborn. It is most likely to be transmitted via blood transfusion. It uses DC-SIGN, AXL, Tyro and TIM-1 as receptors for entry into the cells.

The diagnosis can be done using RT-PCR. Since it is an RNA virus, the single-stranded RNA is converted to double-stranded DNA via reverse transcription, which is amplified and detected. No vaccine is available, although some of them are in clinical trials (Musso and Dubler, 2016). Most of the infected individuals do not show any symptoms and are asymptomatic. Common

symptoms among those who have them include fever, rash, headache, joint pain, red eyes, and muscle pain, which can last up to a week. There is no medicine available for this viral infection. Acetaminophen is given to give some relief to the patient. The patient is advised to rest and drink plenty of fluids (www.cdc.gov). Zika virus was known to cause infections in nonhuman primates via mosquito vectors and was originally isolated from a monkey. It is a result of a virus spillover to humans via mosquito vectors.

Dengue virus- Dengue virus is another flavivirus transmitted by arthropod (mosquito) vectors. Fifty per cent of the world is at risk of dengue, with each year seeing around 100-400 million infection cases. The large spread of the Dengue virus is a result of multiple factors, including climate change, globalization, travel, and viral evolution. There are four serotypes of Dengue virus, DENV-1, DENV-2, DENV-3, and DENV-4. Acquiring infection with any one of the serotypes will result in long-lived immunity for that serotype. All serotypes of the Dengue virus show an enzootic cycle between a non-human primate and mosquitoes and an urban cycle involving humans and mosquitoes (Murugesan and Manoharan, 2020; www.cdc.gov). Dengue virus is transmitted by mosquito vectors, Aedes aegypti and Aedes albopictus, with Aedes aegypti most frequently transmitting it as compared to Aedes albopictus. Female mosquitoes tend to lay their eggs in stored water, which increases the density of the mosquito vector, resulting in increased Dengue cases. Once the Dengue virus enters the mosquito, it establishes a successful infection in the midgut of the vector, and from there, it spreads to other tissues. The virus infects the salivary glands and is present in the saliva of the mosquito so that it can be transmitted to the next human host during the next blood meal. Once it is infected, the mosquito can transmit the virus for the rest of its life (Back and Lundkvist, 2013; www.who.int).

Some of the infections are asymptomatic (showing no symptoms), whereas others result in Dengue fever. Some infections are severe giving rise to Dengue hemorrhagic fever or Dengue Shock syndrome (Murugesan and Manoharan, 2020). The symptoms of Dengue fever include high fever, headache, stomachache, rash, myalgia, and arthralgia. Dengue fever starts with a high fever within 3-15 days of incubation period. Neurological disturbances and febrile seizures can be observed in young children. A maculopapular rash is observed after the onset of fever. The rash begins on the trunk and spreads peripherally. 'Break bone fever' is another name for Dengue fever as it includes severe joint pain. The severe form of Dengue hemorrhagic fever includes hemorrhagic fever (which affects multiple organ systems and damages the cardiovascular system), plasma leakage and thrombocytopenia (low blood platelet count). The other severe infection, which is called as Dengue Shock syndrome (DSS) occurs when the leaked plasma enters the interstitial spaces, leading to shock. DSS is quite fatal, with mortality rates going up to 20%. Clinical symptoms of DSS include abdominal pain, frequent vomiting, and absent blood pressure. The diagnosis of the Dengue virus infection can be done by PCR, detection of antibodies, or by

detecting NS1 antigen in the serum. There are no specific antiviral drugs or medicines available for Dengue.

The patient is advised to drink plenty of fluids. Patients with severe forms of the infection require constant monitoring in the intensive care unit. The Aedes mosquitoes are active during the daytime, and a control of vectors is required to stop the transmission and prevent the disease. A licensed dengue vaccine Dengvaxia® is available in some countries for individuals between the age group between 9 to 45 years of age. It is recommended by the World Health Organization that the vaccine should be administered to individuals with confirmed previous Dengue virus infection. The manufacturer of this vaccine Sanofi Pasteur, announced that individuals who have not been previously infected with Dengue and are administered this vaccine may be at a high risk of developing a severe Dengue infection if they are infected with the virus after the vaccination. Dengvaxia was approved by the US FDA in May 2019 and recommended in June 2021 for children between the age group 9-16 years with confirmed previous Dengue virus infection and living in areas where it is endemic. The Dengue virus is another virus that has reemerged (Back and Lundkvist, 2013; www.cdc.gov).

