TRAVAILS OF EARTH : ECOLOGICAL CONCERNS IN THE SELECT CONTEMPORARY FICTION

Thesis submitted to the University of Calicut
for the Award of the Degree of
Doctor of Philosophy
in
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by
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DECLARATION

I, Priya K. hereby declare that the thesis entitled **TRAVAILS OF EARTH: ECOLOGICAL CONCERNS IN THE SELECT CONTEMPORARY FICTION**, submitted to the University of Calicut for the award of the degree of Doctor of Philosophy in English is an original record of observations and *bona fide* research carried out by me under the guidance of Dr. Sudha K. P., Research Supervisor, Principal (Rtd.) Sree Kerala Varma College, Thrissur and Dr. Abitha Balagopalan, Co-Research Supervisor, and that it has not previously formed the basis for the award of any degree or diploma or similar titles.

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CERTIFICATE

This is to certify that the thesis entitled **TRAVAILS OF EARTH : ECOLOGICAL CONCERNS IN THE SELECT CONTEMPORARY FICTION**, submitted by Priya K. to the University of Calicut, for the award of the degree of Doctor of Philosophy, is an original work of observations and *bona fide* research carried out by her under my supervision and that it has not previously formed the basis for the award of any degree or diploma or similar titles.

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A Note on Documentation

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CONTENTS

Chapter 1

INTRODUCTION

In the year 2018, Japan selected the Chinese character for ‘disaster’ as its ‘defining symbol’(which embodies the key news and events of the previous twelve months), because it was a year when the country had been badly hit by deadly floods, earthquakes and storms. Newspaper headlines, for instance, “Climate crisis: Greenland loses two billion tons of ice in a day”, “Larger marine species could be ‘First Casualties of Global Warming’ ”, “Iceland commemorates first glacier lost to climate change”, are ample proof of the fact that while earlier, the discussions and deliberations on ecological crises were confined to scientific journals, today it has become a common parlance within media and everyday discourse. The observations of local phenomena such as invasion of alien species of flora and fauna, disappearance of native species, alterations in migration patterns of birds, inexplicable droughts, floods, wildfires and the media reports of similar incidents taking place globally have become a pivotal point to understand, discuss and find solutions to mitigate the ecological issues.

Humans have upset the intricate symbiosis of the planet’s ecosystem, which has resulted in increased pollution, deforestation, desertification, climate change, loss of biodiversity and others, which have made it extremely challenging for the humanity as well as other species to grapple with a rapidly deteriorating planet. The recent and rapid growth of the idea of Anthropocene has resulted in an increasing awareness of the scale and dangers of various ecological crises like climate change. Climate change can be regarded as the most vital and vexing concern of the twenty-first century, impinging upon every aspect of lives. Though climate change was first

discovered and discussed in the sciences, today it intersects disciplines such as Geography, Politics, Environmental Studies, Psychology, Sociology, Law, Economics, Humanities, Media and others.

In the contemporary scenario, humankind has become an ecological concern for the Earth rather than being a participatory friend. This is evidenced in the fact that while scientific knowledge and various advancements in technology have been of great assistance to understand the workings of nature, it has been unable to prevent the humanity's destruction of the planet which is taking place as a corollary of the pursuit of reckless development. Moreover, the fast-paced technological developments of today's globalized world have made humanity complacent and forget its interdependence with the natural world. It is only when there is a breakdown of the system that results in serious threats to vast number of lives, that we understand how dependent, helpless and vulnerable we are; as bitterly experienced by the people of Kerala in the aftermath of the floods of 2018 and 2019, followed by landslides in 2019 and 2020. In this context it needs to be noted that these recent catastrophes in Kerala were the drastic consequences of the failure to implement the recommendations of the eminent scientist and ecologist Madhav Gadgil, suggested in the Western Ghats Ecology Expert Panel Report in 2011, which was criticized for being excessively environment-friendly (Harinarayanan and Sreekumar 12). Moreover, such catastrophes and disasters are harsh reminders to the world that climate change is a great leveller and affects every single life on the planet. Al Gore in his *An Inconvenient Truth* (2006), called climate change an inconvenient truth and defined it as an inescapable fact that we would prefer to ignore. It is therefore quite obvious that, in this period of elevated anxiety, a growing number of writers are focussing on climate crisis.

The necessity of interdisciplinarity in the field of research, especially with regard to climate change, can be understood from the term 'Anthropocene' (popularized by Paul J. Crutzen, chemist and 1995 Nobel Prize Laureate) which has evolved into a discourse that permeates the humanities, though it has its origin in the natural sciences. According to Crutzen, it is the humans who exploit the majority of the planet's surface and thereby alter the landscape beyond recognition ("Geology of Mankind" 23). With the glaciers melting and losing their status, tropical rainforests disappearing at alarming rates, it has resulted in irrevocably altered weather patterns and geological conditions on the Earth. The unbearable amounts of carbon emissions by the burning of fossil fuels have accelerated the pace of global warming to dangerous tipping points. Lynn White, Jr. in his article "The Historical Roots of our Ecological Crisis" significantly proclaims, "With the population explosion, the carcinoma of planless urbanism, the now geological deposits of sewage and garbage, surely no creature other than man has ever managed to foul its nest in such a short order" (5). It is in this milieu of ecological deterioration and aggravating climate crisis, this study is situated.

This thesis draws on contemporary fictional narratives which have ecological foci. The recent trend of literary fiction dealing with ecological crises, questions of survival and the sustainability of the planet in the face of climate crisis are of much significance in the contemporary scenario because climatic variability has become the new normal across the globe. The works selected for this research can be grouped under ecofiction and climate-fiction in the sense that they primarily deal with the natural world and a threatened planet, which is not just the setting but an integral aspect enmeshed within the narratives. Ecofiction and climate-fiction (or cli-fi) is the defining trend of contemporary literary imagination. Moreover, the genres bridge

humanities with the sciences and social sciences, which makes it unique. The pivotal themes centre on the planet and focus on the literary delineations of the rising sea levels, soaring global temperatures, pollution, planetary landscape decimated by extreme droughts, floods, tsunamis, extinction of species and so on. Correspondingly, there is a growing presence of the genres in the academic curricula, journals, seminars and conferences.

The following paragraph deals with the research works which have been previously undertaken in this area. In *Eco-Fiction: Bringing Climate change into the Imagination* (2016), Sophia David argues that climate change gives rise to a new form of novel, which as a counteractive narrative can enchant towards ecological imagination and suggests that creative writing and revising the form of novel can bring climate change into the imagination. In *Reading the Anthropocene through Science and Apocalypse in the Selected Contemporary Fiction of JG Ballard, Kurt Vonnegut, Cormac McCarthy and Ian McEwan* (2016), David William Fevyer examines how an imaginative apocalyptic future history of the biosphere such as those presented in the fiction of the selected authors is significant for the comprehension of climate change. In *Climate change in Literature and Culture: Conversion, Speculation and Education* (2016), Stephen Siperstein explores how writers, activists and artists in the global north, engage with anthropogenic climate change and offers ideas and practice for teaching climate change in literary and cultural studies. Therefore, it can be observed that previously researchers have principally focused on the aspects of narration, pedagogical implications and apocalypse, whereas the literary delineations of the consequences of ecological concerns like climate change and its corollaries on the physical and materialistic

landscape and the loss of biodiversity have not been given much attention. Moreover, positing climate crisis as a spiritual crisis has not been attempted so far.

This thesis examines contemporary literary responses to the ecological crises and hence it falls under the purview of the theoretical field of ecocriticism. Ecocriticism contributes significantly to the discussions and analysis of the diverse forms of environmental degradation that afflict the planet today. The precepts of Glen A. Love, one of the founders of ecocriticism, in his path-breaking work *Practical Ecocriticism* (2003), underpin this study. In this work, Love significantly remarks that English teaching and research as a cultural activity, goes on within a biosphere which nurtures life and therefore, teaching and studying literature without reference to the natural conditions of the world and the basic ecological principles that underlie all life seems increasingly short-sighted and incongruous (16) and it is this nexus between human and ecology which forms the core of this study. Love further states that ecocriticism is developing as an explicit critical response to the unheard dialogue between the text and the environmental surroundings which is an attempt to raise it to a higher level of human consciousness. Love significantly adds that serious interdisciplinary work between humanities and sciences is one of the important tasks that ecocriticism must take on in the future. Love affirms the role of science, by which he means knowledge, in revealing how we and nature function so that we are better able to think our way through the staggering environmental challenge and points out the necessity of dialogue with the scientists. Love has also significantly suggested that the scientifically informed ecocritics have an opportunity to help in redirecting literary ecocriticism into a more consequential social and public role (38, 61, 64). In a similar vein, the eminent ecocritic Lawrence Buell attributes much significance to the scientific models of inquiry to literary studies and considers it as a major focus of

ecocritical work (Buell, “The Ecocritical Insurgency” 699). Correspondingly, the truthfulness and effectiveness of the scientific data pertaining to ecology and climate which have been incorporated into literary fiction is evaluated upon in this thesis.

It is a widely accepted fact that there existed an organic worldview of nature which considered the entire world as an organism prior to the rise of Newtonian science and Cartesian dualisms in the seventeenth century following which nature was regarded from a mechanistic standpoint. Consequently, scientific knowledge began to be utilized to subjugate nature thus turning it into an object and capital which paved the way for ecological crises on an unparalleled scale. Nonetheless, contributions of science are of much importance in order to understand how humans interact with the ecology of the planet. This is highlighted in Dipesh Chakrabarty’s assertion that, “in the era of the Anthropocene, we need the Enlightenment (that is reason) even more than in the past” (211). It can be claimed that incorporation of discussions of both scientific knowledge pertaining to ecology and ecological wisdom in the narratives helps to develop a fluid perspective and fosters a broader understanding of the ecological crises. This study examines how these aspects are dealt with in the fiction and how they aid in the enhancement of readers’ insight.

Hence, it can be gleaned that ecological crises is an issue that is too complex to be dealt adequately by a single discipline. Therefore, this study employs an eclectic approach with a liberal use of findings, ideas and phenomena from diverse disciplines in order to achieve a holistic understanding. This approach was also seen as pressing because, as Lawrence Buell significantly states, one of the central concepts of ecocriticism is to envision a new synthesis of literary and environmental studies. In addition, other thrust areas are the significance of scientific models of inquiry to literary studies, understanding landscapes, regions and places and the analysis of the

extent to which literature deals with the sensitivity or insensitivity to the history and phenomenon of human dominance of the nonhuman world ("The Ecocritical Insurgency" 704), and the discussion of these significant aspects form the crux of this thesis. The arguments in this thesis are made based on the rationale that the economic, political and scientific aspects of the ecological concerns in the Anthropocene are inextricably interlinked and cannot be discussed in isolation. Research on climate change has been predominantly the task of sciences, however, at present there is a substantial research endeavour taking place in the field of humanities with respect to the social, philosophical, political and anthropological aspects of climate change. But an exploratory study of the literary delineations of various thematic concerns pertaining to climate change in the aforementioned paragraphs is an untrodden arena and merit research. It needs to be noted that research on climate change in humanities necessitates interdisciplinary approach because climate change knowledge is characterized by research and collaboration between various disparate fields. Therefore, the methodology of the thesis is based on an interdisciplinary approach using theories and concepts from science, economics, politics, media and other disciplines.

The hypothesis of this study establishes that the crucial factors which are responsible for climate crisis and other ecological crises are fossil-fuel based capitalist economy and lack of ecospiritual vision, as delineated in the fictional narratives. The conceptual framework of this thesis is to posit anthropogenic fossil-fueled economy as the predominant contributor of climate crisis, resulting in hitherto unprecedented changes on the planetary landscape and severe loss of biodiversity as implicit in the narratives. There is now a considerable body of research which suggests that climate change is an untoward by-product of the fossil-fuel based capitalist economy that

reign supreme in the globalised world due to the selfish motives of certain political and elite groups who deliberately ignore the observations and the warnings of the scientists. Similarly, there have been significant contributions in research with regard to biodiversity, for instance, the question of its conservation for intrinsic values, aesthetic purposes or utilitarian needs. But these pertinent discussions were hitherto confined to the sciences and are yet to form a part of research in English literature. This thesis attempts to fill these gaps by a close reading of the fictional works to understand humanity's perilous impact on other species, thereby consequently leading to their extinction. Further, it attempts to question the sovereign status attributed to scientific knowledge and scientists as the ultimate saviours, nevertheless admitting the fact that they have always played a crucial role in dealing with the ecological crises. This study also argues that climate crisis is a spiritual crisis because it is the lack of ecospiritual vision which has disrupted the ecological web of the Earth, as depicted by the authors. This thesis concludes with the assertion that a hopeful imagining of new and alternate ways of living is imperative for sustaining life on this planet. It needs to be mentioned that though the chapters in this thesis have a different emphasis, they are co-dependent and converge on a strongly anti-anthropocentric argument.

The novels selected for this study are *The Hungry Tide* (2004) by Amitav Ghosh, *Flight Behaviour* (2012) by Barbara Kingsolver, *The Rapture* (2009) by Liz Jensen, *The Carbon Diaries: 2015* (2009) by Saci Lloyd.

The subsequent chapters are organized as follows:

The second chapter titled "*Anthropos* Versus *Oikos*: Between Ecocriticism and Climate Crisis" introduces the theoretical framework on which this study is based and contextualizes the study in the relevant literature. This chapter provides an overview

of the theoretical field of ecocriticism and examines the perspectives of eminent ecocritics with regard to the significance and incorporation of the study of landscape, nonhuman realm and ecological interrelationship, which consequently leads to the discussion on 'ecology', '*oikos*', '*tinai*' that address the totality of nature. Subsequently, the causes that lead to the disruption of the ecological web, especially the anthropogenic factors and the role of western science in causing the dichotomy between human and nature are discussed. Further, the significance of the role of science in dealing with the ecological crises and communicating relevant information is highlighted and the necessity of incorporating science in literary studies is critiqued. Significant works that have paid critical attention to literature and environment have been mentioned. This chapter also delves into the various ecological factors that have led to the growth of environmental movements and the theoretical field of ecocriticism and it is in this wider context, the concern of climate crisis is situated and elaborated upon. Apart from the ecological, the social, economic and political ramifications of climate crisis are deliberated upon, in order to gain a proper understanding of the literary delineations of the significant themes undertaken in this study.

The third chapter titled "Climate Crisis *en route* Fossil Fueled Development: A Journey Towards Melting Planet" shifts from a broadly ecocritical to a more narrow climate change focus. The primary concern of this chapter is to posit that the predominant causative factors of ecological crises like climate change are the fossil-fueled capitalist economy and lack of ecospiritual thinking which disrupt the planetary web. This chapter further delves into climate related fiction or cli-fi, origin of the word cli-fi, cli-fi's indebtedness to sci-fi and Victorian fiction, notable

characteristics of climate related fiction, significant climate related fiction and non-fiction and their significance in the contemporary climate changed world.

The fourth chapter titled “Bon Bibi’s Wrath and Bethanylands: Narratives of Altered Landscapes” delves into the literary depictions of the vast changes wrought to the planetary landscape due to the ecological crises. Drawing on the thoughts and theoretical concepts of various ecologists, critics and writers, it stresses on the necessity of attachment to one’s locale and the need to address the issues like climate crisis at both local and global levels. The chapter also examines the transformation that takes place in the characters due to the altered landscapes. The novels chosen for analysis are *Flight Behaviour, The Hungry Tide, The Rapture, The Carbon Diaries*: *2015*.

The fifth chapter titled “Critiquing Biodiversity Crisis: The Fate of King Billies and Shushuks in a Disintegrating World” examines the literary delineations of the loss of biodiversity, a serious ecological concern caused by anthropogenic factors. An attempt has been made to correlate and establish that the fictional depictions of biodiversity loss and the corresponding observations made by the authors align with the findings from the scientific researches across the world. Therefore, it could be argued that the factual incidents with regard to biodiversity are fictionalized in the narratives of *Flight Behaviour* and *The Hungry Tide*.

The sixth chapter “Looking Beyond the Binoculars: Earth-Saving Heroes and Ecological Wisdom” attempts to analyze the significance of incorporating scientific knowledge and facts pertaining to ecology and climate into fiction and thereby examine the validity and competence of western science in finding solutions to the ecological crises. While the significance of science in dealing with climate change is

indubitable, it becomes imperative to question whether mere scientific knowledge would suffice in comprehending the issue in its totality and in mitigating the crisis in a holistic way. This leads to a reconsideration of the valorized image of the scientists as the ultimate saviours. Hence, this chapter deals with the representation of science and the role of scientist characters in dealing with ecological crises in the narratives of *Flight Behaviour, The Hungry Tide, The Rapture* and *The Carbon Diaries: 2015*.

The seventh chapter is the conclusion of the thesis. This study concludes with the assertion that fossil fueled capitalist mode of development and lack of ecospiritual thinking are the primary contributors for the mounting ecological crises. The authors contend that the changes wrought to the planetary landscape and the loss of biodiversity are due to the lack of holistic thinking and reverence to the ecological web of the Earth. Therefore, it is argued that the various ecological crises are the manifestations of the spiritual crisis of the humanity. The chapter concludes with the limitations and the scope for further research.

Amitav Ghosh was born in Calcutta in 1956 and was brought up in India, Bangladesh and Sri Lanka. Ghosh was the first English language writer to be the recipient of India's most prestigious Jnanpeet award in 2018 and was named one of the most important global thinkers of the preceding decade by *Foreign Policy* magazine in 2019. Ghosh is the author of *The Circle of Reason* (1986), *The Shadow Lines* (1988), *In an Antique Land* (1992), *Dancing in Cambodia* (1998), *The Calcutta Chromosome* (1995), *The Glass Palace* (2000), *The Hungry Tide* (2004) and the Ibis trilogy consisting of *Sea of Poppies* (2008), *River of Smoke* (2011) and *Flood of Fire* (2015). His non-fictional work, *The Great Derangement: Climate Change and the Unthinkable* (2016) was given the inaugural Utah award for the Environmental Humanities in 2018. His essays have been anthologized under the title *The Imam and*

the Indians and *Incendiary Circumstances*. His most recent novel *Gun Island* was published in 2019.

Barbara Kingsolver was born in 1955, and grew up in rural Kentucky. Her works are *The Bean Trees* (1988), *Homeland* (1989), *Holding the Line: Women in the Great Arizona Mine Strike* (1989), *Animal Dreams* (1990), *Another America* (1992), *Pigs in Heaven* (1993), *High Tide in Tucson* (1995), *The Poisonwood Bible* (1998), *Prodigal Summer* (2000), *Small Wonder* (2002), *Last Stand: America's Virgin Lands, With photographer Anie Griffith's Belt* (2002), *Animal, Vegetable Miracle: A Year of Food Life* (2007), *The Lacuna* (2009), *Flight Behaviour: A Novel* (2012) and *Unsheltered* (2018). Her books have been widely adopted in literature curricula. Kingsolver was named one of the most important writers of the twentieth century. Critical acclaim for her works includes various prestigious awards. Kingsolver has established the PEN/Bellwether Prize for Socially Engaged Fiction. Since 2004, Barbara and her family live on a farm in southern Appalachia where they raise an extensive vegetable garden and Icelandic sheep.

Liz Jensen was born in 1959 in the UK. Jensen teaches creative writing in her home city Denmark and the UK. She is the author of *Egg Dancing* (1995), *Ark Baby* (1998), *The Paper Eater* (2000), *War Crimes for the Home* (2002), Hollywood-adapted *The Ninth Life of Louis Drax* (2004), *My Dirty Little Book of Stolen Time*: *A Novel* (2006), *The Rapture* (2009), *The Uninvited* (2012). Jensen's novels are broadly categorized as literary thrillers and they deal with a variety of subjects and styles. Jensen's novels are popular in their engagement with science fiction and issues of the day, particularly ecological crises. Jensen is a founder member of Extinction Rebellion's Writers Rebel, a literary movement using words and actions to highlight the ecological emergency. Jensen is very much interested and committed to climate

change and has declared, “More and more I feel that climate is the only thing worth writing about” (“Writing climate change”). Jensen has also stated that she has used her novels to explore what she does not know about and so her novels are a voyage of discovery (Schjonning).

Saci Lloyd was born in 1967 in Manchester. She is the author of the critically acclaimed *Carbon Diaries* series – *The Carbon Diaries: 2015* (2009), *The Carbon Diaries: 2017* (2010), *Momentum* (2011), *Quantum Drop* (2013), *It’s the End of the World as We Know It* (2015). Lloyd lives in London and over the last years she has toured extensively, both nationally and internationally, and has used the themes in her books as a springboard onto larger discussions. Lloyd addresses thought-provoking topics such as carbon emissions, climate change, economy and the politics influencing the youth today.

CHAPTER 2

ANTHROPOS VERSUS *OIKOS*: BETWEEN ECOCRITICISM AND CLIMATE CRISIS

> *"If your knowledge of the outside world were limited to what you could infer from the major publication of the literature profession, you would quickly discern that race, class, gender were the hot topics of the late twentieth century but you would never suspect that the Earth's life support systems were under stress"* – Cheryl Glotfelty

Ecocriticism is an umbrella term that can be applied for a variety of scholarly approaches to the interdisciplinary study of literature and the environment. It provides a revealing glimpse into the various ways in which the subject of nature is treated in literature, illustrates ecological concerns and brainstorms possible solutions to rectify the contemporary ecological crises. Ecocriticism, also known as literary ecology or environmental literary studies, emerged in the late twentieth century as a slightly delayed response to the global emergence of the environmental movements during the 1960s and 1970s. Together with environmental philosophy and environmental history, and to some extent about the studies of place, space and landscape, it forms the core of emerging cross-disciplinary field of environmental humanities ("Ecocriticism" 205). Bill McKibben remarks that ecocriticism is a key part of environmental humanities and its mission is encapsulated in the terms ' historicization of ecology' and 'ecologization of history', and it challenges the anthropocentrism or 'human racism' of traditional historical narratives, including histories of literature (Garrard, *The Oxford Handbook* 3). Ecocritics and scholars associated with environmental literary studies are generally understood to be the advocates for the environment,

often serving as activists with respect to the salient matters of environmentalism, conservation, preservation, sustainability, climate change and naturalism (Palley, Jr.1). Moreover, according to Kerridge, ecocritics search for ways to make people care and hope that their arguments will directly persuade them to care, which implies feeling, action and awareness (362-363). It has also been observed that the advocates of ecocriticism are political in their attempts to change dominant ideologies through literary critique in order to demonstrate the shortcomings of our current environmental ideas, to draw attention to environmental issues, to develop new ways of thinking about the environment and to energize environmental activism.

The concept of place is of much prominence in ecocritical discussions. Eminent ecocritics like Lawrence Buell, Ursula.K.Heise and Karen Thornber consider the reason for this interest to be intradisciplinary, implying the redressal of the historic neglect of setting relative to that of plot, character, image and symbol in literary works. More significantly, ecocriticism's attention to place reflects its recognition of the interconnectedness between human life/ history and physical environments (Buell et al. 420). This is significantly reflected in the most popular and prevalent definition of ecocriticism, "the study of the relation between the literature and the physical environment", as defined by Cheryll Glotfelty in her widely discussed introduction to the foundational text of the field of ecocriticism – *The Ecocriticism Reader* (xix). Glotfelty comments that ecocriticism takes an "earth-centered approach to literary studies" and significantly adds:

> Despite the broad scope of inquiry and disparate levels of sophistication all ecological criticism shares the fundamental premise that human culture is connected to the physical world, affecting it and affected by it. As a critical

> stance, it has one foot in literature and the other on land; as a theoretical discourse, it negotiates between the human and the non human. (xix)

This can be further substantiated with Robert Kern's argument that all texts are at least potentially environmental in the sense that they are literally or imaginatively situated in a place, and their authors, consciously or not, inscribe within them a certain relation to their place (25). Therefore, these collective definitions and observations establish the fact that place is a significant concept in ecocritical writings and discussions. Moreover, ecocriticism expands the notion of the world to include the entire biosphere, asking questions like "how does literature function within the ecosystems" and "how does a given textual representation of nature affect the way we treat actual nature" (Glotfelty 4) . This corresponds to the significant remark make by Lawrence Coupe that Green Studies makes no sense unless its formulation of theory contributes to the struggle to preserve the biotic community (3) and the observation by Kerridge and Sammells that ecocriticism seeks to evaluate texts and ideas in terms of their usefulness as responses to environmental crisis (5). Thus, in the theoretical field of ecocrticism, nature is debated in order to defend it and speak for it, thereby moving in the direction of environmental praxis.

In the present scenario of mounting ecological crises and injustices resulting in the loss of biodiversity and extinction of species caused by anthropogenic factors, it becomes imperative to incorporate the presence and the significance of nonhuman nature at the core of human understanding. The theoretical conceptions of ecocriticism give due importance to the conservation of biosphere, particularly the nonhuman realm. It has also been remarked that ecocritics highlight the ways in which human societies systematically, even if unintentionally, damage habitats and species, ranging from microorganisms and plants to insects and amphibians (Buell et

al. 432). In this context it is pertinent to note that in *When Species Meet,* Donna Haraway has stressed on the posthumanist perspective of humans as one species among others rather than with special privileges (130). In the seminal study *The Environmental Imagination*, Lawrence Buell defines an environmentally oriented work as one in which the "non human environment is present not merely as a framing device but as a presence that begins to suggest that human history is implicated in natural history and the sense of the environment as a process rather than as a constant or a given" (7-8). As a corollary to this is the definition given by Scott Slovic, "the study of explicit environmental texts by way of any scholarly approach, or conversely the scrutiny of ecological implication and human-nature relationships in any literary text, even texts, that seem at first glance, oblivious of the nonhuman world" ("Ecocriticism Containing Multitudes" 160). Thus, ecocritical theory gives much importance to the ecological interrelationship and the nonhuman world. In a similar vein, Glen. A. Love states that unlike all other forms of literary inquiry it encompasses nonhuman as well as human contexts and considerations. Love further adds that just as previous modes of ecocriticism had taken the realm of society and culture seriously, in the same way ecological thinking about literature requires us to take the nonhuman world seriously, which means understanding something scientific about how the natural world acts and this aspect needs to be considered as the greatest challenge and opportunity of ecocriticism. Love's *Practical Ecocriticism: Literature, Biology and the Environment* is a refreshing interdisciplinary work which argues for a biologically informed theoretical base for literary studies. Love justifies the use of term 'practical' due to its evocation of discourse that joins humanistic thinking to the empirical spirit of the science and to show the concern for the environment through the work done in the real world by teachers, scholars and citizens of a place and a

planet, which leads them towards ecological, naturalistic, scientifically grounded arguments that recognize human connection with nature and to the rest of organic life. Love argues for environmental literature to be grounded in the life sciences and observes that literary studies has been diminished by a general lack of recognition for the vital role of biological foundation of human life. It is one of the first significant books to attempt to fill the gap by grounding environmental literature in the life sciences with directness and clarity. The thrust of this work is that the life sciences are the key to a proper understanding of the essence and meaning of humankind. Love further believes that ecological awareness enhances and expands our sense of interrelationship and thereby encompass nonhuman as well as human contexts. Love's conviction that the future of Ecocriticism is encoded in the prefix 'eco' points up to the aspect of interconnectedness of the planet as that of the ultimate house (1, 55, 7, 8, 48, 37). Love's scientifically grounded arguments that recognise human connection with nature and the rest of organic life, will definitely aid in rectifying humanity's interaction with the world which is governed by unbridled economic development and has become the ultimate criteria for humanity's sign of growth.

Ecocritics have also scrutinised the nature of the relationships of the various components of the biosphere. It is pertinent to understand that unlike feminism or postcolonialism, ecocriticism did not evolve gradually as the academic wing of an influential political movement as pointed out by Ursula K. Heise ("The Hitchiker's Guide" 506). Rather, its growth parallels the rising awareness of the "end of nature", which is also the title of Bill Mc Kibben's 1989 book. As a corollary to this remark is the statement that public discussions of global environmental problems such as biodiversity loss and climate change made obvious the need for ecocritical discourse to develop new ways of addressing global interconnectedness (Buell et al. 421). This

can be further substantiated with Pramod. K. Nayar's definition that ecocriticism originates in a bio-social context of unrestrained capitalism, excessive exploitation of nature, worrying definitions and shapes of 'development' and environmental hazard (*Contemporary Literary and Cultural Theory* 241). Felix Guattari pertinently states that ecocriticism brings the three ecologies in relationship - environmental, social and subjective (12-13). Helena Feder significantly suggests that ecocriticism should expand to include "the social'', as we are at the moment the only species endangering the existence of other species (234). Greg Garrard observes that as ecocritical work encompasses many literatures and cultures, it would gain a lot from a closer engagement with the theories of globalization (*The Oxford Handbook* 178). In a similar vein, Heise has remarked that ecological issues are situated at a complex intersection of politics, economy, technology and culture and envisioning them in their global implications require an engagement with a variety of theoretical approaches to globalization. Heise had also stated that ecocriticism is a diverse and cross-disciplinary field with triple allegiance to the scientific study, the scholarly analysis of cultural representations and the political struggle for more sustained ways of inhabiting the natural world, which makes it a difficult field to summarize ("The Hitchiker's Guide" 506). From these poignant observations and definitions it can be construed that the theoretical field for which 'ecocriticism' is a blanket term, is still in the state of experimentation and is lurching towards uncharted territories.

As a theoretical venture, ecocriticism includes under its gamut a multiplicity of subjects like nature writing, deep ecology, social ecology, ecofeminism, ecospirituality, urban ecology, environmental justice, bioregionalism, toxic discourse, place studies, reinterpretations of canonical works from the past and many others. Ecofeminism is a significant branch of ecocriticism and feminism which was

introduced by the French feminist Francois d' Eaubonne in 1974 who expressed the view that there exists a direct link between the oppression of women and the oppression of nature. It is significant to note that the term became popular only in the context of numerous protests and activities against environmental destruction, sparked off initially by recurring ecological disasters (Mies and Shiva13). Although commonly identified with the radical political movements of the 1970s and 1980s, ecofeminism has a much longer history, perhaps even extending back to prehistoric goddess worship (Buell et al. 424). Ecofeminism encompasses a variety of theoretical, practical and critical efforts to understand and resist interrelated domination of women and nature because women as primary caregivers generally bear primary responsibility for the food and health of family members and providing fuel, food and water for families becomes increasingly difficult with environmental degradation (Eaton and Lorentzon 1-2). It is significant to note that ecofeminism and deep ecology converge at various points, but while deep ecologists consider anthropomorphism or human-centeredness as the culprit, ecofeminists regard androcentrism or male-centeredness as the primary cause for the desecration of nature.

Eco-historicism is another significant arena which provides insights into the political, economic, and social context of literary texts from past periods that have fallen into obscurity. Research into major figures like Shakespeare, Wordsworth and Austen underpins the discipline and there has also been historicist studies of climate change and literature since the past few years which further explores how the earlier literature provides a useful lens to understand contemporary ecological issues, with particular attention to psychological and social responses to climate change (Johns Putra 26 -27). Further, an interdisciplinary project is envisioned between the climate

change disciplines of climatology, geology, geography and environmental science, political, economic and cultural history and qualitative sources like poems, diaries, newspapers, paintings, folklore and so on (Wood 4). Hence, the field of ecocriticism is a fascinating one due to the comprehensiveness of the scope of its subject matter and as a rapidly proliferating field with hitherto unheard voices.

Ecocriticism is also considered as 'literary ecology', a term coined by Joseph Meeker in 1972 (Glotfelty xix). Ecology is defined as "the scientific study of the interrelationships among organisms, and between them and all aspects, living and non-living of their environment" (Allaby). Love rightly asserts that the new study of literature and nature is connected to the science of ecology, taking from it not only the popular term 'ecocriticism' but also the basic premise of the interrelationship between a human cultural activity like literature and the natural world that encompasses it (38). The word 'ecology' was coined by German scientist Ernst Haeckel in 1866 and has its roots in the German *Okologies* and the Greek word *oikos* which was defined in pre-Socratic thought as 'the whole house' pointing to the fact that humans were part of the nature and had no intention to dominate or control it. Nature was in a state of totality, developing in a cycle in which all things were related to and dependent on each other. It is this implication of interdependence and interrelatedness among the constituent parts in the term 'eco' which makes Glotfelty prefer this term to 'enviro' which is anthropocentric and dualistic in its connotations, implying that we humans are at the center surrounded by everything that is not us, the environment (xx).

It needs to be noted that though early Greek life was based on the *oikos*, no significant theoretical formulation had emerged in Greece, whereas the early Tamils had formulated a theory of '*Tinai*', the early Tamil counterpart of *oikos*, which can be regarded as the earliest known ecocritical theory as pointed out by Nirmal Selvamony.

Further, the earliest source of this theory is considered to be the most ancient Tamil text extant *Tolkappiyam* (Selvamony et al. xii). Nevertheless, the totality of nature remained the basic economic and social structure for all agrarian societies, despite the constant challenge posed by theology. It was the European Enlightenment in the eighteenth century which had led to significant developments of technology and market economy, both based on objective-scientific methodology that resulted in the alienation of humankind from nature ("Ecocriticism" 210). Besides, Descartes' view that things that think 'res cogitans' or human beings are meant to control things that do not think like animals, rocks, trees; furthered our conviction that human beings are the highest life-forms, the centre of the universe (Tong 240). It has been justly remarked that it is the European mind which made all the divisions and classes like the duality of spirit and matter. Thus, the West had chopped the once unitary whole into pieces (Oritz 708). The consequent alienation of humanity from nature that resulted in the unbridled pursuit of progress, guided by science and development began to destroy the diversity of life on an unimaginable scale. Subsequently, some view science as the root cause of environmental deterioration as it posited nature as an object to be analyzed and manipulated and provided the various ways of exploiting nature more radically than was possible by pre-modern means ("The Hitchiker's Guide" 509). Nevertheless, to put it succinctly, ecology addresses the totality of nature. Therefore, an ecological overview emphasizes interaction and connectedness, as remarked by David Keller and Frank Golley (2). Similarly, Stacy Alaimo defines ecology as the branch of biology that studies the relations between various organisms as well as the relations between organisms and their environments. Alaimo further observes that the Studies of Traditional Ecological knowledge (TEK) reveals diverse cultures produce systemic forms of ecological knowledge that is best suited to each

culture's specific environment, social organization and perspectives and hence there would be as many ecological sciences as there are cultures. Therefore, to put it broadly, the study of ecology and literature would include all cultures, all time periods and all sorts of texts including oral literatures and ceremonies and draw not only upon the disciplines of literary studies, ecology, science and science studies, but anthropology, sociology, political theory, history, cultural studies, postcolonial studies and others (100-101).

Discussions on ecology and ecological concerns consequently lead to deliberations on the significance and role of science in ecocriticism. It has been aptly observed that ecocriticism urges its practitioners into interdisciplinarity in science (Love 44). In a similar vein, Dana Philips significantly remarks in *The Truth of Ecology* that the field of ecocriticism is an interdisciplinary one and due importance must be given to philosophy of science and science studies (7). Alaimo firmly believes that both science and science studies have the potential to challenge and strengthen ecocriticism. But at the same time, science should not be revered as an unproblematic path to the truth of nature nor subjected to an echo chamber of skeptical critique (109). Further, it has also been stated that the possibilities of enlisting scientific models, e.g., from evolutionary biology, ecology and information sciences has provoked much interest and debate (Buell et al. 419). From these observations it can be discerned that literature and science converge at various points and science has a profound influence on literature and therefore, incorporating science in literary studies is essential. An overview of significant literary works with scientific basis becomes pertinent in this context. Thoreau's *Walden* (1854) is considered to be one of the widely acclaimed canonical texts about nature as it combines observations of the natural world with reflections on human values, ethics, politics and knowledge

which illustrates a scientific approach to literature. *Man and Nature* (1864) by George Perkins Marsh is considered as an early, classic work of ecology which combines a scientific analysis of how humans have altered the environment with a conservationist philosophy. Alaimo crucially observes that the genre of nature writing can be considered as a sort of scientific endeavour when it attempts to accurately observe interrelations between plants, animals, habitats and environments (103). However, it needs to be mentioned that it was with the publication of Joseph. W. Meeker's *The Comedy of Survival: Studies in Literary Ecology* (1974) that the biological-ecological-literary connection attained first major critical attention. Meeker has argued about the inseparability of literature from the ecological whole, using a comparative approach. However, the biology-literary connection had garnered wide public attention through the writer and scientist Rachel Carson's landmark work *Silent Spring* (1962) which is also credited with shaping the modern environmental movement.

Silent Spring provided the readers a comprehensive understanding of interconnected ecological processes and documented the indiscriminate use of chemicals and pesticides affecting the entire web of life. Carson's *Silent Spring* presented the argument that due to their harmful effects on people, animals and landscapes, synthetic chemicals were a matter of political deliberation. *Silent Spring* is also of much significance because it had popularized biologically verified evidence of environmental destruction and brought the obscure biological discipline of ecology out of the field and the science lab and into the public consciousness, acting eventually upon the academy as a catalyst for new and interdisciplinary thinking (Love 54). Carson mobilized science by speaking in the voice of the citizen, the "we'' who have rights, including the right to know, and with that knowledge comes the responsibility to make judgments based on our weighing of the evidence before us.

According to Cheryl Lousley, the challenge faced by ecocriticism as outlined by Carson in *Silent Spring* is the politicization of environment, which in other words refers to how to make complex socio-ecological interactions socially visible as political concerns. Lousley further comments that the achievement of *Silent Spring* was its politicization of ecology and its demonstration that the study of ecological relationship is of much significance for public affairs (156-157). *Living Downstream* (1998) by the scientist Sandra Steingraber, is a text hailed as the next *Silent Spring*. It combines scientific arguments and data with a personal account of her bladder cancer. In *Living Downstream* and *Having Faith* (2003), Steingraber portrays a comprehensive ecological vision, tracing the flows of fluids and substances through environments, nonhuman animals and human bodies and thereby presenting vivid arguments for environmental protection. While Carson hid the fact that she was suffering from breast cancer because she was concerned that this would invalidate her scientific arguments by making them less objective and because the mere fact of being a woman has already jeopardized her authority; Steingraber uses her personal narrative to pull readers into scientific and political domains (Alaimo 107). It has been crucially remarked that scientists and science writers from Rachel Carson to Sandra Steingraber have mobilized the narrative in such a way that the impact of environmental toxins became intelligible to the common people (Buell et al. 423). Therefore, it can be stated that science and nature writers perform significant function of communicating the perspectives and the findings of scientific experts to the wider public and thereby assist in galvanizing public and political action.

The study of the relationship between the physical world and literature has been a predominant literary and creative engagement since the ancient times. However, it began receiving much academic attention only in canonical works such as

Thoreau's *Walden* and in the works of American and British Romantics. Significant works that paid critical attention to literature and environment are Leo Marx's *The Machine In The Garden* (1964), Raymond William's *The Country and the City* (1973) which is considered to be the starting point for ecocritical theory, *The Comedy of Survival : Studies in Literary Ecology* (1974) by Joseph Meeker, a comparative literature scholar with a background in evolutionary biology, Annette Kolodny's 1975 ecofeminist study *The Lay of the Land : Metaphor as Experience in American Life and Letters*, Karl Kroeber's *Ecological Literary Criticism* (1994), Lawrence Buell's *The Environmental Imagination* (1995), Frederick Turner's *The Culture of Hope* (1995), *Kate* Soper's *What Is Nature?* (1995), Jonathan Bate's *Romantic Ecology* (1998) and *The Song of the Earth* (2000), Eric Wilson's *Romantic Turbulence* (2000), Glotfelty and Fromm's *The Ecocriticism Reader* (1996) and others. Hence, undoubtedly, ecocriticism has over the past few decades carved a niche for itself in the landscape of literary studies by moving from the margins into the mainstream, which is further evidenced by various academic journals devoted to it. The interdisciplinary aspect of the field of ecocriticism is underscored in the title of one of its significant journals *Interdisciplinary Studies in Literature and the Environment* (ISLE), which was established in 1993 following the founding of the Association for the Study of Literature and the Environment (ASLE) during a convention of the Western Literature Association in 1992. ASLE membership grew rapidly and further led to the establishment of its offspring organizations in various countries like Australia, New Zealand, Korea, Japan, India, UK and the independent European Association for the Study of Literature, Culture and Environment (EASLCE). Thus, it can be noted that the theoretical field of ecocriticism has mushroomed significantly in the last few decades.

Ecocriticism has certainly aided in activism as it deepens our understanding about the relationship that we have with our environment. This can be illustrated with Joan Martinez Alier's distinction of the three clusters of environmental concern and activism which is noteworthy:

1.The 'cult of wilderness' concerned with the preservation of wild nature but without saying anything about the industry and urbanization, indifferent or opposed to economic growth, mostly worried about population growth, backed up scientifically by conservation biology.