West Nile Virus- West Nile virus, our third flavivirus under discussion, is also transmitted via mosquitoes. Along with mosquitoes and humans, it infects birds and horses as well. The infections in humans range from asymptomatic to a mild febrile illness to a neuroinvasive illness. Most of the infections are asymptomatic. The frequency of West Nile virus infections increased in the European Union and the neighbouring countries due to an increase in the temperature and the rainfall, so climate change does have an impact on the spread of this virus. West Nile virus infections increase during the rainy season. This virus was first identified in 1937 by an individual from Uganda. The first outbreak of West Nile virus neuroinvasive disease was reported in 1957 in Egypt, India, and Israel. It was later spread to Africa, Western Asia, the Middle East, and some parts of Europe. West Nile virus exists in an enzootic cycle between mosquitoes, birds, humans, and horses.

Birds are the amplifying hosts whereas humans and horses act as dead-end hosts. Culex mosquitoes are the main vectors of the West Nile virus, and birds are the natural reservoirs of the virus. Some of the birds that are the most important reservoirs are Blue jay, Common grackle, American crow, and house sparrow, with the latter playing an important role in the transmission of WNV in urban areas. West Nile virus is also transmitted via blood transfusion and organ transplantation. The symptoms include headache, nausea, myalgia or arthralgia, rash, and gastrointestinal problems. Very few individuals may develop a severe neuroinvasive disease, which includes meningitis (inflammation of the brain and spinal cord membrane), encephalitis (inflammation of the brain) and flaccid paralysis. The incubation period in humans is between 3 to 15 days. The virus is capable of infecting cells of the immune system: Dendritic cells,

Monocytes, Macrophages, B lymphocytes, T lymphocytes, and, also endothelial cells, hepatocytes, and neurons. The diagnosis of the virus can be done by detecting antibodies by Enzyme-Linked Immunosorbent Assay (ELISA) or RT-PCR. Vaccination or targeted therapy is not available for West Nile virus infection (Chianese et al. 2019; https://www.cdc.gov).

Chikungunya virus is another virus transmitted via mosquito vectors Aedes aegypti and Aedes albopictus. Unlike Zika, West Nile and Dengue Viruses, it belongs to the family Alphaviridae. Chikungunya virus was first isolated from an individual in 1953 from Tanzania, followed by Bangkok, Thailand in 1958. Since then, outbreaks have been reported in various Asian and African countries. So, the virus re-emerged after many years (Morrison, 2014). It is an enveloped virus and has a positive sense single-stranded RNA molecule as its genetic material. High fever is the typical symptom. A rash is observed, which is mostly maculopapular (a mix of both flat and raised lesions). The symptoms also include arthralgia (joint pain) and arthritis, which is very painful and debilitating. Other symptoms may include headache and muscle pain. Chikungunya did not have a high mortality rate before 2006. The outbreak of La Reunion Island has seen the death of 213 people infected with the virus. The 2006 outbreak in Ahmedabad, India resulted in the death of 18 individuals due to Chikungunya. Fifteen of the eighteen individuals who died were 60 years or older than that (Vu et al. 2017). There is no specific therapy or vaccine available for Chikungunya. Preventing mosquito bites while travelling and otherwise is recommended (www.cdc.gov; www.who.int).

Recent modelling studies have shown that vector-borne disease transmission is strongly influenced by climate. The virus transmission potential of mosquito vectors is increased at higher temperatures for the Chikungunya virus, Dengue virus and Zika virus (Delrieu et al. 2023). Temperature is a significant factor in the transmission of arboviruses and is also involved in the regulation of the incubation of the viruses in mosquitoes. The mechanistic models based on the thermal biology of mosquitoes have indicated that the transmission of Dengue virus occurs best at 28.1 degrees Celsius in Aedes aegypti and 26.4 degrees Celsius in Aedes albopictus. The analysis of the surveillance study of the dengue cases and climate has revealed a substantial increase in the Aedes aegypti population from 2010 to 2017 in Cordoba. Deviation in the minimum temperature, calculated from 1987 to 2017, has indicated that the emergence of Dengue has been described by temperatures warmer or more than the average, and with the observation of 60% of the months warmer than the long-term average of a given month. All the dengue outbreaks were preceded by meteorological events. The 2015 and 2016 outbreaks were related to the extreme precipitation events in which the monthly precipitation reached a peak of 8.90 and 11.13 mm. The periods in which the monthly mean minimum temperature was as much as 3 degrees Celsius higher than monthly averages were followed by the 2013 and 2016 outbreaks. The 2009 and 2015 outbreaks occurred during periods where the monthly mean temperature was 2–3 degrees Celsius higher than monthly averages (Robert et al. 2020).

There was a peak of Chikungunya and Zika virus cases in Tocantins from 2015 to 2017, and it was in synchrony with the occurrence of the super El Nino in 2015/16, which increased the temperature and precipitation in the region. Many outbreaks were related to the 2015/16 El Nino. The environmental deviations caused an increase in the temperatures, droughts, and rainfall in many regions of the world, which resulted in the occurrence of many outbreaks, including chikungunya and Zika. This El Nino of 2015/16 resulted in conditions that were optimum for emerging and reemerging disease vectors, which contributed to infections. The biology of mosquitoes is related to climatic events like El Nino, La Nina, humidity, and temperature, with these environmental conditions influencing the density and dispersion of the vectors. It was also observed that 2010, 2011, 2012 and 2019 have seen the maximum number of Dengue virus infection cases in Tocantins, and 2010-2012 was the period in which the maximum precipitation rates were observed. There was the highest occurrence of La Niña during this period. La Niña has an impact on the climate in many regions of Brazil in the form of an increase in rainfall. The principal component analysis (PCA) concluded that deforestation in the Cerrado and Amazon rainforest, minimum and maximum temperatures and El Nino had an impact on the Dengue virus cases during the analyzed period (Marinho et al. 2022).

INFLUENZA, AVIAN INFLUENZA, MIGRATION OF BIRDS AND PANDEMICS

Climate change will affect the migration patterns of birds throughout the globe. Birds are reservoirs of viruses such as West Nile Virus and Influenza virus. West Nile virus has already been discussed. Influenza will be discussed here. The influenza virus belongs to the family Orthomyxoviridae and causes a respiratory illness. There are three genera/types of Influenza viruses, namely Influenza virus A, Influenza virus B and Influenza virus C. All three types cause similar types of symptoms in humans. Influenza A virus is a broad-range virus and infects humans, birds, animals such as horses and pigs and even marine mammals. Influenza C virus infects both humans and pigs, whereas Influenza B virus exclusively infects humans. Influenza A virus has the potential to cause pandemics and has a significant mortality rate. Influenza B causes a severe infection that is restricted to old age and high-risk individuals but does not cause pandemics. Influenza C causes mild disease in children. Since Influenza A causes infection in birds, humans, and animals, and has the potential to cause pandemics, it will be discussed in detail here.

Influenza A virus particles are 80-120 nm in size. It is an enveloped virus, and has glycoprotein spikes, which protrude out from the envelope. There are two types of glycoprotein spikes present on the surface of the influenza virus; hemagglutinin (H) and neuraminidase (N). Hemagglutinin is present in large amounts (80%) as compared to neuraminidase (20%). There is an M2 protein embedded in the lipid membrane, which acts as an ion channel protein. Underlying the envelope is the M1 matrix protein, which is the most abundant protein of the virus and gives stability to

the virus particle. The genetic material of the virus consists of eight negative-sense single-stranded RNA. The influenza virus has a segmented genome, and each segment acts as a gene. Each segment is coated with capsid protein and is also associated with RNA-dependent RNA polymerase (RdRp) enzyme, which acts as replicase as well as transcriptase and consists of three subunits. The hemagglutinin H protein binds to the sialic acid present in the glycoproteins or glycolipids, which are present on the ciliated columnar epithelial cells that line the sinuses and the airways. The virus is engulfed inside these host cells via endocytosis. Inside the endosomes, the low pH triggers a conformational change in the H protein, resulting in the fusion between the viral envelope and the endosomal membrane. The eight segments of negative-sense RNA coated with the capsid proteins and RdRp are released into the cytoplasm. These segments coated with the proteins are called Ribonucleoproteins (RNPs). These RNPs are exported to the nucleus.