2.The 'gospel of eco-efficiency' which is concerned with sustainable management and with the control of pollution not only in industrial contexts but also in agriculture, fisheries and forestry, based on a belief in new technologies as instruments for ecological modernization, backed up by industrial ecology and environmental economics.

3. The environmental justice movement variously called as popular environmentalism, the environmentalism of the poor and livelihood ecology, grown out of local, regional, national and global ecological distribution conflicts caused by economic growth and social inequalities. Examples are conflicts over water use, access to forests, burdens of pollution and ecologically unequal exchange, which are studied by political ecology.

Alier further observes that the third cluster points to the fact that indigenous and peasant groups have often co-evolved sustainably with nature and have ensured the conservation of biodiversity, though with an intention of material interest in the environment as a source and as a requirement for livelihood. The third movement is growing worldwide, emphasizing the inevitable ecological distribution conflicts

occurring as a consequence of a rising economy which is resulting in the damage of natural resources, leading to production of more waste, undermining the rights of future generations who endure a disproportionate amount of pollution in spite of not causing it, and loss of access to environmental resources (4, 11, 12). It can be claimed that the fight against the causes of climate change is related to all the three clusters but stands closer to the third strand as the poor people who form the majority of the global population are the most affected.

The varying opinions over the value of the environment also reflect deeper philosophical differences. Critics and scholars have mapped environmentalism across a broad spectrum among which Arne Naess' deep ecology and Murray Bookchin's social ecology are prominent categories. A key figure in the propagation of deep ecology is the Norwegian philosopher Arne Naess who distinguished between 'shallow' and 'deep' ecology, during a lecture in Bucharest in September 1972. Deep ecology, which is also described as ecocentrism or biocentrism, asserts that nonhuman as well as human life has intrinsic value and foregrounds the value of nature for its own sake. It considers the rights of other species at par with that of humans. It is also associated with respect for wild and rural places, and gives much importance to a sense of place and local knowledge ("The Hitchiker's Guide" 507). While biocentrism rejects a human-centered perspective by looking at history from the perspective of other species and nature as a whole (Guha 116), shallow ecology is characterized by Naess as a concern about pollution and resource depletion and the damaging effects this might have on human life, which in other words is instrumentalism. This instrumental approach is problematic as nature is regarded as valuable and protected only if it is beneficial to humans. Moreover, it upholds the belief that humans stand apart and above the rest of the creation (Ingold 218). This interpretation of the world

merely in terms of human values and experiences is called anthropocentrism, which according to Val Plumwood develops in people conceptions of themselves as belonging to a superior and a rational sphere of technology and culture which is dissociated from nature and ecology and she terms this as ‘radical exclusion’. Anthropocentrism regards nature as a hyper separate, lower order lacking continuity with the humans, and stresses those features which make humans different from nature and animals and conceive them as inferiors stereotyped in their lack of reason, mind and consciousness. Since the nonhuman sphere is thought to have no agency of its own and to be empty of purpose, it is thought appropriate that the human colonizer imposes his purposes upon them. This in turn makes us forget the fact that we are not only cultural beings but also natural beings just as dependant on a healthy biosphere as other forms of life. Plumwood significantly adds, “instrumental outlook distorts our sensitivity to and knowledge of nature, blocking humility, wonder and openness in approaching the more-than-human and producing narrow types of understanding and classification that reduce nature to raw materials for human projects”. Plumwood further suggests that ecological thinkers and activists can try to puncture the ‘Illusion of Disembededness’ and counter radical-exclusion by emphasizing human continuity with nonhuman nature (107-108, 99, 111-112). Hence, the deep ecology movement is very significant because it looks back to the ancient conception of nature as interconnected and holistic, an outlook which is of utmost importance in today’s fragmented and dissipated world.

The realization of the significance of deep ecological tenets has resulted in a new kind of response to conservation through the concept of rewilding, whereby humans withdraw from parts of the planet to allow natual processes to play themselves out without disruption from humanity’s desires and narratives. Writers

attempting at rewilding fiction are Jay Griffiths, Charles Foster, Julia Leigh, Tim Winton, Rick Bass, Annie Dillard, David Vann and others. According to the novelist Gregory Norminton, rewilding the novel means to acknowledge in fiction where we come from, where we are going and what we have lost and are losing on the way. Further, the rewilded novels attempt to remind the readers that we are tellurian, that is of this Earth and what awaits us on a denatured planets is loneliness and grief ("We need to rewild the novels"). According to Isabella Tree, author of *The Return of Nature to a British Farm* (based on her creation of new habitates for wild animals with conservationist husband Charlie Barrel), the first book choice on wilding is *A Sand County Almanac* by Aldo Leopald who is presently known as the father of 'rewilding'. This is followed by *Three Against the Wilderness* by Eric Collier, *The Song of the Dodo* by David Quamen, George Monbiot's *Feral: Rewilding the Land, The Sea and the Human Life* and *Half Earth* by Edward O. Wilson (Handerson).

The growth of ecocriticism as an academic discipline can be attributed to the growing public awareness of the planet's increasingly threatened environments. Accordingly, ecocritical studies have proved to be timely and intriguing because the responsibility to address the twenty first century's most pressing problem, that is, the sustainability of Earth's environment, is assigned to all disciplines and not confined to science, law or public policy (Buell, "The Ecocritical Insurgency" 699). The beginnings of a distinctly conscious environmental criticism, which Buell characterizes as the spirit of commitment to environmental praxis (*The Environmental Imagination* 430), seem to have first stirred in the 1960s with widespread public concerns over nuclear annihilation, rapid population growth, urbanization, rising global temperatures, deforestation, loss of wild and natural areas, accelerated species extinctions, increasing contamination of the earth, air, water, land and others.

Correspondingly, one of the nascent factors of the environmental movements is considered to be the urgency in communicating and instilling the significance of ecological connectedness to the global population. The various scientific assessment reports of the condition of the planet have played a crucial role with regard to the same. However, these were accessible and comprehensible only to a select few. Such scientific accounts reached wider audience through popular images such as the image of the 'Blue Planet' seen from outer space and popularized by the photographs of Earth rising above the Moon taken by the Apollo 8 crew in 1968 and the famous 'blue marble' picture obtained by the Apollo 17 mission in 1972, in which the planet appears as a single entity united, beautiful and delicate. These images are deemed to have deeply influenced the media theorist Marshall McLuhan and atmospheric scientist James Lovelock's Gaia Hypothesis (Heise, *Sense of Place and Sense of Planet* 22). Other key markers include the publication of Rachel Carson's *Silent Spring* in 1962, the Club of Rome's 1972 report on *Limits to Growth*, the Three Mile Island nuclear reactor accident at Chernobyl in 1986, the Exxon Valdez oil spillage in 1989, to mention a few. However, these were mostly regional in effect and it was the discovery of depletion of ozone over Antarctica in 1985 by the British Antarctic Survey which succeeded in demonstrating the global connectivity of our environment (Maslin, *Climate Change* 18), and consequently led to international level policies and agreements to cut greenhouse gases emissions.

Gaia Hypothesis needs to be specifically mentioned in this context, because it played an important role in imparting the interconnectivity and holistic nature of the planet. Gaia is a metaphor for the living Earth, according to the Gaia Hypothesis that was introduced in 1972 by James Lovelock. Lovelock collaborated with the eminent American biologist Lynn Margulis and in their first joint paper, they stated that the

Gaia Hypothesis considers the biosphere as an active, adaptive control system capable of maintaining the Earth homeostasis. Gaia includes the whole system of animate and inanimate parts in the biosphere and is a dynamic physiological system that has kept our planet fit for life for over three billion years. Lovelock calls Gaia a physiological system because it appears to have the unconscious goal of regulating the climate and the chemistry at a comfortable state for nurturing life. The Amsterdam Declaration in 2001 was an important step towards the adoption of Gaia Theory as a working model for the Earth because more than a thousand delegates signed a declaration that stated, "The Earth System behaves as a single, self-regulating system comprised of physical, chemical, biological and human components". The concept of Gaia, a living planet, is for Lovelock the essential basis of a coherent and practical environmentalism which counters the belief that the Earth is a property, an estate, to be exploited for the benefit of humankind (*Gaia* 29, 24, 19, 32-33, 173, 248). The concept of Gaia is evocative of John Muir's foundational ecological maxim – "when we try to pick out anything by itself, we find it hitched to everything else in the universe" and Barry Commoner's first law of ecology which states that everything is connected to everything else.

Lovelock's vision of an enduring and balanced planetary ecosystem is contrary to the concept of 'risk society', the term coined by German sociologist Ulrich Beck. Lawrence Buell has opined that risk society holds out the idea of a permanently destabilized globe (*The Future of Environmental Ecocriticism* 90). According to Heise, most environmentalists see the world as unified today either due to a world dominated by corporate capitalism or as a world at risk. Similarly, risks that emanate from political or economic crisis too have similar potential to work across national and social borders and affect populations with little control over their causes. Heise further adds that apocalyptic narrative with its portrayal of an entire planet on the

brink of ecological collapse and human populations threatened to their very survival has been one of the most influential forms of risk communication in the modern environmental movement (*The Sense of Place* 27, 53, 122). It is also pertinent to note that certain ecological and technological risk scenario, for instance, regional ones such as the nuclear accident at Chernobyl in 1986 or global ones such as the depletion of the stratospheric ozone layer and the global warming has affected populations that are geographically, politically and socially distant from the places where these risks originate. The contemporary world is interconnected not only through globalization of trade and culture but also through the natural occurrences and disasters that have wide repercussions all over the planet. This is evidenced by the detection of the signs of radioactive contamination of the sea after the Fukushima nuclear accident in Japan, which a few years later was detected on the American coast.

Ulrich Beck links the concept of risk to broader theorizations of modernization and globalization and postulates that modern societies have entered a phase of 'reflexive modernization'. Further, the hazards that are characteristics of this new era are themselves the effects of these modernizing processes and some of these risks such as global warming and the thinning of the ozone layer are for the first time truly planetary in scope. Beck proposes that such risks will lead to a new stage in the evolution of modernity, implying a 'risk society' by which he intends that the technological developments of modern society has reached a stage where it has become unable to protect itself against the unintended side effects of its own technologies, which initially were latent and invisible and are now emerging into full public view. Even as the socially privileged attempt to export such side effects to the less empowered, in the end they cannot prevent these from returning to harm them. This is demonstrated by the various ecological crises and a significant instance is the

excessive pesticide usage. The highly dangerous pesticides are exported to countries with lax environmental regulations and they in turn, export their pesticide contaminated harvests back to the countries who exported the chemicals and he calls this ‘boomerang effect’. Purchasing organic produce may offer a temporary release from this cycle for the affluent, but when soil, air, and drinking water are polluted, even the socially privileged are increasingly impacted by risks that affect the foundations of life. Heise aptly observes that while it is not easy, even for experts, to predict the long-term consequences of large-scale risk scenarios such as climate change or loss of biodiversity, yet all of us have come to live with daily awareness and expectation that these types of risks form part of our everyday environment (*The Sense of Place* 146-147, 151) . In this context it is also crucial to note that the twenty first century has seen an increased awareness of forms of environmental destruction that cannot be immediately seen, localized or, by some, even acknowledged (Clark x). These crucial aspects lead to the discussion of the key features of the ecological crises, which is attempted in the subsequent paragraphs.

The ecological crises faced by the inhabitants of the planet today is the crisis of reason or what the dominant culture has made out of reason, as remarked by Plumwood. This proposition is significant because Plumwood coherently determines that reason itself is not dysfunctional because it is plural, political and part of social context and it is not the reason itself that is the problem but rather the arrogant and insensitive forms of it that have evolved in the framework of rationalism which treat the material and ecological world as dispensable (15). This tendency to trivialize nature where nature is everything that culture is not is critiqued by Dana Philips as *Lumperphanomenon* (32). This attitude or thinking is a serious concern because it further exacerbates the commodification of the world which would eventually lead to

the annihilation of the planet. Another significant aspect is that ecological concerns do not garner public attention or outrage like other social or political issues (Fisher 118). It is probably due to the fact that they are not always easy to discern. Rob Nixon pertinently remarks that many environmental problems amount to a form of 'slow violence' by which he means, "a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all" and it is also exponential because it operates as a major threat multiplier due to which the conditions for sustaining life becomes gradually degraded. Nixon further explicates that stories of toxic build-up, massive greenhouse gases, and accelerated species loss due to ravaged habitats are all cataclysmic, but they are scientific convoluted cataclysms in which casualties are postponed, often for generations (3). Another feature is their irreversibility or the extensive time it could take to restore the previous equilibrium. This is illustrated by species extinction and climate change because even if the emissions were halted tomorrow, elevated levels of carbon dioxide would remain in the atmosphere for many hundreds, even thousands of years (Dobson 56). Hence, the catastrophic results of the anthropogenic modifications of the global climate can be clearly dubbed as slow violence. Further, it is a violence that is perpetuated by the rich and the developed countries, the 'resource omnivores' (Gadgil and Guha 177 - 178) and the principal casualties are the poor people who lack resources. And unfortunately climate crisis turns the people of the third world countries into the victims of 'displacement without moving', a radical notion of displacement which refers not only to the movement of the people from their places of belonging, but also implies the loss of their land and the resources, a loss that leaves communities stranded in a place stripped of the very characteristics that made it habitable (Nixon 3,

19). Thus, it is the least privileged of the society who unjustly endure multiple forms of violence. Therefore, it can be deduced that the global climate crisis exemplifies all the aforementioned attributes.

These significant aspects inevitably lead to the discussion on climate change, which can be claimed as the most severe ecological crisis faced and simultaneously caused by humanity so far. Amitav Ghosh, similar to other writers and thinkers in the field of ecocriticism, considers climate change as synonymous with Anthropocene. The term Anthropocene has rapidly become adopted in the humanities in a sense beyond the strictly biological and is a loose, shorthand term for all the cultural, ethical, aesthetic, philosophical and political aspects of environmental issues that are truly planetary in scale, notably climate change, ocean acidification, effects of over-population, deforestation, soil erosion, over-fishing and the general and accelerating degradation of ecosystems (Clark 2). The term Anthropocene was first coined by Paul Crutzen and Eugene Stoermer. Their suggestion for an Anthropocene start date was the latter part of the eighteenth century, coinciding with the Industrial Revolution. According to Crutzen and Stoermer, the Anthropocene represents a dangerous shift, a very unwelcome and radical rupture in Earth history and this rupture implies that the Holocene can be no guide to the Anthropocene, geologically or intentionally. The culprit behind the arrival of Anthropocene is humankind, understood as ‘homo faber’, the technological man of modern Western Civilization who is the new geological force by means of the power to disturb the great cycles that govern the planet’s trajectory (Hamilton 5,10). They pertinently remark that the human impact is not a temporary blip but is likely to last for a long time and even if drastic action is taken over global warming now, its effects will last for tens of thousands of years because of the momentum that has been built into the climate system.

Anthropocene is a biophysical phenomenon - a qualitative change in Earth's most critical physical characteristics that has profound implications for all living things including humans. Moreover, as remarked by Ian Angus, it has to be understood as a socio-ecological phenomenon - a qualitative change in the relationship between human society and the rest of the natural world (*Facing the Anthropocene* 109). Similarly it has been stated that the Anthropocene blurs and even scrambles crucial categories by which people have made sense of the world and their lives, for instance, between culture and nature, fact and value and between the human and the geological and meteorological (Clark 9). This can be further substantiated with the propositions regarding the climate change in the form of four theses by Dipesh Chakrabarthy in his seminal essay "The Climate of History". Chakravarthy observes that historians will have to revise many of their fundamental assumptions and procedures in this era of human-induced climate change in which humans have become geological agents, changing the most basic physical processes of the earth. Chakravarthy further explicates:

1. Anthropogenic explanations of climate change spell the collapse of age-old humanist distinctions between natural history and human history.

2. The idea of the Anthropocene, the new geological epoch when humans exist as a geological force, severely qualifies humanist histories of modernity or globalization.
3. The Geological Hypothesis regarding the Anthropocene requires us to put global histories of capital in conversation with species history of humans.
4. The cross-hatching of species history and the history of capital is a process of probing the limits of historical understanding. (201, 207, 212, 221)

Thus, Chakrabarty concedes with the science of climate change to be right in its broad outlines and agrees that the present crisis of climate change is human-made. The word 'Anthropocene' was confined to the scientific fields until a few years back. However, today it is a widely discussed word with many works dedicated to the subject, hundreds of academic papers, innumerable articles in newspapers, magazines, websites, blogs and is a significant topic of discussion in conferences and seminars in humanities. There have also been exhibitions related to art in the Anthropocene era and a heavy metal album called *The Anthropocene Extinction* has been released.

'Planetary boundaries' is yet another significant concept related to the Anthropocene, which arose as a result of a significant investigation in 2007 to identify the Earth's processes that are crucial and inevitable to maintain the stability of the planet and to maintain Holocene like conditions on Earth. The project was initiated by the Stockholm Resilience Centre and headed by environmental scientist John Rockstorm, along with Paul Crutzen, Will Steffen, James Hansen and Katherine Richardson who had identified nine planetary boundaries, the disruption of which would lead to abrupt environmental changes at planetary scale. The significant terms related to planetary boundaries which were introduced in 2015 are the following:

1. Climate change , 2. Land-system change, 3. Changes in biospheric integrity, 4. Biogeochemical flows, 5. Stratospheric Ozone depletion, 6. Ocean acidification, 7. Freshwater use, 8. Atmospheric aerosol loading, 9. Introduction of novel entities.

The disturbing fact is that we have already crossed a few of the nine 'planetary boundaries' that are considered by some scientists as the ultimate barrier not to be overstepped (Latour 1). Climate change and land-use change are found to be in the danger zone and biosphere integrity is in a very high-risk zone, and this thesis delves

into the literary representations of these three crucial aspects. With regard to climate change, it has been observed that the volume of greenhouse gas had passed 400 parts per million (ppm) in 2015 and continues to be the highest in the past thousands of years. There are radical alterations in the land systems which affect biodiversity and negatively impact the earth's climate and water systems. Similarly, biospheric integrity is being affected profoundly because the species are rapidly declining and going extinct at the rate of thousand times compared to the pre-industrial times. The results of a study related to accelerating extinction risk from climate change suggest that extinction risk will accelerate with future global temperatures, threatening up to one in six species under current policies. Even species not threatened directly by extinction could experience substantial changes in abundances, distributions and species interactions which in turn would affect the ecosystems (Urban 572-573). Hence, we can understand that the planetary boundaries are tightly linked, although they are defined separately. Ian Angus explicates that if one boundary is transgressed, other boundaries are also under serious threats and further illustrates that significant land-usage changes in the Amazon could influence water resources as far away as Tibet. Similarly, the climate boundary will be affected if the nitrogen-phosphorus boundary is transgressed since it erodes the resilience of marine ecosystems by reducing their capacity to absorb carbon dioxide (*Facing the Anthropocene* 76). Therefore, it had been aptly remarked by Wallace Broeker (considered as the grandfather of climate change, who passed away in 2019) that the Earth's climate system is an ornery beast which over-reacts even to small nudges.

The following section deals with the various global political summits and scientific reports which have played a crucial role in putting the issue of the climate crisis on the world map. The World Commission on Environment and Development's

1987 report, *Our Common Future,* known as the Brundtland Report had played an influential role at the international level by putting forward the idea of sustainable development. It was a significant focal point for bringing diverse groups together in the belief that environmental protection and economic growth were compatible aims that could be harmonized. It further led to the United Nations Conference on Environment and Development in Rio in 1992, in which 172 countries signed the United Nations Framework Convention Climate Change (UNFCCC), the document that formed the basis for all future climate negotiations. It stressed on the urgency to combat climate change and agreed that the already industrialized countries would take the first action and would also pay the developing world to avoid the growth of emissions (Narain 94). Thus, UNFCCC was historic because it recognized the historic responsibility of certain countries in creating the problem and hence urged these countries to provide finance and technology to the rest so that their right to development will not be compromised.

The Kyoto Protocol drawn up in 1997 is of much importance in the discussions of climate negotiations because it was the first international treaty to outline the general principles on cutting the greenhouse gas emissions. It is an extension of the UNFCC, which was based on the scientific consensus that global warming is occurring and the predominant cause is the human-made carbon dioxide emissions. Moreover, it is based on the principle of 'Common But Differentiated Responsibilities', because it acknowledges that different countries have different capabilities to combat climate change due to the difference in the pace of economic development. Therefore, the responsibility to reduce the current emissions is assigned to the developed countries on the basis that they are historically responsible for the current level of greenhouse gases in the atmosphere. However, the USA under the

leadership of President Bush, withdrew from the climate negotiations in March 2001 and did not sign the Kyoto Protocol. They rejected the Kyoto Protocol calling it fundamentally and fatally flawed because it did not include China and India. It conveniently forgot that this global deal was premised on the principle that the rich would reduce emissions to make space for emerging countries to grow. During the following decade, climate change negotiations continued but the US and its allies refused to act and the Kyoto Parties, largely the Europeans, did cut emissions but not anywhere near what was needed. It is pertinent to note that whenever the subject of climate crisis is brought up for deliberations, the developing countries like China, India and Brazil are blamed by the developed countries as if the West are mere spectators to the reckless model of economic growth, while it was the West's governments and multinational companies that had propagated a model of export led development which had led to the crisis. Moreover, it is not fair that U.S with a miniscule of five percent of the world's population has occupied over twenty one percent of the atmospheric space (Narain 95, 85). As carbon dioxide lasts for more than 150 years in the atmosphere, it means that this 'historical burden' has to be accounted for, since the already accumulated emissions in the atmosphere is responsible for temperature increase which in turn leads to extreme weather events around the world.

The work done by the Intergovernmental Panel on Climate Change (IPCC) is of much significance because it provides the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences. IPCC is the leading body for the assessment of climate change and was established by the United Nations Environmental Programme (UNEP) and the World Meteorological Organization (WMO) in 1988. It is recognized as the most

authoritative scientific and technical voice which reviews and assesses the most relevant scientific, technical and socio-economic information produced worldwide that is relevant to the understanding of climate change, evaluating the risks and developing suitable responses ("Climate change 2013"). In 2008, the IPCC was jointly awarded with Al Gore, the Nobel Peace Prize, to acknowledge the work done by the IPCC over the past twenty years. The assessment reports and special reports of the IPCC published till date, unanimously agree to the disparaging fact that the rate of the emissions due to the 'business as usual' scenario is directly proportional to the increase in global mean temperatures. It needs to be noted that Stern Review (2006) is another landmark work which focused on the economic aspects of climate change and the cost and benefits of developing timely solutions (Opdam 715).

The scientific understanding pertaining to the reality of climate change caused by anthropogenic factors has strengthened but a small but persistent proportion of the population still oppose the mainstream scientific position. A number of factors contribute to the rejection of scientific evidence with political ideology playing the key role. Conservative think tanks supported with funding from vested interests have been and continue to be a prolific source of misinformation about climate change. A major strategy adopted by opponents of climate mitigation policies has been to cast doubt on the level of scientific agreement on climate change. This demonstrates that misconceptions can have significant societal consequences and interferes with the communication of accurate scientific information (Cook). It also points towards the aspect of ecological denial which is explicated by Plumwood as the refusal to admit the reality and seriousness of the ecological crisis. It depicts the weakened sense of the reality of our embeddedness in nature as the bulk of the effort and energy is not

put into dealing with crisis such as greenhouse gases but rather into denying that a problem exists or into giving it an extremely low priority (14).

Science has played a very crucial role in putting the issue of climate change on the world agenda. Various new ideas pertaining to science and technology have been formulated to deal with the crisis of climate change since its discovery as the most serious ecological concern faced by the planet. It was in the late 1980s that the world saw the emergence of the concern of the gradual warming of the Earth's atmosphere due to the emissions of heat-trapping gases, initially called the 'greenhouse effect', which later came to be referred to as 'global warming' and 'climate change'. Climate is generally defined as 'the average weather'. The original definition of climate was "the average weather over thirty years" (Maslin, *Climate* 34). But this has changed because our climate has been changing rapidly, leading to hitherto unobserved changes in the physiological features of the planet affecting the well-being of the ecosystem drastically. The scientific evidence amassed over several decades strongly suggests that the human activity is increasing the concentrations of greenhouse gases in the atmosphere leading to a rise in average temperature at the Earth's surface which is termed as anthropogenic climate change, that is, climate change which is caused by human beings and that which is distinct from any natural greenhouse effect (Dobson 91). Climate change is generally considered as a more scientifically accurate term than global warming because "changes to precipitation patterns and sea level are likely to have much greater human impact than the higher temperatures alone", as explicated by NASA (Shepherd).Various scientific reports concede to the fact that the figure of 2^{o}C higher than the pre-industrial temperatures is the maximum temperature change that humanity would be able to tolerate. Therefore, the emissions of the greenhouse gases have to be cut fast and drastically if the rise in temperatures has to

be capped at 2ºC. It was approximately 1,29,000 years ago the climate was 2ºC higher than that of the present which proves the direness of the situation. Citing the scientific findings, the prominent environmental writer and activist Bill McKibben observes that in order to achieve the target we must release no more than 565 gigatons of carbon dioxide between now and 2050 and considering the present rate we would exceed that amount by 2028 (McKibben, "Global Warming's" 1). Adding carbon dioxide or any other greenhouse gas to the atmosphere by the burning of fossil fuels or leveling the forests is considered as 'anthropogenic forcing' in the rhetoric of climate science (Kolbert 106). And the present rate of the anthropogenic forcing is alarming and unprecedented in human history. According to scientific observations 50% of our emissions have been already absorbed by the Earth, with 25% going into the oceans and 25% going into the land biosphere, which is a worrisome aspect for the scientists. However, it is unlikely to continue in the future because with the rise in global temperatures, the oceans will warm and will be able to hold less carbon dioxide and if we continue to deforest and convert land for farming and urbanization, there will be less vegetation to absorb carbon dioxide, again reducing the uptake of our carbon pollution. Scientists are predicting that continuing on our current carbon emissions pathway we could increase the temperature of the planet approximately between 2.8ºC and 5.6ºC in the next eighty five years, which economists suggest could cost us as much as 20% of world gross domestic product (GDP) to deal with the climate crisis (Maslin, *Climate Change* 12). Since 1880, the ten warmest years in the 139 years record have all occurred from 2005, with the warmest years being the five most recent years ("Scientific consensus") and unfortunately the trend of rising global temperatures continues unabated.

Derived from the Greek word *Klima*, meaning a fixed zone or area on the earth, the concept of climate came to encompass in medieval and Renaissance natural philosophy, the natural economy of air, soil and water in a particular place as well as their combined effects on the organisms living there. Climates were plural, local and fixed; they varied across place but not over time. The twin features of geographic variation and temporal fixity made climate a potentially powerful explanation for global biodiversity (Barnett 220). McKibben significanty remarks that for the ten thousand years which constitute human civilization, we have existed in the sweetest of sweet spots as the temperatures had barely budged; it was warm enough that the ice sheets retreated from the centers of our continents so we could grow grain and cold enough that mountain glaciers provided drinking and irrigation water to those plains and valleys throughout the year. The farming process had taken advantage of the predictable heat and rainfall and though there was an abrupt departure from the norm in the form of a hurricane, a drought or a freeze, occasionally in one place or another, it was very rare as reflected in the language: freak storms or disturbances. Unfortunately, we no longer live on that planet and it is a different place which necessitates a new name and hence McKibben suggests the name 'Eaarth' (*Eaarth* 1, 2), which is very apposite because unprecedented colossal changes are being observed, recorded and analyzed by the climate scientists in every major element of the planet.

Today natural climate has been taken over by the anthropogenic climate. Moreover, as aptly pointed out by Mike Hulme, climate change contributes to the dissolution of the modern dualisms of nature-culture, present-future and global-local. Hulme pertinently adds that by changing the composition of the world's atmosphere so substantially, humans have not simply brought a new category of weather into

being - ‘human weather’ as distinct from ‘natural weather’, rather it has altered the planetary system which yields distinct weather at distinct time in distinct places. Therefore, whatever the weather we experience today is the result of this new co-produced natural-cultural system. Hulme also suggests that Beck’s idea of cosmopolitanism can be used to understand the new phenomena of climate change and our changing experiences of the weather, as climate has today become cosmopolitan, unlimited and without boundaries (“Cosmopolitan Climates” 267-268, 269). In a similar vein, Gert Goeminne and Karen Francois opine that anthropogenic climate change is inextricably hybrid which implies that it is naturally produced, operating beyond human understanding or control and at the same time it is also socially produced because it is the consequence of human actions.

The vast technological prowess of humanity over the past few centuries has drastically altered the planet’s ecosystem. Harold Fromm significantly opines that the effects of nature are now mediated by technology and hence it appears that technology and not nature is actually responsible for everything. This has resulted in the failure of the humanity to see that the roots of his being are in the Earth which has provided humans a sense that they mentally and voluntarily determine the ground of their own existence. This is aptly phrased as ‘The Myth of Voluntary Omnipotence’ and is the contemporary form of Faust legend (35). In a similar vein, Mckenzie Wark opines that the application of science, that is the technology, decides everything and hence is the subject of the contemporary historical tragedy (33). Thus, tragedy is no longer the sole domain of humanity and the collapse and degradation of the natural environment, the fall of nature, the fall of the bigger body of which we are a part, is the ultimate tragedy (Estok 2). As a corollary to this is the observation made by McKibben:

> The idea of nature will not survive the new global pollution - the carbon dioxide, the CFCs and the like. . . .We have changed the atmosphere, and thus we are changing the weather. By changing the weather we make every spot on earth man made and artificial. We have deprived nature of its independence which is fatal to its meaning. Nature's independence is its meaning, without it there is nothing but us. A child born now will never know a natural summer, a natural autumn, winter or spring. Summer is going extinct replaced by something else that will be called "summer". This new summer will retain some of its relative characteristics – it will be hotter than the rest of the year, for instance . . .the "record highs'' and "record lows" of the weathermen are meaningless now. (*The End of Nature* 50-51)

Thus, it can be deduced that the death of nature is caused by anthropogenic factors and has inevitably led to the Anthropocene era. Moreover, climate change is the inescapable impact of the actions of the past generations not just on the present, but on the future generations as well (McKibben, *The End of Nature* 175). Similarly, Ghosh has also remarked in his significant prose work *The Great Derangement* that the events of today's changing climate represents the totality of human actions over time, and every human being, past and present, has contributed to the present cycle of climate change (154). Therefore, climate change is the greatest challenge facing humanity, as remarked by William Nordhaus, winner of Nobel Prize in Economics in 2018.

Climate change is an environmental, economic, cultural and political phenomenon that is reshaping the way we think about ourselves, about our societies and about humanity's place on Earth. Apart from climate change as a physical

phenomenon that can be observed, quantified and measured, Hulme also regards it as an idea to be debated, adapted and used. Thus, climate change has become "the mother of all issues", the key narrative within which all the environmental politics from global to local is now framed (*Why We Disagree* 1). Hence, far from simply being a change in the physical climates or a change in the sequences of weather experienced in given places, climate change has become an idea that travels beyond its origin in the natural sciences to the worlds of politics, economics, international diplomacy and religion, often through the interposing role of the media.

The fact that the Earth's climate is lurching towards dangerous tipping points is discerned through many warning signs given by nature and unfortunately humanity turns a blind eye towards them at its own peril. Climate change and species extinction are disruptions to the physical integrity of nature, which is communicated through a variety of signals. For instance, climate change is deciphered not just in atmospheric studies, but a slew of individual signals like glaciers and other ice-bound water melting, oceans warming at a rapid rate, other weather related issues such as increased rainfall in certain areas and drought in others, songbirds returning earlier, butterfly species moving north, insect eggs hatching earlier and all of these individual global warnings add up to global climate change (Schlosberg 192). Added to it, the oceans are turning acidic, the difference between day time temperatures and night time temperatures is diminishing, animals are shifting their ranges pole ward and plants are blooming days, and in some cases weeks earlier than they used to (Kolbert, *Field Notes* 13). These individualized instances of warning signs or wake-up calls that alert us to the presence of wider perils are defined as 'canaries' in the rhetoric of climate change (Hamblyn 230). Thus, canaries perform the crucial role of making climate change explicit and visible. The islands of Tuvalu are of much relevance in this

context since the anthropogenic climate change is going to be the cause for these islands to disappear first. Ironically, it is regarded as an experimental space and hence expressed through the metaphor of 'the canary in the coal-mine' (Farbotko 53). Elizabeth Kolbert significantly remarks that the most dramatic changes due to climate change are occurring in those places like Shishmeref, where the population is the least. The disproportionate effect of climate change experienced in the far north is the melting of the Arctic which was earlier predicted by climate models, while it can be measured and observed directly today. Hence, climate change has gradually ceased to be merely a theory because nearly every major glacier in the world is shrinking and those in the Glacier National Park are retreating so quickly that it has been estimated that they would vanish entirely by 2030 (*Field Notes* 13). Thus, the theoretical predictions of climate change for the future are fast turning to everyday realities in Arctic territories as are evidenced through daily news reports in the media.

The present era is defined by events that were earlier atypical. Sudden landslides, flash floods, freakish tornadoes, persistent droughts, torrid summers, violent torrents pouring down from melting glacial lakes and others have become the new normal globally. Amitav Ghosh elaborates upon the severe consequences of the climate crisis in *The Great Derangement* (TGD). Significant sea-level rise is being observed in the deltas of Bengal, Asia and other parts of the world which would result in the submersion of low-lying islands like the Lakshadweep chains and the migration of upto fifty million people in India and seventy five million in Bangladesh. The Indus on which Pakistan is critically dependent, has been exploited to the point where it no longer reaches the sea and as a result salt water has pushed inland by 65 kms swallowing up over one million acres of agricultural land. The most severe risk is the accelerating water crisis in Asia. In the Himalayas, the waters that are stored in the

form of accumulation of ice sustain 47% of the world's population, but this region is warming twice as fast as the average global rate, and it is estimated that one-third of the Himalayan glaciers would disappear by 2050. If the glaciers continue to shrink at the present rate, the most populous parts of Asia will have to face catastrophic water shortages within a decade or two (119-121). And unfortunately, the burden of these impacts will be borne largely by the region's poorest people, especially the women. Sunita Narain crucially remarks that the subcontinent's weather pattern in general and the monsoon in particular is not only the country's real finance minister, but it is also truly the most globalized Indian with connections across the globe as it is deeply connected to ocean currents and winds from the Pacific, the Arctic and the neighbouring Tibet plateau. Nonetheless, it is the most under-studied and least understood of all weather phenomena, thereby making it a complex and confounding problem, and climate change is increasing the level of complexity (115). It is a painful reality that famines and droughts are used as a ruse to thrust genetically modified seeds, forcing farmers into further debt. Moreover, the vast areas of coastlines that are inhabited by poor and indigenous people are exposed to the ravages of storms and rising seas, which are frequently observed in Sundarbans.

The newest report from the IPCC published in October 2018 suggests that the effects of climate change would be worse than expected because the actions needed to be taken to curb the crisis are not being implemented on the scale that is necessary. According to the findings of the report, the consequences of even 1.5ºC of warming has dire consequences which include the loss of the world's coral reefs, decline in global crop yields and marine fisheries, exposure to extreme heat waves, the displacement of millions of people owing to sea-level rise. What is dangerous climate change is an important question for policy makers and the answer depends on where

one lives. For example, if one is on a small island nation, any sea-level rise could be considered dangerous because it directly results in loss of land (Maslin, *Climate Change* 68). Frederick Otto, Director of Oxford's Environmental Change Institute, opines, "half a degree of additional warming makes a huge difference and for people who are already marginalized, this can be an existential difference". Apparently, India is unprepared for the crisis in terms of data and planning, cautions N H Ravindranath, climate scientist at the Centre for Sustainable technology of the Indian Institute of Science, who is tasked with preparing the first national study on the impacts of climate change. The assessment report of Ravindranath would serve as the bedrock for climate related policies by the Indian Government and the United Nations. Dr. Jayashree Roy, an eminent researcher in the field of environmental economics and climate change, who was among the network of scientists who shared the 2007 Nobel Peace Prize awarded to the IPCC, points out that India should lead the demand for greater and accelerated collective ambition towards mitigation efforts at the global level. It is absolutely urgent for India to save a huge burden of loss and damage, since it has the largest share of the global poor population exposed to all kinds of climate risks and megacities with high population densities. Moreover, putting a monetary value will not do justice to capture the enormity of the problem (Muller). At the global level, it has been observed that the world is leading to climate apartheid where the rich buy their way out of the worst effects of climate change while the poor bear the brunt.

Today, climate change knowledge is a field of contention with fundamental disagreement over the causes and the appropriate ways of dealing with the crisis. Andrew Jamison explicates three main positions in relation to climate change knowledge which are – dominant, oppositional and emergent. The dominant position

is associated with those who have been most active in raising political awareness about climate change in the past decades, and who have promoted a substantial lowering of the emissions of carbon dioxide into the atmosphere and a transition to what has been termed as ‘low-carbon’ society. The oppositional position is associated with self-proclaimed ‘skeptics’ who for various reasons questioned the importance of climate change as opposed to other issues. They have actively challenged the dominant position, primarily by questioning the truth value of the scientific knowledge claims that have been made on its behalf. The emergent position is associated with those who are convinced that climate change is occurring and that it will have serious consequences if it is not abated, nevertheless stress on the importance of dealing with climate change in ways that take issues of justice and fairness seriously into account. According to Andrew Jamison, since climate change is such an all-encompassing and multifaceted issue, it is necessary to foster a ‘hybrid imagination’ mixing natural and social, local and global, academic and activist forms of knowledge in new combinations to deal with it (818). Kim Stanley Robinson, an eminent writer of climate fiction, gives much importance to the study of science. To a question posed by Mckenzie Wark, Robinson had underscored the fact that scientific community is getting more active in pointing out the necessity of decarbonising the economy at the earliest and suggested that the scientists and scientific institutions should get more involved in policy-making (Wark 81-82). It is an indubitable fact that majority of the scientists around the world are genuinely concerned about the fate of the planet and take efforts to mobilize the public to protect it from further destruction.

Swedish teenager Greta Thunberg who began regularly walking out of classes in August 2018 to sit outside the Swedish Parliament in Stockholm with the sign reading “school strike for climate”, has become a huge inspiration for the students and

the youth across the world to protest against the inaction in dealing with climate change through social media hashtags such as ‘Fridays for Future’ and ‘Youth Strike for Climate’. Thunberg has become the figurehead for the youth protests, an expression of anger at adults’ inaction against the climate crisis. While delivering a speech at the 2018 United Nations Climate Conference in Poland, Greta said, “You say you love your children above all else and yet you are stealing their future in front of their eyes” (Rigitano). A statement issued by researchers from Germany, Austria and Switzerland states that young people’s concerns are justified and supported by the best available science, since the countries are not doing enough to keep the global warming below 2ºC which was the aim of the 2015 Paris climate accord. Similarly, the prominent climate scientist Kevin Anderson has alleged that “as adults we have abjectly failed” (Warren 292). Today there are various activist groups, organizations and NGOs such as OXFAM, Friends of the Earth, 350.org which have taken up the task of alerting the public to the wide range of challenges that climate crisis poses. From these instances it may seem obvious that more scientific information about climate change would lead to better options of mitigation and adaptation. However, the reality is inconveniently more complex since scientific information is just one factor which influences decisions and responses that have implications for greenhouse gas emissions and climate-related factors. And decision-making and behaviour are products of complex interactions between individuals, groups, institutions and the physical and natural environments (Whitmarsh and Lorenzoni 159). Furthermore, it has been aptly observed that our predicament about climate change is not a lack of knowledge but a disconnection between what we know and how we act (Kerridge 363). In psychoanalytical terms, this gap is the manifestation of a defensive response called “splitting” which enables one to know the traumatic truth, yet simultaneously

not know it (Dodds 50). Hence, dealing with climate crisis is very complicated because it is interrelated to various spheres and activities of human lives. Therefore, solutions and drastic actions need to be sought and implemented at multiple levels – individual, regional, national and international.