RNA viruses mostly replicate in the cytoplasm of the host cell as they carry their replication enzymes (RdRp) and are not dependent on the host for the same. Influenza virus is an exception as it replicates in the nucleus despite being an RNA virus. A negative RNA strand is not the messenger RNA and cannot act as a one. So, all negative-sense single-stranded RNA viruses, including Influenza virus have to do transcription to generate mRNA or the plus strand. Like positive-sense single-stranded RNA viruses, negative-sense single-stranded RNA viruses cannot replicate their genome in a single step. Their RNA-dependent RNA polymerase (RdRp) enzyme uses the negative genomic RNA strand as a template to make a positive RNA strand, which acts as the replicative intermediate or the antigenome, and the same RdRp enzyme uses this antigenome plus RNA strand as the template to make the genomic negative sense RNA. The influenza virus does the transcription and replication for all eight genomic strands. All eight genomic segments of negative-sense RNA are assembled at the surface of the membrane, and the viruses are released via the budding process in which it takes a part of the host lipid cell membrane, which becomes the envelope of the virus. The H, N and M2 ion channel proteins are synthesized on the membrane ribosomes, glycosylated, folded, and sent to the cell surface via the Golgi network so these proteins are already present on the infected host cell surface, and when the virus takes a part of the cell membrane via budding as its envelope, these proteins come with it (Shors, 2017).

Influenza has a short incubation period of 1-4 days. An infected person sheds many virus particles during sneezing and coughing, with up to 1 million virus particles present in just a single droplet! The infected individual spreads the virus at school or workplace or during travel. The increase in the number of deaths during the epidemic acts as an indicator by comparing it with the average number of deaths due to the virus during the winter season. The symptoms are headache, body ache, fever, malaise, dry cough, sore throat, and myalgia. Most of the patients experience a continuous fever of 100 to 103 degrees Fahrenheit, along with weakness, and runny or blocked nose. Some people may see complications such as laryngitis, and secondary bacterial

infections such as pneumonia or middle ear infections. People with a chronic lung, heart or kidney condition are at even higher risk. Pregnant women, old age people, young children and people with compromised immunity are at high risk of contracting influenza. Influenza can be fatal.

Influenza occurs in the winter season in the temperate and colder regions showing its relationship with the climate. Research done by the teams of Anice Lowen and Peter Palese in 2007 has proved that Influenza A spread via aerosols is dependent upon humidity and temperature, with cold temperatures of around 5 degrees Celsius being best for transmission. Rapid tests are available for the diagnosis of influenza virus infections. PCR, detection of the virus in cell culture, and detection of antibodies in the serum are some of the methods used in the diagnosis. There are licensed antiviral drugs available to treat influenza and these drugs do not work if they are administered 48 hours after the onset of illness. Amantadine (Symmetrel) and rimantadine (flumadine), the drugs that act by blocking the function of the M2 ion channel protein of the virus have been discontinued due to their ineffectiveness and the development of drug resistance. Oseltamivir phosphate (Tamiflu), Zanamivir (Relenza), and Peramivir (Rapivab) are the drugs that inhibit the neuraminidase protein of influenza. These are approved drugs and have some side effects. Vaccination is available for influenza, and people who are at high risk of complications are vaccinated each year before the flu season. A live attenuated influenza virus vaccine containing live attenuated (have lost its pathogenicity/virulence) virus was licensed in 2003 and is approved for the age group between 2 and 49 years old (Shors, 2017).

There are 18 different types of the envelope Hemagglutinin protein (H) and 11 different types of the envelope Neuraminidase protein (N) that exist and are present in the Influenza virus. The H proteins are designated as H1- H18 and N proteins N1-N11. These H and N proteins differ in the amino acid sequence, and each influenza virus carries any one of the 18 H's and any one of the 11 N's on its surface. The influenza viruses are distinguished based on these H and N proteins. If one is immune to Influenza virus H1N1, the person will not have immunity to H3N2 and so on. The influenza virus strains, which infect birds and animals, can infect humans as well. In July 2012, an outbreak of Influenza occurred in the United States, which spread to multiple states. The causative agent was identified as swine Influenza A virus (vH3N2). Most of the individuals developed Influenza after coming into contact with pigs at county fairs. A total of 306 human cases of vH3N2 were reported between 9th July and September 7th, 2012 with more than 80% of the cases happening in Indiana and Ohio. Most of the cases were seen in children and teenagers who had participated in competitions at county fairs or had encountered pigs at the fairs. The infection can occur by inhaling coughing, or sneezing droplets from the infected animal. Infection can also occur if one touches the infected animal and then touches one's mouth or nose, leading to the transfer of the viruses to the respiratory tract and infection.

Avian Influenza A virus H5N1 virus, which used to infect birds was able to infect humans with a high mortality rate of 50%. There are two processes, Antigenic shift and Antigenic drift that result in genetic variation and the generation of new strains of the virus. RNA viruses show a high rate of mutation as compared to DNA viruses. Mutation is a biological phenomenon where the sequence of the genome is changed. Mutations happen naturally as well. DNA polymerases, the enzymes that carry out replication of the genome in organisms with DNA as the genetic material have proofreading ability and can remove an erroneous nucleotide added during the replication. By doing this, DNA polymerases reduce the frequency of mutation. The replicating enzymes of RNA viruses (RNA-dependent RNA polymerases) lack proofreading activity and are unable to remove the errors during the replication. This is the reason RNA viruses have a high mutation rate which results in the generation of new viral variants, which may have increased virulence. RNA-dependent RNA polymerases may be up to 10,000 times more error-prone as compared to their DNA polymerase counterparts.

Mutations are very commonly observed in Influenza A virus as it is an RNA virus. These mutations mostly occur in the H and N genes, which code for the H and N envelope proteins respectively. When a virus infects a human body, different types of immune responses get activated. One of them is immunoglobulin antibodies (proteins produced by B lymphocytes), which bind to the viral proteins (antigens) and neutralize the virus. Antibodies are produced against the hemagglutinin protein of the Influenza A virus. If a mutation takes place in the hemagglutinin gene of the influenza virus i.e., one or a few nucleotides are changed in the RNA genome, it changes the amino acids in the H protein, resulting in a variant H protein which will be displayed on the surface of the virus. The existing antibodies against the H protein will not be able to recognize and bind to this new variant of H protein and will not work. This process in which a mutation in the genome of the Influenza virus creates a new strain is called antigenic drift and may give rise to epidemics and increase the number of Influenza cases as the virus is new to the immune system.

Antigenic shift, the other event has more dramatic and serious consequences. If two different Influenza A virus strains, one of the non-human origin, and one of the human origin infect the same animal (pig) or a bird, then antigenic shift may occur. The two different strains are replicated inside the same cells and a new virus strain can emerge if a reassortment of H and N genes occurs. If one of the viruses packs the H gene of the second virus (instead of its own H gene), a new virus strain is created despite carrying its own seven segments as this event has given rise to a new H and N combination and new virus. For example, if an avian influenza virus and a human influenza virus simultaneously infect a pig, an antigenic shift event and the reassortment creates an avian influenza virus with a human H protein on its envelope, which can infect humans now. This event of antigenic shift mostly gives rise to pandemics, with infections and deaths going up to a large scale globally. Humans do not have immunity against this new

strain and are susceptible to infection. With multiple types of hemagglutinin and neuraminidase proteins existing, there are 256 different types of H and N combinations possible in an antigenic shift event (Shors, 2017).

Influenza pandemics have occurred starting from 1918, 1957, 1968, and 2009. The 1918 Spanish flu pandemic caused by the H1N1 Influenza virus was extremely devastating and destructive, killing between 20 to 50 million people. It killed seven times more people than World War I. The virus was 25 times more deadly than the previous Influenza viruses. The symptoms were completely intense, with the cough so bad it can rupture muscles. Emergency hospitals were set up, and public health officials recommended quarantine measures, wearing a mask and personal hygiene. Johan Hultin, a graduate student had traveled to Alaska in 1951, collected tissues from the dead bodies in the mass grave of the individuals who had died of Influenza, returned to the laboratory with the lung tissues but unfortunately could not cultivate the Influenza virus in the laboratory from the tissue samples. On knowing the work of Jeffrey Taubenberger's research team in 1997, Johan Hultin at the age of 72 again went to the Brevig Mission grave, removed lung tissue samples from four individuals who had died of 1918 Influenza, and sent the samples to Taubenberger's team for research analysis who was able to sequence the genomic RNA of the 1918 Influenza strain. It is not clear why the 1918 Influenza pandemic was so devastating and had a high mortality rate but sequencing helped to discover that the 1918 Influenza strain was an avian Influenza strain, which modified and adapted to humans.