Amitav Ghosh compares the present times when the world is inflicted with the pandemic COVID-19 to the last great period of climatic disruption which is called the Little Ice Age of seventeenth century when there was a terrifying cycle of epidemics, famine, war, revolution and social breakdown. The climate crisis testifies the fact that Earth is not an inert entity which is very clearly expressed by James Lovelock's 'Revenge of Gaia' and Gaia Hypothesis that was criticized and mocked by scientists for a long time. Ghosh lays stress on the fact that nearly half of the greenhouse gases that are now in the atmosphere were put there in the last thirty years and this period is called the 'Great Acceleration' which he considers as a fitting name because all the crises are effects of this acceleration. Ghosh firmly believes that climate breakdown, migration crisis, the novel coronavirus epidemic are all cognate though there is no direct casual link between them (Zae O'Yeah). Therefore, it is quite explicit that our tactlessness to deal with the climate crisis would be cataclysmic for the planet because climatic stability is inevitable for ecological stability (Philips 71). Undoubtedly, the burning issue of twenty first century is the sustainability of Earth's environment, as observed by Buell ("Ecocritical Insurgency" 699). But the responsibility of addressing and dealing with the global crisis cannot be relegated solely to the sciences. Rather, there should be a radical shift in the thought patterns, behaviours and ways of living of the entire humanity, giving due importance to the holistic nature of the planetary ecosystem.

Chapter 3

CLIMATE CRISIS *EN ROUTE* FOSSIL FUELED DEVELOPMENT: A JOURNEY TOWARDS MELTING PLANET

> "*I suspect we're reluctant to think about climate change because we're worried that if we start we will have no choice but to think about nothing else*" - John Lanchester

Climate crisis is the most critical and consummate ecological, economical and socio-political challenge that has been faced by the humankind and its dominant causative factor is the fossil-fueled capitalist economy. It is a rueful fact that capitalism which is closely related to globalization is a vicious, self-perpetuating cycle that will eventually exhaust the world's natural resources if it continues unabated. According to Felix Guattari, capitalist system and intense globalization have dominated the world since the latter half of the twentieth century, and its ideology of unrestricted competition has resulted in the widespread plunder of natural resources, particularly the fossil fuels. Consequently, the poorer countries are forced to sell their labor at an extremely low cost in order to get access to the global market place and have exploited their natural resources without due consideration for sustainability (4-5). Similarly, James Fulcher points out that a major consequence of globalization has been the expansion of free trade by the developed countries, incorporating the lesser developed countries into a global trade network which has been designed to foster greater economic growth. Thus, the free market constantly expands assisted by the absence of governmental barriers to natural resource extraction, thereby paving the way for transnational corporations to continue to satisfy the ever-growing global demand for their products (Park 205). Geographer Bram

Buscher has coined the term ‘liquid nature’ to implicate the atrocities of the market mechanisms being done to the natural world and further illustrates that the trees, meadows, mountains have lost their intrinsic, place-based meaning and has become deracinated, virtual commodities in a global trading system (Klein 223). This is an explicit illustration of instrumentalism which makes humans insensitive to interconnections, as pointed out by Plumwood (8) and has been discussed in the previous chapter.

It is in this context of capitalist exploitation, the understanding of Ecological Marxism becomes crucial. It has been observed that Ecological Marxism is an important field pertaining to the study of present ecological crisis, as it provides an adequate framework to understand our society’s worsening alienation from nature. Bertell Ollman and Tony Smith argue that dialectics is the most sensible way to study a world composed of mutually dependant processes and also to understand capitalism which is characterised by a far greater complexity and interaction than that was prevalent earlier. They significantly add that a dialectical approach to a proper analysis of present ecological crisis is necessary because its methodology analyses the whole and the interconnections that make up the whole are viewed as inseparable (71, 7). This can be substantiated with Mckenzie Wark’s argument that the basic law of the physical world is of the dialectic which has helped nature to preserve itself so far (32). Hence, as John Bellamy Foster opines, ecological problems are the result of contradictions in the human relationship to nature which is introduced by capitalist economy (72). This statement is a corollary to the warning given by Engels about the ecological consequences of the alienation of nature in *The Dialectics of Nature*:

> Let us not, flatter ourselves overmuch on account of our human victories. For each such victory nature takes its revenge on us. Each victory, it is true in the

> first place brings about the results we expect but in the second and third places it has quite different unforeseen effects which only too often cancels the first . . . thus at every step we are reminded that we by no means rule over nature like a conqueror over a foreign people like someone standing outside nature - but that we with flesh, blood and brain, belong to nature and exist in its midst. (460-461)

Therefore, the ecological disasters are caused by the alienation of the humankind from the society due to capitalism which goes against all laws of natural reproduction and sustainability.

Bertell Ollman observes that capitalism is a huge structure, very omnipresent but few see it and has a major effect on everything going on inside it and hence he compares it to 'The Great Attractor' which is a huge structure composed of many galaxies and that which exerts a strong attraction on our galaxy and therefore on our solar system and on the planet on which we live. Ollman further remarks that, according to the astronomers, the Great Attractor was not discovered earlier in spite of being very huge due to its enormous size and because scientists had focused so intently on its parts that they could not see what they were parts of. Similarly in capitalism, "the system consists of a complex set of relations between all people, their activities (particularly material production) and products. The problem people have in seeing capitalism . . . comes from the difficulty of grasping such a complex set of relations that are developing in this way and on this scale" (9). Therefore, it can be stated that capitalist modernity has resulted in an economic system which is purely instrumental but at the same time hidden from our sight. It is a way of life dedicated to power, profit and the business of material survival, rather than fostering the values of human sharing and solidarity (Eagleton 22). To alter the circumstances caused by

post-industrial capitalism which Felix Guattari terms as Integrated World Capitalism (IWC), he proposes 'cultivating a dissensus' which is principally a call for the revival of individual competence as a social force for the development of new egalitarian, decentralized, participatory democracies oriented towards an environmentally sustainable way of living (Guattari 6,14; Carter 300). In a similar vein, Gregory Bateson suggests that the maxim 'survival of the fittest' (which apparently undertakes the capitalist mode of thinking) needs to be reconfigured to that of 'survival of organism plus environment' (499). This is taken as a pivotal aspect by Tim Ingold to elaborate on 'the ecology of life' who exclaims that for conventional ecology, the 'plus' signifies a simple addition of one thing to another, both of which have their own integrity, quite independently of their mutual relations. Whereas, 'organism-plus-environment' approach denotes not a compound of two things, but one indivisible totality (19). This is reminiscent of Chief Seattle's Testament which gives due stress on the interconnectedness of the web of ecology and life, "The earth does not belong to man, and man belongs to the earth. All things are connected like the blood which unites one family. . . man did not weave the web; he is merely a strand of it. Whatever he does to the web, he does to himself" ("Chief Seattle's Letter"). And unfortunately, capitalist ideology is an inversion of the aforementioned thoughts since it has diligently succeeded in transferring the geographical features of the Earth like water, air, forests from being a common asset into private property that can be owned and sold, thus transforming the human from a tenant of the Earth to a selfish proprietor and destructor of the environment.

Herman Daley and Joshua Farley in *Ecological Economics* point out that Adam Smith published *The Wealth of Nations* in 1776, the same year when Watt produced his first commercial steam engine and further add that it is no coincidence

that the market economy and fossil fuel economy emerged at the exact time (10). Thus, new technologies and huge amounts of fossil energy facilitated the unprecedented production of consumer goods which necessitated new markets that played a crucial role in capitalism (Klein 10). Contemporary forms of capitalism are closely connected to the large-scale exploitation and use of fossil fuels like oil, coal and natural gas (Newell 12). Hence, the global capitalism has resulted in the depletion of natural resources and is pressing the limits of the finite, limited resources of the Earth. Over 300 million years ago, even prior to the time when dinosaurs lived, plants were buried deep in the earth whose carbon content got converted to oil, gas and coal over a long period of time, which is now being burnt callously within fraction of seconds. Thus, capitalism is destroying what nature had taken millions of years to create, releasing millions of tons of carbon dioxide into the atmosphere, at a more rapid rate which is beyond the capability of oceans and other carbon sinks to absorb. This disruption of the carbon cycle is increasing the global temperature which is causing changes to the condition of the Earth. Hence, humans have turned into 'squanderers of past solar heat', as Engels had succinctly termed the fossil fuel economy. Jean Paul Sartre termed fossil fuel as the capital bequeathed to mankind by other living beings, since they are the decayed remnants of long-dead life forms and belong to the ground where they perform valuable ecological functions like carbon sequestration and absorbs other toxins like uranium, cadmium, mercury that are dissolved in ground water. Therefore, fossil fuel extraction is symptomatic of an extreme rootlessness and a debased culture. Unlike other ecological crises, climate change can be considered as exceptional because it has its roots in the development of the global fossil fueled capitalist economy. Amitav Ghosh concurs with Naomi Klein and others that the present dominant model of capitalism is one of the principal

drivers of climate change and significantly adds the aspect of empire and imperialism is of equal importance (TGD 117).

The fossil fuel economy is characterized by self-sustaining growth predicated on growing consumption of fossil fuels and therefore, generating a sustained increase in emissions of carbon dioxide. Thus the concept refers to an expansion in the scale of material production realized through expansion in the combustion of coal, oil and natural gas. In the lexicon of climate change discourse, the term 'business-as-usual' is commonly employed as a stand-in for the fossil fuel economy which necessitates commodity production and waged or forced labor as components of their very existence. The fossil economy took birth in Britain in 1850, and it was the sole country responsible for more than 60% of global carbon dioxide emissions from fossil fuel combustion which eventually spread to other advanced capitalist countries. Malm takes the canonical Marxian view of the specificity of capitalist growth as a starting point for an analysis of fossil economy and significantly remarks that the compulsion to expand the material scale of production is not an attribute of the human species, rather an emergent property of capitalist power relations. Malm further states that the business-as-usual has been thriving successfully for the past two centuries, in complete disregard for the scientific knowledge of the noxious effects of large amounts of carbon dioxide emitted into the atmosphere ("The Origins of Fossil Capital" 17, 26, 49, 58). Considering these factors, Malm puts forth a new theory called "fossil capital hypothesis" which suggests a certain chain of causation between globalization and global warming and argues that any meaningful action on climate change, at some point, will have to challenge the dynamics of fossil capital as global phenomenon which necessitates the acknowledgement of the power relations permeating the continuous growth of carbon dioxide emissions ("China as Chimney

of the World" 167). The Australian political activist Clive Hamilton is of the opinion that facing these truths about climate change implies recognizing that the power relations between the humans and the earth is at fault and is completely the reverse of the one that we have assumed for the past centuries (58). Therefore, it can be argued that fossil fueled capitalist mode of development has explicitly come to mean the disruption of the ecological web of nature.

The first major source of carbon dioxide is the burning of fossil fuels, since the greater part of global carbon dioxide emissions come from energy production, industrial processes and transport, according to the IPCC. These emissions are not evenly distributed around the world because of the unequal distribution of industry and wealth. As explicated in the previous chapter, historically the developed nations have emitted much more than less developed countries. A disparaging fact is that the world will put half a trillion tones of carbon dioxide into the atmosphere between 2015 and 2044, which is the same amount that was emitted between 1750 and 2015 (Maslin *Climate Change* 7). This is because rapidly developing countries such as China, India, South Africa, Brazil and others are increasing their emissions of greenhouse gases at a huge rate because economic development is closely associated with energy production. For example, in 2007, China became the biggest emitter of carbon dioxide in the world, overtaking the USA. The recipient of the Pulitzer Prize in 2015 for *The Sixth Extinction: An Unnatural History,* Elizabeth Kolbert, feels dismayed by the reaction of Donald Trump to the latest IPCC report published in October 2018, to quote, "I want to look at who drew it, you know which group drew it" and the next day as a devastating hurricane hit Florida, Trump flew to Pennsylvania to campaign for Lou Barletta, a climate-change denying Republican congressman. Kolbert critically remarks that though the Trump Administration often

seems incapable of systematic action, it has spent the past eighteen months targeting the rules aimed at curbing the greenhouse gas emissions. One of these rules which required greater fuel efficiency for car and trucks would have reduced carbon dioxide emissions by an estimated six billion tons, if it had been implemented. The administration had argued that there was no need to bother about a mere six billion tons which depicts their laxity in dealing with the climate crisis (Kolbert, "What is Donald Trump's response"). Moreover, in the US the cost of energy is low, which is a contributing factor for people to drive more, buy bigger cars and build bigger homes, which add to the emissions and make their lifestyle desirable and addictive. Bill McKibben sarcastically remarks that if an alien landed in the United States on some voyage of exploration, he might well report back to headquarters that we were bipedal devices for combusting fossil fuels (*Eaarth* 28). But their way of living cannot be practiced by every human being on the planet, not because of technical or economic limitations as Ghosh points out, but because humanity would asphyxiate in the process. Gandhi had desired and hoped that India should not take to industrialism after the manner of the West because similar economic exploitation would strip the world bare like locusts. This famous line is considered as one of his best-known pronouncements on industrial capitalism. Fortunately, most of the dominant countries of Asia got industrialized towards the end of the twentieth century and were slow to enter the carbon economy since the technologies that created this economy were invented in England and therefore inaccessible to most of the world. This is because industrialization comes about through a process of technological diffusion that radiates outwards from the West (TGD 124, 126). These significant observations made by Gandhiji and Ghosh reinforce the fact that the fossil-fueled capitalist mode of economy is the prime culprit of the climate crisis.

The climate crisis has never been given due attention by the political leaders despite the fact that it destroys lives on an immense scale. Moreover, the suggestions given by the climate scientists regarding the reductions of emissions are not implemented. It is clearly evident that as long as the world economy is carbon-based (driven by energy from coal, oil and natural gas) growth cannot be delinked substantially from carbon dioxide emissions, and more prosperous a country's economy and the higher its per capita income, the higher its fossil fuel consumption for power generation and transport and the higher its greenhouse gas emissions. This is because any limit on carbon dioxide emissions amounts to a limit on economic growth turning climate change mitigation into an intensely political issue and a blame-game (Narain 92, 93). Added to it, the triumph of market logic with its ethos of domination and fierce competition paralyzes the efforts to respond effectively to climate change. Cut-throat competition between nations has deadlocked UN climate negotiations for decades, as rich countries declare that they will not cut emissions and risk losing their vaulted position in the global hierarchy, while poorer countries declare that they will not give up their right to pollute as much as rich countries did on their way to their prosperity, even if it points towards the deepening of a disaster that affects the poor most of all (Klein 22). Sunita Narain aptly remarks that the countries are reluctant to adopt steps that lower the emissions because it fundamentally conflicts with deregulated capitalism, the reigning ideology which is extremely threatening to an elite minority who has a strong hold over our economy, our political processes and the media (18). Therefore, climate change is the inadvertent consequence of the tug-of-war between capitalism and Earth's resources.

The increase in the consumption of fossil fuels by China and India has resulted in a radical shift in their global ranking of power. This has subsequently led to the

threat of rapid and irreversible climate change, which is the primary environmental challenge faced by India and China owing to its economic growth. Chinese cities have the highest rate of air pollution in the world. Rivers such as the Ganga and the Jamuna are effectively dead. In the recent years, India and China have also witnessed the large-scale depletion of groundwater aquifers, loss of biodiversity, destruction of forests, decimation of fish-stocks and other critical concerns. Further, it has been significantly remarked that India is in the middle of an 'Age of Ecological arrogance' as politicians are bitterly hostile to environmental concerns due to the strong influence exercised on public policy by resource extractive industries and the apathy of media which has turned India to an environmental basket case marked by polluted sky, dead rivers, falling water tables, ever increasing amounts of untreated wastes, disappearing forests. Meanwhile, tribal and present communities continue to be pushed off their lands through destructive and carelessly conceived projects (Guha xvii, xix).

It needs to be noted that fossil fuels like coal, oil and natural gas had been extracted, used and appreciated in China for a very long time, but China did not make transition to a large-scale coal economy prior to Britain (Ghosh TGD 131). Conversely, by 2007 China was responsible for two-thirds of the annual increase in global emissions predominantly because of the foreign trade. According to a significant study, 48% of China's total emissions between 2007 and 2008 were related to producing goods for export. This is supposed to have been caused by China's willingness to spend seemingly limitless funds on massive infrastructure projects – modern ports, sprawling highway systems, endless numbers of coal-fired plants, massive dams, which is succinctly summed up as a "climate nightmare" (Klein 80-81). It also draws attention to the fact that climate crisis is a crisis of culture, and thus of the imagination, as culture generates desires for vehicles and appliances, for certain

kinds of gardens and dwellings that are among the principal drivers of the carbon economy and this culture is intimately linked with the wider histories of imperialism and capitalism that has shaped the world (Ghosh, TGD 13).

In this context it is inevitable to underscore the tragic drawback of militarism which is supported by the massive exploitation of natural resources and fossil fuels which has a staggering impact on ecology, especially due to the nature of weapons, for instance, toxic chemicals, radiation, explosives, and others. Patricia Hynes has documented the ecological consequences of US militarism in *Pentagon Pollution,* a series of articles on climate and capitalism, in which she explicates that modern war and militarism of the world account for 5% to 10% of global air pollution including carbon dioxide, ozone depletion, smog and acid forming chemicals (qtd. in Angus, *Facing the Anthrpocene* 162). Hence, it can be deduced that military power is also a significant contributor to climate change. Therefore, capitalism and fossil-fueled economy have consequentially led to unprecedented anthropogenic climate change.

It is pertinent to understand that despite the fact that contemporary hyper-globalized capitalism has aggravated the climate crisis, it did not create it. Rather the vicious process is reckoned to have begun with the exploitation of coal on a commercial scale in the late 1700s, as the by-product of Industrial Revolution. Klein exclaims that humans have behaved in such reckless ways even under socialist systems and the roots of the climate change dates back to core civilization myths on which post-Enlightenment Western culture is founded, that is, the myths about humanity's duty to dominate a natural world that is believed to be at once limitless and entirely controllable (159). In a similar vein, Timothy Clark poignantly remarks that it is not enough to identify modern capitalism as the exclusive agent of environmental violence and adds that though socialist system of government have

also had appalling environmental records, the processes culminating in the Anthropocene includes events that predates the advent of capitalism, primarily the invention of agriculture, deforestation and the consequent eradication of large mammals over centuries in all continents, in the process of the expansion of the humanity across the globe (2). Therefore, it can be noted that there is a direct correlation between climate change, wealth and power.

It is generally accepted that rather than altering the profit-based capitalist mode of economy, it is easier to turn a blind eye towards the disastrously changing earth's climate. Consuming less is a significant alternative identified by a miniscule ecologically conscious group. However, policies based on reducing consumption are difficult to be embraced by the ruling political groups and elites who prefer policies related to green consumerism, which is in fact a business tactic that suitably fits within the market logic because it merely substitutes one power source for another. In this context it needs to be pointed out that Gandhi preached and practiced minimal consumption and recycling of resources, which is reflected in his well-known aphorism, 'The world has enough for everybody's need, but not enough for everybody's greed' and wrote his letters on the back of used papers. Gandhi's views had a great influence on Arne Naess and can also be seen echoed in Starhawk's earth-based spirituality which stresses on interconnection and immanence, which implies that each living being has value and we have to take responsibility for everyone and everything to which we are related; and a compassionate lifestyle which stresses on simple living for masses of people and other species to continue living. Starhawk gives due importance to the utilization of less resources, shifting to renewable sources of energy and recycling in order to achieve a sustainable economy (Tong 253). Starhawk's views corresponds to the notion of 'elegant frugality' given by Henryk

Skolimowski (*Dancing Shiva* 109) and 'subsistence perspective' propounded by Maria Mies and Vandana Shiva, who suggest that production and consumption should be based on basic human needs and treating natural resources judiciously as community goods rather than private properties (Tong 264). In this context it needs to be stated that Aurobindo's Aurovilla situated at Puduchery in India is an exemplar of ecological and sustainable habitat based on the premise of holistic thinking and living.

Unfortunately, policies related to reducing consumption are neglected because they would succeed in bringing about a fundamental change in the lives of the people and their mindset and thereby lead to a drastic change in the quantity of energy consumed for the production of materials. Thus, climate change deliberations are not merely about the environment, these are intensely economic negotiations (Narain 87). It once again reinforces the fact that the emissions are intrinsically linked to economic growth and this correlation disrupts the sanctity of the ecological web of the planet. Vandana Shiva considers economic growth measured by the Gross National Product as maldevelopment, since it is the violation of the integrity of organic, interconnected systems that sets in motion a process of exploitation, inequality, injustice and violence (8). Hence, it can be stated that the correlation between the emissions and economic growth is one of the predominant barrier in bringing about necessary changes to mitigate the climate crisis. And if fossil-fueled capitalist economy is not precluded in the earliest possible, Anthropocene would be just a short period prior to the death of the planet. It also points to the fact that the capitalist-driven ecological problems cannot be understood and dealt with sectional perspectives. They require a holistic understanding, addressing fundamentally social processes at the global level. Moreover, ecological degradation cannot be held or reversed by harking to some

fabled golden era, but only by a radical transformation of the modes of production which causes it. It also needs to be noted that in the micro context, traditional or pre-capitalist societies have developed norms and practices in harmony with the immediate available resources necessary for sustaining the society. Furthermore, these communities exercise a high degree of social control over these resources in contrast to the situation under capitalism when this symbiotic relationship between the producers and the means of production is torn asunder (Raghunandanan 546-547). The concept of sacred groves or *devaranya* is a frequently cited feature of pre-industrial cultures in India, to assert that they were imbued with ecological awareness and interrelatedness.

The realisation of wholeness and reverence is inevitable in order to heal the planet and bring the world back to balance as we are standing at the abyss of the climate change, species depletion and other untoward consequences of our continued ecocide. It has been rightly observed that it may not be possible to return to the simplicity of an indigenous lifestyle (Lee), but we can become conscious and aware of the fact that what we do and how we do at an individual level affects the ecological web of our planet and therefore we need to live sustainably by not getting attracted to materialism and consumerism. It is in this milieu of increasing anthropogenic contributors leading to the annihilation of the planet, the concept of ecospirituality attains much significance because it focuses on the spiritual nature of our present predicament and aids in the re-awakening to the interconnectedness of our planetary ecosystem; since it is the mindset that we are separate from and superior to the other components of nature which is the root cause of the ecological crises. In this context it is significant to note the pertinent observation made by Franca Bellarsi that while ecocritics tend to concur in attributing social, economic, political and ethical causes to

the current environmental crisis, they would not regard it in terms of a spiritual crisis. Bellarsi further advocates an ecospiritual vision to foster environmental awareness and opines that though ecospirituality is linked to a deep ecological paradigm, it does not simply fit into a uniform mould and therefore its study benefits from a greater interdisciplinarity which actually coincides with one of the original promises of ecocriticism. Ecospirituality concerns itself with re-establishing a severed bond with the nonhuman, which assists humans towards the realization that it is always enmeshed in nature and an essential part of his environment. Thus ecospiritual-minded humans cultivate humility towards the natural world (1, 9). This can be corroborated with the observation that the realization of the aspect of interrelatedness is the primary element which helps to see ourselves in a humble position in relation to our environment because without such a vision, the environment would merely be a set of resources, fodder and feed to the consumers to be utilized (Evernden 93). Correspondingly, the eminent eco-philosopher Henryk Skolimowski calls for a reverential thinking, that is, attributing sacredness to ecology and treating all forms of life with reverence and respect as the primary tenet of ecospirituality which helps in uniting and healing the entire web of life (*Dancing Shiva*13).

Vandana Shiva has pertinently remarked that interdependence and interconnectedness of everything is ‘spirituality’ and its ecological relevance lies in the rediscovery of the sacredness of life because life on Earth can be preserved only if people begin to perceive all life forms as sacred. Further, this quality is not located in an other- worldly deity, in a transcendence, but in everyday life and in things that surround us (Mies 17). In a similar vein, it has also been remarked that ecospirituality is the manifestation of the spiritual connection between human beings and the environment (Lincoln 227). Therefore, it can be stated that though ecospirituality is

variously called as ‘earth-based spirituality’ (associated with the work of prominent pagan ecofeminist Starhawk), ‘nature spirituality’, ‘ecological spirituality’ and others, its essence remains the same. In succinct terms, ecospirituality emphasizes the aspect of interconnectedness of humans with their environment and reverential attitude towards nature.

Indigenism is a significant aspect that needs to be discussed in relation to ecocriticism and ecospirituality. It has been stated that ecocriticism, from its inception, has had a keen interest in indigenous imagination, which had predominantly arisen from the fundamental concern of the negative environmental consequences of industrial modernity (Buell et al. 428). Ecospirituality takes its cues from the perspectives of the indigenous people from countries across the globe. A case in point is the indigenous Maori concept of environmental protection in New Zealand. The anthropologist Marama Muru-Lanning notes that the Maori tikanga understandings are less about people's exclusive ownership of a natural resource and more about their relationship with it, that is, they belong to it. For instance, the Whanganui River Deed of Settlement was signed between the New Zealand government and local Maori population in 2014, which requires the river to be recognized as an indivisible living whole that has all the corresponding rights, duties and liabilities of a legal person (Fisher 120-121).Therefore, it can be noted that the aspect of interrelatedness is very significant and is a common denominator in the definitions of ecospirituality as well as in the root form of the word ‘oikos’.

Ecospirituality assists in the reconfiguration of the relationship of humanity to its environment, taking the aid of both science and spirituality which view nature as holistic. It is significant to note the remarks of Todd. A. Borlik that Pythagoras (who is best known for the mathematical theorem that bears his name) was one of the first

individuals to expound a conviction in the organic integrity of cosmos through the doctrine of *anima-mundi* or world-soul which considered world as one entire perfect living creature and recognized a sanctity in nature. Thereby, it encouraged humans to reflect on the ecological impact of their actions. Thus, the perceptions of Pythagorean philosophy provided an alternative worldview to the prevailing Judeo-Christian assumptions about the relationship between humanity and nature. Lord Francis Bacon, the father of empiricism, who is credited with developing the scientific method, had complained that the Pythagorean sect planted the monstrous imagination that the world was one entire perfect living creature which was afterwards watered and nourished by the school of Plato and others. Borlik further adds that Bacon's opposition to Pythagorean cosmology is a marked departure from the opinions expressed by many of the leading minds of the Elizabethan age since he had initiated a scientific mentality which uninhibitedly interrogated and subjugated the natural world to enlarge the boundaries of human empire. In contrast to the Darwinian view of nature as a realm of bloody competition, Pythagoras taught that an elemental amity exists among all living things and that the rational beings have a responsibility for the irrational, a notion similar to the idea of stewardship (Borlik 25-26, 34). Pythagoras was also the first to outline a coherent cosmological model and coined the Greek word '*kosmos*', envisioning the universe as a collective entity governed by a set of physical and metaphysical laws that maintained and ensured its continual flourishing. This perception of the biosphere as a self-regulating system that strives for homeostasis or stability is central to modern ecology.

Parallels can be drawn between the holistic vision of nature propounded by Pythagoras and the ancient Indian concept of '*Vasudhaiva Kutumbakam*' contained in the *Mahopanishad*, which means that the entire world is one family. This is further

reflected in the Gandhian vision of holistic development and respect for all life forms. It is also reminiscent of Barry Commoner's phrasing of the first law of ecology that 'Everything is connected to everything else', which implies the necessity to see even the smallest, most remote part in relation to a very large whole and is the central intellectual action required for an ecological vision (Rueckert 108). Similarly, Fritjof Capra in *The Tao of Physics* states that the world is "a complicated web of relations between the various parts of the whole" (71). In this context it is also pertinent to mention the process thought according to which the ecological consciousness refers to the notion of interconnectedness and interdependence of all creatures and every entity is regarded as equally significant. This holistic world view is in line with the principles of the Taoist tradition in which all things are interrelated in a harmonious relationship and it does not consider nature as an object to be conquered or dominated. Einstein, one of the greatest scientists the world had ever seen, was greatly influenced by Spinoza's views of the universe according to which there can be only one substance which must be identified with the universe conceived as a whole which he calls as God or Nature (Tlumak 88). This reverberates with Alice Walker's 'Animism' which is "a belief that makes it possible to view all creation as living, as being inhabited by spirit" (J. O'Brien 193). The famous physicist David Bohm's theory provides an influential interpretation of the quantum phenomena and proposed that the subatomic particles in the human body are deeply connected to that of the subatomic particles that comprise every other living organism and that everything is related to everything else. Serpil Oppermann opines that the underlying fact about Bohm's holistic approach is the fundamental idea that the universe acts like one indivisible unity in the wake of a deeper, implicate order of undivided wholeless and although the world may appear apparently fragmented at the peripheral level,

everything is an extension of everything else (11). Hence, we can observe that the aspect of interrelatedness conjoins the apparently diverse fields of science and spirituality.

These various propositions can be regarded as the multifarious reflection of ecospirituality which gives prominence to the well being of life as a whole, considers the world as a living organism akin to Gaia and gives due importance and respect to every creature on the planet. It draws attention to the fact that ecospirituality is not a religion or philosophy, but a way of living found in many different communities around the world, though it lacks a formal structure. Further, it underscores the fact that it is the same spiritual knowledge which forms the core of all the great human cultures. It can also be discerned from these precepts that anthropocentrism which lies at the root of current practices of ecological destruction needs to be confronted (Ignatov 2). However, it cannot be achieved by harking back to some fabled past and necessitates a new set of guidelines. Skolimowski has poignantly remarked that wisdom is the possession of the right knowledge for a given state of the world and as the condition of the world changes, we cannot embrace one structure of wisdom for all times and so we need to seek a different structure. Skolimowski also makes a very useful distinction between ‘ecological man’ and ‘Faustian man’ and remarks that the meaninglessness of present society is the combined result of objective scientific worldview, the nihilism of values and of the Faustian conception of human who lives dangerously at whosoever’s expense, even if it means at the expense of future generations. Whereas, the ecological man is highly sensitive to the web of ecological and social relationships and understands that the richness of life consists in compassionate living in the web of life (*Dancing Shiva* 42, 70-71). It has also been remarked that climate change is a natural-cultural issue and the need for a planetary

environmental aesthetic, based upon a radical notion of immanence is stressed upon (Whitney). Undeniably, it is the lack of recognition or denial of the interconnectedness of the planet which leads to various ecological crises like climate change. Evidence for the same can be found in the very significant encyclical letter '*Laudato Si- On Care for our Common Home'*, in which Francis focuses on the global environmental deterioration due to anthropogenic factors and gives utmost importance to the issues of climate change, pollution and loss of biodiversity. Francis advises, "If we feel intimately united with all that exists, then sobriety and care will well up spontaneously". Therefore, it can be concluded that climate crisis is the manifestation of spiritual crisis.

Catherine Keller and Laurel Kearns in their valuable collection *Ecospirit: Religion and Philosophy for the Earth* consider climate change under-theorized across the academic disciplines and attempt to look at the issue as a spiritual crisis. Keller and Kearns consider the burning of fossil fuels as the counterpart of man's original sin and further point out that thirty four prominent scientists called for religious involvement to deal with the issue of climate change stating that efforts to safeguard and cherish the environment need to be infused with a vision of the sacred (109, 106). This corresponds to Ghosh's conviction that the organizations with religious affiliations possess the ability to mobilize people in far greater numbers than any other, and if religious groupings around the world join hands with popular movements, they will be able to provide the momentum that is needed for the world to move forward on drastically reducing emissions (TGD 215). Similarly, James Lovelock has also stated that the scientists who form the IPCC and other climatologists are well aware of the interconnections of the whole Earth system, including its life forms, and the crucial role played by this larger entity in the

imminent climate change (*The Revenge of Gaia* 156).With looming concerns of life-threatening consequences of climate change, Earth has started losing its prefix of 'Mother', signifying gentleness and care, and is gradually marching towards retribution as reflected in the title of James Lovelock's *The Revenge of Gaia*, written in the aftermath of hurricane Katrina. The title *The Revenge of Gaia* makes explicit the crux of his work that the self-regulatory Earth system 'Gaia', behaves like mythic goddesses like Nemesis and Khali as she acts as a nurturing mother towards her progeny but once they transgress she is ruthlessly cruel towards them. This points towards the fact that climate crisis is nature's or Gaia's act of vengeance attributable to humanity's disruption of the ecological web as evidenced by the various disasters taking place globally. An antidote for the same would be to develop a sense of a reciprocal obligation for the environment by regarding it as a holistic entity in which we are enmeshed and integrated. To agree with Borlik, the task of ecocritics is to demonstrate through literature the fact that earth is an integrated entity and work towards a planetary stewardship (74), and literature can undoubtedly be the prophet for the same.

In the contemporary literary scenario, there is a significant and sustained investigation of ecological issues in literature and literary criticism. Any literary study of climate crisis by definition engages with and falls under the critical category of ecocriticism (Putra 11). However, it needs to be noted that climate change 'theory' is closer to 'hypothesis' at this stage because unlike the issues of gender and national identity and philosophy, century-old texts and interpretations that are commonly associated with climate change are not available (Trexler "Mediating Climate Change" 234). Nevertheless, ecocriticism is an important space in which it is viable to germinate work on climate change literature (Putra 19). Scott Slovic, the founding

president of ASLE, allocates to ecocriticism the tasks of critiquing political positions hostile to environmentalism, exploring the role of climate change in society, investigating historical responses to climate change and interpreting how anthropogenic climate change is enunciated in contemporary discourse. Slovic further states that the current global crisis has occurred not because of how ecosystems function but rather because of how our ethical systems function (Slovic 130-131), which has the implications of anthropocentrism and lack of ecospiritual thinking.

Ecocriticism is endowed with an exceptional sense of urgency produced by the 'ticking-clock' warnings. This can be substantiated with the definitions of ecocriticism which usually begin by relating the literary movement to the global crisis and this association further implies that its fundamental purpose is to change the culture and through culture, change policy and behaviour (Kerridge 363). It has been significantly remarked that climate change has transformed the theoretical or existential problems into a lived experience (Putra 12). Thus, instead of scrutinizing climate change, some literary theorists utilize climate change along with the insights of literary theory to scrutinize contemporary life, culture and thought; and in order to posit their arguments they take recourse to the idea of the Anthropocene. Hence, the concept of Anthropocene has become valuable in climate change criticism to signify not just how humans have become geological agents but how human destruction of both civilization and environment has engendered an existential crisis and radically altered human ontology and epistemology, that is, our ways of being and knowing. In fact, the interdisciplinary field known as Environmental Humanities has developed in part as a response to climate change and its corollaries such as ocean acidification and mass extinction. Terry Gifford remarks that climate change related events necessitate a biosemiological reading which draws from semiology and biology, humanities and

sciences, literary interpretations and systems theory, in order to understand how we receive and transmit signs within the complex dynamics of our relationship with all that is around us (8). Thus, the humanities play an important role in making the science and policy making of climate change accessible through better communication skills (Siperstein 3). Hence, humanities and literature classrooms can be considered as important transformation spaces to instil holistic thinking using climate fiction as tools. Adeline Johns Putra has aptly remarked that one place in which to explore the possibilities of generically aware ecocriticism is the fictional discourse of climate change which permeates a wide range of genres, for instance, science fiction, dystopia, fantasy, thriller, even romance, as well as fiction that is not identifiable within a given genre like the social or psychological character studies. In the contemporary literary scenario, climate change fiction or cli-fi is identified as a genre in its own right and it garners significant critical and public attention. Climate change fiction, drama and poetry, with its dominant tone of lament, all circulate around the problem of the legacy of environmental degradation that humans today are handing over to the species of tomorrow, both the human and nonhuman (7, 3, 12-13).

It was in the 1990s that writers started incorporating the themes pertaining to ecological crises in their creative works and discussions. This lead to the birth of the genre of eco-fiction with texts from socially and environmentally conscious writers including *The Jungle* by Upton Sinclair and *The Call of the Wild* by Jack London. Ecofiction gained momentum through Carson's *Silent Spring* followed by Edward Abbey's *The Monkey Wrench Gang*. According to Jim Dwyer in his *Where the Wild Books Are: A Field Guide to Ecofiction*, the precursors of ecofiction are ancient and include many First People's fictionalizing nature in written form including pictograms, petroglyphs and creation myths. The exaltation of nature continued in

classical literature such as Ovid's *Metamorphoses* and Latin pastoral literature, Medieval Europian literature such as Arthurian lore and Shakespeare's tales, followed by Romanticism, traditional pastoralism and transcendentalism (2). Ecofiction is a loose umbrella term for various genres and sub genres which include a variety of fictional works that address the relationship between natural settings and the human communities, for instance speculative fiction, Anthropocene fiction, solar punk fiction, climate fiction, thrillers, dystopian narratives and others. Ecofiction has since continued and evolved, accommodating the ongoing climate crisis. Subsequently, the genre of climate fiction can be subsumed under ecofiction. Therefore, the novels chosen for this thesis belong to the genres of ecofiction and climate fiction. Ghosh's *The Hungry Tide* is usually catagorised under ecofiction. Nonetheless, it can be also grouped under climate fiction as it implicitly deals with various critical climate related concerns. Similarly, *The Rapture* is usually catagorised as apocalyptic eco-thriller and *Carbon Diaries* is considered as dystopian fiction. Since the narratives abound in climate related concerns, they can be termed as both climate fiction and ecofiction. *Flight Behaviour* is hailed as a classic climate fiction and therefore it also belongs to the category of ecofiction. However, it can be noted that there are no strict demarcations among the genres with regard to the thematic concerns and so they tend to overlap and the terms of the genres like ecofiction and climate fiction are often used interchangeably.

Climate fiction or cli-fi is an emerging area of exploration which consists of narratives that examine the causes, effects, implications of anthropogenic climate change (Merchant 2013). It also needs to be noted that apart from ecocriticism and environmental humanities, other concepts and theories pertaining to the study of ecology like energy humanities, petrocriticism, extinction narratives and others,

intersect with the discussions of cli-fi. In the recent years, there has been a remarkable flourishing of texts and films that articulate the implications of anthropogenic climate change. The term cli-fi which is a portmanteau of the words climate and fiction has a recent origin. It was coined by the Taiwan-based North American activist and journalist Dan Bloom in 2007 and since then the usage of the term has been proliferating in international conferences and academic circles. According to Dan Bloom, cli-fi is a literary way of thinking, reading and writing about climate change themes and the stories can take place in the past, the present or the near future. They can be utopian, dystopian or what Margaret Atwood calls 'ustopian'- a hybrid of utopia and dystopia. The cli-fi genre is described by Dan Bloom as a literary cousin of sci-fi but "based on reality and real science" ("cli-fi").

Bloom traces the origins of the genre in *The Purchase of the North Pole* (1889) by Jules Verne who called it an 'adventure novel' as the term science fiction did not exist then and it was about a climate change phenomenon which he claimed as the after-effect of the tilting of the Earth's axis. Verne had published a futuristic novel *Paris in the Twentieth Century* in 1883, which is set almost hundred years in the future and he imagined a Paris hit by a sudden drop in temperatures which goes on to last for three years. Hence, it was cli-fi though it was not called so. British author J G Ballard wrote about climate-related disasters in *The Wind from Nowhere* (1961), *The Drowned World* (1962) and *The Burning World* (1964), which deal with droughts caused by the disruption in the precipitation cycles due to industrial pollution. In *The Drowned World* (1962), Ballard imagined a dystopian future of melting polar caps and rising sea levels caused by solar radiation and it was prophetic because today they have become a factuality though caused by anthropogenic factors. Hence, Bloom comments that cli-fi is nothing new and has just a name now. Bloom firmly believes

that cli-fi can make remarkable achievements compared to scientific and political discussions since they create characters that the readers will care about and perhaps even identify with because novels are about empathy whereas scientific and political discussions in the media are not. Therefore, Bloom had also designed a series of annual awards called 'Cliffies' in order to promote the genre. Bloom's first choice of cli-fi is *Flight Behaviour* though it was not published as a cli-fi novel and Kingsolver never called it so. Bloom finds the novel fascinating because it appeals to the readers' EQ rather than IQ. *Polar City Red* by Jim Laughter was the first novel to be published as a cli-fi novel and Bloom was credited with the invention of the term cli-fi by Margaret Atwood while promoting the book in 2012. However, the first novel to engage directly with climate change is considered to be Arthur Herzog's *Heat* (1977) which deals with an imagined future dominated by global warming (Putra 6). Bloom quotes the words of the American writer Sarah Stone who had commented about Edan Lepucki, an eminent cli-fi writer, "if we survive it will be in part because of books like this one, which go beyond abstract predictions and statistics to portray the moment-by-moment reality of a painful possible future, the price we may have to pay for our passionate devotion to all the wrong things" (Flyn).

It is interesting to note that the traces of cli-fi can be discerned in the Victorian fiction since it was in the nineteenth century in Britain that fossil fuel economy first took shape through its coal-powered factories, railways and steamships that resulted in the emergence of modern consumer capitalism. Although Victorian writers lacked the present understanding of a warming planet, they had a deep awareness of the rapid and far-reaching ways that their society was changing. Moreover, it was in their hands that the genre of novel became a powerful tool for thinking about the interconnections between individuals, society, economics and the natural world. A prominent example

is Elizabeth Gaskell's *North and South* (1855) which belongs to the genre of 'industrial novel', in which the protagonist Margaret Hale is forced to relocate to the industrial town of Northern Manchester, the epicenter of Victorian coal-fired industrial production, due to family circumstances and her first impressions are that of the environment, the economy and the city's urban geography which have been transformed through fossil fuel consumption (Steer).

The term cli-fi's implicit reference to science fiction acknowledges a debt to the genre of science fiction and there are significant overlaps between the two, nevertheless, it cannot be merely reduced to a sub-genre of sci-fi (Leyda 13). This is especially because science fiction is incapable of addressing climate change or the Anthropocene. Ghosh cites Canadian novelist Margret Atwood's claim that science fiction draws from imagined other worlds located somewhere apart from everyday lives, whereas, Anthropocene is not an imagined 'other' world located in another time or dimension, but our everyday reality experienced by us. Ghosh significantly adds that science fiction would be considered by many as better equipped to address climate change than mainstream literary fiction but sci-fi would not serve the purpose since the events of global warming are contrary to the content of wonder tales. Nonetheless, the mainstream novel is insufficient in dealing with the climate change because it is concerned with ordinary people and mundane affairs of everyday life and not with the extraordinary and improbable events experienced by humans and the landscape due to the climatic changes like unpredictable floods, typhoons, droughts and hurricanes that are increasing on a daily basis (TGD 72-73, 97). However, the authors attempting to deal with climate in their fiction could not employ the conventional narrative styles and forms which had typically focused on families, nations or individuals, since it necessitates discussions and representations on

planetary scales. In addition, the case of climate change is compounded by its newness and imagining how such a planetary transformation might affect particular places and individuals and envisioning a kind of change that has not occurred before which amounts to a paradigmatic exercise in "second-hand non-experience" (Heise, *Sense of Place* 206). Therefore, the climate themed novels require a planetary or global scale to reflect the temporal and scalar effects of climate change that cannot be provided by the mainstream novel. Thus, cli-fi is significant in the present conditions of intense climate crisis.

Adam Trexler's *Anthropocene Fictions* is the first book-length study of climate change fiction which surveys a large number of climate change novels and investigates their themes and patterns. In this comprehensive study, Trexler poignantly remarks that climate change novel undermines the passivity of place, elevating it to an actor that is itself shaped by the world systems and alters the interactions between characters and introduces entirely new things to fiction. Hence, climate change cannot be relegated to merely a theme in fiction because it remakes basic narrative patterns. Moreover, rather than offering anthropocentric character studies, the novels capture how geology, geography and nonhuman species radically shape human experience. In most of the novels, the characters are thrown into an unprecedented disaster like blizzard or drought due to sudden climate change (233, 171, 205, 5). Thus, cli-fi enlightens the readers on how to mitigate climate change, adapt to it or deal with the issue. However, it places more emphasis on the physical aspects of climate change rather than the psychological or political ramifications. Hence, the dominant theme of the novels is the difficulty of survival. It can be gleaned that in any literary depiction of climate crisis, the themes and the settings are closely interwoven so that one cannot be separated from the other. Though the novels

deal with the global threat of climate crisis, the narratives centre on the local level by exploring the occurrence and impact of natural disasters at a particular locale which may radiate to other places. And it is almost always set in the very near future or even in the present and the setting and the plot is governed by the effects of climate change (Loock 7). It has been critiqued that cli-fi is evidence of environmental pre-trauma or anxiety about things that will happen in the future (Kaplan 2015). Similarly, it has also been suggested that climate change fiction encourages us to move from denial to recognition, acceptance and the will to act (Murphy 149). Trexler significantly adds that incorporating climate change into fiction is not a straightforward task since it must bring fact into dialogue with fiction, in order to explore how global warming impacts human character, the future, imagined landscape, the political realm or culture. At the same time it also needs to be borne in mind that fiction cannot be merely read as attempts to seize the arbitrary meaning of climate change or as literary representations of scientific facts (*Anthropocene Fictions* 29, 35). Thus, the novels perform significant functions by sensitizing us to the happenings around us. These aspects make climate change novels unique among the other thematic varieties or sub-genres of dystopian fiction like techno, feminist and political dystopian.

Incorporating scientific aspects pertaining to climate change into the narrative is an important aspect of cli-fi. However, as Trexler remarks fictionalising climate change is not about falsifying it or making it imaginary, but rather about using narratives to heighten its reality and it would be a grave error to think global warming novels as imaginative products unconcerned with science (*Anthropocene Fictions* 75, 61). In a similar vein, Livia Albech Ripka comments that climate themed fiction, like most science fiction, is extension not invention which stresses on the importance of

incorporating facts, reality and experiences into the narrative. Correspondingly, it can be observed that the majority of cli-fi novels include at least one scientist character performing the crucial role of imparting the meaning and implications of the climate change for the characters in the locale as well as to the readers. They typically appear as either Earth saving heroes or minor characters that allow the authors to dump masses of data on the reader (Trexler, *Anthropocene Fctions* 31). Hence, it can be stated that the scientist characters are found to be genuinely concerned about the fate of the planet and often engage emotionally with the climate change.

Writers dealing with climate change often imagine a bleak life on the planet at some point of the narrative. Lawrence Buell declares that apocalypse is definitely the single most powerful metaphor that the contemporary environmental imagination has at its disposal (*The Environmental Imagination* 93). Readers also encounter archaic images like flooded towns and cities as in Bacigalupi's Bangkok, Ballard's London, Le Guin's Oregon, and Rich's Manhattan. Besides, there is a preoccupation with islands as in Amitav Ghosh's Sundarbans, Boyle's Santa Barbara Channel Islands, Ian Mc Ewan's Spitsbergen, David Mitchell's Hawaii and Michel Crichton's Vanuatu. Margret Atwood in her *The Year of Flood*, second volume of her *Oryx and Crake* trilogy, extends the urban flooding even further by recalling its biblical origin and the Noah's Ark narrative and uses them as metaphors for planetary crisis. Factual reporting of devastating floods has visually been an enduring feature of the media. With climate change, stories about floods take on new significance indicating a global problem that can be traced ultimately to human actions. Trexler significantly points out that over the last forty years, the dominant literary strategy for locating climate change has been the floods and further suggests that floods offer a rich literary means of rendering climate change in a local place as a tangible concrete effect. This can be

further corroborated with the fact that the representation of the immediate phenomenon of climate change in fiction through the narratives of flooded landscape dates back to ancient religious and apocalyptic narratives such as the Bible, the Quran, the Greek myth of Deucalion, the Mesopotamian *Epic of Gilgamesh* and the Hindu myth of Manu. These stories suggest that humans have used floods to understand the limits of humanity, its ethical boundaries and our ultimate dependence on the land since the beginning of civilizations. While global temperatures have risen and ice in Antarctica has broken up, there have been rather obvious calculations showing that melting of Antarctica and Greenland glaciers would result in disastrous sea-level rises (*Anthropocene Fictions* 82-84). In the past few years various prominent novelists have employed the deluge motif to make the readers aware of the ecological, economic and political implications of the changing climate.

Besides its reflection in literary fiction, climate change is widely discussed in films, documentaries and travelogues in which multifarious manifestations of the crisis are traced in various locations around the globe. Few prominent examples are the Oscar-winning documentary *An Inconvenient Truth* (2006) by Al Gore in which he communicates the science pertaining to climate change through lectures delivered to a range of audiences across the world, the 2004 Hollywood blockbuster film *The Day After Tomorrow* which was a commercial success with a huge viewing public (estimated at 21 million people in the USA alone), James Cameron's film *Avatar* in 2009, a growing number of documentaries on climate change such as 60 Minutes, ABC News, *Years of Living Dangerously* focusing on the human stories of climate change and *Warmer* which is an online compilation of seven short stories as part of Amazon’s Original Stories series, which makes the readers ponder about the incipient death of the planet. Margaret Atwood’s popular cli-fi trilogy *MaddAddam* is currently

being adapted into a series for HBO. This rise in visual media coverage suggests that the discussions of climate change has gone mainstream and have played a pivotal role in transforming climate change from an obscure scientific issue to a dominant public concern. According to statistical findings, the movie *The Day After Tomorrow* had generated more than ten times the news coverage compared to the IPCC 2001 report. Michael Molitor, the primary science consultant for the movie had predicted, "This film could do more in helping us move in the right direction than all the scientific work and all the US Congressional testimonies put together. . . . Nothing I have done in the twenty three years of my climate change career may have a greater impact than this film". In a similar vein, several scientists have observed that the film had facilitated their work to communicate climate change as globally and locally important phenomena rather than something that was only relevant to the scientists (Svoboda 10, 12). In this context it is pertinent to note the observation made by Julia Leyda that climate related fiction and films are generators of 'structures of feeling' and while certain texts explicitly involve climate change in their scenarios and stories, in certain others it functions more as a 'climate unconscious', not overtly mentioned in the text. In 2011, Patricia Yaeger in her Presidential address to the Modern Language Association had speculated on the idea of naming the literary eras of the Anthropocene after the dominant fuels. Drawing on the critical foundations of Jameson and Yeager, Leyda suggests that film and television studies could productively seek out textual and visual traces of a "climate unconscious" in popular series such as *Game of Thrones, The Walking Dead* and others that are not at first glance about climate change (16). The attention to weather in HBO's blockbuster series *Game of Thrones* with its opening episode entitled "Winter is Coming'' points to American (and global) audiences readiness to consider extreme weather and

climate change as a severe threat. In another series *The Walking Dead* which is a horror dystopia, it is always summer and the series alludes to the collective responsibility to work together as a team and the dire consequences awaiting future generations if immediate action is not taken. Trexler poignantly states that in the coming decades, humanity may or may not take greater steps to draw down existing greenhouse gases and reduce further emissions. In either case, the influence of climate change will only grow in the twenty-first century as we transform our consumption of energy or are forced to face the accelerating effects of climate change. And as this process plays out, climate change will increasingly become a part of everyday life, influencing more authors to come (*Anthropocene Fictions* 233), and this prediction has already turned into a reality.

It can be stated that climate themed novels demonstrate the significance of the literary approach to the study of climate change or Anthropocene which is usually discussed under the rubric of sciences and social sciences. They serve as significant instruments to make the wider public understand the nuances of climate change and galvanize them into redemptive action since IPCC, COP and other global scientific reports have not been very successful so far. Climate themed fiction and ecofiction can definitely make a huge difference in the mindset of the readers since they will be better able to relate and empathize with the experiences of the characters resulting in ecologically conscious behaviour and sustainable ways of living.

Chapter 4

BON BIBI'S WRATH AND BETHANYLANDS: NARRATIVES OF ALTERED LANDSCAPES

"*A place is what you make of it*" – Amitav Ghosh

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong to, we may begin to use it with love and respect" – Aldo Leopald

A landscape is a part of Earth's surface that can be viewed at one time from one place. It consists of the geographic features that mark or are characteristic of a particular area. It is broadly categorized as natural and cultural landscapes. The features of a natural landscape are mountains, hills, plains, streams, soils, weathers and others. A cultural landscape is one that is modified by the people and it consists of the plants they grow, the animals they care for and the structures they build. A landscape is the dynamic backdrop of an individual's life as it moulds the identities of the individuals inhabiting it and reflects a living synthesis of people and their place.

Rootedness to a place is a vital need for living beings that is being ignored at a great cost in the present times. Over the past few years there has been a proliferation of books and articles from divergent disciplines which re-examine the notion and significance of place and bioregion. The works of writers like Gary Snyder, Edward Abbey, Wallace Stegner, Wendell Berry, Barry Lopez, Rick Bass, Ann Ronald, Terry Tempest Williams, Edward. S.Casey, Yi-Fu Tuan, Edward Ralph, James Lovelock, Edward. O. Wilson, affirm human connections to place as very significant. Various eminent writers such as Mark Twain, George Eliot, Willa Cather, D. H.Lawrence, Ernest Hemingway, Leslie Marmon Silko, Scot Russell Sanders, have attributed much

significance to the place or landscape by depicting it as an active participant or major character in their works.

One of the dominant concerns over the past few years has been the growing ecological concerns affecting the planet's biosphere. Glen A. Love has significantly pointed out that the interpretation of place in literature is growing in prominence due to the impetus of ecological and socio-biological thinking, rapid joining of interdisciplinary fields in the sciences and social sciences and the rise of new approaches in the humanities such as ecocriticism (90). According to the recent researches by the scientists all over the world, climate change is turning out to be the biggest catalyst for major changes to the planet's ecological landscape. Naomi Klein has significantly stated that climate change is a crisis that is intensely place-based. For instance, in the early stages it is about an early blooming of a particular flower, the late arrival of a migratory bird, an unusually thin layer of ice on a lake and noticing these small changes requires the kind of communion that comes from knowing a place deeply, not just as scenery but as sustenance (159). Environmental philosopher Paul Shepard has significantly observed that knowing who we are is impossible without knowing where we are (Heise, *Sense of Place* 32). Such perspectives help us to understand the role of place in making the humans ethical and ecologically conscious. Thus, being aware of our place, landscape and locality is an inevitable aspect of our living.

The concept of 'land ethic' by Aldo Leopald is a very significant concept pertaining to the ecocritical approaches to place. Leopald seems to be critical of modern cultures, since it alienates people from the land. According to Leopald, our educational and economic system is headed away from rather than towards an intense consciousness of land, by many middlemen and innumerable physical gadgets.

Humans have no vital relation to the land and consider it just as the space between cities on which crops grow. Conversely, Leopald extends the basic human rights to nonhuman subjects because the individual is a member of a community of interdependent parts and the land ethic simply enlarges the boundaries of the community to include soils, water, plants and animals, or collectively, the land. In short, a land ethic changes the role of *Homo sapiens* from conquerors of the land community to plain members and citizens of it (224, 203-204). Another crucial aspect is the question of prioritization of the local versus global. While certain thinkers and writers prioritize the local, the others stress on the global perspective. For instance, Arne Naess had proclaimed that "the nearer has priority over the more remote – in space, time, culture , species" ("Identification" 268). Whereas, according to the concept of 'topophilia' articulated by the geographer Yi – Fu Tuan, which implies the affective bonds that tie humans to a particular place, the attachment to the planet as a whole is possible and desirable (101); and the popular 1970 slogan 'Think globally, act locally', formulated by Rene Dubos are instances of certain environmentalist thinkers and writers who give due importance to the global apart from the local. In a similar vein, Gary Snyder has pertinently remarked that we can live wisely in our chosen places if we recognize its connections to the rest of the planet since "a place on earth is a mosaic within larger mosaics – the land is all small places, all precise tiny realms replicating larger and smaller realms" (xvi, 27). Ursula. K. Heise critically comments that the recent attempts made by the thinkers and writers to articulate an environmentalist version of the global have adopted a different strategy, that is, they primarily aim at an understanding of the global structures but retain the emphasis on the local as a matter of political or didactic practicality (*Sense of Place* 39). Heise's views can be substantiated with the observation made by Ehrlich and Ehrlich that

localization can strengthen the attachment to an immediate environment which is still a major part of the identity of most of the human beings and an understanding of the local surroundings helps people to become aware of the ecosystem services upon which their lives depend (324-325). Hence, from these pertinent observations it can be stated that an ecologically sensitive behaviour necessitates a profound sense of place and attachment to place which are crucial for environmentalist thinking and ameliorating the ecological issues like climate change to a significant extent. This chapter delves into analyzing how the characters in the narratives relate to their place, both local and global, and the devastating changes wrought upon the ecological landscape through exploitative human intervention.

Barbara Kingsolver's *Flight Behaviour* (FB) begins with the reference to the stifling summer that has continued till the month of November and this is followed by incessant rainfall and massive keeling of trees all over Appalachia due to inexplicable reasons. This is one of the many unaccustomed changes observed in their landscape as confessed by the 'I know all' elderly people of the locality who claim to have observed everything in creation. This climatic anomaly presages the unprecedented arrival of the monarch butterflies which makes the protagonist Dellarobia Turnbow worried and scared due to the strangeness of the spectacle because the entire landscape spanning the forest, valley and ridge seemed altered and pale like dead leaves. The varied landscape has a profound impact on Dellarobia physically, mentally and emotionally and because it is an inexplicable experience, "the impossible'' and beyond the grasp of her knowledge, she renders a metaphysical connotation to the spectacle by comparing it to the Moses, Ezekiel and the Scriptures (FB 7, 18, 22). The drastic alterations in the weather pattern brings about significant changes in the flora and fauna of the landscape affecting the cultivation of crops

which is evidenced by the neighbour's tomato yield that has melted to liquid stench under the summer's non-stop rains and has resulted in a very less quantity of harvest. This was the baneful consequence of the absence of consecutive rainless days that were needed for cutting, raking and baling a hay crop, which makes farmers like Cub desperate and helpless.

The changed climate necessitates new lexicon to describe the hitherto unobserved changes, and the term "spark weather" is an appropriate one as ingeniously used by Dellarobia to depict the dry air produced by cool weather. This weird weather perplexes the minds of the people in the locality who have to struggle a few seconds in order to place the month of the year on stepping outside their houses. Cub poignantly remarks that it felt like no season at all. Preston gives up the hope for a white Christmas and enquires to his mother whether Santa Claus knew how to drive a boat because instead of snow they had heavy rain which "fell on them in sheets and gushes, not normal rain anymore but water flung at the windows as if from a bucket" raising the level of groundwater (FB 59, 118, 169). Corresponding to Trexler's remark that in fiction local places often act as a synecdoche of the planet (*Anthropocene Fictions* 235), the vivid descriptions of climatic alterations by the author who resides in Appalachia, correspond to the erasure of the typical norms of climate and seasons that the inhabitants of a particular place were earlier accustomed to and the bizarre climatic changes taking place all over the world.

It is pertinent to note the confession made by Dellarobia about her lack of observation of her surroundings, a belated realization caused by the onset of the monarch butterflies which are described as an incomprehensibly immense, unbounded, uncountable congregation of flame-colored insects and she admits that in almost thirty years of walking around on the grass of the world, she could not recall

having spent two minutes alone with a butterfly (FB 72-73). She further speculates that the butterflies would have been present earlier and everyone could have missed them, which is actually a dig at the self-aggrandizement of the humanity either ignoring or treating the environment badly. Heise has significantly pointed out that the insistence on individuals and communities' need to reconnect to local places is a way of overcoming the alienation from nature that the modern societies generate (*Sense of Place* 29). Hence, developing a sense of place by becoming familiar with the details of the ecosystems that immediately surround the individuals is crucial to relate to the natural world which would further aid in its conservation.

The utilitarian perspective of Cub is revealed in the narrative through the selling of trees in their property, which he takes for granted. Further, he is described as being wary of people who take efforts to save trees for trees' sake. Similarly, his father Bear is also bent upon logging the mountain in his property solely for financial benefits, in spite of being repeatedly warned that deforestation would result in landslides and floods. This aspect is further vindicated by the author through the delineation of the destruction of Josefina's town in Mexico (FB 60, 189). Here we can discern the commodification of the environment which is aptly phrased as being "liquefied" by Bonnnneuil (Boyden 195). Hence, it can be observed that Cub and Bear value nature solely for its instrumental purpose and they depict anthropocentric behaviour in their attempts to violate and exploit their surroundings, which is significantly termed by William Rueckert as self-destructive and suicidal (107). The author also makes a dig at the local political groups who are least concerned about the cause of the monarchs' presence in the mountains and instead of taking efforts towards ecological conservation of the mountains and the monarchs, they plan towards utilizing the monarchs for tourism opportunity by comparing it to a

Disneyland (FB 292). This instance from the narrative is also a critique of the unbridled tourism sector, which distorts the ecological equilibrium of the landscape. This is reinforced by the description of Josefina's father as a tourist guide, who earned his living by carrying people on a horse into the forest to witness the monarchs' migration to Mexico, one of the greatest natural events on Earth, attracting tourists from all over the world. Hence, it can be inferred that the logging of the mountain in Joshua's hometown in Michicoa was probably to expand the tourism opportunities that had inadvertently led to the mudslides and the consequent displacement of the people and the monarchs alike. Dellarobia is shaken out of her complacency on becoming aware of the shocking changes wrought to the landscapes of Mexico and the other parts of the world ravaged by disasters. She compares them to "horror-movie images''(FB 234) and regrets for having seen the brutal and alarming visuals. According to the noted Earth scientist Kusala Rajendran, unchecked tourism and illegal constructions trigger disasters and deforestation, resulting in the loosening of the soil profile and landslips (Krishnakumar). Moreover, both gradual and abrupt environmental changes often result in migration and forced displacements which lead to a range of social and psychological impacts including feelings of anxiety, grief and loss, disruption to networks of support and belonging and other negative psychological outcomes like anxiety, depression, post-traumatic stress (Korpula 14), which unfortunately do not receive much attention during the post-disaster and rehabilitation phases. Contrary to the anthropocentric men in Dellarobia's family and the local political groups who are adamant in their attitude towards their surroundings, Dellarobia becomes increasingly conscious and concerned about her locale and the world at large, thereby attaining a biocentric vision. Dellarobia takes much efforts to convince Cub to persuade his father to not to log the mountains. In order to prove her

point, she cites the instance of the pathetic sight of the Buchman place after the mountains were logged out, “It’s a trash pile. Nothing but mud and splinters. . . . It looks like they blew bombs all over it. Then all the rains started and the whole mountain is sliding into the road” (FB 53-54). Dellarobia’s transformation into an ecological person underscores the significance of attentiveness to nature as pointed out by John Dryzek. Dryzek considers listening to non-verbal communication of nature as a rational process and further remarks that by paying attention to the signals from nature, we become ecological citizens and social beings (149). Thus, the readers are made to understand that paying due attention to the natural surroundings helps to forge mutually supportive bonds with the landscape.

The various facts pertaining to climate science is communicated by the scientist character Dr. Ovid Byron, a lepidopterist, to Dellarobia and other characters in the narrative. Dr. Ovid scathingly attacks the cult of climate deniers who are reluctant to believe or admit the bitter factuality of climate change, though “the damn globe is catching fire, and the islands are drowning and the evidence is staring them in the face” (FB 318). Facts pertaining to climate change are considered formidable and if revealed would hinder the economic and political growth of certain countries and individuals. This is elucidated in the interview of Dellarobia by the TV journalist Tina who evades the crucial questions regarding the presence of the monarch butterflies in Appalachia and instead deviates into the discussion about the spiritual vision of Dellarobia who is celebrated by the media as the ‘The Butterfly Venus’. Dr. Ovid explains about the organization ‘three-fifty-dot-org’ to which Pete belongs, and states the significance of the figure, “the number of carbon molecules that atmosphere can hold, and still maintain the ordinary thermal balance’’ (FB 294, 383), to which the organization desires to draw attention. Dr. Ovid further explains about the crucial

greenhouse gas – carbon dioxide, and states that the thermal stability of the planet would become highly disturbed when it hits 350, which is a brutal fact staring at the people all over the world. According to the climate scientists, 350ppm (parts per million) of carbon dioxide has been identified as the safe upper limit to avoid a climate tipping point. The 350.org was founded in 2007 at California by a group of university friends in the US along with environmental activist and author Bill McKibben. It is an international movement of ordinary people working to end the age of fossil fuels and build a world of community-led renewable energy in order to safeguard the planet from the effects of climate crisis. The aim of the organization was to campaign for policies to reduce the overall greenhouse gas concentrations to the level of 350 parts per million (ppm). Dr. Ovid further elaborates upon the drastic and horrendous consequences being faced by the Earth due to the increasing levels of the carbon dioxide in the atmosphere:

> Hurricanes reaching a hundred miles inland, wind speeds we've never seen. Deserts on fire. In New Mexico we are seeing the inferno. Texas is worse. Australia is unimaginatively worse – a lot of continent is in permanent drought. Farms abandoned forever . . . . In Victoria hundreds of people burned to death in one month, so many that their prime minister calling it hell on earth. This has not happened before. There is not an evacuation plan. (FB 384-385)

It is significant to note that every bit of information related to the changes wrought upon the planetary landscape due to the climate crisis, shared by Dr. Ovid to Dellarobia and other characters is a factuality. For instance, it is a scientifically proven fact that every kind of weather is intensified by warming and even if humans stop burning carbon, the accumulation plays out for a very long time resulting in a

four degree rise in the world's average temperature that would lead to unstoppable processes like the loss of polar ice. This would further result in the trapping of more heat by the land and water, releasing more carbon into the air. Dr. Ovid points out that the carbon is absorbed by the forests and the oceans that act as buffers and carbon sinks, but not when the forests are burning or dying of drought or the oceans are made acidic by the increasing levels of carbon, resulting in the loss of fishes and coral reefs (FB 386-388). Therefore, it can be stated that since the web of life is interconnected and interrelated, the cataclysmic effects of anthropogenic global warming and climate change lead to a series of cyclic and irreversible changes on the landscape.

Appalachia is renowned for its abundant flora and fauna, including rare species found only in that particular region, but when Dellarobia searches the place for flowers suitable for the survival of the butterfies to be tested in labs, she is shocked to find a total absence of green leaves. The floral bunches which stand on naked pink stems poking straight up appeared "eerie" as if handed over by "death". Unfortunately this is caused by the "devastation in the spring range", a consequence of climate change as hypothesized by Dr. Ovid. This "leafless forest" is aptly described by Dellarobia as an "inhospitable garden" (FB 479, 482, 476, 480). This vivid description reminds us of the often-quoted opening lines of T.S. Eliot's "The Waste Land", "April is the cruelest month/ breeding lilacs out of the dead land". It is also pertinent to note that in the narrative, climate change leads to the movement of the entire forest which moves up the mountain slopes, in a slow motion, towards the peaks from where they cannot levitate. According to scientific researches, a huge migration of trees has begun across much of the West due to global warming, insect attacks and other factors ("Climate change causing"). This recent phenomena is mostly apparent in the US and the reasons are attributed to elevated temperatures and

altered rainfall patterns (Meyer). The final part of the novel depicts a bleak landscape being ravaged by floods, resulting in the exodus of the monarchs in large numbers. Dr. Ovid painfully elaborates upon the fate of the butterflies which would be forced to migrate to a "whole new earth - a world we can count on nothing we had ever known or trusted, a place where we don't want to be" (FB 449). This connotes a dystopian world in which there would be a complete absence of the idyllic. Nevertheless, the resilience of the monarchs' in surviving the hostile circumstances in spite of being on the verge of extinction, offers a new glimmer of hope and an ultimatum to mankind to not to tread the hitherto trodden path of exploitation and consumerist living and rather care and nurture the Earth's biosphere.

The Hungry Tide (THT) by Amitav Ghosh is intensely local because it is mostly set in the Sundarbans and the characters remain detached from the rest of the world. Piya's new conservation project is based on indigenous people and animals. Kanai stays back at Lusibari keeping aside his business affairs. Though Neelima leads a significant and esteemed non-governmental organization, she does not travel out of the area. Hence, the characters bond with their locale in their own individualistic ways which helps to develop spatial closeness, cognitive understanding, emotional attachment, responsibility and care. These features are found to recur across a wide variety of perspectives that emphasize sense of place as a basic requisite for environmental awareness and activism (Heise, *Sense of Place* 33). The unique landscape of the Sundarbans is brought to the imagination of the readers through its introduction by Kanai to the cetologist Piyali Roy (Piya), who is a stranger to the locale in the beginning of the narrative, "Until you behold it for yourself, it is almost impossible to believe that here interposed between the sea and the plains of the Bengal, lies an archipelago of islands. . . stretching for almost three hundred

kilometers, from the Hooghly river in West Bengal to the shores of Meghna in Bangladesh". Kanai further elaborates upon the peculiarities of the landscape and ecology of the mangrove forests where everyday thousands of acres disappear underwater to re-emerge hours later and the currents are so powerful that they reshape the islands every day, "some days the water tears away entire promontories and peninsulas; at other times it throws up new shelves and sandbanks where there were none before" (THT 6, 7). Kanai's description of the peculiar landscape is validated by Ghosh's elucidation of the Sundarbans in *The Great Derangement* (TGD):

> Sundarbans, the great mangrove forest of the Bengal Delta, where the flow of water and silt is such that the geological processes that usually unfold in deep time appear to occur at a speed where they can be followed from week to week and month to month. Overnight a stretch of river bank will disappear, sometimes taking houses and people with it, elsewhere a shallow mud bank will arise and within weeks the shore will have broadened by several feet. (7)

Pramod. K. Nayar significantly remarks that the story of *The Hungry Tide* is inseparable from the shape, form, texture and history of the Sundarbans land (92). Nevertheless, this sensuous local scene is simply dissolved by climate change, a fact that is not overtly presented in the novel either in the form of newspaper reports, scientific papers of conservation officials or the warnings of non-local NGO workers, in spite of the fact that the shallow tide country of India and Bangladesh has been at the centre of cultural and political accounts of global warming (Trexler, "Mediating Climate Change" 219). Ghosh himself had stated that the landscape of Sundarbans is so dynamic and alive that it is a living entity. It does not exist solely, or even incidentally, as a stage for the enactment of human history, and is itself a protagonist (TGD 7) which is made explicit in the title of the novel. Thus, the landscape of

Sundarbans is constantly in a flux evolving according to the physical factors, making it flexible and alive, turning into a character and erasing the conventional notions of landscape as fixed or constant.

Kanai's journey to Lusibari through Canning is considered perilous by his aunt Neelima because the river Matla has changed and diminished to the width of a narrow ditch flowing along the centre of a kilometer wide bed. Bubbles of air rose frequently from the depths and burst through to the top, leaving rings on the burnished surface. Kanai pertinently remarks that the sounds made by them seemed to be giving voice to the depths of the earth (THT 24). Global warming and climate change has resulted in dearth of water in the rivers, seas and oceans which is fatal to the existence of life because it is the water that nourishes and sustains every form of life on the planet and the author seems to suggest that the earth is giving voice to the pangs of its plight to which humanity has turned a deaf ear. Kanai perceives an apparent connection between Nirmal's cry of angst - "The Matla will rise'' (THT 26), when he was found on the embankment few days prior to his death, and the story narrated by Nirmal during his childhood days about the Viceroy who built the port in Canning. The Britishers wanted Matla to be the capital of Bengal, both literally and economically, equipped with all kinds of urban amenities like hotels, parks, banks, and streets. Nevertheless, Matla had to succumb to the surge of a minor storm which washed away the entire town, as aptly predicted by Piddington. Ghosh's vivid and factual description of Lord Canning's idea of building a port in the vicinity of the river Matla, can be considered as a critique of the colonial vision of the world in which proximity to the water represents power and security, mastery and conquest; which in the present times have been incorporated into the very foundations of middle-class patterns of living across the globe. Moreover, it is also considered as a

sign of affluence and education since sea-front location is regarded as a status symbol and enhances the value of real estate. Ghosh laments that this was not the case earlier, because throughout the entire span of the human history, people had regarded the ocean with great wariness and although they made the living from the sea through fishing or trade, they generally did not build large settlements on the water's edge. In the early modern era, there had existed a general acceptance that provision had to be made for the unpredictable furies of the oceans like tsunamis and storm surges which can be seen in the coast around Fukushima where stone tablets had been placed along the shoreline in the Middle Ages to serve as tsunami warnings for future generations. An awareness of the precariousness of human existence is to be found in every culture which is reflected in biblical and Quranic images of the Apocalypse, in Fimbulwinter in Norse mythology, in tales of '*pralaya*' in Sanskrit literature and so on. It is pertinent to understand that it was in the seventeenth century that colonial cities began to rise on seafronts around the world. Mumbai, Chennai, New York were all founded in this period and these cities which were brought into being by processes of colonization are now among those that are more directly threatened by climate change (TGD 49, 48, 74, 50).

Similarly, the extreme vulnerability of the geographical position of Lusibari is vividly described by Kanai. It was an area of two kilometers long and was shaped like a conch shell. It was the southernmost part of the inhabited islands in the fifty kilometers of mangroves that separated it from the open sea, with no other settlement in the vicinity. Although there were many other islands nearby, Lusibari was cut off from these by four encircling rivers of which the Raimangal, the mightiest in the tide country, encircled the pointed end of the island, the narrowest spiral of the conch. Nirmal firmly believed that history would repeat itself at Lusibari which was ill-

reputed for catastrophic cyclones. So he had insisted upon building a large ward on the upper storey of the building during the construction of the hospital, well-equipped to withstand cyclones. Nirmal had once enumerated to the young Fokir the various incidents of storms that had taken place in Lusibari in 1930, 1970 and 1737 which proved to be extremely disastrous owing to a concurrent earthquake, making it a rare incident in the history as it was the first known instance of these two catastrophes happening together. It is important to note that Nirmal foretells that the severe storm would recur again within a matter of time and as the water would rise "the *badh* will succumb in part or in whole" (THT 36, 204). These instances from the narrative depict the vulnerability of the Sundarbans landscape in the face of climate crisis, which is validated by the words of a farmer residing at Ghoramara in Sundarbans who laments that the monsoon is a very difficult time for the residents. The tides are so dramatic that about a third of the land disappears and reappears every day and this has been recurring for centuries. Further, since the past few decades the changes have become more extreme. In this delta water levels are rising more dramatically compared to the other parts of the world, especially on the island of Ghoramara. Today, just over 3000 people live here while ealier it was home to 40,000 people. Sundarbans is one of the most economically backwater regions of the country and is both a hotspot of climate change and biodiversity. According to a 2017 statistical report, out of every 1000 people in the Sundarbans, 190 eat only one meal a day and 510 are malnourished (Muller). In spite of being aware of the fact that the houses of the inhabitants would get inundated in the floods every year, they do not abandon it because they regard the place as their motherland and hence keep rebuilding their houses with complete awareness that it would get washed away (Shapiro). Ghosh had aptly predicted that the accelerating impacts of global warming would threaten the

very existence of low-lying areas like Sundarbans, and have major repercussions on the landscape. Ghosh had also perceived the portents of accumulative and irreversible changes due to climate crisis in receding shorelines and a steady intrusion of salt water on lands that had been previously cultivated (TGD 7). In another instance, Ghosh had described the Sundarbans as a haunting landscape and lamented that it is a place that has been most drastically affected by climate change (Saha). This can be corroborated with Ghosh's pertinent observation in his significant article "Folly in the Sundarbans*"*:

> The Bay of Bengal is one of the most active cyclonic regions in the world: two of the most devastating hurricanes in human history have been visited upon the coast of Bengal in 1737 and 1976. Each of those cyclones claimed over 300,000 lives, a toll larger than Hiroshima and Nagasaki combined. The toll might have been higher still if not for the Sundarbans. The mangrove forests have historically abosorbed the first shock of incoming cyclones: they are the barrier that protects the hinterland. . . .That this region will be hit by another devastating storm is a near certainty, in this era of global warming.

Nirmal acknowledges the fact that as a 'townsman', he considered the Sundarbans forest as 'an emptiness, a place where time stood still', but after dwelling there he attains the realization that the reality was the contrary because transformation is the rule of life in the tide country. This is manifested through the rivers changing course every week, islands being made and unmade in days and mangroves recolonizing a denuded island in ten to fifteen years (THT 204, 224). Thus, similar to the character Dellarobia in the *Flight Behaviour*, Nirmal too evolves into an ecological person, being transformed by the landscape in which he dwells. It can be stated that Nirmal has an ecospiritual vision which is illustrated by his belief that "everything which

existed was interconnected: the trees, the sky, the weather, people, poetry, science, nature''. Nirmal's hopes for the future generation to be more idealistic, less cynical and selfish (THT 282, 278), seems to have failed because mankind is becoming increasingly self-aggrandized, greedy, thriving on consumerist ideology and perilously ruining the nature in the process.

In the narrative, Fokir, Kusum and Horen lack formal education. Nonetheless, they are well-versed with their landscape as evidenced from the fact that Horen is aware of the phenomenon of the moon rainbow at Gerafitola and the place where salt is made. Kusum proudly declares about her son Fokir, "The river is in his veins" (THT 245). Nirmal, Kusum and Fokir perform significant roles in their locale as they bequeath the history and culture pertaining to the tide country through stories, legends and songs to their peers and the succeeding generations. Their oral narratives perform the crucial function of preserving the bounteous landscape. Fokir as a young child was familiar with the nook and corner of Gorjontola, prior to having visited the place, through the tales and songs taught to him by his mother Kusum. This is a significant aspect of the indigenous wisdom which views nature as holistic and hence plays a crucial role in their rootedness to the landscape. In a literal sense, indigenism means to be born of a place. However, for indigenous communities it also implies to live in relationship with the place where one is born as in the sense of an indigenous homeland, which implies that an indigenous member has the responsibility to practice kinship roles in reciprocal relationship with his or her bioregional habitat and this is manifested through cultural beliefs, rituals and ceremonies that cherish the biodiversity (Annette 66). The landscape of Garjontola attains much significance because it is the place where Kanai attains humility and self-realization. Kanai confesses in his letter to Piya that he regrets having prided himself "on the breadth

and comprehensiveness of his experience of the world" and adds, ". . . at Garjontola I learnt how little I know of myself and the world". This realization leads to his translation of the song sung by Fokir, which is imbued with the spirit of his life as well as the landscape of Garjontola. Kanai aptly remarks, "It lives in him and in some way, perhaps, it still plays a part in making him the person he is" (354). This narrative corroborates with the pertinent remark that there is no such thing as an individual and there is only an individual-in-context, individual as a component of place, defined by place. The prevailing favoring of the consumption of landscape as a commodity is counteracted by endorsing the self as an extended part of the landscape (Evernden 103), which can be discerned in Fokir. The song sung by Fokir was actually the history of the tide country. As recollected in Nirmal's book, Fokir at the age of five had recited from memory many of the cantos, that comprise the tide country legend and the story of Bon Bibi, the forest's protectress (THT 353-354). The waterscape of Garjontola acquires additional significance since it is the place where Fokir accompanies Piya on her expedition and experiences contentment on merging with the unique landscape. The final part of the narrative is pregnant with meaning as Ghosh vividly describes the cyclone which sends a gigantic storm surge into the Sundarbans resulting in the death of Fokir, who sacrifices his life protecting Piya as if to imply that the specific purpose of his life was to merge with the landscape of Garjontola. Ghosh confesses that this scene was extraordinarily difficult to write and for its preparation he had to refer a great deal of material on catastrophic waves, storm surges and tsunamis. The novel had proved to be prophetic because it was published in the summer of 2004, prior to the occurrence of a cataclysmic tsunami that was set off by a massive undersea earthquake in the Indian Ocean measuring 9.0 on the Richter scale which resulted in a great loss of lives (TGD 44 – 45).

In this context, it is also important to note that in the *Gun Island* (GI), sequel to the novel *The Hungry Tide*, Ghosh vividly describes the ghastly aftermath of the cyclone Aila which hit the Sundarbans in 2009.

> . . . . Aila's long-term consequences were even more devastating than those of the earlier cyclones. Hundreds of miles of embankment had been swept away and the sea had invaded places where it had never entered before; vast tracts of once fertile land had been swamped by salt water, rendering them uncultivable for a generation if not forever. (48)

To make the matters worse, this was followed by a terrible drought due to which the streams, rivers and ponds had dried up and the stench of rotting fish and dead livestock had hung heavy in the air. Half of the population died of starvation, parents sold their children and people were reduced to eating carcasses and cadavers (GI 55). In the *Gun Island*, Ghosh also dwells at length on the aftermath of the severe Bhola cyclone in 1970 which had torn through the Bengal delta, hitting both the Indian province of West Bengal and the then East Pakistan and was the greatest natural disaster of the twentieth century in terms of casualties, as its death toll may have been as high as half a million. The cyclones Bhola, Aila and the recent deadly Amphan in 2020 in the wake of the deadly pandemic COVID-19 are some of the other major instances which prove Ghosh's novels to be apocalyptic and cautionary.

The *Gun Island* is explicitly about the climate crisis which is evidenced in the narrative by the words of the keynote speaker of the conference held at the museum, a young historian who delivered a speech on climate and apocalypse in the seventeenth century and illuminated that it was a period of several climatic disruptions owing to which the period was described as the 'Little Ice Age' since many parts of the world

had been struck by famines, droughts and epidemics. Moreover, it was during that time when the Londoners began to use coal on a large scale for the purpose of heating, the process which initiated humanity's dependency on fossil fuels. The speaker significantly adds that our experiences and observations should suffice to remind us that the climatic perturbations of the Little Ice Age were trivial compared to what is in store for us now. Whatever ancestors experienced is but a pale foreshadowing of what the future holds. This is further explicated with the crucial facts pointed out by the character Cinta Brown that the temperatures are rising around the world because of global warming due to which the habitats of various animals are also changing. This is caused by the presence of greater amounts of carbon dioxide and other greenhouse gases in the atmosphere which is emitted by the cars, planes, factories, whistling kettles and electric toasters and expresso mechines. Further, Cinta pertinently questions whether it is natural that we should need these things that nobody needed a hundred years ago (124, 214). Therefore, it can be observed that the young speaker and Cinta precisely articulate the contemporary agony and the sufferings of the inhabitants and the devastating changes wrought upon the landscape of the planet caused by the fossil-fueled economical structure of the anthropocentric humanity.