After the 1918 pandemic, the next Influenza pandemic happened in 1957, called the 1957 Asian Influenza Pandemic. It was first identified in the month of February 1957 in Northern China and was caused by the H2N2 Influenza strain. Many people died in this pandemic though it was not as devastating as the 1918 Spanish flu pandemic. This 1957 Influenza strain was quickly studied, and a vaccine was released by the month of August of 1957. The 1968 Hong Kong Influenza Pandemic, which followed the 1957 Pandemic, was detected in Hong Kong in 1968 and was the mildest form of the pandemic and affected mostly old people. It was caused by the H3N2 Influenza virus strain. The 2009 H1N1 Swine Influenza Pandemic started in North America and is the most recent pandemic. The Influenza virus strain of this pandemic was a swine strain. It affected 208 countries, and children were the most affected group (Shors, 2017). The pandemic began with an outbreak getting started in Mexico. Many deaths were seen in individuals less than 50 years of age as they did not have immunity against the virus (Madigan et al, 2012). There was a H5N1 Influenza pandemic scare in 1997. A three-year-old child in Hong Kong passed away 12 days after Influenza-like symptoms in May 1997. The virus strain was later confirmed as the H5N1 Influenza strain. This was surprising because the H5 Influenza subtype was not known to infect humans and was an avian influenza strain. At the same time, it was discovered that this same strain was responsible for the deaths of chickens at poultry farms in Hong Kong in March 1997. It was hypothesized that the H5N1 Influenza strain emerged in Hong Kong in 1997 because

the migratory shorebirds infected with the non-pathogenic strain of Influenza fecally contaminated the water, and the virus was transmitted to ducks and then got transmitted to the chickens in live bird markets in which it became very pathogenic and was even transmitted to humans. It was confirmed by November 1997 that the H5 strain of Influenza was responsible for the new human cases, and there were 18 confirmed cases of Influenza by December 1997 with 6 cases being fatal. It was confirmed that most of these patients had encountered live chickens or were present in the chicken markets a few days before the appearance of the symptoms. As a precautionary measure, 1.6 million chickens were slaughtered, and a ban was imposed on the import of chickens. This measure reduced the number of deaths as compared to the previous pandemics. There was a fear that there would be a reassortment of strains and antigenic shifts leading to a pandemic. Scientists are quite sure that some migratory birds are carrying the pathogenic H5 subtypes of Influenza A viruses- H5N1 and H5N2 (Shors, 2017).

Birds have a pattern of migrating long distances, with some of them such as waterfowl, being natural reservoirs of Influenza A viruses can spread the pathogenic viruses to other birds. In a study, data analysis from different sources suggested that the main cause of the widespread highly pathogenic avian influenza (HPAI) H5N8 viral strain was likely to be long-distance flights of the migratory wild birds infected with the virus. It happened first from South Korea or unsampled locations in the region to northern breeding grounds in spring 2014, and then from those locations to North America and Europe in autumn 2014 (Lycett et al. 2016). Highly pathogenic Avian Influenza viruses H5N8 were discovered in migratory birds since they passed through Hubei province in the latter stages of 2020. By looking at the phylogenetic analyses of viruses and the migration pattern of wild birds, it is guessed that these H5N8 viruses may have been distributed or carried from Siberia to Central China by these birds. Many mutations were observed, with one mutation in the HA protein resulting in the protein binding to the human receptor, thus increasing the transmission in mammals (Xiong et al. 2021).

Migratory birds are sensitive to climate change, with changes in the climatic conditions modifying the migration phenology, resulting in a shift in the wintering and breeding areas. There is a possibility of the emergence and reemergence of viruses present in the permafrost of Arctic northern Eurasia. The warmer temperatures are melting the upper layers of the permafrost with a concern that these viruses will be transmitted to the waterbird species, which breed in the regions underlaid with permafrost. Some specialists in the Caspian region have reported the effects of the warming on the environment. A state ornithological expedition surveyed the birds in Turkmenistan during the mid-winter in 2021-2022, where the ornithologists observed and reported that there is a transformation in the coastline and water surface areas of the bays, which is due to a decrease in sea level caused by multiple factors such as global warming. On the northern coasts, most of the lagoons, bays and gulfs have dried. These habitats which were occupied by birds have seen a decrease in bird numbers in the winter season in Turkmenistan.

The shorelines have been shifted by kilometres on the lower central and southern coasts, which has again negatively impacted bird numbers. A study by an Iranian group of researchers, Alemi Safaval et al., published in 2018 has revealed dramatic future consequences of Caspian Sea level changes and their effects on coastal morphologies. These factors may have a major ecological impact on the migratory waterfowl phenologies and the patterns of transmission of pathogens (Petherbridge et al. 2022).