Liz Jensen's *The Rapture* (TR) is set in Britain in 2013 and begins with the stark description of weather during the summer when the temperatures were merciless, oppressive and the seasons did not seem to make sense anymore (3). This corresponds to the stifling summer in the beginning of the *Flight Behaviour* and the phrase "spark weather'' used by Dellarobia (59) reverberates with Gabrielle's description of the "maverick weather'' that was becoming the norm across the globe (TR 4). The heat of the long over-heated summer weeks become so oppressive that

venturing outside becomes an ordeal and objects that were earlier regarded as optional accessories, for instance, water, sunglasses, cream, headgear have become absolute necessities carried everywhere by the wheel-chair bound psychologist and narrator Gabrielle Fox. Jensen underpins that it is a climate changed world with the mentioning of the latest scientific warnings which predict the loss of the Arctic ice cap and the rise of global temperature up to 6^{o}C within Bethany Krall's lifetime (TR 35, 23). Thus, the entire fabric of the narrative ostensibly depicts a world which is apparently on the verge of an apocalypse due to the climate crisis with whimsical weather, droughts, floods, tsunamis and other events.

Bethany considers herself as a miniature version of the planet Earth because she is able to experience the pain of the soul of the Earth in her body during her Electro Convulsive Therapy (ECT). Therefore, Bethany's wounded psychic and physical body is a stand-in for the ravaged earth, a synecdoche which makes Gabrielle comment, "Bethany's pain is planet-shaped and planet-sized: she has her own vividly imagined earthquakes and hurricanes, her own volcanic eruptions, her own form of meltdown". Bethany's belief that "her heart was shrinking, her blood was poisoned and she was rotting from inside" (TR 36, 11) succinctly presents the ecological deterioration of the Earth. It is also reminiscent of the wretched condition of TeKa in the animated movie *Moana* (2016), which is actually the violated and enraged form of TeFiti who symbolizes Mother Nature and the stealing of her heart corresponds to the over-exploitation of the natural resources.

The "stuff" registered by Bethany after her ECT refers to the various catastrophic changes in the earth's biosphere which stems from the fossil fuel based capitalist workings of the society. Gabrielle Fox makes a clinical guess that Bethany's visions could be a metaphor for the climate change. Bethany illustrates her visions of

the dystopian Earth, the symptoms of which can be said to have begun already, “Seas burning. Sheets of fire. Whole coasts washed away. The glaciers melting like butter in a microwave. You know Greenland? Basically *dissolved* like a great big aspirin that says Hazard Warning on it. Empty towns full of human bones with lizards and coyotes in charge” (TR 22). Similar to the scientist Dr. Ovid in *Flight Behaviour,* Bethany calls this dystopian place ‘the promised land’ and frequently alludes to the titular Rapture – a belief that the Messiah will return after a seven year period of ‘Tribulation’ or ‘End Times’ in which God will punish humankind for its sins by means of plagues, floods, fire and brimstone (TR 35). Global warming and other catastrophic consequences related to climate crises as predicted by Bethany and borne by the entire humanity are undoubtedly caused by the sins of mankind. This echoes McKibben’s proclamation of “the end of nature” which implies that we are no longer able to think of ourselves as a species tossed about by large forces, rather we are those larger forces because hurricanes, thunder storms and tornadoes are not acts of god but that of man and for the first time human beings have become so large that they have ended nature as an independent force. McKibben further explicates that we are part of nature, but over the past few centuries we have forgotten, to our own peril, how connected we actually are to the rest of the fabric of creation (*The End of Nature* xviii- xix). Bethany’s apocalyptic visions are conveyed through biblical prophecies owing to her religious background, “and whosoever was not found in the book of life was cast into the lake of fire . . . . Behold, the Lord maketh the earth empty, and maketh it waste, and turneth it upside down, and scattered abroad the inhabitants thereof” (TR 42). Bethany grows up in a family adhering to the Faith Wave group. However, she breaks away from its ideologies, retaining its form. It is ironic to note that the fall of the statue of Christ, the redeemer, from its place in Rio De Janeiro

becomes the cause of death of thousands of people as predicted by Bethany. This narrative can be considered as Jensen's attempt to debunk the dogmatic religious practices which have apparently failed to guide the humanity towards ecologically sensitive behaviour. It further illustrates the fact that ecospiritual consciousness is not confined to the narrow boundaries of the religious orthodoxies or dogmas. Hence, it would be futile to rely completely on scriptures to find solutions for our contemporary ecological issues, as Skolimowski crucially remarks, "Wisdom is not the possession of a set of permanent principles and is not to be found in the Upanishads or in the Bible, in the Bhagavad Gita or in the Koran . . . each of these great text represents a specific response to problems and conditions of specific historical realities" (*Dancing Shiva* 42).

Bethany's description of herself as a 'weathergirl' is appropriate because she is able to foresee every fact related to catastrophic climate changes like the dates, time, places which are confirmed by her notes. However, what makes her unique and different from other weather forecasters is that she is also able to experience it physically in her body, that is, she also "feels" it. This is a consequence of the ECT which provides her relief from the delusion of being dead but stimulates a preoccupation with climate change, chemical pollution, weather patterns, zoological disturbances and apocalyptic scenarios, as opined by her former therapist Hamish Bates. Dr. Hussan Ehmet, Gabrielle's colleague, finds Bethany's perceptions "uncanny'' (TR 25, 35, 39) which echoes with Ghosh's usage of the Freudian and Heideggerian term (TGD 43). Contrarily, Bethany is excited and pleased about her visions of catastrophes because the death of people on a large scale would be a solution for the crucial problem of over-population which is a significant contributor to the ecological issues. Bethany awaits the 'big day', the twenty ninth of July, when a

hurricane would hit South America, Brazil and Rio and a large number of people would be killed, and mocks, “The fewer the merrier. More oxygen for the rest of us” (TR 42, 43). Bethany’s observation strikes a chord with that of the character Thanos in the sci-fi movie *Avengers: Infinity War* (2018), who is bent upon terminating the people on a large scale to relieve the burden of the planet as it is over-populated beyond the limits of its tolerance.

Jensen depicts a world which is regressing, because the planet awaits its end. This is underscored in the title ‘*The Rapture*’ which according to the Christian theology, refers to the transportation of believers from Earth to heaven at the Second Coming of the Christ. It is interesting to note that both the factions – evangelical faithwavers and the ecologists await the end of the world, though in divergent ways. Doing justice to the title of the novel, there is no reference to a hopeful future on the planet in the entire narrative. Moreover, the author frequently hints at the humans’ wrong doings in the past and the present which has decimated the planetary landscape. Gabrielle’s soliloquy on the scourged landscape aptly mirrors the plight of our planet today:

> A generalized malaise that seems to go above and beyond the norm, not just in Europe but across the whole globe, a globe that is over-freighted, claustrophobic, product-mad, too dense for its own mass. . . . World preoccupations remain an uneasy toxic mix: money (too little of it), disease (too much), territorial aggression, racist executions, spiraling oil prices, web stalkers, Islamic terror, the new fly borne malaria, melting ice caps, aggressive cults in China, carbon credit fraud, the rise of the Planetarians, contraception, over-population . . . . (TR 45)

This description of the bleak landscape reverberates with Bethany's christening of her visions of post-apocalyptic world after herself, 'Bethanyland', which alludes to the title and the intent of the poem *"*The Wasteland*"* by T. S. Eliot, and in her own despairing terms is an 'Armageddon' with trees all burnt and everything it contains is poisonous and though it contains a lake, nobody would desire to swim in it since all the fishes are dead and there are mosquitoes bugging around everywhere which gives malaria (TR 47-48). The ecologically degraded Bethanyland can also be interpreted as Bethany's externalization of her agonized mental and physical state and a contrary to pantheism which has resulted due to the ecospiritual barrenness of humanity. Unfortunately, the premonitions of Bethany are ill-fated to negligence resulting in the huge loss of lives and property. For instance, Bethany foretells the hurricane Stella which does hit Brazil, flattening a sprawl of towns and villages. The descriptions of the scenes of carnage in the narrative are horrendous and nightmarish, "Brazilians struggle in the flooded wreckage of what must once have been their homes – sheet of corrugated iron here, a door frame there, a child's bed. Desperate people clinging to gas canisters and oil drums. Lives upended in the time it takes for a pan of beans to boil" (TR 74). Hurricane Stella wrecks havoc upon Rio turning it into a waterscape of streets, wiping out four thousand lives and resulting in the outbreak of typhoid. It reflects the dreadful fact that with ecological issues like climate change, such gruesome catastrophes have become the new normal, victimizing the people all over the world. It also proves the novel to be prophetic and cautionary because storm Stella, a severe blizzard did occur in 2017 which hammered the U.S and killed many people. Hence, it can be observed that *The Rapture* is marked by a global perspective since the author depicts the occurrence of events all over the world. A prominent thematic feature that can be observed in this novel and which is also a defining

characteristic of the twenty-first century novel, is the reshaping of space itself, with the breaking down of barriers and the tendency towards the global and the international (Mundler 7). This is further evidenced by Dr. Frazer's gifting of a large globe made of light translucent plastic to Bethany, which is metonymical of our planet's land and water bodies choked by plastic pollution that would soon lead to 'an unpeopled earth', or rather 'pure geography' (TR 97). It connotes the extinction of the entire flora and fauna and also has the implication of a planet sans species, economy, politics, religion, science, technology, economy, and others; in which humans take great pride and are used as weapons to tame nature but would ultimately prove ineffectual and meaningless in the face of extinction.

It is interesting to note that the author draws apparent similarities between Bethany's prophetic paintings related to the various disasters and that of the paintings made by Vincent Van Gogh who was a renowned Dutch landscape painter. Van Gogh did his prominent artistic works during his most disturbed phase of life, for instance, the *Starry Night* which writhes with weather, constellations and a fierce crescent moon. The Mexican physicist Jose Louis Aragon who had analyzed Gogh's skies mathematically, derived at the conclusion that Gogh made his paintings while he was suffering from frequent bouts of epilepsy. Correspondingly, the ECTs of Bethany give her a grand-mal seizure, an experience similar to an epileptic fit, though induced artificially and in controlled environment which makes her predict the disasters accurately, as emphatically stated by Dr. Frazer (TR 130-132). In this context, it is pertinent to note the scientific analysis of the correlation between the sciences, economics and arts; which is a very decisive and fundamental aspect in the understanding of the climate crisis. Another significant aspect that needs to be highlighted is that a coherent pattern can be discerned in Bethany's chaotic art work.

While Bethany uses different colored pens for her drawings, the entire text is in black which is the colour of coal and therefore it can be considered as a pointer to the fossil-fuel based economy, the dominant cause for climate crisis. After much deliberations and ponderings, Dr. Frazer arrives at the conclusion that the ECTs give Bethany extra sensitivity to energy fluctuations, similar to that experienced by the species of birds and animals which can sense tremors and disasters in advance (TR 134, 136). Terry Gifford considers the animality of Bethany's ability to sense the approaching upheavals through the electricity, as a reminder of lost embodied skills, that is, a highly attuned animal biosemiotic sensitivity to the world possessed by *Homo sapiens*, prior to the evolution of a rational propositional language (9). Bethany's instincts sense the beginning of a build-up of pressure, both atmospheric and under-ground, similar to the kind of animalistic sense with which dolphins instinctually understand the approaching storm by sensing the changes in the atmospheric pressure in *The Hungry Tide*.

Bethany's visualizations are accurate pointers of the impending doom. Nevertheless, her visions demand to be demystified and decoded, a task assigned to the psychiatrists, ecologists and scientists. For instance, Bethany foretells to Gabrielle during one of her sessions, "Cracking, not where the tectonic plates meet, but in other places, new places . . . which precipitates in the belching out of unbreathable toxic gases". Gabrielle learns about the mining of methane, the most dangerous greenhouse gas which is locked frozen in the sea floor due to water pressure and cold temperatures all around the world in the form of crust, and is too dangerous and volatile to be harvested for energy purposes (TR 25, 188). Methane is a more potent greenhouse gas than carbon dioxide. So, the potential release of methane due to the melting of the permafrost is discovered to have critical implications for climate

change (Finney100). According to the scientific researches, this process is commonly known as Fracking or Hydraulic Fracturing which releases more methane into the atmosphere. Moreover, the atmosphere is found to respond more quickly to methane emissions. In the words of Robert Howarth, Professor of Ecology and Environmental Biology at Cornell University, US, "it is the low-hanging fruit to slow global warming". This technology is being used across US and has contributed to a dramatic increase in the use of natural gas for electricity in the recent decades. Nevertheless, accidental leaks of methane are observed to be a vital source of dangerous climate pollutant in the US, with eighty times the warming power of carbon dioxide ("Methane leaks"). Huge quantities of methane has made its way into the atmosphere since the beginning of the Industrial Revolution due to increasing human populations which implies more agriculture, more waste and more fossil fuel production (Voiland). Methane extraction is an unfortunate instance of neocolonial extractivism and as aptly pointed out, it is a resource-depleting model developed under capitalism, because it has a non-reciprocal, dominance based relationship with the earth (Klein 169). Gabrielle understands that methane cataclysm involving sudden sub-oceanic methane gas is not just a theoretical possibility but a dramatic part of geological history and twice in the distant past, the planet's atmosphere had been microwaved, resulting in the devastation of most life on Earth. It has been scientifically observed in the past few years that methane which is a heat trapping gas like carbon dioxide has started escaping into the atmosphere. Immense quantities of methane are locked up beneath the frozen tundra and in icy clathrates beneath the sea. This is a worrisome fact because methane is not released directly and the process is set in motion by the rise in temperature that is caused by the release of carbon due to the burning of coal, gas and oil. The situation is made worse by the steady weakening of the natural

systems that pull the carbon out of the air. McKibben succinctly remarks that humans are making it so hot that plants absorb less carbon dioxide than they used to. Humans are sabotaging the biology of the planet, draining its biodiversity, affecting every other life and thus running Genesis backward or rather, decreating the planet (*Eaarth* 20, 21, 23, 25).

Modak's disinclination towards the survival of human species that are hard-wired for self-destruction, makes Ned worried because he would not support them in their efforts to warn the public about the imminent catastrophe which would devastate the planet on an unimaginable scale. Ned further explicates that the earlier occurrences of methane catastrophe resulted in mass extinction, melting of glaciers, flooding of huge areas and if it recurs this time, it would not affect just one particular region but would flash heat the entire planet, "a cataclysm on a scale that humans had never seen before". And a disheartening consequence would be that the victims would also include the "decent hard-working fellows who ain't done no harm. . . dying a horrible death", as Bethany states (TR 214, 228, 23). Modak's standpoint reminds us of Thomas Hobbes' Leviathan, a despotic sovereign, who disposed off human lives according to his whims as an alternative to the anarchic state of nature.

The imminent catastrophe due to the methane extraction is mocked by Bethany as "the reign of Antichrist" and "the dominion of the Beast'' (TR 292-293), reminding us of the title and the intent of the poem *"*The Second Coming" by W. B. Yeats. When the methane catastrophe is triggered, TV telecasts tens of thousands of jellyfish washing up and disintegrating on the beaches of Britain, Scandinavia and northern Europe. There are reports of unusual dolphin and bird activity across the entire east coast of Britain and into the Channel. The author gives a heart-rending description of the landscape gulped by the gigantic waves which turns buildings and

trees to matchwood, as a vast carpet of glass unrolls, incandescent, part solid, part liquid and part gas – a monstrous concoction of elements from the pit of the Earth's stomach. The burning waterscape erases the land efficiently and the heat becomes unbearable as if the sun itself has plunged into the water and is irradiating from below making it impossible to breathe (TR 334). This is a dreadful illustration of 'terra-deforming', where a habitable ecosystem filled with life, is changed into a place where almost nothing can live (Klein 189). This horrendous scene evokes Yeats' oxymoronic image of 'terrible beauty' in the poem "Easter 1916", because Bethany describes it as wonderful, stares at it mesmerizingly and ends up her life diving into it gracefully, ultimately accomplishing her single-minded mission of death. Bethany portends the birth of life within Gabrielle, prior to her final exit. Gabrielle bemoans it is unfortunate that the birth would take place in the Bethanyland which is "a world not ours", connoting a place of nature sans culture.

> . . . I know already there will be no green fields in Bethanyland, no safe place for a child to play with. Nothing but hard burnt rock and blasted earth, a struggle for water, for food, for hope. A place where every day will be marked by the rude, clobbering battle for survival and the permanent endurance of regret, among the ruins of all that we have created and invented, the busted remains of the marvels and commonplaces we have dreamed and built, strived for and held dear: food, shelter, myth, beauty, art, knowledge, material comfort, stories, gods, music, ideas, ideals, shelter. (TR 341)

This narrative is reminiscent of Dr. Ovid's lament on the exodus of the monarchs to a whole new earth which would be contrary to the one that has always supported us, that we have all grown accustomed to (FB 449). It is an indubitable fact that it is the

lack of sustainable developmental activities that has resulted in the destruction of pristine nature. Gabrielle mulls over the inability of mankind's long-term vision:

> What has happened to us? How is it that we, the inventors of devices that fly across oceans, hurtle to other planets, burrow underground, and kill from a distance, we the atom splitters, the antibiotic discoverers, the computer modelers, the artificial heart-implanters, the creators of GM crops and ski-slopes in Dubai, have failed to see five minutes beyond our lifetimes? (TR 302)

According to Terry Gifford *The Rapture* illustrates Ulrich Bech's concepts of 'eco-cosmopolitanism' and 'world risk society', which can be observed in the final part where the entire world is at risk due to the extraction of methane which is being exploited in the coasts of every continent of the globe and results in 'eco-cosmopolitanism', that is, 'new transnational communities arising from shared risk experiences' (Heise, *Sense of Place* 11). The ending of the novel makes the readers realize that the last moments of the life on the planet is infused with tragic meaning because humanity's downfall is caused by his own hubris. Nevertheless, it is significant to note that the author attempts to conclude the novel on a hopeful note by hinting at Gabrielle's pregnancy, in spite of the fact that she believed herself to be infertile after her fatal accident. This can be interpreted as an attempt to make the readers responsible for the planet by imagining its future with traces of life.

Saci Lloyd's *The Carbon Diaries*: *2015* (CD) is written from the point of view of the teenager Laura Brown, who portrays the drastically altered urban landscape of London in 2015, transformed by disastrous weather and consequent carbon rationing by the UK government in order to create an immediate 60% reduction in greenhouse

gas emissions which radically affects her family and neighbourhood. Laura's diary opens with a grim picture of UK in January after the 'Great Storm' owing to which the entire life supporting systems had collapsed, leaving thousands of people homeless during the entire winter. The absence of fuels like petrol for over a month drastically alters their lives and daily routine. The people of UK are mocked by Laura as 'guinea pig freaks' (CD 4) for being forced to sacrifice every comfort of life that are ultimately based on the consumption on fossil fuels while the people of other countries continue their trodden path of destructive and self-annihilating way of living. It is significant to note that during the publication of the novel in 2008, Carbon Rationing was under serious consideration in the UK Carbon Rationing is also known as Tradable Energy Quotas (TEQs) and was devised by environmental writer David Fleming who first introduced the concept in 1996. The UK's Tyndall Centre for Climate Change Research has been researching on this scheme since 2003. Lloyd depicts that every home is fitted with a smart meter to regulate the over-consumption of electricity and every individual is issued a carbon card that keeps track of the points. Laura's family is allotted a carbon allowance of two hundred carbon points per month to spend on travel, heat and food; while other utilities like clothes, technology and books have the carbon points built into the price, which includes the cost of the energy that is 'the dirty fossil fuels' used in its production and transportation (CD 6). Trexler significantly points out that in the novel the legislation creates a mechanism whereby the atmosphere, the government and the smallest individual choices are drawn together. Carbon credits force individuals into a new economic consciousness by making choices to balance their well-being against the environmental cost (*Anthropocene Fictions* 203). This is further illustrated by Laura's observation, "It's not about money anymore; it's about keeping your cards low".

Kim's mental unreadiness to unwrap her carbon card, due to the fear that "if she touches it then that's all her youth gone" (CD 47, 8), is a dig at the present day youth who prefer a carefree and extravagant life at the peril of the non-renewable natural resources of the Earth, similar to their previous generation represented by their parents. Laura's parents feel guilty for bringing about such a sad state-of-affairs through irresponsible and unsustainable style of living. Further, this narrative illustrates De-Shalit's communitarian theory of intergenerational justice according to which the future generations should be taken into consideration while taking environmental decisions and they should be left with ample supply of environmental goods so that they are not over-burdened (13). Laura's father loses his job as a tourism teacher because carbon rationing eliminates the industry. However, it can be remarked that it would definitely prove beneficial in preserving the sanctity of natural landscape from further abuse because nature would no longer be exploited as an object of voyeurism.

The acute water shortage endured by the residents which makes them incapable of even performing their daily ablutions makes them desperate and compels them to think of drastic measures like harming their own bodies to end up in hospital because the government was holding back the water for priority places like Queen Elizabeth Hospital in Greenwich. Staccy, Laura's neighbor laments, ". . . if this carries on I'm gonna mess up a kidney or something so I can get to the ward". The whole of Europe bears the brunt of the horrendous consequences of climate change resulting in many losses of lives, property and electricity. The blizzards and snow become severe in Italy and France gets buried in deep snow. Laura records, "There's heavy snow across Europe again . . . . It's like some ice-giant's taken Europe in its frozen grip. Traffic paralyzed everywhere – 20,000 people struck in the cars overnight

around Budapest in -33°C; 35,000 trapped on a motorway near Heidelberg in Germany; 18,000 snowed in Vienna. Practically every airport's closed in central Europe" (CD 31, 62).The underlying motif of Laura's diary entries seems to be the dire consequences of the abuse of fossil fueled electricity and economy, the dominant and inevitable feature of urban landscape, which makes their lives hooked up to carbon cards. Laura confesses that she feels like a criminal every time she uses electricity (CD 39). It also results in fuel protests by lorry drivers all over the country since the Government has imposed massive tax on fuel because they are already on the edge of rationing. People are forced to leave their cars on the motorways and start walking as they cannot afford to drive anymore. The extremity of the consequences of climate change is succinctly summed up in the diary entry, "Woke up this morning and someone had polluted the world so much that the climate was messed up and the UK went on rations and nobody ever had any fun again" (CD 93). In this context it is pertinent to note the crucial observation made by Amitav Ghosh that an element of uncanniness can be discerned in the events triggered by climate change as the freakish weather events of today, despite their radically nonhuman nature are nonetheless animated by cumulative human actions. In that sense, the events set in motion by global warming have a more intimate connection with humans than did the climate phenomenon of the past. This is because we have all contributed in some measure, great or small, to their making and they are the mysterious works of our own hands returning to haunt us in unthinkable shapes and forms (TGD 43). The author depicts that the entire fabric of life is affected severely, including the emotions which are usually considered as fixed or a constant - *sthayibhavas* and this leads to the realization that love, relationships, dating necessitates a new form, a new language

and a new set of rules because “it’s a new world out there” (CD 86), which echoes the words of Dr. Ovid and Gabrielle.

Laura’s diary entry of her father’s new house rules shocks the reader out of the complacent present day modern lifestyle. Laura records:

> No rain for weeks and weeks. Dad tried to hand out a load of new house rules at dinner today. He wants us to shower in a bucket for 1 minute max and then throw the water on the garden. No more dishwasher, no more washing machine, one clothes wash per person per week, by hand. The toilet rule’s the most disgusting part: basically – if it’s yellow, let it mellow, if it’s brown flush it down. (CD 152)

Thus, *Carbon Diaries* explores how climate change precipitates problems that are not purely natural because they are spurred by human activity, compared to the previous decades when floods and storms appeared as outside forces and Lloyd depicts the more intricate interplay between Anthropocene weather and human’s choices (Trexler, *Anthropocene Fictions* 204). This aspect is further illustrated by a totally unexpected disaster, a category -5 hurricane which hits the east coast of US, Wilmington in Carolina in the middle of the night on 11th June when everyone was asleep resulting in innumerable deaths. Further, around 9000 mobile houses and 10,000 apartments had vanished off the face of the Earth because local news media instructed people not to evacuate (CD 170). The severe winter, blizzards, snow and rain in the first few months of the year later leads to extreme summer and droughts, which is an inevitable consequence of climate crisis. This can be substantiated by Laura’s diary entry on 17thJune which depicts the severity of the state-of-affairs of her country, especially the paucity of water due to extreme summer:

> No rain for 9 weeks and counting. Thames Water has applied to City Hall to bring in a second level drought order. That means no watering of parks and sports ground, plus they want to pull all of London on water Smart Meter system, like the electricity one. The Mayor refused them. He said it was their fault there's a water shortage in the first place – that over the past two months they'd lost 50 bn litres of water in London through leaky pipes – enough to fill a thousand of those stupid Olympic swimming pools every day. Makes me crazy. What's point in us dicking around with showers and not flushing shit down when that kind of stuff's going on? (CD 175)

Hence, it can be stated that a significant aspect stressed by the author is the severe paucity of water, the giver and sustainer life. It is pertinent to note that in Cheyenne, the word for life is the same as the word for water. Laura's diary entry of 7thJuly, reinforces the present day water crisis experienced severely across the globe. Laura's mother aptly observes that water cannot be taken for granted anymore because the water crisis is getting severe and it is going to become a political issue. This is reminiscent of the water wars in Paolo Bacigalupi's novel *The Water Knife* (2015). Laura's mother significantly adds, "Water's rapidly becoming the most serious social issues of this generation. You can see it starting already in Spain. There's been no rain in North Africa for two years and thousands of immigrants are floating across to Europe through the Spanish borders" (CD 187). Various scientific researches demonstrate that the far-reaching impacts of climate change including changes in temperature, precipitation and sea levels are expected to have varying consequences for the availability of fresh water around the world. An increase in the rate of evaporation would affect water supplies and contribute to the salination of irrigated agricultural lands. The rising sea levels result in saline intrusion in coastal aquifers.

Approximately 1.7 billion people, that is, one-quarter of the world's population are living in countries that are water stressed and it is predicted that by 2030, there will be a thirty percent increase in the demand for food and energy, both of which require large quantities of water. It will be the countries which have no infrastructure for dealing with water shortages that would be the worst affected (Maslin, *Climate Change* 82). Peter Newell and Mathew Patterson aptly point out that behind the cosy language used to describe climate change as a common threat to all humankind, it is clear that some people and countries contribute to it disproportionately while the others bear the brunt of its effects. Further, it is those people who suffer most who have contributed least to the problem, that is, the poor in the developing world. This makes climate change first and foremost a deeply ethical and moral issue despite being talked about as a scientific question (7). Laura's realization of the practical difficulties of sustaining life, for instance, the severe paucity of water, makes her cancel the tour of Dirty Angels, the punk music group to which she belongs. Laura firmly asserts that the country needs rain and not a message through music, which questions the relevance and utility of arts at such dire times.

In the diary entry of the last day of the year, Laura emphasizes the need to live in the present on a day-to-day basis because survival remains the sole concern for the next year, a ghastly new year resolution to reckon with. Similarly, Kieran aptly remarks that nothing can be taken for granted in the new world order (CD 181). These instances aptly mirror the dire conditions of the contemporary world ravaged by pandemics and extreme calamities, erasing every facet of the planetary landscape. Through these narratives, the author suggests that with the exhaustion of the natural resources there would be nothing left to do than to merely survive till the nature perishes completely. These instances validate Ghosh's poignant remark that climate

change events are peculiarly resistant to the customary frames that literature has conventionally applied to nature, since they have become too powerful, grotesque, dangerous and accusatory to be written about in a lyrical, or elegiac, or romantic vein (TGD 43). Laura significantly observes that every single aspect of life has undergone drastic change due to lack of water, electricity and carbon rationing. Survival becomes the utmost priority in life, scaling down every object of comfort and luxury to bare necessities. The unexpected and inevitable changes in the personal and social life of Laura make her increasingly sensitive to the ecological aspects of the world. For instance, she records the colossal forest fires all over France which becomes difficult to be extinguished owing to the paucity of water. Laura painfully observes and records the desertification of her garden and empathizes with the baby carrot's little gasps of thirst. This illustrates her growing sensitivity towards her natural surroundings.

It is important to note that conventionally dates and time are mentioned in the narratives that are written in the form of diaries and they give temporal information to the readers. However, Lloyd makes it a point to highlight the seasons as well, which is an innovative feature employed to highlight the changing landscape of London owing to abnormal and unprecedented weather conditions caused by the climate crisis. Moreover, Laura attaches the clippings of newspaper reports related to the various disasters. For instance, the report with the headline "Fire Consumes Algarve" dated 31st July, imparts greater authenticity to her observations and feelings and makes Saci Lloyd's fictional account factual and realistic, a significant characteristic of climate-fiction. Further, this is validated by the fact that climate change, as a stunningly complex global phenomenon, demands a multitude of mathematical calculations, technologically mediated data and virtual conceptualizations (Alaimo 108). Similarly,

Heise suggests that the modernist traditions of cut-up and collage, digital texts using Google Earth and incorporating graphs and databases have more potential compared to the cohesive narratives of episodes in the lives of small number of characters that are the main territory of literary realism (*Sense of Place* 57). It also needs to be mentioned that the intimacy of the diary form helps to reveal the drastic changes wrought upon the ecological landscape caused by the pervasiveness of fossil fuels in everyday activities. Further, it helps to disclose the minute details regarding the manner in which the personal and social lives of the individuals are affected.

The depictions of the extreme climatic conditions across Europe as recorded by Laura are a microcosmic reflection of the climate changed world. This is reinforced by Laura's self- reflexive remarks on reading her diary entries, "God I was just looking back in the diary to the summer when I was praying for rain. Now I'm praying for none. We're messed up" (CD 327). Torrid summer is followed by incessant rains and floods in the months of October and November which leaves the members of the scientific community like weather forecasters of the Met office clueless regarding the weather and the climate. This is evidenced by Laura's diary entry on 15th August, "No rain . . . . Met office don't know if the storms are going to make it here" and on 13th November, when student Nathan remarks to the teacher, "the weather man he don't know shit. He say rain and the sun shines, he say sunshine and it rains" (CD 228, 322). It is pertinent to understand that climates have changed on all time scales, but the climatic changes in the present epoch have been wrought by anthropogenic factors especially the fossil-fueled capitalist economy, as demonstrated by Laura's frequent remarks. Hence, it can be alleged that the enterprise of science has succeeded in overturning the previous Greek idea of climate as a stable property of the natural world (Hulme, *Why We Disagree* 6). Therefore, the popular dictum

‘Climate is what you expect, weather is what you get’ is no longer applicable because climate just like weather is constantly changing.

The torrential rain and rising sea levels instills fear in the minds of the people like Laura’s father that London would drown in a matter of time. An outbreak of cholera in Canning Town, another deadly disaster as a consequence of climate change worsens the situation. This corresponds to the scientific findings that climate change and altered weather patterns would affect the range, intensity and seasonality of many vector-borne and infectious diseases. For example, it has been observed that there is a strong correlation between increased sea surface temperature and sea level and the annual severity of the cholera epidemics in Bangladesh (Maslin, *Climate Change* 85). The climax of the narrative is a major flood which overwhelms the Thames Barrier. It can be observed that apart from altering the geographical details, the flood erases humanity’s relation to their landscape. The documentation of catastrophic floods, the submerging of homes and familiar landmarks and the images of grief-stricken victims have become a familiar feature of climate changed daily life. The spiraling effects of perilous urban development, a crescendo of record-breaking storms and a twenty four hour news cycle convey that floods are not merely a long-standing historical possibility but rather a distinctly contemporary facet of the planetary landscape. According to Kusala Rajendran, a noted Earth scientist, unplanned and unchecked urbanization is discovered to be the common denominator that contributes to the intensity of any disaster, particularly in the densely populated and developing nations. Rajendran further explicates that developmental activities of human societies lead to inevitable conflicts with nature and the consequent impacts would depend on the setting of the landscape and the utilization of land and water resources (Krishnakumar). Correspondingly, in the narrative, climate change appears not as a

singular, catastrophic event, but rather as interplay between climate and communities (Trexler, *Anthropocene Fictions* 204). This can be further corroborated with the scientific argument of Antonio Vallisneri, a prominent naturalist physician and professor of medicine at the University of Padua, in his celebrated treatise on climate change *Of Marine Bodies Found In the Mountains*, first published in 1721, that the floods alter the global climate, the Earth's water, air and soil for a lengthy period thereby causing permanent changes in the human health and reproduction. Vallisneri further emphasized upon both human suffering and human culpability in causing it (Barnett 225). The flooded landscape in the narrative mirrors the anguish of the entire humanity across the planet and strikes a chord with readers of Kerala for whom such scenes are still fresh in memory in the aftermath of the floods of 2018.

Through the various disasters depicted in the novels which are examined in this chapter, it can be gleaned that climate change dissolves place, both local and global. Further, places have specific histories that are simultaneously cultural and geographic and the meaning of places changes as disasters befall them (Trexler, *Anthropocene Fictions* 235). Ghosh takes the position that the disastrous events are not entirely of 'Nature' and hence they confound the very idea of 'Nature writing' or ecological writing and significantly points out the fact that they are instances of the uncanny intimacy of our relationship with the nonhuman (TGD 43). It can be observed that the characters Dellarobia, Gabrielle, Bethany, Nirmal, Moyna, Laura have to live through 'solastalgia', a term coined by the Australian philosopher Glenn Albrecht, to express the evocation of solace, destruction and pain, and defines it as "the homesickness you have when you are still at home". Albrecht employs the term to capture the particular form of distress that sets in when the homelands we love and from which we take comfort, are radically altered by extraction and industrialization,

rendering them alienated and unfamiliar. Albrecht further demonstrates that although this particular form of unease was once familiar to those who inhabited the sacrifice zones – lands decimated by open pit mining or clear-cut logging, it is increasingly becoming a universal human experience with climate change creating a new abnormal wherever we happen to live because it is our home, the whole Earth, which is now under assault. This consequently leads to a feeling of great dread as the planet heats and our climate gets more hostile and unpredictable.

The environmentalists' call for a reconnection with the local which attempts to realign culture with place, is according to Heise, a form of "reterritorialization" (*Sense of Place* 53), and has become crucial in the present day desperate conditions of alienation. Mitchell Thomashow significantly remarks that the way to an understanding of the global is through an understanding of the local environment in a "place-based perceptual ecology", since people are best equipped to observe what happens around them when they can hear, smell, taste and touch. Further, these observations are poignant in their home or in places where they are likely to spend a significant amount of time and connect with the natural world (5). Through the pertinent observations and remarks of Dr. Ovid and his research team with regard to the climate crisis, Dellarobia is better able to understand the various causes and consequences of ecological issues, for instance, the fluctuating and extreme climatic conditions, migration of the monarchs to Appalachia and causes of their extinction, the hitherto unobserved changes in their landscape like the keeling of trees, bad harvest of crops and so on. It can be observed that Dellarobia learns to be responsible for her immediate surroundings after she gains knowledge about the ecological issues pertaining to her locality and the world at large. Once Dellarobia perceives how she is responsible for those changes, she makes much effort to find solutions to the issues,

thus manifesting an ecological growth. Thomashow has also emphasized that there is no such thing as a local environmental problem because all such problems form part of a network of global processes and issues which is evidenced by large-scale ecological changes such as climate change or shrinking biodiversity that is becoming a part of the awareness of average citizens. This is further assisted by media such as television and internet, which has made it possible for the people of a society to experience a multitude of faraway places in unprecedented sensory detail and imaginative scope. Therefore, Thomashow finds it advantageous for ecological awareness (7). It is significant to note that all these aspects are underscored in the narratives of the *Flight Behaviour* and *The Rapture*. Dellarobia, Piya, Gabrielle, Laura gradually learn to observe and understand the significance of the place in which they dwell and grow in ecological wisdom, while this quality is naturally ingrained in Fokir and his community. It has been aptly remarked that how we perceive and contemplate the land, affects how we treat the land and live within it; and we are less likely to honor and respect the land if we regard it as separate from ourselves (Smith 43). So, it can be deduced that intimate knowledge and deep ecological identification with one's landscape aids in its protection against deterioration and exploitation. Further, according to the early studies in ecocriticism, it acts as a remedy for the alienation and rootlessness of an individual in the modern world (Volpp). Nonetheless, an 'ecoglobalist affect' is deemed to be necessary, which implies being preoccupied emotionally with a finite, near-at-hand physical environment while at the same time, being connected to a context of planetary reach (Buell, "Ecoglobalist Affects" 232). This attribute can be discerned in the scientist characters like Dr. Ovid, Ned, Piya, Modak and later showcased by Dellarobia, Bethany and Gabrielle.

It is significant to note the ecospiritual thought manifested by Fokir, Horen, Kusum and Nirmal towards their locale. This corroborates with Thomashow's perception of spiritual connotation to place and the global ecological awareness, according to which, through familiarity and intimacy we learn to pay closer attention to the full splendour of the biosphere as it is revealed to us in the local ecosystem (212). McKibben has significantly pointed out that one can work most effectively close to home instead of futilely addressing all the world's problems (*The End of Nature* xx). However, with the changing times and perilous circumstances it is imperative to adopt behavioral patterns bearing in mind the entire biosphere of the planet. The authors have succeeded in capturing the essence of the places around which the novels revolve and also in garnering the readers' attention to the various hitherto unknown aspects of the biospherical changes caused by the ecological crises. The narratives provide an impetus to perceive our landscape differently and transform the ways we inhabit it. What makes us humans unique is that we have the ability to think rationally which can be used to choose better ways of living sustainably. Further, we can opt out of the present degenerative systems which lead to the colossal destruction of the landscape of the Earth. Love, care, empathy, compassion, self-restraint and sense of equality among all creatures of the planet need to become the norms to maintain the ecological equilibrium and the beauty of our bountiful landscape. Since the landscape is inextricably connected to its biodiversity, the subsequent chapter delves into the literary representations of the loss of biodiversity and extinction of species in the narratives.

Chapter 5

CRITIQUING BIODIVERSITY CRISIS: THE FATE OF KING BILLIES AND SHUSHUKS IN A DISINTEGRATING WORLD

> "*If there were a parliament of creatures, its first decision might well be to vote the humans out of the community, too deadly a presence to tolerate any further. We are the affliction of the world, its demonic presence. We are the violation of the Earth's most sacred aspects*" – Thomas Berry

The uniqueness of Ecocriticism as a literary inquiry lies in its inclusion of non-human considerations along with human contexts. Biodiversity is a way of talking about the world as a whole and emphasizes the vast multiplicity of its expressions and patterns (K.O'Brien 178). Today, the word biodiversity is increasingly used to connote loss and ecological degradation and the terms like 'endangered species', 'extinct', 'species on the verge of extinction' have become common parlance in the media. It has been aptly remarked that we humans have engineered ourselves into a position where, for the first time in history, it has become possible for us to destroy the whole species (Krutch 28). Correspondingly, Glen A. Love points out the shocking fact that the extinction of plants and animals is taking place at an accelerating rate of seventy four species per day and 27,000 each year (15). Without biodiversity there would be no life and today, 'biodiversity loss' has become an ecological rallying cry since it is an unprecedented reality in the history of around sixty five million years that humans have become its sole destructors.

It is an indisputable fact that ecological crises have become an established part of the contemporary era. The figures describing the explosion of human population and the parallel extinction of species is considerably large and the conditions are so catastrophic that it has become difficult for concerned individuals or communities to save the depleting flora and fauna, and to aid in the conservation of nearly extinct species, consequently leading to a state of numbness. It is a fact that the planet had undergone significant warming even in the past, but it was a very gradual process which occurred over millions of years although it also had resulted in mass extinctions of flora and fauna. According to the scientific findings of paleontologists and biologists, massive extinctions are part of the world's history. Nevertheless, in the past they were the products of environmental factors such as meteorite collisions or volcanic explosions, while at present humans are the causative agents who have brought the world to the brink of annihilation. Kevin J. O'Brien crucially remarks that there have been five other massive extinction events but this is believed to be the first time that extinction at such a scale is being caused by the activity of a single species (185). Researchers have discovered that the extinctions had wiped out in each case between 76% and 95% species of the time. The last major extinction which took place around 65 million years ago is assumed to have wiped out the dinosaurs and allowed a platform for mammalian species to develop. It is believed that presently around 10% of life-forms would have been extinguished through human destruction of habitats. However, this figure is open to an exponential leap as since the human population is still exploding, necessitating greater resources to sustain its immediate growth. Estimates suggest that within 150 years, one half of the world's species would be made extinct largely through the intervention in the biosphere. The most pessimistic scenario of mass extinction is that biodiversity would dramatically reduce, while the

weeds and pests such as rats and pigeons would flourish, competing for scarce resources with humans. This underscores the fact that biodiversity is not just a matter of quantities but qualities too (Bleakley 51- 52).

It has been scientifically observed that multifarious anthropogenic factors leading to ecological crises, predominantly climate change, pose severe threat and injustice to nonhuman nature. The accelerating climatic crisis is making it extremely difficult for the species' evolutionary ability to adapt. Moreover, the disruption of climate would lead to the death of forests which would in turn result in the loss of flora and fauna because animals are not as adaptable as humans (McKibben, *The End of Nature* 117). If climate change continues unabated at the present rate, the planet would soon become unfit for survival in the near future. Global biodiversity is a phenomenon which is increasingly at the mercy of humanity and human development is the widely agreed upon explanation for its decline (K. O'Brien 185). Hence, the economic model of unbridled fossil-fueled capitalism, the prime driver of climate crisis, needs to be fundamentally altered since it has alienated humans from nature and obliterated the interrelated ecological web which is inevitable for the sustenance of life on the planet. This aspect has also been emphasized by Rachel Carson in her eloquent speech in 1963 in which she introduced the concept of ecosystem and conveyed the inevitability of considering the integrated ecological perspective in every activity:

> Since the beginning of biological time there has been the closest possible interdependence between the physical environment and the life it sustains. . . . The serious student of Earth history knows that neither life nor the physical world that supports it exists in little isolated compartments. On the contrary, he recognizes the extraordinary unity between organisms and the environment.

> For this reason he knows that harmful substances released into the environment return in time to create problems for mankind. . . . We cannot think of the living organism alone, nor can we think of the physical environment as a separate entity. The two exist together, each acting on the other to form an ecological complex or ecosystem (*Lost Woods* 230- 231).

Francis in his significant encyclical letter "*Laudato Si*" laments that loss of biodiversity is not given due significance and further adds, "In assessing the environmental impact of any project, concern is usually shown for its effects on soil, water and yet, few careful studies are made of its impact on biodiversity, as if the loss of species or animals and plant groups were of little importance". In this context it is equally important to underscore the significance of the passage of the Federal Endangered Species Act in 1973, which is generally regarded as the most ecocentric environmental legislation because of its underlying premise that humans do not have the right to willfully cause the extinction of other species regardless of their value or lack of value for humans. Hence, by extending legal protection to certain species of plants and animals, it succeeded in projecting ecological thinking into central public policy. Khwame Anthony Appiah, during his chairmanship of the panel of judges of Man Booker Prize 2018, had significantly remarked that the dominant theme of the novel in English today is of our species and the other species with which we share this planet, challenged by anxiety, suffering from pain and of our institutions and environment under threat ("Long story"). In lieu of this remark, the subsequent sections in this chapter delves into the examination of the depletion and subsequent extinction of species, which is explicitly a predominant aspect in the narratives of Kingsolver's *Flight Behaviour* and Ghosh's *The Hungry Tide* and also its sequel *Gun Island* which is used as a paratext.

The title of the novel *Flight Behaviour* alludes to the mass movement of monarch butterflies across North America which is considered as an amazing natural phenomenon in the world. The monarch butterflies were the sole means of survival for Josefina's family, the climate refugees from Mexico, who were forced to evacuate their homeland owing to landslides which had resulted in severe loss of lives, properties, houses, schools and the monarchs which were regarded as a pride of their place. The beauty of the monarchs is vividly described by Dellarobia as "unearthly", "a valley of lights", "an ethereal wind" (FB 21, 198). The readers get a premonition of the extinction of the entire population of the monarchs which are at Appalachia, right from the beginning of the narrative, through the frequent allusions to death, "It bristled like a cluster of dead leaves", "Nearly all the forest she could see from here, from valley to ridge, looked altered and pale, the beige of dead leaves", "self-automated dead leaves marching across a forest floor" (FB 16, 18, 72). Thus, we can discern a shift from the aesthetic, mystical and spiritual association attributed to the monarchs to the realistic aspects pertaining to its impending extinction.

The monarchs usually travel to Mexico where they hibernate in the winter and hence their arrival in Appalachia is a huge anomaly, an abnormal behaviour that is implicated in the title of the novel. This disturbance in the typical behaviour of migratory monarch butterflies which coerces them to settle further north than usual owing to an unusual climate, is a sign of their imminent extinction and is aptly remarked as a slow motion ecocide (Clark 128). It has been found that monarchs play a crucial role in the ecosystems they inhabit because, the adult monarchs on their visit to countless number of wildflowers for nutrient rich nectar, transfer pollen from one part to another and assist in the reproduction of those species. It is also important to note that while the monarch butterfly species is not endangered and are common

across the world, its subspecies known as *Danaus plexippus plexippus* which performs the great North American migration is considered a threatened phenomenon by the International Union for Conservation of Nature (IUCN), especially in Mexico and California due to human activities like logging, development and agriculture (Neumann). This aspect is explicated in the narrative by Dr. Ovid to Dellarobia's family. The author highlights the grim reality that the habitat of the monarchs in Mexico was threatened by the deliberately ignored though increasingly evident phenomenon of anthropogenic climatic crisis. Dr. Ovid explains to Dellarobia that the monarchs are forced to leave the Mexican roost sites earlier every year because of various factors like increasing temperatures, spraying of herbicides and pesticides; and they migrate to Appalachia because of a change in its genetically coded pattern which is caused by global warming. Dr.Ovid significantly adds that the entire population of the monarchs is in the mountains and if the climate gets extremely cold or warm, it would result in the extinction of the entire species since according to the reports, there is none left in Mexico. Dr. Ovid is primarily concerned about the fact that a winter storm could arrive at any moment and kill every butterfly on the Appalachian mountain because the roosting colony over it is a significant proportion of the entire North American population in terms of genetic and reproductive viability. Having dedicated twenty years of his life into the study of the lives of the monarchs, Dr. Ovid is certain that climate change is the culprit of the ‘‘bizarre alteration of the previously stable pattern’’, observed in the monarchs (FB 481, 315), which would immediately result in the extinction of the beautiful species. Therefore, he is desperate to get to the root of the matter in order to track and preserve the chain of evidences leading to their extinction for the purpose of scientific record. Dr. Ovid aptly describes the fate of the monarchs as a reflection of "continental ecosystem

breaking down" and systematically measures the monarchs' response to the changing climate of Appalachia, which is threatened by frequent rains and freezing temperatures, a grave consequence of climate change. According to Dr. Ovid's observations, apart from the logging of the mountain, another major threat faced by the monarchs is the depletion of the fat reserves on their bodies owing to rising temperatures, which cannot be refueled due to the lack of winter flowers on the mountains. This reiterates the aspect of the diminishing flora in their locale. Dr. Ovid further explicates about the death of forests caused by drought or burning, extinction of insects and diminishing fish and coral reefs across the world (FB 206, 388). Hence, it has been aptly remarked that the novel is an examination of the loss of biodiversity (Trexler, *Anthropocene Fictions* 77).

The alarming rate of loss of biodiversity and depletion of species serves as a yardstick of the anthropogenic climate change occurring across the planet, and its primary causative factor is the anthropocentric attitude of human species. Dr. Ovid critically remarks, "Humans are in love with the idea of our persisting . . . . We fetishize it . . . . Our retirement funds, our genealogies. Our so called ideas for the ages". Dr.Ovid in his address to Preston's classmates, highlights about "animals losing their homes because people being a bit careless" (FB 390, 490). While, Dellarobia considers the monarchs as 'God's creatures' which are awaiting their 'End days', Dr. Ovid is saddened by the news of the imminent death of monarchs which are dearly beloved to him because he had spent a major portion of his life amidst them trying to analyze their beautiful yet complicated system. Therefore, the extinction of the species would be nothing less than a death in his family (FB 315-316). It can be observed that the deep ecological tenets of Arne Naess are reflected in the concerns voiced by Dr.Ovid and Dellarobia who view the monarchs at par with humans. Deep

ecological approach is significant in the preservation of nature as it demands recognition of its intrinsic value along with a return to the primal identification of humans and the biosphere (Garrard, *Ecocriticism* 24). It can be noted that Pastor Bobby's sermon to Turnbow's family is actually an oblique address to Bear to prevent him from logging the mountain in their property which is also the host to the monarchs, and a warning against losing gratitude for the miracle of life, "If God is in everything . . . how could we tear him down? How is it not arrogance to see the flesh of creation as mere wealth to be scraped before us for our use?" (FB 550). Thus, Pastor Bobby professes an ecospiritual outlook towards nature which is imperative for ecological equilibrium and perpetuation of life on the planet.

Kingsolver has incisively incorporated thoroughly researched facts pertaining to climate change as the prime causative factor for the depletion of species, which serves an eye-opener to the non-scientist characters in the narrative and the readers alike. The recently deceased expert on monarchs, Dr. Lincoln Brower, was a Research Professor of biology at Sweet Briar College and had studied the death of monarch butterflies for over six decades. Kingsolver had discussed with Dr. Brower while writing this novel. Dr. Brower had lamented that the plight of the monarchs is comparatively bad in the present scenario, because the numbers of the monarchs are getting drastically reduced owing to a combination of pesticide use, logging and the impacts of climate change (Ripka). These aspects are pointed out in the narrative by Dr. Ovid to Dellarobia's family. A pertinent study on the decline of monarch butterflies has demonstrated that the population of the iconic monarch butterfly of Eastern North America has declined over the last twenty one years. The causes are attributed to the loss of forest habitat, reduction in host plants (various milkweed species) due to land-use change (mostly urbanization) and deforestation, the growth of

herbicide resistant crops by farmers that can withstand the chemical spraying but kills large swaths of milkweed plants on which their young rely for food, climate extremes including droughts, heat waves and storms that have hit North America in recent years (Flockhart 156; Dell'Amore). It is crucial to note that all these aspects are delineated in the narrative and the only point of departure is the winter migration of monarchs to Appalachia which is a fictional element.

It is pertinent to understand that there have been frequent reports in the media about environmental defenders in Mexico and Latin America who are devoted to the protection of monarchs and are increasingly under threat or attack from criminal groups, particularly when they interfere with their commercial interests in logging and farming. According to the official records, twenty one environmental activists were murdered in 2018 and 2019 respectively. These facts illuminate the burden carried by the indigenous, poor communities to conserve their environments. It is significant to note that a major portion of the Rosario Monarch Butterfly Biosphere Reserve in Michoacan, Mexico is split into several sections, each managed by a community called an '*ejido*', a Mexican form of collective management (Okeowo). The monarchs possess much cultural and spiritual significance for the indigenous people of the Mexicans, as they are regarded as the returned souls of the deceased because they migrate during the occasion of the holidays known as the 'Day of the Dead' (October 31-November 2). During these three days celebration of *Dia de los Muertos*, a large number of people dress like monarch butterflies and decorate their altars with monarchs in order to mourn and remember their ancestors (Johnson).

It can be stated that apart from the plight of the migrating monarchs, Kingsolver is also concerned about the depletion and impending extinction of various other floral and faunal species which can be discerned in her attempt to begin the

novel with a bleak description of the massive keeling of trees all over the country. Dellarobia and the inhabitants of Feathertown are shocked by the sight of the trees which simply fall off after centuries of survival and the alarming aspect was that the tree was intact, not cut or broken by wind (FB 7), which consequently leads to a significant loss of vegetation in the locale. Dellarobia observes that in the vicinity of Hester's farm-house there were groves of little trees which were devoid of leaves and were apparently dead. According to the first global assessment of tree deaths by U.S Geological Survey researchers, the number of documented episodes of tree loss related to warming and droughts has risen rapidly in the recent years (Westervelt). Researchers term these dead trees as 'ghost forests' which is occurring across the world and is particularly apparent in North America. Scientists agree that the startling sight of dead trees in the earlier healthy areas is a clear sign of the consequence of climate change. It has been observed that the process that creates 'ghost forests' has been continuing for thousands of years as a natural phenomenon, nonetheless, it has greatly accelerated in recent decades due to the rapid melting of polar ice and rising sea levels which pushes salt water farther inland (Andrews). In the narrative, Cub points out about the trees being affected by new diseases and pests which were eating the wood and its causative factors are considered to be the wetter summers and mild winters experienced during the recent years. Moreover, there was also a significant decrease in the tomato yield and the problem was further compounded by a gray fungal caul which was smothering the fruits and trees caused by the non-stop rains in the summer (FB 17, 24, 28). Hence, it can be discerned that the unfavorable alterations in the climate adversely affect the flora, consequently impinging upon the lives and livelihood of people of Appalachia who are basically dependent on farming and agriculture. It is also implicated in the narrative that the agriculture has become

increasingly dominated by the ‘life science corporations’ which cut across agribusiness, biotechnology and the chemicals and pharmaceutical industries, as pointed by Vandana Shiva. These corporations sell genetically engineered seeds which require extensive use of pesticides and herbicides sold by these corporations and large amounts of water which results in disastrous environmental consequences like loss of biodiversity, increased chemical pollution and exploitation of scarce water resources. Farmers incur large amounts of debt and become dependent on the corporations since considerable investment is required and thus end up losing their land owing to disasters and poor harvests which destroy their capacity to repay their debts. Thus, small-scale agriculture loses its viability and is taken over by large-scale intensive units (Mies 233-236). James Fulcher significantly remarks that this process further results in commodification of nature as plants, seeds, water which were previously natural resources often available freely to all, become commodities that have a monetary value (93). This can be corroborated with Mckenzie Wark’s observation that capitalism turns everything into a commodity (7). Unfortunately, it is the poorer sections who are the prime victims of this vicious cycle of the dominant capitalist economic model which is inherently incapable of reconciling the discrepancy between the appraisal of natural resources and their actual value (Park 189). This is explicitly evident in the desperate attempts made by Cub and Bear to log the mountain in their property to meet their financial needs.

Kingsolver delineates through various instances the significant loss of biodiversity due to the baneful consequences of the use of chemicals which adversely affect the ecological equilibrium. Dellarobia’s neighbours, the Cooks, had lost their son due to cancer. This narrative reminds the readers of the faces of deformed and helpless children of the remote villages in the hilly district of Kasargod in Kerala due

to the gruesome endosulfan tragedy. Padre and other villages in its vicinity are plantation lands where cashew is the main crop. The Plantation Corporation of Kerala (PCK) had been aerially spraying endosulfan on the plantations since the 1970s. Endosulfan is an organochlorine pesticide that has been banned or restricted because it is toxic and persistent (Narain 37). The Cooks are prompted to shift to organic cultivation which unfortunately results in substantial loss since the entire yield of tomato crops is ruined and their peach orchard is on the verge of death. This indicates the extent to which the soil has lost its natural viability and hence leads to the failure of organic farming. The staple food of the monarchs is the milkweed plants which are being killed by the farm chemicals, a crucial factor for their displacement. It is a sad fact that laws are not enforced stringently which is evidenced by Bear's possession of forbidden insecticide Dichlorodiphenyltrichloroethane (DDT), with which he intends to kill the monarchs (FB 281, 202, 115). In this context it is crucial to note the pertinent observation made by Rachel Carson in her ground-breaking *Silent Spring* that the barrage of poisons, sprays, insecticides which are universally applied to farms, gardens, forests and homes and that have the power to kill every insect, the 'good' and the 'bad', to still the song of birds and the leaping of fish in the streams, to coat the leaves with a deadly film and to linger in soil; are the synthetic creation of man's inventive mind, brewed in his laboratories and have no counterparts in nature and therefore should be called as biocides (25). The publication of Carson's *Silent Spring* was a pivotal point in the ecological history and it is aptly named as 'the most revolutionary book since *Uncle Tom's Cabin'* by the US Supreme Court Justice William O. Douglas, since Carson poignantly conveyed that for the first time in human history every human being is now subjected with dangerous chemicals from the moment of conception until death. US President John F. Kennedy was very much

impressed by her critique that he ordered his Science Advisory Committee for an examination of the subject of pesticide misuse. Thus, Carson was able to challenge the scientific establishment and force the implementation of new pesticide regulations which garnered hostile reaction from the scientific establishment because she had undermined their moral integrity and leadership and toppled America's blind faith in science and thus initiated public debate over the direction of technological progress (Lear 259). It can be stated that Carson's primary intention was to convince humanity to view ourselves as an integral part of nature and understand the central truth of ecology that every aspect in the universe is interconnected and therefore to act sensibly in order to prevent the destruction of the ecological web of the planet.

Kingsolver attempts to convey the significance of protests to preserve the biodiversity through the depiction of young women from England like Nelda and Myrtle who knit monarch butterflies out of old orange sweaters as symbols for the plight of the monarchs and hang them all over the trees on the Appalachian mountain, as a sit-in against logging and global warming which garners much support and appreciation from the people across the globe (FB 414). This instance is evocative of Wangari Mathai's Green Belt Movement (1977) in Kenya to fight against deforestation and desertification. The members of the group through their attempts at reforestation had distributed and planted seven million saplings by the year 1992, which were cared by groups of rural women who were spread across twenty two districts of Kenya. It is also reminiscent of civil disobedience acts like India's Chipko Movement (1973) where the rural women of Himalayas had stopped the contractors from felling trees for external markets. Further, it echoes the context of the making of the book *Vanaparvam* (a collection of tree poems by the eminent poets of Kerala) published by the highly acclaimed Indian poet and activist Sugatha Kumari, who was

always at the forefront of environmental and feminist movements in Kerala. Sugatha Kumari played a prominent role in the Save Silent Valley protest, a nationwide movement to protect some of the oldest natural forests in the country. Her poem "*Marathinu Stuthi*" (Ode to a Tree) was the opening song for the meetings of the Save Silent Valley campaign and became a symbol of the protest from the intellectual community. It was also during this occasion that the prominent poet O. N.V. Kurup had first read out his famous poem "*Bhoomikkoru Charamageetham*" (An Elegy to Planet Earth). Though the poets were mocked as 'tree poets' for their anti-developmental stance, they continued undeterred. Sugatha Kumari used literature to mobilize people because she firmly believed that human's deepest emotions are expressed in literature and everything that affects one's life is transformed into literature (Jayarajan).

Kingsolver attempts to highlight the significance of Nelda and Myrtle's acts of resistance as various studies have proved that a significant percentage of anthropogenic carbon dioxide emissions are caused by deforestation. Moreover, it is estimated that every year million acres of forests are destroyed releasing tons of carbon dioxide into the atmosphere, thereby desecrating the biodiversity. It has also been discovered that deforestation and land degradation together account for a substantial share of greenhouse gas emissions because there is more carbon in the soil compared to the atmosphere and land degradation contributes to the release of a greater amount of carbon into the atmosphere (Pandey). The butterflies made from orange sweaters in order to draw attention to the plight of the monarchs are also reminiscent of the '*Chekutty* dolls' made out of soiled textiles from the flood ravaged handlooms of Chendamangalam in Kerala, which are being sold across the world as a symbol of the survival of the weavers after the devastating floods of Kerala in 2018,

an another disastrous consequence of climate change. The author also attempts to convey the fact that environmental ethics and values have to be imparted to the children from a very tender age.This is implicit in the gifting of a calendar with huge colour photos of different species for each month, by Dr. Ovid to Preston (FB 250). Such gestures would influence the children to be conscious of their natural surroundings, which would thereby aid in its preservation.

Dellarobia's attainment of knowledge pertaining to the scientific facts related to the imminent death of the monarchs is a significant aspect which is frequently repeated in the narrative. The description of the resistance of the monarchs, in braving the climatic hazards at Appalachia before their final exodus to a different place "to a new earth" (FB 597) towards the end of the novel can be interpreted as an attempt by the author to conclude with a wishful thinking that human species should consider themselves at par with nonhuman species and adopt sustainable methods of living. The author attempts to enlighten the readers that while it is implausible for the nonhuman species to change their genetically coded behaviour and adapt themselves according to the changing physical and geographical conditions necessitated by anthropogenic climate change, it is definitely possible for the humans to forego their egotistical thinking and live without intruding upon the cohabiting species by identifying themselves with the interconnected and holistic ecological web of the planet.

In *The Hungry Tide*, Ghosh reveals the interface between the humans, state, the flora and fauna in the Sundarbans, a unique landscape and the setting of the novel. The Sundarbans is in a precarious condition due to multifarious ecological crises caused by anthropogenic factors. The Sundarbans is a complex ecosystem which is home to a large number of endemic floral and faunal species owing to its peculiar

physical and geographical conditions. The Sundarbans has been declared as a United Nations Educational, Scientific and Cultural Organization (UNESCO) world heritage site in 1987. In 1947, the Radcliffe Mission awarded the Western Sundarbans (the Hooghly Malta estuary) to West Bengal, India and the Eastern Sundarbans to East Bengal (now Bangladesh). The Government of India has recommended the Sundarbans as a Ramsar Site, a wetland of international importance, because it provides a number of ecological services such as acting as a 'bio-wall' by checking soil erosion, protection of human lives and habitats from regular cyclones, nursery for fish and other aquatic lives, production of fuel wood and other products, absorbent of considerable amounts of carbon dioxide and a major filter of effluents flowing from the city of Kolkata every day. It is also significant because it is the world's largest mangrove ecosystem and the only mangrove tiger land of the world (Chand 5). The Sundarbans is one of the last habitats of the Asian river dolphin and the Royal Bengal Tiger and unfortunately a fast disappearing environment. Ghosh highlights the elemental and fragile aspects of the Sundarbans with vivid descriptions of the plight of the endangered river dolphins, tigers, crabs and other species.

It is pertinent to note that apart from problematizing the crucial question of allowing humans to live at the peril of its landscape or preserving it for the sake of the animals like the Royal Bengal tiger, Ghosh elucidates the depletion of species and the loss of biodiversity in Sundarbans which is described as "a universe unto itself, utterly unlike other woodlands or jungles" (THT 7). This corresponds to the pertinent observation that ecocritics explore texts as "refractions of physical environments and human interactions with those environments notwithstanding the artificial properties of textual representation and their mediation by ideological and socio-historical factors" (Buell, et al. 430). The character Nirmal Bose voices the concern that a

slight change in the sea level would result in the extinction of the mangrove forests (215). This is an implicit reference to the baneful consequences of the anthropogenic factors, coupled with far-reaching impacts of climate change endured by the Sundarbans like other mangroves in the world. Today, Sundarbans is considered as one of the worst climate change hotspots by the climate scientists (Chand 1). It has been observed that the ecosystem has become degraded and unbalanced owing to urbanization, industrialization, harbour construction, selective felling of vulnerable species of trees, fishing for shrimp larvae and the young and the greatest threat of human population pressure (Vannucci 31). Although mangroves are a highly resilient system, they are not able to withstand the human pressures which have proved to be lethal. It has been discovered that the natural protection from tidal waves and cyclones rendered by the Sundarbans is being degraded at alarming rates due to increasing global temperatures and human development which is inevitably leading to the loss of species in this rich biodiversity part of the world (Vidal). Further, these aspects lead to the destruction of life and property, forcing the inhabitants into becoming environmental refugees. In addition, it also causes serious threats to agriculture and fish production, extinction of mangroves and mangrove-related species (Hazra 334). According to experts, mangrove forests thrive in a special natural environment where there is a mixture of specific proportion of saline water and sweet water and an alteration in its proportion causes harm to the mangrove forests. This phenomenon is presently being observed in the Sundarbans. It has also been noticed that increasing salinity in the water and soil of the Sundarbans owing to climate change, is resulting in the decline of common species like Sundari, Passur and Keora trees (“Sundari disappearing”). Various researchers confirm to the fact that the mangrove ecosystem is very fragile and it is so formed that any interference would gradually lead to the

extinction of its various components and also the ecosystem as a whole. The inhabitants depend of the Sundarbans on the forest for fishing, honey collection, wood cutting and shrimp fry collection due to which the area is prone to heavy biotic pressure. Illicit felling of the small timber and fuel wood, unauthorized fishing, destruction of the spawns of various aquatic species in the course of large-scale catching of the tiger prawns are found to be comparatively high in the buffer zone because of the rapid increase in the human population, poverty and unemployment prevalent in these areas. These multiple factors are found to have adverse effects on the ecological balance, leading to the elimination of the floral and faunal species (Mallick 64-68). It is significant to note that all these aspects are extensively dealt with in the narrative of *The Hungry Tide*.

The use of past tense in "once crab-covered shores of the tide country" (THT 49), points to the depletion of the crabs which are the keystone species of the Sundarbans ecosystem as they keep the mangroves alive by removing their leaves and litter. In the absence of the crabs the trees would choke on their own debris, as crucially pointed out by Piya (THT 49, 142). It is important to note that crab-catching is another activity affecting the biodiversity of the Sundarbans. It has been observed that the high demand for crabs in the export market results in the over-exploitation of matured females leading to acute shortage of mother crabs, which affects their natural breeding and consequent decline of crab population in the Sundarbans water (Chand 4). This explicates Moyna's eagerness on educating her son Tutul, and her reluctance in encouraging him to follow his father Fokir's line of occupation of catching crabs. Moyna's observations regarding the perilous threat caused to the aquatic species are an eye-opener to Kanai and the readers alike:

> I don't want him catching crabs. What's the future in that . . . . Mashima says that in fifteen years the fish will all be gone, what with the new nets and all. . . . These new nylon nets, which they use to catch *chingrir meen* – the spawn of tiger prawns. The nets are so fine that they catch the egg of all the other fish as well. Mashima wanted to get the nets banned, but it was impossible. . . . Because there's a lot of money in prawns and the traders had paid off the politicians, for that matter. It's people like us who are going to suffer and it's up to us to think ahead. (THT 133)

This lament on the depletion of the aquatic species is reiterated by Ghosh in the *Gun Island* by stating that fishermen considered themselves lucky if they netted a handful of fry, while earlier their boats would come back loaded with catch (49). In an interview, Ghosh had stated that Sundarbans is a lifeline for various species and is a breeding ground for various species of fishes. Ghosh had also remarked that we are already observing catastrophic decline in fish catches and hundreds of fisherfolk are losing their livelihood (Saha). Ghosh's remarks correspond to the words of Bren Smith who has been a fisherman on Thimble Island Ocean Farm in the Long Island for decades. Smith reveals their dismal condition, "Issues like overfishing, climate change, they are not environmental issues for a lot of us that work on the ocean, they're economic issues . . . there's going to be no food, no jobs and a dead planet" (Field). These instances provide a revealing glimpse into the greed and self-centeredness of certain sections of the society who plunder the natural resources and violate nature to the point of its obliteration.

Various scientific research reports assert that apart from climate change issues, indiscriminate collection of shrimp seeds from the waters of Sundarbans is resulting in the depletion of the prawns. According to a statistical data, in order to catch one

shrimp seed, approximately seventy fish or shrimp seeds of other uneconomic varieties are killed or injured in the process (Chand 4). In this context, it is pertinent to note that in many coastal areas in Ecuador, Honduras, Sri Lanka, Thailand, Indonesia, India, Bangladesh, Philippines and Malaysia, there is social resistance to the introduction of shrimp farming for export because it requires the uprooting of mangroves in order to build the ponds. Being in the tidal zones, the mangroves are usually public land in all countries. However, governments give private concessions for shrimp farming or the land is enclosed by shrimp growers, despite specific environmental laws and court decisions to protect the mangroves as valuable ecosystems. In such areas, poor people are found to live sustainably in or near the mangrove forests. They earn their living by collecting honey and crabs, fishing, utilizing mangroves for food and other purposes. Shrimp or prawn production entails the loss of livelihood for people dependent on the mangroves. In addition, it leads to various drastic and irreversible changes and spells the loss of coastal defense against sea level rise, breeding grounds for fish, carbon sinks and repositories of biodiversity; causing severe ecological and social threats (Alier 80). These crucial aspects are significantly highlighted by Ghosh in the narrative by depicting that the indigenous people eke out a living by selling the products of the mangroves. However, it is pertinent to understand that they do not exploit their environment in the process as they consume only what is needed by them. This is illustrated through the words of Horen, “Bon Bibi granted me enough honey to fill two bottles. I came here to sell them”. Fokir earns his living by catching crabs, but Fokir’s method does not cause any threat to the aquatic species, as observed by Piya (THT 28, 129, 140). Thus, Horen and Fokir represent those sections of the society, who earn a living from the mangroves in a sustainable manner. Therefore, they can be considered as ‘ecosystem

people', the phrase used by Raymond Williams to refer to indigenous folks living in a state of ecological balance with their surroundings. This narrative further reflects the fact that in ecological distribution conflicts, the poor are often on the side of resource conservation and a clean environment, though they themselves do not claim to be environmentalists. Moreover, it is also an exemplification of livelihood ecology which emphasizes that indigenous and peasant groups have often co-evolved sustainably with nature and have ensured the conservation of biodiversity (Alier viii, 13).

The character Nirmal agonizes at the loss of birds, crabs and other floral and faunal species in Lusibari which was earlier a forest resplendent with variegated species. The landscape of Lusibari in the past stands in stark opposition to the present, which is made explicit through Nirmal's vivid elegiac rumination:

> . . . how when I first came to Lusibari, the sky would be darkened by birds at sunset. Many years had passed since I'd seen such flights of birds. When I first noticed their absence, I thought they would soon come back but they had not. I remembered a time when at low tide, the mudbanks would turn scarlet with millions of swarming crabs. That colour began to fade long ago and now it's never seen anymore. Where had they gone, I wondered, those millions of swarming crabs, those birds? . . . The birds were vanishing, the fish were dwindling and from day to day the land was reclaimed by the sea. (THT 215)

This deterioration of the biodiversity in the Sundarbans is reinforced in the *Gun Island* through the disinterest showcased by Rafi's grandfather to teach Rafi about various distinctive aspects related to the faunal species and water in the Sundarbans. This is mainly due to the fact that Rafi's grandfather had aptly realized the fact that

the rivers, the forest and the animals were no longer as they were earlier and every facet of the landscape was undergoing drastic alterations, due to which Rafi would be forced to migrate sooner (GI 86).

Apart from the ecological concerns faced by the mangrove ecosystems and its related species, it is pertinent to understand the miserable plight of the human inhabitants. This is brought to light through the lament of Kusum, “our crime was that we were just human beings, trying to live as human beings always have, from the water and the soil. No one could think this is a crime unless they have forgotten that this is how humans have always lived – by fishing, by clearing land and by planting the soil” (THT 262). Hence, it is quite distressing that the existence of the settlers of the Morichjhappi were considered worth less than dirt or dust, because the island had to be saved for its trees and animals as it is a part of the reserve forest and belongs to a project to save tigers which is paid for by people all around the world. In this regard, the observation made by Luca Raimondi with regard to the Sundarbans is worth mentioning. The forced evictions and the killings of Bengali refugees settled in the Sundarbans islands of Morichjhappi at the end of the 1970s provide a brutal example of the pre-eminence achieved by national and international wildlife conservation interests over the needs of marginalized minorities – small peasants, destitute migrants, outcasts or backward caste members whose lives are considered worth less than dirt or dust. In 2002, another eviction was ordered by the West Bengal government which adversely affected the community of fishermen, who had customarily used the island of Jambudwip for fish-drying, a traditional source of income. This episode highlights the crucial link between colonial imagery, environmental concerns and ecotourism projects. Raimondi significantly adds:

> Once cleared of all signs of human activity on grounds of environmental security, the island was ready to be refashioned as an immaculate place – a "wild fiction", inside the multibillion super tourism complex proposed by the business group Sahara India Parivaar, dotted by "virgin islands" and beaches of "pristine glory". A successful nationwide mobilization – involving a consistent number of independent observers, among them Amitav Ghosh himself – raised the alert against the project which was stalled and eventually cancelled. (129)

In a similar vein, Ghosh in his significant essay "Folly In the Sundarbans" (2004) notes that the ambitious plan submitted by the business group Sahara India Parivar to the government of West Bengal in 2003, proposing the creation of an enormous new tourism complex in the Sundarbans, would have resulted in "a massive intervention in an area that is a designated World Heritage Site and Biosphere Reserve". Such attempts at economic exploitation of Sundarbans mangroves is made explicit in *Gun Island*, for instance, "The Sundarbans are the frontier where the commerce and the wilderness look each other directly in the eye, that's exactly where the war between profit and nature is fought" (8). Thus, the inhabitants of Sundarbans have been deprived of their rights over the land and their existence and aspirations have been repeatedly questioned through the process of reclamation. Therefore, an appraisal of the ecological concerns related to loss of biodiversity and depletion of species in the ecologically sensitive landscape of Sundarbans necessitates a critical evaluation of the socio-political-cultural concerns enmeshed within the region.

Another crucial aspect that needs to be underscored is that the governmental efforts to conserve the tiger species jeopardize the lives of humans who end up as helpless preys, attacked and consumed by the man-eating tigers. This is aptly termed

by Kanai as ‘genocide’ because these killings are never reported or written about in papers because these people are extremely poor in order to be worthy of consideration (THT 300). Huggan and Tiffin state that both environmentalists and ecocritics have discussed such conflicts and are “alert to the dilemmas involved in conserving endangered ecosystems and animals when the livelihoods of local (subaltern) people are simultaneously put at risk” (185). According to the data collected by Nilima, a human being is killed by a tiger every other day in the Sundarbans, and the numbers of deaths are greater than that are officially recorded. Moreover, these attacks have been continuing since centuries even when the population was a fraction of what it is at present (THT 240). Based on the scientific observations inferred from the National Aeronautics and Space Administration (NASA) Landsat satellite images, the sea levels have been rising by an average of three centimeters a year over the past two decades which is significantly greater than the global average. Further, the area has lost almost twelve percent of its shoreline in the last four decades (Muller). While the land of the Sundarbans is being swallowed by the oceans, humans and tigers are being squeezed into an ever-shrinking space with deadly consequences. The sea has encroached into the tigers’ hunting grounds pushing them to target humans and livestock alike which results in the poaching of tigers, as depicted in the novel (THT 293). This can be corroborated with scientific records according to which, between 1994 -1995 and 2001-2002, ten tigers were poached while they strayed into the fringe villages (Mallick 65). Similarly, villagers are forced to venture deeper into tiger territory, putting them at ever greater risks of tiger attacks. Tiger attacks on men make their wives an outcast. Being a ‘tiger widow’ is stigmatized because the inhabitants believe that a person attacked by a tiger has invoked the wrath of Bon Bibi, the guardian spirit of the forest and such widows are called *swami-khego*: those who eat

their own husbands. Tourism activities associated with the Sundarbans National Park and Tiger Reserve have further constricted the area in which fishing is generally permitted. This forces the tiger widows who are already socially ostracized to venture deep into the mangroves, rendering them vulnerable to the similar fate of their husbands. The relentlessly encroaching sea has also driven crocodiles, venomous snakes and sharks closer to human settlements (Augustin). From these instances it can be deduced that the poorer sections are the principal casualties of the climate crisis and their unseen poverty is compounded by the invisibility of the slow violence that permeates their lives (Nixon 3). Therefore, it can be stated that climate crisis aggravates the constant tug-of-war between the humans and the wild leading to lose-lose situation.

One of the major preoccupations of Ghosh as a scholar and historian has been to recover the lost histories. In *The Hungry Tide*, Ghosh deals with the history of riverine dolphins which is a prominent aspect of the ecology and history of Sundarbans. Ghosh at various occasions in the narrative eloquently summarizes the studious involvement of various ecologists in the analysis of the dolphins. The dolphins have been discovered since the time of the origin of the rivers Ganga and Sindhu. Piya observes that Calcutta was actually "a centre of cetacean zoology" because it was the place where various aquatic species were first identified, for instance, the Indian pilot whale *Globicephalus indicus*, the Irrawady dolphin *Orcaella fluminalus*, the Indian river dolphin and others (THT 231). And, therefore, the dwindling of the population of the dolphins to the point of their extinction is a matter of great concern. This is expounded in the beginning of the novel through the depiction of Kanai Dutt's ignorance of the presence of marine mammals in the Sundarbans. Piya ruefully acknowledges, "The cetacean population has kind of

disappeared from view. No one knows whether it's because they're gone or because they've not been studied. There hasn't ever been a proper survey" (THT 11). These instances in the narrative can be corroborated with Ghosh's observations on the depleting population of the cetaceans in the Sundarbans:

> Historically the waters of the Sundarbans were home to great numbers of whales and dolphins. British naturalists of the nineteenth century reported the area to be teeming with marine mammals. Very few of these animals are to be seen in these waters today. Their fate is unknown because there has been no major census or survey. There is limited expertise in this field in the Sundarbans being a border region; foreign researchers have not been allowed to conduct surveys for reasons of security. For all we know the cetacean population of this region has already dwindled catastrophically. ("Folly")

The alarming rate of decline of the river dolphins like the Gangetic dolphins and the Irrawady dolphins which are the subject of Piya's scientific study, is further reinforced to the readers when Piya shows the pictures of both the species on the display cards to the fishermen who mistake them for birds and this bears testimony to their unfamiliarity with the species. It is pertinent to note that Piya during her first scientific expedition in Sundarbans was not able to spot even a single dolphin in spite of keeping vigil for the entire day. This is a matter of grave concern for Piya because she had not foreseen such a dearth in their population as the waters had earlier contained large number of dolphins, a fact testified by several nineteenth century zoologists. Piya further elucidates, "The discoverer of the Gangetic dolphin, William Roxburgh had said explicitly that the freshwater dolphins of the Ganges delighted in the labyrinths of rivers, and creeks to the South and South-East of Calcutta. This was exactly where she was and yet after hours of careful vigilance she had still to spot her

first dolphin" (THT 42). The declining population of the aquatic species is due to anthropogenic climate change, a significant fact which is not explicitly stated even once in the entire narrative and it is a task left to the readers to infer it through the various instances delineated by the author.

The existence of the dolphins has been identified by the western science in 1801 by Roxburgh, a fact which is also acknowledged by Piya. Nontheless, the existence of the species has been recorded and illustrated much earlier in *Baburnama* manuscript which dates back to 1598, in the Moral Edicts of King Ashoka in 240 B.C and the legend of the origin of Ganges as its '*vahana*' or vehicle in the Indian mythology of the *Mahabharata*. The Ganges dolphin has been legally protected in India since 1972 under the Wildlife Protection Act. However, as per various scientific assessment reports, the effective surveillance and enforcement of the protection of the dolphins have been proven difficult owing to the apathy, ignorance, shortage of funds and personnel in the Wildlife Department. Further, it has also been detected that, in West Bengal the dolphins are accidentally killed by the fishing gill nets, dolphin meat is consumed by the people of Banpar community, dolphin oil is used as a fish lure and as a medicine for certain ailments. However, the most obvious and immediate threat is found to be the loss of habitats. According to a study conducted from 2011 to 2016, it has been observed that the unique body shape of the dolphins makes it difficult for them to remain submerged in the waters containing high levels of salinity because freshwater flow to the Sundarbans is crucial for the subsistence of these species. The rise in sea levels triggered by climate change is observed to be a crucial factor for the increase in the salinity of waters of rivers and channels. Ganges river dolphin species *Platanista gangetica* or susu is the national aquatic animal of India and is one of the four freshwater cetacean species found in the world, in Bhagirathi Hooghly River

Systems in India that covers hundreds of kilometers of rivers and channels around the Sundarbans. According to a recent scientific study conducted on the status and conservation of the Ganges river dolphins, it has been observed that they are no longer sighted because of the increasing salinity of waterways and hence the status of the species has changed from Vulnerable to Endangered in the IUCN Red List of threatened animals. The reasons for the rapid decline in the dolphin population in West Bengal are attributed to anthropogenic factors like over-exploitation and habitat destruction. The construction of Farakka Barrage in 1975 has created a barrier to the movement of dolphins and other aquatic wildlife along the Ganges including the biologically-rich Sundarbans. Heavy industrialization along the river Hooghly and their effluent discharge in the river and the use of chemical fertilizers and pesticides by the cultivators along the river are found to be responsible for the loss of the habitats of the dolphins. All these factors have resulted in salinization, water logging, deforestation and loss of vast areas of wildlife habitat (Sinha 350-351). Therefore, it can be noted that Moyna's lament on the decreasing number of crabs and prawns is the fictionalization of the realistic scenario. Moreover, fatal entanglements in fishing gear such as nylon gillnets, large scale destruction of biomass in the estuarine Sundarbans during prawn seed collection and the ensuing reduction of the dolphin food species are identified as major threats to the Ganges dolphins and the ecological integrity of their riverine environment. Further, excess extraction of river water for irrigation has reduced the water level, particularly during the dry season, which is also observed to be catastrophic for the migration of the Ganges dolphins (Mallick 296-297).