BATS AND VIRUSES

There is not much data available, and things are not clear on the migration patterns of bats in response to climate change, but one study has mentioned that fruit bats migrate to more suitable areas in response to climate change and extreme temperatures, and it is predicted that many bat species will gain new habitats and will lose existing habitats in future due to climate change (Diengdoh et al. 2022). Even non-migratory bats can travel several kilometers within their lifetime. It is expected that bats can result in viral transmission of new species, and probably bring zoonotic viruses into new places. It is indicated that mitigation exclusively cannot reduce the possibility of climate-driven viral sharing. When global warming is slower, species can keep a tab on the changing climate optima, leading to an increased potential for range expansion and more first encounters. There is substantial evidence that some bat species regularly cover continental distances (Carlson et al. 2022).

If bats migrate in future excessively or change their migratory patterns, one concern that remains is the emergence and reemergence of viral diseases, as bats are reservoirs for many viruses. Many viruses such as Ebola virus, Marburg virus, Nipah virus, Hendra virus, severe acute respiratory syndrome coronavirus (SARS-CoV), Middle East respiratory coronavirus (MERS-CoV) and SARS-CoV-2 have been associated with bats. Bats are reservoirs for the Rabies virus and Influenza virus as well. Some of these viruses give rise to fatal infections (Letko et al. 2020).

THE RETURN OF SMALLPOX?

There is a fear that the smallpox can return due to climate change. The causative agent of smallpox is variola virus, a dsDNA virus. It was eradicated in 1980 due to the smallpox eradication plan implemented by the World Health Organization (Madigan et al. 2012). The stock viral cultures are stored in two international repositories, CDC in Atlanta, Georgia and the State Research Center of Virology and Biotechnology (Vector) in Russia. Variola major and Variola minor are two different strains of the same virus. Variola major virus results in a severe disease with a high degree of rash, high fever, and a high mortality rate, whereas variola minor causes a mild disease with a fatality rate of just 1-2% in unvaccinated people. The incubation period for smallpox is 12-14 days, and the initial symptoms include a fever of 38-40 degrees Celsius, headache and severe

backache. Vomiting occurs in around 50% of the infected individuals. Diarrhoea, delirium, and convulsions occur in a few individuals. After the fever declines, a macular rash appears in the mouth and on the tongue. The macular rash is transformed into papular (raised) and vesicular (blistery) and contains the virus in huge quantities. When these vesicles rupture, infectious viruses are excreted in the saliva. The individual is highly contagious at this stage. The rash in the case of smallpox is centrifugal (The rash is more observed on the face and extremities as opposed to the entire body) and is important in the diagnosis of the disease. The smallpox vaccine, which uses the vaccinia virus, was instrumental in the eradication of smallpox. Vaccinia is also a poxvirus that provides cross-protective immunity against the variola virus. The current generation is not vaccinated against the variola virus as smallpox was eradicated in 1980 (Shors, 2017).

Variola virus is capable of surviving under unfavourable conditions. Though the virus is eradicated and stored safely in only two international repositories, the variola virus DNA can be identified in skin lesions of the mummy of Rameses V which is 3200-year-old in Egypt. Russian experts discovered a vault in 1991 near the North Pole which was full of frozen victims who died from smallpox several years back in the 19th century when the epidemic occurred. This discovery raises concern over the return of smallpox following floods due to the melting of the glacial ice induced by global warming. The ability of the smallpox virus to withstand freezing for a long time increases the possibility and the fear. In a study, unknown viruses were detected in a 700-year-old caribou frozen stool, which was stored in a permanent ice layer. The two viruses recovered from the frozen faecal sample were RNA and DNA viruses (Sayed and Kamel, 2021).