The observations and concerns shared by Piya with regard to the river dolphins are scientific facts which enlighten the readers, for instance, "Orcaella were

a rare and dwindling breed. Only a few hundred now remained in Asia's rivers". Piya observes a peculiar behaviour displayed by the Orcaella group while they were congregating in a pool. Piya is disheartened by the fact that the dolphins had disappeared from the waters of Sundarbans which earlier contained large population of marine animals and deduces that the present dramatic deterioration is the result of the loss of habitats and drastic changes in their environment. Piya's mentioning of an Orcaella river dolphin getting drowned in gill net near Phnom Penh is a clear indicator of the inhuman over-exploitation of the aquatic animals. The author also highlights that the rapid decline of the Orcaella population in the region of Phnom Penh in Cambodia is a brutal consequence of the indiscriminate American carpet bombing and the massacre by Khmer Rouge cadres who used the dolphin oil to supplement their dwindling supplies of petroleum. The dolphins were hunted with rifles and explosives and their carcasses were hung up in the sun, so that their fat would drip into buckets and later the oil was used to drive boats and motorcycles resulting in the extinction of the once abundant population of Orcaella in the Tonle Sap, Cambodia's great freshwater lake (THT 123, 124, 268, 305). These instances are the illustrations of actual incidents which can be corroborated with scientific research data. According to the findings of a significant study, the increased rate of the mortality of Irrawaddy dolphins in the Mekong river basin is attributed to anthropogenic causes like accidental entanglement in large meshed gillnets and added to it, dolphins were shot, hung in the sun and oil collected in pails and the carcasses were then used as a petroleum substitute for motor cycles and motor boats. Hunting for dolphin oil in the mid 1970s by the Khmer Rouge resulted in the decimation of dolphin inhabiting Cambodia's Toule Sap Great Lake (Baird and Beasley 301-307). Piya cites another instance of exploitation of the dolphins, when Mr. Sloane – a river dolphin of the

species *Orcaella brevirostsis* was found stranded near a small village in Central Cambodia. Piya had cared for the dolphin for six days consecutively. Mr. Sloane had disappeared on the seventh day, owing to inexplicable reasons. Later, Piya discovered about the growing demand for river dolphins for new aquariums that were opened throughout eastern Asia, and learnt that the Irrawady dolphins fetched approximately one thousand US dollars in the black market. The plans of making the Mekong River navigable as far as China which resulted in the destruction of the dolphin's preferred habitats made the population of Orcaella more vulnerable. Piya considers the stranding of Mr. Sloane as not an individual misfortune but rather as a harbinger of catastrophe for the entire population (THT 306). This corresponds to the statistical findings of certain studies which have demonstrated a recent decline in the Mekong dolphin population with the present population being only 52% of the ancestral population which is primarily caused by anthropogenic threats (Krutzen et al.).

With the development of the economy and the population explosion at Kolkata, the number of motorized vehicles in the Hooghly River has increased many folds in the recent past. Heavy river traffic in Hooghly near Kolkata has become a major threat as there are many anchorages and ships in the city and the underwater noise are found to have harmful effects on the dolphins (Sinha 352). Since the dolphins depend on echolocation, sonic pollution adversely affects their well-being. Innumerable motorized ferry boats crisscross dolphin movements and their propeller blades often inflict severe injuries to the slow-moving dolphins and ultimately lead to their mortality (Mallick 298). Correspondingly, Ghosh has also highlighted that fast-moving speedboats and high powered watercraft pose a great danger to marine mammals, particularly to such endangered species as the Irrawady dolphins, because

the high-pitched noise produced by speedboats disrupts their echolocation systems often resulting in casualties. In January 2000, on the bank of the Matla River, Ghosh himself had sighted the carcass of an Irrawady dolphin with a huge hole gouged out of its head by a propeller ("Folly"). These aspects are fictionalized in the novel by depicting that the propeller of the fast-moving official boat becomes the cause of the death of the few weeks' old Irrawady calf as observed by Piya (THT 345). The factors responsible for the beaching of Rani and her pod in the *Gun Island* is considered to be the man-made sounds from submarines and sonar equipments because marine mammals use echolocation to navigate and any kind of disruption makes them disoriented. It has also been discovered that there is a higher rate of encounter with the species in rivers and stretches that have limited use of motorized boats, less river traffic and more country boats (Mitra and Chaudhary 12746). This crucial aspect is underscored in the novel by the character Nirmal who sarcastically remarks to Kanai that on some rivers there are more number of boats than there are trucks on the Grand Trunk Road. The comforting silence of Fokir's boat is contrasted with the shuddering noise of the diesel-powered engine of the *bhotbhoti*'s. Further, the reference to the fewer sightings of the dolphins when they travel in the *bhotbhoti* (FB 17, 338, 266) are pointers to the sound pollution made by the motor boats which adversely affects the dolphins and their communication.

In the narratives, Ghosh explicates in detail the various obstacles to the survival of the dolphin species owing to climate crisis and human interferences. In the *Gun Island*, Ghosh delineates that the mother dolphin had calved a second time, whom Piya names as Rani which gets entangled in a length of nylon netting. During the former years of Piya's research, patterns of movement of dolphins were found to be regular and predictable. However, in the later years they had begun to vary and

became increasingly erratic due to the changes in the composition of the waters of the Sundarbans. The rising sea levels had caused the flow of fresh water to diminish and salt water had begun to intrude deeper upstream making certain stretches too saline for the dolphins. The dolphins had started to avoid some of the waterways they had frequented before and had gradually begun to venture farther upriver into populated heavily fished areas. Inevitably, some had been ensnared by fishermen's nets and some had been hit by motorboats and steamers. Over the last few years, the pod had lost so many members that its numbers were reduced to Rani and just two other dolphins (GI 91, 92-93).

Ghosh further elaborates on the oceanic dead zones, a critical aspect of climate change, which aids the readers to understand the severity of the crisis. The stark contrast in the waterscape of the rivers is vividly portrayed by Ghosh in the description that the rivers were earlier like a moving forest populated by an incredible variety of life forms. The present gruesome condition of the rivers is a forewarning to the readers:

> . . . vast stretches of water that have very low oxygen content – too low for fish to survive. Those zones have been growing at a phenomenal pace, mostly because of the residues from chemical fertilizers. When they're washed into the sea they set off a chain reaction that leads to all the oxygen being sucked out of water. Only a few highly specialized organisms can survive in those conditions – everything else dies, which is why those patches of water are known as "dead zones". And those zones have now spread over tens of thousands of square miles of ocean – some of them are large as middle-sized countries . . . . They've started appearing in rivers too, especially where they

> meet the sea. . . . Because it's through rivers that the agricultural effluents reach the oceans. . . .(GI 95)

The predominant factors responsible for the decimation of the waterscape are attributed to the refinery which had begun functioning a few years earlier. The dumping of its effluents into the rivers was resulting in untoward incidents like massive fish kills. With large quantities of chemicals flowing into the rivers, thousands of dead fish were observed to be floating on the surface or washed up ashore all around the world. Piya firmly believes that the refinery had also resulted in great stress for the dolphins due to which Rani and her pod abandoned their old hunting grounds. Piya, as a cetologist, feels helpless about the pathetic condition of Rani since the usual habitats could not sustain her anymore, forcing her to search for new hunting grounds. Moreover, the young ones depend on Rani for survival. Piya echoes the concern shared by Dr. Ovid and McKibben when she ruefully remarks, "We're in a new world now. No one knows where they belong anymore, neither humans nor animals" (GI 97).

It is important to note that apart from the ecological significance of the dolphins, its spiritual implication is also emphasized in the narrative of *The Hungry Tide*. Kusum's tales included the dolphins which were regarded as Bon Bibi's messengers that brought her the news of the rivers. Kusum had also transmitted the belief to her son Fokir, which she had gained from her father that by following the dolphins they would always be able to find fish (THT 307). It can be discerned that Fokir's attitude to his surroundings is based on a non-heirarchical conception of the ecology where there is an absence of privileging of human species over the other. Fokir possesses the quality of ecological modesty and considers humans as just one species among others, with no special rights, a quality deemed to be necessary to be

responsible to the environment (Turner 50). Hence, Fokir's thinking represents the perspective of the tribals, whose thought is antithetical to the notion that a great hierarchical order exists in which the ground and trees occupy a very low rung, animals a slightly higher one and human especially civilized, a very high one; and consider all creatures as necessary parts of an ordered, balanced and living whole (Allen 246). It is also a reflection of the *Tinai* concept in which no species is superior to another and hence it is not anthropocentric. A typical oikos is a nexus in which the sacred, the humans, natural and cultural phenomena stand in an integrated relationship and *Tinai* is the Tamil equivalent of oikos (Selvamony 20, 35). Fokir's relation to nature is that of man-in-nature as against the archetypal conflict of man-versus-nature, and this is an illustration of the integrative oikos in which there is a long-standing relationship between the human and the place in which he or she lives ("Oikopoetics"). It can be stated that Fokir shares an intimate and harmonious relationship with nature. Fokir is most comfortable when he is on his boat in the river and though he earns his living by fishing crabs, it is through a sustainable way without causing any harm to the aquatic species. Fokir, Horen and their community eke out a living from nature, but they practice subsistence perspective, they are not greedy and consume only what is necessary for them.

Ghosh significantly points out that according to the myth of Bon Bibi, the land was held in careful balance until human greed intruded to upset this order. According to the myths and legends of the Sundarbans, Bon Bibi is the "goddess of the forest who rules over all the animals of the jungle". Horen had gained the knowledge of the legend of Bon Bibi from his father and Fokir had frequently heard it from Kusum that it had become a part of him (THT 103, 28, 248). According to Ghosh, Bon-bibi as a narrative conceptualizes the whole balance between the human and the nonhuman and

it is the figure who mediates between them (Jha). The legend of Bon Bibi is passed on as a legacy to the future generations, through the oral narrative which aids in preserving the significance of the unique landscape of the Sundarbans. Thus, the landscape of Sundarbans intermingles not just the elements of land and water but also the aspects of culture like language and religion, and consequently erase the hierarchical notions by considering every single life on an equal-footing. Another significant instance elucidated by Ghosh is that in West Bengal it was the Sundarbans that had absorbed the devastating impact of the Bhola cyclone in 1970. Ghosh underscores the fact that no bodily harm had come to the villagers of the hamlet in the part of the Sundarbans across the Raimangal river owing to Manasa Devi, the goddess of snakes, whom they considered as the protector of the nearby shrine. The shrine's walls and roofs had kept them safe from the storm and continued to shelter them afterwards, providing them with clean, fresh water from its well – a rare amenity in Sundarbans. It is pertinent to note that the shrine was situated at a good distance from the sandbank situated on a slight elevation in the middle of a sandy clearing that was surrounded by dense shards of mangroves (GI 12-13). This is an explicit reference to the sacred groves, one of the finest instances of traditional conservative practices that preserve the biological diversity of that particular region (Gadgil and Chandra 184-185). Further, it points to the fact that a spiritual outlook towards the environment is crucial, since it has always aided in the sustenance of nature. In this context, it would be apt to quote the words of the Lakota Shaman Lama Deer:

> We Siox spend a lot of time thinking about everyday things which in our mind are mixed up with the spiritual. We see in the world around us many symbols that teach us the meaning of life. We have a saying that the white man sees so little, he must see only with one eye. We see a lot that you no longer notice.

> You could notice if you wanted to, but you are usually too busy. We Indians live in a world of symbols and images where the spiritual and the commonplace are one. . . . To us they are part of nature, part of ourselves. (Silko 256)

These words underscore the necessity of viewing even the smallest in relation to the larger whole (Rueckert 108). It also points towards the significance of protecting the biodiversity from the ravages of humans in order to sustain the ecological equilibrium of the planet which would definitely thrive without the human species, a negligible aspect in the planetary web. Christopher Manes pertinently remarks:

> If fungus, one of the "lowliest" of forms on a humanistic scale of values were to go extinct tomorrow, the effect on the rest of the biosphere would be catastrophic, since the health of forests depends on *Mycorrhyzal* fungus, and the disappearance of forests would upset the hydrology, atmosphere and temperature of the entire globe. In contrast if *Homo sapiens* disappeared, the event would go unnoticed by the vast majority of life forms. As hominids we dwell at the outermost fringes of important ecological processes such as photosynthesis and the conversion of biomass into usable nutrients. No lofty language about being the paragon of animals or the torchbearer of evolution can change this ecological fact. . . .(25)

Ghosh had significantly stated that giving voice to the nonhumans is the central literary challenge of this era (Gill) and it can be claimed that he has very much succeeded in his attempt in the narratives of *The Hungry Tide* and *Gun Island*. The major anthropogenic factors responsible for the depletion and consequent extinction of nonhuman species are considered to be the destruction of habitats through

conversion of forest into grazing and farmland, destruction of forest by the logging industry, pollution, hunting to extinction, collection for the pet trade, destruction of fresh water habitats through pollution, endangering the lives of fish, amphibian and reptiles, and then affecting other species in the associated food chains (Bleakley 53). It is pertinent to note that all these aspects are underscored in the narratives of both *The Hungry Tide* and *Flight Behaviour.*

It can be claimed that both the narratives assist the readers to think through the Anthropocene and the authors depict and critique anthropocentric culture which is based on extractive ideology of domination and plundering. It has been aptly stated that in assuming a natural prioritization of humans and human interest over those of other species on earth, we are both generating and repeating the racist ideologies of imperialism on a planetary scale (Huggan and Tiffin, *Postcolonial Ecocriticism* 6). Similarly, Jean Baudrillard has suggested that the inhumane treatment of animals often culminating in extinction can be related to the rise of reason and humanism and compares this process with racism which creates an abyss between the humans and the animals, turning them into 'beasts of burden' to work for us as a result of capitalist economy, 'beasts of demand' where they are utilized as laboratory specimens, 'beasts of consumption' for meat trade, 'beasts of somatization' where they are forced into carrying a psychological life wholly invented by humans, that is, training animals to perform or entertainment from Disney representations to television wildlife documentaries (133). Baudrillard's remark is an exemplification of David Schlosberg's contention that there are various obstacles in doing justice to nature. Schlosberg cites John Rawls' theory of justice, according to which our relation with animals, plants and other creatures are outside a relation of justice and this view is furthered by Brian Barry who argues that justice and injustice can be predicated only

for relations among creatures who are regarded as moral equals. These remarks stand in stark contrast to Huggan and Tiffin's suggestion that there is "no social justice without environmental justice, and without social justice for all ecological beings – no justice at all" ("Green Postcolonialism" 10) and Aldo Leopald's conception of land ethic which is about enlarging the boundary of the moral community to include the natural world (104).

Humanity can be considered as spiritually hollow owing to its apathy towards the nonhuman nature which is the root cause of the ecologically imbalanced world. Humanity's spiritual and ethical failure is closely related to lack of regarding ourselves as ecological beings which makes us insensitive to our interconnections and dependencies. The depletion of species are signs or feedbacks by mother nature which point out the painful fact that far from being the beautiful goddess of mythology, she is a mother facing great many fertility challenges of her own. One of the most distressing impact of the industrial activities which affect the natural world is that they are interfering with systems at the heart of earth's fertility cycles and a large number of species are finding it difficult to successfully reproduce and to protect their young ones from the harsh new stresses of a changing climate, which interferes with their genes and extinguishes the spark of life even at earlier stages like egg, embryo or a baby (Klein 434).

The recent attention to the importance of environment and spirituality and the paradigmatic shift in thinking that ecological issues require, has created a welcome space for indigenous voices (Coates 367). According to indigenous cosmology, the web of kinship extends to all animals and plants, animate and inanimate. Hence, there is recognition of the interrelatedness and interconnectedness of all life forms which can be illustrated by the legend of Bon Bibi in *The Hungry Tide* which functions as a

decisive factor for the attitudes and beliefs of the indigenous people like Horen and Fokir. Therefore, the contemporary forms of ecological crises can be considered as a boomerang effect of the shift from the integrative oikos to hierarchic oikos in which the members stand in a hierarchic relationship with the sacred at the top, the humans in the middle and nature at the bottom, which further leads to the anarchic oikos that has evolved from a desire for a non-material, industrialized culture in which nature is just a commodity (Selvamony, "Tinai" 35). McKibben aptly remarks that reason is the unique gift of human species which should be exercised from following blindly the biological imperative towards endless growth:

> Our reason allows us to conceive of our species as a species and to recognise the danger that our growth poses to it, and to feel something for the other species we threaten. Should we so chose, we could exercise our reason to do what no other animal can do. . . we could limit ourselves voluntarily, chose to remain god's creatures instead of making ourselves god. . . such restraint – not genetic engineering or planetary management – is the real challenge, the hard thing. Of course we can splice. But can we not splice genes. (*The End of Nature*, 182)

Similarly, Lynn White, Jr. has significantly argued that more science and more technology are not going to get us out of the present ecological crisis (14). In order to protect the fertility of the inhabitants of the mother Earth, a significant shift is required in the worldview based on resuscitation and regeneration. Further, whether we choose to see the earth as a mother, a father, a parent, or an ungendered force of creation, what matters most is that we acknowledge that we are not in charge and we are part of a vast living system on which we depend (Klein 444). We need to develop an environmental culture which values and fully acknowledges the non-human sphere

and our dependence on it and further to take better decisions about how we live and impact on the non-human world (Plumwood 3). We need to aim at biocentric equality, that is, placing humans at par with other species and move from ego-consciousness to eco-consciousness, by foregoing the notion that the planet exists solely for the gratification of human species. These ecospiritual thoughts can be discerned in Fokir, Horen, Dr. Byron and are later developed by Dellarobia and Piya.

The much discussed part in Genesis verse 1:28, in which God tells the human species: "Be fruitful and multiply and fill the earth and subdue, have dominion over the fish of the sea and over the words of the air and over every living thing that moves upon the earth" (*New International Version*) should be interpreted from an ecological perspective that humans should be the stewards and caretakers of nonhuman species. The concept of 'cosmocracy' propounded by the eco-philosopher Henryk Skolimowski is significant because it encompasses democracy for the whole terrestrial life and therefore it implies freedom extended to all living beings, not just to humans and assigns humans the role of being the guardian of all the organisms. Hence, according to Skolimowski, cosmocracy is the most evolved form of democracy because all living beings exist as equal beings (V. Singh). It can be stated that Fokir, Piya and Dr. Ovid are cosmocrats because they regard all living beings as equals.

It can be construed that ecological crises like climate change and loss of biodiversity are the outer manifestation of the inner spiritual crises of humanity which is caused by the failure to balance our never-ending needs with nature's limits. It has been aptly pointed out that the biodiversity crisis needs to be addressed in conversation with the scientists who have most carefully defined and monitored it (K.O'Brien 179). In order to preserve the biodiversity from extinction, it is imperative

to have a serious dialogue with the ecological sciences because it is an effective way to understand the world and how humans are supposed to live sensibly and sustainably on the planet. Hence, the following chapter delves into the literary delineations of the scientists, sciences and knowledge in relation to ecology and ecological crises.

Chapter 6

LOOKING BEYOND THE BINOCULARS: EARTH-SAVING HEROES AND ECOLOGICAL WISDOM

"Science is organized knowledge; wisdom is organized life"

– Immanuel Kant

"The saddest aspect of life, right now is that science gathers knowledge faster than society gathers wisdom" – Isaac Asimov

The basic insights central to our current understanding of ecological crises like climate change, pollution, loss of biodiversity and others, are undoubtedly the contributions of western science and it dates back to the beginning of the second half of the nineteenth century. During 1870s, the Italian geologist Antonio Stoppani had observed that human influence was ushering in a new age which he termed as the 'anthropozoic era' (Kolbert 183). In 1896, Svante Arrhenius made the first calculations of how changes in atmospheric carbon dioxide due to the burning of coal would impact global temperatures (Trexler, *Anthropocene Fictions* 2). The first scientific breakthroughs demonstrating that the burning of carbon could be warming the planet were made in the late 1950s. By 1965, the concept was so widely accepted among specialists that US President Lyndon B. Johnson was given a warning report by his Science Advisory Committee that through the worldwide industrialization, man is unwittingly conducting a vast geophysical experiment and the climatic changes that may be produced by the increased carbon dioxide content could be deleterious from the point of view of human beings (Klein 73). The Dutch chemist Paul Crutzen commented that we should no longer think of ourselves as living in the Holocene and the new age is defined by one creature man who has become so dominant that he

is capable of altering the planet on a geological scale, and dubbed this age as the 'Anthropocene'. Crutzen had shared the Nobel with F. Sherwood Rowland in 1995 for his work on the chemistry of ozone depletion, a phenomenon that offers many parallels, both scientific and social, to the global warming. Today, majority of the scientists all over the world concur to the fact that though a single weather event cannot be attributed to climate change, the increased frequency and intensity of unpredictable weather events are definitely because of anthropogenic climate change (Narain 114).

The climate movement is considered to have precisely begun (that is the moment when the issue pierced the public consciousness and could no longer be ignored) on 23 June 1988 when James Hansen, the Director of NASA's Goddard Institute for Space Studies, testified before a congressional hearing that global warming became the topic of chat shows and political speeches though it had been on the political and scientific radar much earlier. Later in the month of June 1988, hundreds of scientists and policy-makers held its historic world conference on 'The Changing Atmosphere in Toronto', where the first emissions reductions were discussed. This was followed by the first session of the IPCC. The issue became so prominent that the 'Man of the Year' of the Time Magazine for 1988 was an unconventional choice: 'Planet of the Year: Endangered Earth' (Klein 73). It is pertinent to note that climate scientists have been warning all along about the precarious condition of the planet due to anthropogenic factors, which are unfortunately ignored at the cost of our own peril. The year 2015 was momentous in the annals of climate change as it was marked by extreme weather events. El Nino wrought havoc upon the planet resulting in devastating floods and droughts, freakish tornadoes, cyclones, severe temperature anomalies around the world; which all

culminated in its declaration as the hottest year on record, and significantly the grim predictions of climate scientists had turned prophetic in that year (TGD 201). The year 2015 also produced two important publications on climate change, Francis' encyclical letter *Laudato Si* and the Paris Agreement on climate change. Though both the works deal with divergent aspects, they converge on the point of the acceptance of the research produced by climate science. Hence, the documents are a vindication of climate science because their publication acknowledges that the Earth's climate is changing due to anthropogenic factors. It also underscores the necessity of gaining scientific information pertaining to climate change and its dissemination to the wider public. Hence, it is explicitly evident that there is a unanimous concurrence with regard to climate change as a scientific reality. However, as significantly observed by Sunita Narain, the scientists who study the weather or understand the monsoon are treated with contempt or neglect by the scientific establishment and the government has never recognized a monsoon scientist like a space or nuclear scientist, and it is time that they get due recognition because understanding the monsoon is what will determine our survival (116).

It is significant to discuss the factors responsible for the failure of the climate crisis to garner the attention and seriousness it entails and the attitude of laxity and procrastination to deal with the predominant crisis of the age, despite the increasing number of scientific evidences. James Lovelock, in his significant work *Revenge of Gaia,* outlines that science itself was handicapped in the last two centuries by its division into many different disciplines, each limited to viewing only a tiny facet of the planet and further opines there was an absence of a coherent vision of the Earth. Scientists did not acknowledge the Earth as a self-regulating entity until the Amsterdam Declaration in 2001. Moreover, since the development of the Gaia

Hypothesis in the 1960s, the idea of the global self-regulation of climate and chemistry was unpopular with both the Earth scientists and life scientists because they considered that it was irrelevant to the explanation of the facts of life on the Earth and had condemned it in scathing terms. This was especially due to the fact that it was incompatible with the Darwinian evolution. Nonetheless, a few meteorologists and climatologists had later accepted the hypothesis (5, 29). From these critical observations it can be deduced that the belated recognition of the Earth as an interconnected system was a significant factor in the relegation of climate science. Another crucial factor is the reigning fossil-fueled capitalist economy, the primary contributor of the accelerating greenhouse gases. Kevin Anderson of the Tyndall Centre, one of Britain's eminent climate experts, had emphatically stated that our growth-based economic logic is in fundamental conflict with atmospheric limits (Klein 86). It is also pertinent to note that the dramatic findings of the scientific community has been deliberately muted by the powerful campaign of misinformation launched and funded by those industries which cannot imagine a future without fossil fuels (McKibben, *The End of Nature* xvii). From these remarks it can be discerned that the planet is bridled by the ruling economic and political elite groups who with the aid of some self-interested scientific experts and media, conceal the facts related to climate science, which displays their callous disregard for the humanity, cohabiting species and the future generations. Further, climate change was for a long time, and to some extent still is regarded as a predominantly scientific issue which implies that its intricacies, complexities, and logic can be understood only by a select few. Members of the non-specialist public, that is, the majority of the population have to rely on mediators to translate scientific models and data into a language more readily comprehensible, which turns it into a problem of communication and hence it is also

an intricately social issue (Kluwick 502). This throws light on the importance of communicating the scientific findings pertaining to climate science to the common public without recourse to scientific jargon, which is generally deemed unnecessary or neglected deliberately. It is in this context that ecofiction and climate fiction attain significance because fiction is often channelized to express truths that cannot be described by direct, declarative writing. Moreover, cli-fi brings facts into fruitful dialogue with fictional narratives, which makes its relation to science self-explanatory. Further, it validates the inclusion of the scientist or a team of scientists as significant characters in the narratives. In this context it needs to be stressed that climate fiction ruled the twelfth Jaipur Literature Festival (JLF) held in January 2019. Another interesting highlight of the Festival was that the keynote address was delivered by the Indian born British American structural biologist Venkataraman Ramakrishnan, who had won the Nobel Prize for Chemistry in 2009. It was the first time in the history of JLF that a scientist had delivered the keynote address, while conventionally it was done by literary giants.

Kingsolver's *Flight Behaviour* abounds in discussions pertaining to various aspects of knowledge and science. Dellarobia is depicted as a seeker of knowledge as she attempts to gain information through whichever means possible. Consequently, she is able to recall instantly the name of the butterflies that have migrated from Mexico – 'monarchs', '*Mariposas monarcas'* , when described by Josefina. Dellarobia recollects that she has heard the words from the channel Animal Planet. Dellarobia was earlier ignorant of the disasters like landslides until Josefina informs about the "mountains collapsing on people" which results in the loss of houses, schools, people, mountain and the *monarcas*. Dellarobia is left helpless and speechless when she gathers more information from the Google in Hester's computer,

regarding the landslides in Mexico which has resulted in the migration of monarchs and Josefina's family to Appalachia, who experience intense psychological trauma as climate refugees. It is significant to note that apart from gathering information and knowledge, Dellarobia makes it a point to share the knowledge which she receives from various sources like the scientist Dr. Ovid and Internet, to her family and friends. For instance, Dellarobia enlightens her husband Cub about the fact that clear-cutting the mountains could cause landslides and floods which had occurred in Mexico where the butterflies lived earlier. Later, Dellarbia informs Hester that the drastic changes in weather that they were experiencing would get more severe owing to pollution, "you pollute the sky long enough, it turns bad on you". Moreover, she attempts to convey her knowledge pertaining to the monarch butterflies to Dr. Ovid, mistaking him for a tourist on a visit to see the monarchs, ignorant of the fact that he is an entomologist and lepidopterist who teaches at a University in New Mexico (FB 138, 141, 234, 465, 165). Through the motives and attitude of Dellarobia, the author underlines the fact that gaining of knowledge and awareness of our environment is very significant to attain mental and emotional maturity.

It is pertinent to note that Kingsolver's descriptions of the monarchs as victims of anthropogenic climate change are scientific truths, except the aspect of the sudden relocation of the wintering colonies to Southern Appalachia which is a fictional event. It is a fact that the Mexican town was mainly known as the entry point for visitors to the spectacular colonies of monarch butterflies. Unprecedented rainfall had resulted in mudslides and catastrophic flooding on the Mexican mountain of Angangueo in February 2010 in which thirty people were killed and thousands lost their homes and livelihood. The entire migratory population of the North American monarchs still return every autumn to the same mountain tops in Central America (FB 598).

Dellarobia gathers from Internet that logging the mountain side above the Mexican town was a major causative factor for the mudslides and torrential floods in Mexico. Thus, it can be deduced that it is the exploitation of nature for humanity's greed that causes the ecological imbalance which consequently paves the way for the extinction of the beautiful species like monarchs.

Dellarobia's growth in ecological knowledge, especially pertaining to the consequences of climate change and the fate of the monarchs, leads to her transformation from a self-centered person who was earlier detached from her familial and physical environment, to a better individual who learns to regard herself as part of the environment and world at large. Later she herself describes her transformation to Tina Ultner, the news reporter, "I was so focused on my own life. Just one person. I had to come back and live a different life". Dellarobia's realization of the short-sightedness of her husband's family in their decision to log the mountain to "make one payment" (FB 287, 236) ignoring its ecological implications, depicts her transformation into a more sensible and practical person. This poignant change in her perception is in sharp contrast to her earlier version, because she was not able to observe and understand the objects that were obviously visible to her eyes, for instance, the sight of the cluster of butterflies which she had earlier mistaken for bees and fungus. Dellarobia is greatly influenced by the information which she receives from Dr. Ovid, his research team and the Internet, about the fate of monarchs owing to climate change that it brings about a significant change in her consciousness. It is significant to note that though Dellarobia is not a woman of high education, she grows in ecological wisdom which is reflected in her claim that 'Man' would ultimately lose in the fight against 'Nature' and also in her prognostication, whether Dr. Ovid's research team "were looking at some kind of disaster here?". When

Dellarobia's realization is strengthened by the direness of her personal experiences which is aggravated by the climate crisis, she vehemently suggests to Dr. Ovid about the necessity of imparting the findings of climate science to the common people, "People can only see things they already recognize. They'll see it if they know it" (FB 338, 194, 341). This is a crucial aspect to be borne in mind by the scientific community regarding the necessity of communicating their scientific findings to the wider public about the various ecological concerns utilizing every means possible, so that the people can understand the changes they observe in their surroundings, its causative factors and redemptive and mitigatory action that could be undertaken to deal with the issue.

The role of science and scientists is explicitly discussed at various occasions by the scientist Dr. Ovid, for instance, "Science as a process is never complete. It is not a footrace with a finish line"; "Science doesn't tell us what we should do. It only tells us what *is*" (FB 483, 442). Dr. Ovid acts as a spokesperson for the majority of the scientists who are genuinely concerned about the well-being of the planet and utilise science for the benefit of the world at large. Dr. Ovid performs the role of transmitter of scientific facts and knowledge pertaining to the monarchs and other significant aspects related to ecology and climate change to Dellarobia who represents the non-scientific public and has been ignorant of the facts related to the same. It can be observed that Dr.Ovid is genuinely concerned about the cohabiting species and is not merely fulfilling the obligations of his profession, which is to measure and count and describe what exists, as proclaimed by him. Dr. Ovid's lament, "We are scientists. Our job is only to describe what exists. But we are also humans. We like these butterflies . . . so we're very concerned" (FB 310, 204) underscores the fact that he is a scientist with tremendous interest in his scientific pursuit of knowledge and in its

wider implications to the planetary ecosystem. Dr.Ovid sarcastically comments to Dellarobia that people expect the scientists to be some kind of super heroes saving the patients with special powers. Further, he adds that, "I'm not here to save monarchs. I'm trying to read what they are writing on the wall" (FB 314, 442). These remarks of Dr. Ovid might give an impression to the readers that he is not genuinely concerned about the plight of the monarchs and is merely fulfilling his professional duty, but actually he is trying to communicate the fact that finding solutions to the ecological concerns is not the sole responsibility of the scientists, rather it is the responsibility of the entire humanity, that is, a concern of conscience. This inadvertently hints at the fact that protecting the species is the duty of the people and ruling political bodies that have to take up the responsibility of preventing the biodiversity loss. It also explicates the reality of the present-day scenario where the scientific findings and observations pertaining to ecological concerns are deliberately ignored by the government officials who support the causes of the business stalwarts for economic benefits. Hence, though climate change is often talked as a scientific question, it is first and foremost a deeply political and moral issue (Newell and Paterson 7). Therefore, the implicit answer to Dellarobia's poignant question: "To whom did a species belong?" (FB 442) can be stated as, the species belong to the Earth and humans are just one among them who need to shoulder the responsibility of their stewardship. The rhetorical and derisive question raised by Dr. Ovid to Dellarobia about the purpose of saving a world that is bereft of its Soul, continents without butterflies, seas without coral reefs (FB 438) is reminiscent of the prominent concepts of Walden's 'Over-Soul', Paulo Coelho's 'Universal Soul', Alice Walker's 'Earthlings' and the Indian spiritual thought of *Vasudaiva Kudumbakam* (the whole world is a single family); which connote the ecospiritual wisdom of interconnectedness and interrelatedness of the planetary web.

Dr. Ovid's realization of the significance and inevitability of every facet on the planetary landscape reflects his ecological wisdom and proves that his knowledge is not confined to the rationalistic domain of science.

It can be observed that though Dr. Ovid compares scientists to referees and remarks that, "they can talk to every side", he fails in his attempts. Dellarobia aptly remarks, "Could may be. But you're not. You're always telling me you're not even supposed to care, you just measure and count" (446). This makes Ovid an imperfect vessel of climatic truth, conveying the limits of science in the contemporary world (Trexler, *Anthropocene Fictions* 227). It also illustrates the taciturn nature of Dr. Ovid, who is not very adept at communicating the scientific findings to the public. Nevertheless, it can be stated that through the scientist characters Dr. Ovid and his research team, Kingsolver engages the readers in an explicit discussion about the role of scientists and depicts them in a positive light especially because of their concern for the fate of the nonhuman species and the efforts taken for their conservation. Further, it can be stated that the author employs the narrative to exhort the readers to wean away from anthropocentric behaviour which victimizes the nonhuman species and disrupts the ecological wholeness. It can be claimed that the scientific facts related to the extinction of the monarch butterflies which is caused by anthropogenic climate change and the crucial role of science in dealing with it are often reiterated by the author to enhance the readers' grasp on these subjects. Kingsolver had stated that there are plenty of well-documented circumstances in which animals that are less adaptable than humans are getting shifted in ways that are both incongruous and fatal, as a drastic consequence of the climate crisis. This is validated by her research on the monarchs and discussion with the experts like Dr. Lincoln Brower (Curwood). Kingsolver is a real-life scientist and biologist-turned writer with a Master's degree in

Ecology and Evolutionary Biology. She firmly believes that the subtleties and nuances of the ecology and climate science can be effectively communicated through literature and this is explicitly reflected in this novel.

Leighton Atkins' Sustainability Pledge, which is asked to be signed by Dellarobia, is a very poignant narrative in the novel. The Pledge is an enumeration of the changes in the lifestyle that needs to be brought to the daily routine in order to lower the carbon emissions, that is, "to relieve the damage of carbon emissions to the planet", as declared by Atkins (FB 451). The norms mentioned in the Pledge are overt references to those factors linked to free-market capitalism and unconstrained carbon use which are considered as 'business-as-usual' in the climate science jargon because there is an absence of the concept of sufficiency (Newell and Paterson 7). It can be stated that the Pledge problematises the aspect of individual choice and ethical consumerism in dealing with climate change and underscores the significance of scientific knowledge in the decision-making process of a country. Moreover, it has implicit reference to the Biblical Fall of mankind on exercising free-will. Dellarobia's responses to Atkins highlight the fact that she does not possess electronic gadgets like refrigerator, computer or thermostat, which are generally considered as necessities by others, and she prefers to reuse or buy recycled products. Dellarobia's responses are highly commendable and surprising because she has always been practicing the conditions mentioned in the Pledge and it is an eye-opener to both Atkins and the readers' alike. Further, she represents those individuals and communities who practice sustainable living and are comparatively fewer in the society. It is also a fact worth-mentioning that Dellarobia's responses and ways of living are very similar to the suggestions given by Andrea George, Director of the Sustainability and Environmental Management Office at Vanderbilt University, who gives much

importance to the role played by the individuals in bringing about a systemic change to combat the climate crisis. Andrea suggests that the principle of consumption should be ‘reduce, reuse and recycle’ and the key factor is to reduce, because abstaining from unnecessary consumption is the most sustainable option. The technology industry has a huge environmental footprint and therefore, we have to limit the number of devices we buy and instead repair our older electronic gadgets like phones and laptops. Moreover, avoiding online shopping and expedited shopping, which are observed to be baneful for the environment, is a crucial step that the eco-conscious people need to practice. Andrea terms this combating the Amazon effect and believes that it would go a long way in reducing the carbon footprint. Andrea further suggests that if driving a vehicle, we need to bundle tasks together so that we spend less time in traffic idling and consume less fuel and walking or biking has to be made the primary modes of transportation. Andrea further remarks that airplanes are a significant contributor of greenhouse gas emissions and we had observed that climate activist Greta Thunberg had made headlines across the country by travelling by ship in 2019 to attend the climate conferences in order to make her voyage carbon neutral (Adamczyk).These remarks of Andrea can be further corroborated with the observations made by Peter Newell and Matthew Paterson:

> The origins of climate change are implicated in the choices we all make every day, throughout the day. From the moment you wake up in the morning and decide what to eat for breakfast (assuming you have the luxury) you are engaging mostly unconsciously in sets of choices about whether the food you eat is sourced locally or has been transported half way around the world to get to your breakfast table. How you heat the water for your shower implies a decision to use a particular source of energy which will have an impact

> (malign or benign) on climate change and how you decide to go to work also determines how much CO2 you add to the atmosphere. (7)

While climate change is considered as a common threat to all humankind, it is a painful fact that some people and countries contribute to it disproportionately, while the others bear the brunt of its effects who have contributed least to the problem, which is the weaker sections of the world. This aspect is clearly delineated by the author through Dellarobia and her community, who is a prototype for the poorer sections of the society who have never done much to cause climate change, nonetheless, are the victims of its brutal consequences. Kingsolver laments the fact that a lot of people on planet Earth are asked to rein themselves in when they have never got there in the first place (Curwood). This is reflected in the distressing words of Paani Laupepa, the Assistant Secretary for the Environment of Tuvalu, "I feel sad and angry at the same time, sad that eventually we will have to move, and angry because this is not our doing, but because of doing of others who don't care, who are looking after their own needs and not at the bigger picture" (qtd. in Rajagopalan 299). Laupepa was referring to the imminent evacuation of Tuvalu prior to its disappearance into the ocean as the world's first casualty of climate change. Tuvaluans feel that they are being punished for no fault of others. The reckless burning of fossil fuels by the rich countries has resulted in soaring temperatures and sea level rise due to which the poor are the worst affected. Thus, Tuvaluans will be the first to pay the price though they did nothing to see their landscape just disappear. This further points towards the interconnected aspect of the world's ecosystems.

Kingsolver underscores the fact that media serves as the spokesperson for the elite political and economic groups who misrepresent and conceal the inferences of the scientific researches for their vested interests. Conversely, these elite groups

exploit the findings of modern techno science to satisfy their self-centered wishes with total disregard for the environment and the future generations. The bitter reality of the conflict that exists between the scientists' community and the political elites who hold the strings of media, are effectively conveyed through the verbal banter between Dr. Ovid and Tina Ultner. Dr. Ovid scathingly criticizes the hypocritical stance taken by Tina in her attempts to pacify her sponsors and for not giving due seriousness to the causative factors of the extinction of monarchs which serves as a canary for the climate crisis in the narrative. Tina's primary focus on the human interest angle of the beauty of the sight of the butterflies can be considered as a camouflage to hide the bitter factuality of the crisis in spite of being aware of the direness of the situation. Tina's demand to Dr. Ovid to make his explanation for the presence of the monarchs in Appalachia briefer, is to convey to her audience that it is an inconsequential matter which does not require much media attention. Dr. Ovid plaintively responds that it is an evidence of the distorted system, a biological system falling apart along its seams because everything hinges on the climate. The mentioning of the term climate and the reference to global warming makes the reporter unhappy and blatantly responds that he would lose his audience. Dr. Ovid as a responsible scientist is not ready to change his answer to improve the ratings of the media. Dr. Ovid further indicts the media for its complicity and firmly adds:

> You are letting a public relations firm write scripts for you. The same outfit that spent a decade manufacturing doubts for you about the smoking and cancer contention. Do you people never learn? It's the same damned company, Tina, the Advancement of Sound Science. . . .They went off the Philips Morris payroll and into the Exxon pocket. . . . What you are doing is unconscionable.