MONKEYPOX

Monkeypox, caused by monkeypox virus, another poxvirus, was considered a disease of animals before 1970. Monkeypox virus was first isolated in 1958 from cynomolgus monkeys. In the 1970s and 80s, the first human cases of monkeypox were reported in western Africa. In 1996/1997, the first outbreaks of human-to-human transmission of monkeypox took place in Zaire (Democratic Republic of Congo). Monkeypox virus has crossed the species barrier and started infecting humans, maybe due to the proximity of animals to humans. A monkeypox outbreak was reported in many countries in 2022-2023, including India. It began in India on 15th July 2022 when a case was suspected in Kerala of a man who arrived from UAE. It was confirmed by the National Institute of Virology. Symptoms of monkeypox mainly include a rash on the hand, feet, chest, face, or genitals. Fever, chills, headache, and swollen lymph nodes can also be observed. It is transmitted via direct contact including sexual contact (Khan and Bashar, 2022; https://www.cdc.gov). Monkeypox cases have a significant association with meteorological factors like temperature, precipitation, dew, wind, and humidity. Further research is required though results have revealed that temperature and dew can have an impact on the monkeypox

virus cases (Islam et al. 2022). Studies have revealed that Nipah Virus spillover in Bangladesh, Hendra virus in Australia, Marburg virus in Uganda and Ebola virus in Central Africa have been linked to seasonal factors (Letko et al. 2020).

CONCLUSION

Climate change may give rise to the emergence of many new viral diseases in future and may also see the reemergence of some other viral diseases. Climate change may change the migratory patterns of birds, which may increase the chances of Influenza virus outbreaks. Avian influenza viruses can adapt to humans, causing influenza outbreaks. These migratory birds, directly or via other birds, may transmit the virus strains to animals who may come in proximity, and if the animal is simultaneously infected with another strain or is already infected, may give rise to a possibility of an antigenic shift event and a pandemic scare. Climate change may also result in bats changing their habitats. Bats are reservoirs for many viruses, and that may increase the chances of the emergence, and reemergence of viruses. Some of the viruses transmitted by bats, such as the Ebola virus cause a fatal disease. These patterns of animals coming in proximity to humans may result in a new virus spillover situation. We have seen that many viruses have emerged because of a spillover event. Climate change and natural events are likely to increase the cases of infections by arboviruses and vector-borne viruses. Climate change, along with human factors may increase outbreaks and epidemics. For instance, migratory patterns and changes in the habitats may bring animals that are reservoirs to new habitats, and people hunting animals for food and the ones who consume bushmeat may encounter these infected animals initiating an outbreak.

RNA viruses have a very high mutation rate as their replication enzymes, RNA-dependent RNA polymerase lack proofreading (error-removal function) and this gives rise to new variants to which humans may not have immunity. This is difficult in pandemics. All these factors together add to the troubles of the public health officials. It is not an easy task to develop antiviral drugs and vaccines for a new virus. Emergency-use vaccines may have their risks. Some pandemic scares in future that have the potential to be controlled may have their own consequences.

In 1976, several cadets in New Jersey showed influenza-like symptoms and were admitted, with one of them dying within 24 hours. It turned out to be an outbreak of Influenza A virus, with four patients showing the presence of H1N1. 150 million doses of vaccine were prepared in the US with 46 million doses being administered in a few months. Manufacturer's insurance carriers said that they will not compensate for harm or loss for such an urgently prepared vaccine. A liability protection bill was passed by the Congress. Problems were reported with the vaccine, with the major concern being Guillain Barre syndrome (GBS), an illness having nerve damage and muscle weakness, sometimes causing paralysis and death. The vaccine administration was stopped. 532

individuals among the ones who received immunization developed Guillain-Barre syndrome, within 10 weeks after vaccination. 32 of these 532 individuals who developed GBS died. Further research concluded that the virus would have been less pathogenic (Shors, 2017).

Many countries do not have good healthcare facilities if new outbreaks, epidemics, and pandemics happen in future. The current SARS-CoV-2 pandemic is ongoing and there is no direct evidence, and it is not clear whether it is due to climate change (https://www.hsph.harvard.edu). Some of the researchers have already said that a new pandemic is inevitable. Are we prepared for climate change and new viruses?

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WEB RESOURCES

https://www.cdc.gov/zika/index.html.

https://www.cdc.gov/chikungunya/index.html.

https://www.who.int/news-room/fact-sheets/detail/chikungunya.

https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue.

https://www.cdc.gov/dengue/index.html.

https://www.cdc.gov/westnile/index.html.

https://www.cdc.gov /poxvirus/mpox/symptoms/index.html.

https://www.hsph.harvard.edu/c-change/subtopics/coronavirus-and-climate change/#:~:text=expensive %20to%20fix%3F-Does%20climate%20change%20affect%20the%20transmission%20of%20coronavirus%3F, and%20our%20risk%20for%20infections.