> You're allowing the public to be duped by a bunch of damned liars . . . prevaricators. (FB 508-509)

This is an explicit allusion to the contemporary international socio-political scenario in which gargantuan transnational corporations like BP, Exxon Mobil, Shell, Freeport Mc Moran, and Walmart, make use of high minded advertisement campaigns through strategic donations to NGOs and universities and buy out or intimidate scientists who might testify against the slow violence of their practices and instead claim to be fine stewards of our delicate planet. Meanwhile, they persist with their profitable devastation of relatively impoverished, less regulated societies that have little visibility and recognition value in the rich country corporate media. Thus, the oil majors and allied transnational corporations are potent, active players in manufacturing the icons and stories that shape popular perception of environmental science and policy (Nixon 37-38). In a similar vein, Ghosh pertinently remarks that the opposition to climate science is enabled, encouraged and funded by certain corporations and energy billionaires whose vested interests have supported organizations that systematically spread misinformation and create confusion within the electorate. This situation is further compounded by the mass media which has generally underplayed climate change and has sometimes even distorted the findings of climate scientists, and this bias owes much to the fact that large sections of the media are now controlled by climate skeptics and big corporations that have vested interests in the carbon economy (TGD 184). It needs to be noted that Rob Nixon and Ghosh are not in favour of the media which serves the vested interests of the elite groups and it is this apathy that is vehemently expressed by Dr. Ovid. Thus, it can be concluded that the media plays a vital role with regard to dissemination of scientific truths and is an influential factor in moulding the public perception on climate change.

Therefore, if media perform their duty of transmitting the scientific truths without altering or falsifying it, they would prove beneficial to the society. Victoria Wibek provides a useful insight regarding the same:

> The mass media are seen as important actors in influencing public awareness and opinion on climate change. Many studies have highlighted the decisive role of news media such as television, newspapers and the Internet in shaping public understanding of scientific issues by acting as a bridge between the scientists and the lay public. . . . Some researchers have noted that the tendency in the mass media toward sensationalism and alarmism may be counter-productive for public engagement in climate change. In other words, how the mass media frame the issue of climate change strongly influences how the public will understand and interpret it. (11)

Tina, who represents the media in the narrative, is ostensibly a spokesperson for the climate deniers and she fails in her attempts to trivialize the critical concern of the extinction of monarchs, a serious consequence of the climate crisis. Nevertheless, she is adamant in proving her point and doggedly states that the scientists are in disagreement regarding its occurrence and the role of humans as its causative factor. Dr. Ovid gets disturbed by this statement and as a spokesperson for the scientific community vehemently declares that while 97% of active climate scientists believe humans are a major cause of climate change, the numbers are radically different among economic geologists, that is, the scientists who study natural formations, so that they can be commercially exploited by the extractive industries. Only 47% of these scientists express their belief in human-induced climate change and one of the most interesting findings of the many recent studies on climate perceptions is the clear connection between a refusal to accept the science of climate change and the resultant

social and economic privilege (Klein 46). The scientific consensus on anthropogenic climate change is further explicated by Naomy Oreskes who states scientists had predicted much earlier that increasing greenhouse gas emissions could change the climate and in the current scenario, there are overwhelming evidences which prove it. Moreover, these changes are occurring in addition to natural variability. Hence, when contrarians attempt to shift the focus of attention to natural climate variability, they are misrepresenting the situation. Further, the mass media have paid a great deal of attention to a handful of dissenters in a manner that is greatly disproportionate with their representation in the scientific community (73-74). The fervent exchange between Dr. Ovid and the reporter is recorded and posted on the YouTube by Dellarobia's friend Dovey, tagging the post as "This is what science looks like", and the video is greatly appreciated. This throws light on the importance of social media which functions as a major platform for rapid communication and mobilization for public action and therefore, it can be effectively utilized for public perception and participation to deal with the climate crisis. Hence, it has been aptly remarked that the novel traces the complex circulation of scientific knowledge through a small Tennessee community (Trexler, *Anthropocene Fictions* 227). It can also be claimed that the novel succeeds in its attempts to convey the facts pertaining to various ecological issues in a persuasive and effective manner.

The narrative of Ghosh's *The Hungry Tide* garners attention to ecology and scientific knowledge through numerous references to the various contributions of real-life scientists in the field of ecology and the fictionalization of factual situation pertaining to the endangered flora and fauna. The scientific contributions of Mr. Henry Piddington are discussed at length by Ghosh in the narrative of *The Hungry Tide* and in *The Great Derangement*. Though Piddington was a shipping inspector by

profession, he can be considered as a scientist of much significance because he had conducted a detailed examination of storms and is credited with the coining of the term ‘cyclone’. After understanding Lord Canning’s plan to build a new port on the river Matla which would be the new capital of Bengal, Piddington leaves no stone unturned to warn the planners and the surveyors regarding the dangers of urbanizing the tide country since it would be dangerously exposed to the winds, tides and storms and therefore would not last for more than fifteen years (THT 27, 285, 286). Mr. Piddington had substantiated his claims by elucidating the scientific facts pertaining to the mangroves that it acts as Bengal’s defense against the Bay, serves as a barrier against nature’s fury, absorbs the initial onslaught of cyclonic winds, waves and tidal surges, keeps the hinterland alive and in its absence the plains would have been drowned much earlier. Further, the new port was dangerously exposed and given an unfortunate conjunction of winds and tides, even a minor storm would suffice to wash it away. Piddington had written to the Viceroy requesting him to reconsider the matter because a port built on Matla would not last even for fifteen years and aptly predicted that the whole settlement would be drowned by a cyclone. A storm does occur after five years in 1867, drowning the entire town in a matter of hours (THT 285-287). This narrative is a crucial evidence of the fact that in India, scientific studies have never been given much importance, as pointed out by the eminent scientist and ecologist Madhav Gadgil (Harinarayanan and Sreekumar 12). Thus, it can be observed that scientific knowledge is utilized to warn the humanity about possible hazards. And Piddington had become one of the first Cassandras of climate science (TGD 78). However, Mr. Piddington was unfortunately considered a ‘mental’ for his timely warnings and nobody paid attention to the advice of the pragmatic scientist. This is an illustration of the helplessness of the scientists who are forced to be mere puppets in

the hands of the political executives, the ultimate controllers of the decision-making process of any country.

It needs to be noted that Piya is the only fictional scientist character delineated in the novel. Piya as a cetologist had worked in every place where the Irrawaddy dolphins are present, for instance, Burma, north Australia, the Phillipines, coastal Thailand, except in India where they had first entered the official zoological records. This inspires her to pursue her research work in India. Piya deems it as her responsibility as a scientist to prepare a detailed report of the declining population of the cetaceans because a considerable time has elapsed between her arrival and that of the earlier naturalists Blyth and Roxburgh who had crossed these waters much earlier and found them teeming with cetaceans. Moreover, Piya is concerned that if she discontinues her research work, she is clueless when another cetologist would turn up and so she plans to stay as long as possible (THT 307, 299). Piya realizes that the study of the strange behavioral patterns of the Orcaella species in the Sundarbans and the causes of its depletion was the work of a lifetime. Nevertheless, Piya is prepared to dedicate fifteen to twenty years of active field research into it with much contentment which indicates her commitment towards both her profession and the conservation of the species. Moreover, Piya aims for something worthwhile, a more fulfilling experience of satisfaction in protecting a beautiful and significant variety of species, rather than the monetary benefits her work would fetch. Piya exclaims:

> It was true that whatever came of it would not revolutionize the sciences, or even minor branch of them, but it was also true that if she were able to go through with it – even a part of it – it would be as fine a piece of descriptive science as any. It would be enough; as any alibi for a life, it would do; she

> would not need to apologize for how she had spent her time on Earth. (THT 127)

In spite of enduring various hardships, Piya decides to dedicate her entire life in order to make the rivers safe again for the Irrawady dolphins. Piya shares her anguish with Kanai, about forgoing her comfort zone of family and friends and embarking on a solitary journey without any assistance. She ruefully continues, “Look at me. I have no home, no money and no prospects. My friends are thousands of kilometers away and I get to see them may be once a year, if I’m lucky” (THT 301).This lament is an indication of the personal sacrifices made by the scientific community which is represented by Piya, for the sake of the conservation of the species or in a wider context, to preserve the equilibrium of the ecology of the planet. It is also significant to note that the dolphins cannot be relegated to as mere specimens of her scientific analysis since she considers them as individuals with their own identity and rights. This is illustrated in her naming of a river dolphin *Orcaella brevisostris* as Mr.Sloane which was found stranded near a small village in Phnom Penh in central Cambodia. Piya takes much effort to keep the dolphin alive by feeding it with fish and providing it with sufficient water. Piya experiences much gratification when it recognizes her, it “ignored the others and went straight over to Piya’s side of the reservoir” (THT 287). The importance of the value of recognition and observation of nonhuman species which is showcased by Piya is significantly brought out in the words of John Rodman, “While we can never get inside a muskrat’s head and know exactly what the world looks like from that angle, we can be pretty certain that the view is different from ours. What melts away as we become intrigued with the plurality of perspectives is the assumption that ours is privileged” (89). Piya’s gesture of naming the dolphins, for instance, ‘Mr. Sloane’, ‘Rani’ is also indicative of the fact that she considers the

dolphin species at par with the humans which is a significant aspect of ecological wisdom and a testament to Piya's biocentric vision.

The spotting of Irrawady dolphin *Orcaella brevirostis* by Fokir was a significant moment of triumph and happiness for Piya, because it was a sign that the species were not totally extinct. Piya is genuinely happy after her surveillance of the group of seven dolphins including a calf and comments, "It was exhilarating to know that the population was still reproducing" (THT 112,144). Robert P. Marzec has aptly observed that Piya's unfolding of a new consciousness in relation to the environment is no longer concentrated on the Orcaella as an isolated object of inquiry, but as an inhabitant of an extended system of existence. Moreover, it gives her an ethical rationale for existence (433). Piya's emotional response is not just an indication of scientific accomplishment, rather it is the testimony to the fact that Piya just like Dr. Ovid in *Flight Behaviour* is very much concerned about the survival of the cohabiting species and not merely fulfilling the commitments of a scientist. Further, it reflects her ecospiritual consciousness that every species is of equal importance in the perpetuation of life on the planet.

Piya records every navigational route of the dolphins which was traced by Fokir. Piya stores them in a monitor which is connected to the satellites of the Global Positioning System (GPS) and it was the only piece of the equipment that survives the storm. The binoculars used by Piya function as significant equipment because it assists her to deliver precise scientific observation. It has been aptly claimed that the binoculars do not represent yet another binary opposition of mind and materiality or culture and nature, rather functions as an ecological prosthesis (Trexler, "Mediating Climate Change" 75). The technical equipments such as the binoculars, GPS monitor and the like, utilized by Piya for her data collection are of considerable assistance

with regard to scientific observation and analysis. Further, they demonstrate the advantages of technology for the conservation of depleting species. The significance of GPS is further reinforced in the *Gun Island* when Rafi states that the GPS would be of great assistance to prevent getting caught up in storms, which would be a matter of life and death. Further, Rafi comments that the cell phones are necessary to receive weather alerts. It is also mentioned that Badabon Trust's guest house ran on solar power (THT 86, 91) which highlights the significance of utilizing renewable sources of energy to combat climate change. Therefore, it can be undoubtedly claimed that science and technology is an inevitable aspect which is enmeshed within the lives of the characters and it definitely aids to overcome the everyday challenges. Moreover, the various instances from the narratives provide substantial evidence to the fact that appropriate utilization of science and technology aids in ecological conservation. Thus, the practice of science is central to the novel. Further, Ghosh's methodology follows an anthropological model that reports human truth practices based on participant observation. This is apparently due to the fact that Ghosh was trained as an anthropologist at Oxford and had spent two decades as a professional ethnologist which shaped his own methods of composition, consequently leading his imagination to engage with real life and with the lives people lead, instead of supplying the materials for his novels almost entirely out of his own imagination (Trexler, "Mediating Climate Change" 210-211). Ghosh had accompanied Isabella Beasley, a student of James Cook University and a specialist in the study of *Orcaella brevirostris*, on a survey expedition of the Mekong and she had introduced him to the ways of the Irrawady dolphins and to those of the cetologists (THT 401). Hence, *The Hungry Tide* was written after extensive research in the Sundarbans. Therefore, the

narrative of the novel is inextricably linked with the methods of science and the workings of the scientists.

It needs to be stated that in spite of being in the scientific field, Piya's method of analysis is primarily based on but not confined to observation, data collection and analysis. In spite of possessing a scientific outlook towards her surroundings, she gives due importance to her intuitive understanding and the knowledge of the local people. In the novel, Fokir functions as a representative of the indigenous people whose ecological wisdom helps in the stewardship of their environment. The myths and legends related to the landscape of Sundarbans, function as significant sources of knowledge which anchors the lives of the indigenous people to their landscape. The dichotomous vision of the stark separation between human and nature which perpetuates the anthropocentric ideology is absent in Fokir's outlook towards life and surroundings. It can be remarked that while Piya represents science and western knowledge, Fokir acts as a counterpart with his ecological wisdom. So, it would be appropriate to consider Fokir as a sentient being with a silent and deep knowledge of his surroundings. According to Tim Ingold, simply to exist as sentient beings, people must already be situated in a certain environment and committed to the relationships this entails. This results in sentient knowledge which is not of a formal, authorized kind, transmissible in contexts outside those of its practical application. On the contrary, it is based in feeling, consisting in the skills, sensitivities and orientations that have developed through long experience of conducting one's life in a particular environment. Another word for this kind of sensitivity and responsiveness is intuition which has been widely regarded as knowledge of an inferior kind in the tradition of western thought and science (25). It can be observed that with Fokir's companionship,

Piya also becomes a sentient being and her transformation is further explicated by Ghosh in the *Gun Island.*

Piya's request for Fokir's assistance in order to survey the daily migrations of dolphins (THT 210), points to the fact that Piya as a scientist is ready to accept the indigenous wisdom of Fokir who is well-versed with the ecology of the Sundarbans. To the question posed by Moyna, Piya responds that inspite of the fact that she is a scientist, Fokir's knowledge of the waterscape of the Sundarbans is of much significance, though he is an illiterate. Moreover, Piya feels proud to work with Fokir, whom she finds exceptional compared to the previous fishermen she had worked with, because he possesses an incredible instinct and has thorough understanding of the river. These instances demonstrate Piya's realization that the scientific knowledge is not all-comprehensive and complete, and needs to be complemented with the wisdom of the indigenous people who have an ecospiritual affinity with their surroundings. This can be substantiated with Ghosh's statement, "I read a lot of science, especially climate science, but I don't think science is the only way to understand reality. . . . It doesn't exhaust our knowledge of the world" (Ghoshal). Further, the limitations of western science are also brought to the fore in the vivid descriptions of its failure to protect the humans from the tiger attacks or to save the river dolphins and other species from extinction. Piya also loses most of her technical equipments which had aided in her scientific pursuits, during the severe storm at the climax of the novel, which highlights the limits of human agency to control their scientific inventions in the face of nature's wrath and further draws attention to the futility of techno-science to triumph over nature.

The various scientific descriptions pertaining to the aquatic animals shared by Piya to Kanai in the section 'Pilgrimage' are factual events. The chapter is evocative

of the noteworthy essay “Tradition and Individual Talent” by T.S. Eliot, since Piya gives due recognition to the contributions of her forerunners in the scientific field like Pliny, the Elder, who had identified the Indian river dolphin in the first century, William Roxburgh, who wrote a famous article in 1801 announcing the discovery of the Gangetic dolphin, and others like Blyth and Anderson for identifying the Indian pilot whale *Globicephalus indicus* and the Irrawady dolphin *Orcaella fluminalus*. At Gorjontola, during Piya’s data-collection with Fokir, she is elated by the sight of Gangetic dolphins *Platanista gangetica*, because their population is considered to be rapidly declining. However, the gladness at this unexpected sight immediately leads to despair because of their strange and disturbed behaviour. Piya recollects an article written in 1970s by the Swiss cetologist Professor G.Pilleri, who is considered as an expert in the study of river dolphins. Pileri had discovered that Platanistas’ are very sensitive to atmospheric pressure which makes them behave in unusual ways (THT 365-367). Fortunately, it is a timely recollection since Piya is able to foresee the coming of a storm. The author makes an attempt to underscore the fact that no scientist can work fruitfully in isolation and every scientific finding is in some way based on the contributions of their predecessors.

Piya’s report on the dolphin sighting in the Sundarbans area receives several offers of funding from conservation and environmental groups. Piya proposes to commence the project under the aegis of the Badabon Trust run by Nilima so that the local fishermen could be involved (THT 397), which depicts her altruistic mentality to support the indigenous community. The most important achievement of *The Hungry Tide* is considered to be the articulation of the emergence of this new social configuration resulting from the endangered river dolphins.This can be observed in the epilogue of the novel where Piya proposes a new conservation organization named

after Fokir and under the sponsorship of the Badabon Trust, a local NGO creating a partnership between disparate agents: ecological scientists and American environmentalists, academic funding bodies and web-based environmental contributors, a grassroots organization for women and under-employed men, local fishermen and endangered marine animals (Trexler, "Mediating Climate Change" 217). This social configuration can be stated as a symbolic manifestation of the holistic web. It needs to be noted that the routes and maps recorded in the GPS represent decades of work and volumes of knowledge of Fokir. And in the depiction of Fokir as the foundation of Piya's project, the author reiterates the significance of science and technology to preserve the ecological balance of the planet and simultaneously underscores the necessity of integrating it with the indigenous knowledge and wisdom to make it comprehensive. This is keeping in with the line of thought that in the present scenario even voices from within the sciences are arguing for establishing new ways of thinking about nature because knowledge in relation to nature is construed organically, which implies that it is finite and changing rather than fixed, eternal and unchanging truth. Correspondingly, scientific and technological interpretations of nature have no epistemological privilege as the final word and the complete understanding. They are truths but not the only one and hence space should be provided for other logics, especially eco-logics that promote wholeness and balance in this epoch of eco-destruction (Glazebrook 76). Therefore, it can be deduced that western science needs to be complemented with indigenous wisdom in order to find solutions to the ecological crises in a comprehensive and holistic way. It has been aptly remarked that the novel pays close attention to Piya's field work, the colonial background to ecological research, the interplay between local myth and scientific knowledge and tensions between human place and climatology, all of which

makes it an interesting field to explore the interconnections between science and literature (Trexler, “Mediating Climate Change” 210). It also needs to be mentioned that though climate crisis is the predominant theme in the novel, there is not even a single explicit reference to it in the entire narrative which is often acclaimed by critics. However in the *Gun Island*, the author explicitly engages with climate change, probably to instruct and highlight the magnitude of the issue to the readers.

In *The Rapture* by Liz Jensen, the principal scientist hero is the physicist Dr. Frazer Melville. Gabrielle Fox is a psychotherapist who is assigned Bethany Krall. Bethany has been labeled ‘intractable’ and nobody prefers to deal with her. Though Bethany was brought up by evangelical Christian parents, who are staunch believers in the Bible, she is greatly influenced by the knowledge and scientific information she received from school, which irks her parents to the extent of disowning their only child and label her as a devil. Bethany is described by her school teacher as highly intelligent but disturbed and self-destructive. Nevertheless, she paid attention in class displaying keen aptitude for sciences, arts and geography. Bethany is considered as an insane teenager, one of the most dangerous children in the country who has not even completed her schooling. Therefore, her premonitions about the various upcoming disasters and her perceptions about the precarious condition of the planet due to the climate crisis do not garner any attention or seriousness (TR 8, 10, 331, 300). It can be stated that it is the knowledge which Bethany gains through the science subjects which equips her to have a better understanding of the climate crisis. However, the narrative is also evocative of the depressing fact that despite being aware of the harsh realities of the anthropogenic ecological crises and its brutal consequences being endured by the inhabitants of the planet, human species refuse to act. This is evident from the sardonic remark made by Bethany to Gabrielle that she is at Oxsmith

because people like her refuse to observe and learn from the happenings around them and therefore, it is much easier to lock her up than listen to her words. Bethany significantly adds, “You pretend things aren’t happening because that’s what you want to believe, and by the time you do, it’s fucking too late” (TR 57). This is precisely what the climate scientists across the world have been trying to warn the governing political bodies and public at large. In this context, it is significant to note the pertinent observation made by Terry Gifford that as living beings we need to be aware that we live at the centre of an environmental crisis, and we need to refine our evolved abilities to read the natural systems within which we have our home and sustenance, the feedback system with which each of us daily interact. Our evolution as a species has been in part, determined by our ability to interpret the signs of nature; for instance, the meaning of the pattern of storms, the reasons for the appearance or disappearance of particular creatures, implication of a river changing its course. Bethany has evolved a sensitivity that is more advanced and hence she is a biosemiotic creature compared to the rationalists around her and possesses “tacit knowledge”, a phrase used by Wheeler who elaborates, “Tacit knowledge is real knowledge semiotically conveyed and “read”, but it cannot ever be wholly conveyed in prepositional language; it is skillfulness (for good or bad which can only be learned by practice in doing)”. The animality of Bethany’s ability to sense approaching natural upheavals through the electricity of “turbulence”, “sensitivity to geological and meteorological vibrations” in the novel is in one way a reminder of lost embodied skills. Gifford further observes that Bethany’s special skill is problematic to Gabrielle at first because it is not recognized as a form of creativity. Gabrielle and the scientist Frazer Melville have to unify Bethany’s predictions in the language of abstract conceptual knowledge (9, 161,10).

Frazer considers Bethany's warnings implausible and mocks it as 'pan-catastrophology' when informed by Gabrielle about the massive hurricane that would occur at Rio De Janeiro on twenty ninth of July. Frazer admits that global warming is resulting in various incidents which are unprecedented in the history of the Earth which makes it difficult to model it on the computers because they contain only the parameters of facts that are already known. It can be suggested that Liz Jensen makes an attempt to mock at the scientific and technological advancements made by the human species, through the delineation of the character Bethany who has the ability to predict global catastrophes to its exact dates as she proudly declares, " I have fucking satellite vision. Like the Hubble telescope" (TR 70, 71, 25). Her peculiar ability which is ascribed to the ECTs can be considered as metonymical for the fossil-fueled electricity, a significant contributor of climate change. Bethany's body is a microcosm of the planet Earth and the ECTs help her to experience within her body what the planet is going through. Nonetheless, Bethany is incapable of convincing others about her sufferings or rather the sufferings of the planet. Therefore, it has been aptly remarked that understanding climate change ecologically and conveying a sense of the quite divergent impacts it might have on communities around the globe is a task of great magnitude (Heise, *Sense of Place* 206). Further, it points towards the limitations of science and technology to comprehend nature in its totality and find complete solutions to the various ecological issues of the planet.

Bethany's drawings garner attention from Frazer and Gabrielle only after the fall of the statue of Christ due to the hurricane Stella in Rio and Brazil. Frazer justifies his lack of belief in Bethany's prophecies with his statement that doubt is essential because the progress of science depends on both argument and debate. Frazer further adds that new theories are heavily resisted and are accepted very gradually and proves

his point by stating that scientists firmly believed that the present global warming had nothing to do with human-generated carbon emissions (TR 87). It can be noted that Frazer's remarks are reminiscent of Dr. Ovid's conversation with Tina. Moreover, Frazer's remark indicate the divergent opinions held by the scientists with regard to the anthropogenic climate change which resulted in their division into believers and skeptics, prior to its acceptance by the majority of the scientists across the world.

Frazer finds apparent similarities between Bethany's sketches and Van Gogh's paintings, with regard to storms and turbulences. An earthquake measuring 7.7 on Richter scale that devastates Istanbul leads to the expurgation of the skepticism of Frazer and Gabrielle. Further, they feel guilty for the manslaughter on a massive scale, since they did not disseminate the knowledge of the forthcoming disaster to the public and this grave omission had led to the atrocity on the scale of any war crime. While Gabrielle and Frazer become aware of the disaster by listening to the BBC news, Bethany claims to have experienced it all over her body. According to Bethany, the forthcoming disaster on twelfth October is worse and hitherto inexperienced by the humanity because though it would commence at a particular place, it would spread rapidly, too fast for anyone to do anything about it. Though Frazer tries to inform his colleagues, nobody pays any seriousness to his statements. He is mocked for his 'humour' and 'insanity' and is also criticized and warned by his superior for making scientifically unfounded statements (TR 113, 128, 157, 159). Therefore, it can be observed that Frazer's experience corresponds to Piddington's fate in *The Hungry Tide*.

It needs to be noted that twelfth October is also considered as the day of the Rapture. The Faith Wavers led by Bethany's evangelical father gather at the Olympic stadium, awaiting the event. This narrative can be regarded as a dig at the narrow-

minded outlook propagated by the dogmatic religious beliefs and practices which does practically very little to think and act about the critical issue of climate change. This can be substantiated with Reverent Yongkee Cho's version of the Second Coming according to which the 'rapture' is not of individual but of the church and with the rapture, the Holy Spirit will leave the earth, the world will subsequently stand under judgement and will be destroyed. Therefore, the salvation is not salvation of the world and history, but from the world and history. Hence, it has no relevance to the spirit of the whole creation or the continuation and preservation of the life of ecosystems (Lee 395). The role of Frazer as a scientist is pertinent because he provides an interpretation for Bethany's predictive drawings of climate catastrophes and takes responsibility for the subsequent action as his profession is based on the study of seismic activity, tsunamis and cyclones. It can be noted that similar to Kingsolver and Ghosh, Jensen resorts to the incorporation of factual events; for instance, the paintings of Van Gogh and his suicide helps the readers to gain a better understanding of the character Bethany. Frazer deciphers Bethany's coded charcoal paintings and arranges a team of experts including a climatologist and geo-paleontologist to analyse the impending collapse and communicate it to the wider public. It can be rightly claimed that Frazer does everything possible within his means to save the planet from annihilation caused by the drilling of the sea bed of the North Sea for frozen methane. This is the ultimate climatic disaster predicted by Bethany, as depicted in the final part of the novel. Thus, it is made explicitly clear that the catastrophe is not an accidental occurrence but an inevitable consequence of the 'slow violence' (to use a phrase of Rob Nixon) perpetuated by humans on the nature. Further, unlike Dr. Ovid and Piya who are already familiar with the nature of the ecological crises and travel to those particular places as part of their scientific

pursuits, Frazer understands about the imminent catastrophe incidentally. Thus, the realization of the crisis is an on-going process which culminates only with the actual disaster in the final scene. This can be considered as a deliberate attempt by the author, which can be corroborated with her statement that she uses her novels to explore about what she does not know and hence her novels are a voyage of discovery (Schjonning).

In the narrative, Dr. Kristin Jonsdottir, an Icelandic geo-paleontologist, has worked extensively on analyzing the frozen methane in the ocean's crust and describes it as the ice that burns, which is a factuality. Ned Rappaport, a climatologist who had earlier worked for National Oceanic and Atmospheric Administration(NOAA), had quit a few years back after spending fifteen years modeling climate disaster scenarios and making recommendations that no one ever paid due attention (TR188, 207). This mirrors the contemporary state of affairs with regard to the fate of the climate scientists whose findings and warnings regarding the climate science are not given due seriousness. It also hints at the climate denialism advocated by the climate skeptics within the group of scientists who are not ready to reveal the profound facts related to anthropogenic climate change, chiefly for the sake of their personal benefits. Ned Rappaport diligently decodes Bethany's painting of 'Tribulation' and ascertains it as the drilling of the frozen methane. Ned crucially points out that hundreds of experimental rigs have been planted off coast all around the world by the energy companies of China, the US, India and others, who are involved in the process of exploiting the sub-oceanic hydrates which has increased the threat of the methane catastrophe (TR 212). This is a fictionalization of the soon-to-be materialized grim reality because the possibilities of fracking are being seriously researched by the developing economies of the world. The scientific technique of

fracking methane hydrates that leads to the ultimate ecological disaster can be considered as the crux of the narrative. It has been discovered that methane hydrates are a massive source of greenhouse gas and are available in huge quantities compared to oil, gas and coal. According to Klaus Wallmann, who is leading a German research initiative to explore hydrates as a natural gas resource, disturbance of the hydrates could wipe out local ecosystems and trigger tsunamis. According to a pertinent study conducted by the Centre for Arctic Gas Environment and Climate (CAGE) in June 2017, unexpected methane blasts are a crucial problem (Colman). Huge hydrate blowouts are found to have occurred earlier, but they were triggered by nature. Approximately fifty five million years ago, the release of 1,200 to 2,100 billion tons of methane carbon from hydrates has been blamed for causing global temperatures to accelerate by 5ºC (Jones). In the narrative, Ned poignantly remarks that the climate protocols are always flouted. Further, the hypocrisy of the ruling government, the selfishness of particular groups and the tendency of the humans to think in terms of short duration compounds the problem (TR 213). This corresponds to the observation that fracking is incompatible with the international goal of maintaining global warming under 2ºC above pre-industrial levels. Nevertheless, it is the same governments around the world which had ratified the Paris Agreement that are presently supporting oil and gas companies which are extensively involved in fracking all over the world (Mikulka). This exemplifies Vandana Shiva's observation that at a deeper level, scientific knowledge on which the development process is based is itself a source of violence and modern reductionist science has excluded ecological and holistic ways of knowing which understand and respect nature's processes and interconnectedness (14). It is yet another instance of the exploitation of scientific knowledge for the greed-driven motives of a certain privileged and influential group

who plunder the natural resources and thus abuse the planet. These groups with vested interests forget the fact that the Earth is shared by many innocent people and other living creatures who would be the primary victims of the nature's fury when the planet retaliates. The author also underscores the fact that the moments of denial experienced by Gabrielle is suggestive of the false hopes of humanity which is very confident that though there might be instances of such large-scale catastrophes, it would not occur in their lifetime or nature cannot wipe-out civilization since humanity is technologically equipped to face disasters on a large scale. And it is this particular strain of thought that propels humans to continue unfazed on the trodden path of exploitation and plundering of nature.

Harish Modak is a significant scientist and a thinker in the novel who has advocated zero birth-rate. Nevertheless, he is ostensibly a pessimist and a sadist with regard to the fate of mankind because he believes that humanity is going to reap the consequences of its egotistical actions shortly. Modak had vehemently expressed his observations in his latest article published in the Washington Post, which is read by Gabrielle:

> There is colossal arrogance in the assumption that humans will last forever. If we look at the planet's life across billions of years, rather than in terms of humankind's meager history as a dominant species, we will see that our presence has lasted the blink of an eye. We are the agents of our own destruction – and when we are gone, extinguished by our heedless quest for expansion, the planet will not mourn for us. Indeed it will have cause to rejoice. (TR 36)

Modak significantly adds that while earlier children were regarded as a blessing, presently the kindest thing to do for our grandchildren is to refrain from generating them. Modak's remarks are implications of the hostile living conditions of the planet the future generations are going to bequeath, due to the reckless attitude of the present generation. It can be stated that Modak is a spokesperson for a large number of people around the world who concur with his viewpoint and have decided to abstain from having children. This validates Modak's opinion that giving birth to them in such a depleted world would be an act of injustice. In spite of Modak's incisive arguments against protecting the human species, he finally creates a geo-graffiti of mystery ciphers BHC6N-05.24ECH4 made of phosphorescent liquid that freezes on contact with ice, in order to draw attention to Traxorac's methane rig in the North Sea. Further, with the assistance of Ned Rappaport and Kristin Gonsdottir, Modak warns the public through the media about the impending tsunami in the North Sea, which could devastate northern Europe and submerge much of Britain. Kristin employs the techniques of the figures, maps and graphs to warn the public about the scientific aspects of the disaster (TR 299-300). Therefore, it can be discerned that scientific knowledge emerges as things are circulated through laboratories, instruments, competing scientists, institutions and the public (Trexler, "Mediating Climate Change" 35). It can also be asserted that it is the methodology of scientific analysis and demonstration by the scientific experts with the help of relevant technology which succeeds in warning the public. Further, the use of modern technologies like the mobile phone, internet, computer, satellite and other, facilitates rapid communication and leads to the formation of a planetary perspective. The depiction of the brainstorming for solutions by the group of experts from different fields of climate science highlights the significance of their methodological analysis and the necessity

of instantaneous communication to the public about their observations and findings. This course of action is crucial because experts such as scientists, doctors, statisticians or engineers often tend to evaluate and prioritize risks quite differently from the way the general public does (Heise, *Sense of Place* 124). It also needs to be noted that the scientist characters do not attempt to escape from the place of risk. Rather, they stay back and take much effort to warn the vast population of the imminent ecological catastrophe which highlights their selfless attitude. Gabrielle is able to overcome her dejection and regains a sense of self-worth by getting involved with the group of scientists to warn the public of the disasters which proves to be a selfless act. Further, it depicts her as a transformed individual compared to what she was prior to her fatal accident. Hence, similar to Dellarobia, Gabrielle transforms from a self-centered individual who was primarily concerned about fulfilling her own wishes and dreams, into a matured individual who gets more concerned and involved with the life of other individuals, society and the planet at large.

It can be argued that the significance of science and technology cannot be undermined in the contemporary world, but at the same time the legitimacy of utilizing scientific knowledge for unsustainable causes which disrupts the ecological balance of the planet needs to be thwarted. This is the underlying premise that is articulated by Jensen. Further, it can be stated that the thematic concerns of *The Rapture* with regard to the utilization of knowledge, science and the pertinent role of scientist characters to deal with the ecological concerns are similar to the *Flight Behaviour* and *The Hungry Tide*.

In the narrative of Saci Lloyd's *The Carbon Diaries:2015*, the very act of carbon rationing in London as chronicled by Laura Brown is a scientific process because it involves the utilization of the technological devices to investigate the

individual's consumption of energy in response to the allocated carbon allowance. Hence, it necessitates scientific knowledge and skills to understand and budget for carbon emissions. The vivid descriptions of the carbon rationing fictionalize the actual attempts made by the Carbon Rationing Action Groups (CRAGs) in various parts of London in 2006. The idea was first articulated by Andy Ross, following the climate change march in London in December 2005 which was inspired by George Monbiot's speech calling for 90% emission cuts by 2030 (Howell 4). Thus, it can be observed that the novel discusses real and pragmatic issues of everyday life and this corresponds to Lloyd's remark, "Let my books be real. . . . Why has everything got to be fantasy now?" (Thorpe). It can be observed that due to the climate changing world, the knowledge-driven education system undergoes drastic changes from divergent and multifarious subjects like Philosophy, Sociology, Art to those courses and subjects which focus on life skills meant for survival, that is, 'more practical stuff' like Design Technology. The college where Laura studies focuses on arranging classes to make the students equipped to face the altered circumstances caused by the climate crisis. For instance, Laura records that the college syllabus has been reprogrammed with a compulsory Environmental Energy Saver A-level Course. Later, the college is suspended since rain water rises to a dangerous level and on reopening a lecture on flood preparation procedure is delivered by the Energy Specialist Parry Jones. Storms and storm surge is explained and safety instructions required during floods and storms are imparted. Moreover, the college cancels the Travel and Tourism course because they consider that it is impractical to offer courses in which students are not going to enroll hereafter (CD 28, 12, 48). In the sequel *Carbon Diaries: 2017*, Laura records on 6th February that on the reopening day of the University her class is assigned the task of designing a direct action campaign to change how and why people drive cars

(39). Hence, it can be observed that theoretical and practical aspects of scientific knowledge and technology attain more prominence than ever before. The significance attributed to the instruction of practical and smart thinking through the curriculum in both the narratives can also be attributed to the fact that Saci Lloyd is a teacher by profession.

Climate changed landscape necessitates new gadgets and inventions like smart meter into the lives of the common people, which is capable of displaying every aspect associated with energy consumption in the house. The smart meter gradually overpowers the members of the family and transforms into a 'military dictator'. For instance, the smart meter switches off Kim's hot water in the shower and replaces it with ice cold water, turns off the toaster at breakfast and later disconnects the oven, cooker and fridge owing to over-consumption of electricity (CD 71). It is pertinent to understand that the over-dependence on fossil-fueled electricity which has resulted in the ecological disequilibrium, has inadvertently lead to carbon-rationing. Moreover, the scientific inventions and gadgets, necessitated due to climate crisis, attain the level of supremacy to reign over humans. These instances underscore the fact that prioritization of technology would later turn baneful for survival. This is exemplified through the improbable weather events and unprecedented disasters across the globe which bring the entire public system to a standstill, thus impinging upon the lives of individuals and societies. It also points to the fact that stringent measures adopted to avoid catastrophic warming like the use of smart meters which are so jarring to the reigning capitalist economic model would not have had to be employed, if the governments including that of the US had started reducing emissions back when the scientific consensus on anthropogenic climate change had first solidified (Klein 55). It needs to be stated that the utilization of smart meters is a factual concept,

implemented in North America, Italy, Australia, Finland and Sweden. They are highly adept energy trackers, though beyond human control. They transmit wireless signals to indicate the quantity of electricity consumed in the house.

It is interesting to note that dire circumstances force ordinary and non-scientific people to think and act like scientists. For instance, Laura's father takes efforts to invent and innovate with the intention of making the house 'self-sufficient'. Laura's father makes an attempt to unearth indigenous knowledge by attempting to experiment an ancient secret process of harvesting water from the air, "It kind of captures tiny water droplets from passing clouds and fog and in the morning – Bingo – the pond is full of water. The key to it is the hilltop location, because as the air rises it cools and cold air holds less moisture. Forget Africa is being in drought – there's been precious little rain in Europe this year and I want to make sure we've got a viable source of water". In a similar vein, Ravi declares to Laura that his ambition is to "invent stuff. Make things cleaner and better" (CD 147, 170, 223).

The author explicates through the narrative that experiencing the bitter consequences of climate change which has altered the norms of modern existence leads to the transformation of the characters' consumerism-driven life as they realize the significance of leading a sustainable and pragmatic way of living, a pivotal aspect of ecological wisdom. This positive change depicted in the narrative can be attributed to the author's endeavour at writing these novels with the intention of being part of a movement for change. Moreover, the author has stressed upon the necessity of discovering a better and fairer way of living at the earliest possible (Gruber). Lloyd effectively communicates the knowledge about the possibilities of imminent catastrophes awaiting the humanity, if we persist on the trodden path of business-as-usual. The author appears to suggest that industrial policies need to be adapted

according to the suggestions of the climate scientists in order to develop sustainably, that is, without causing interference with the ecology of the planet. Thus, the thematic aspects of knowledge, science and ecological wisdom are clearly interwoven in the narrative.

To conclude, any response to anthropogenic climate change entails a scientific understanding of human relationship with the environment in the Anthropocene. Climate-themed fiction seems to be an important tool to communicate climate knowledge from scientific domains to the wider public at large. The novels examined in this chapter effectively convey the facts pertaining to climate science and affirm that climate crisis is caused by anthropogenic factors. The authors have painstakingly collected factual details related to the ecological crises and weaved them into the fabric of their imagination. This is a unique feature of the cli-fi genre and a pivotal aspect in the literary domain in the present testing times. This aspect of incorporating facts into the fictional narratives is crucial because according to the findings of a study, facts including science facts presented in narratives appear more real to the readers than facts not seen in narratives (Marsh etal. 449). Similarly, another study has demonstrated that readers judged science facts embedded within a narrative to be more truthful than facts not included in the narrative (Dahlstrom 857). However, the implication of climate change novels cannot be constricted to as mere attempts to seize the arbitrary meaning of climate change or as literary representations of scientific facts. Rather, they are the force that interacts with climate change, remaking what we know about the climate change and the novel at the same time, as poignantly stated by Ghosh (TGD 54). An underlying motif of these novels is the condemnation of the dominant capitalist economy which is based on the exploitation of fossil fuels – the predominant causative factor of climate change, and this crucial aspect is

reiterated by the scientist characters. Kingsolver and Lloyd make it explicit that decarbonising the economy should be of utmost priority, to combat the ecological crises. A significant alternative suggested through the narratives is to exploit renewable sources of energy and this is exemplified in *Gun Island* by depicting that Badabon Trust's guest house was powered by solar energy. A significant feature of climate fiction is that after the discovery of anthropogenic climate change, society is blamed and then invoked as the space for positive action and nature is cited as the pre-existing state and ultimate goal, as critically remarked by Ghosh (TGD 57). These aspects can be traced in all the novels examined in this study.

Science is undeniably an ally and savior of the environment. Scientific knowledge has played a crucial role in explicating the ecological destruction caused by anthropogenic factors. Further, it is the application of science through technology that assists the process of scientific analyses. This is exemplified in the novels through the depiction of the utilization of the labs and equipments by Dr. Ovid and his research team, various scientific gadgets by Piya for data collection, various sources of modern technological media and the geo-graffiti of mystery ciphers to draw attention to Traxorac's methane rig in the North Sea by Frazer and his team and the smart meters to check carbon consumption. However, the authors have also underscored the culpability of science in the unfolding of the ecological crises. Various forms of scientific knowledge are exploited to gratify the economic and political interests of the elite groups. Val Plumwood has poignantly remarked that modern science also has an uglier face. Plumwood refers to techno science which has contributed to producing the environmental crisis as much as to curing it, through its application to highly complex situation whose aim is to maximize outputs, generally with devastating results (38). The exploitation of science to control and subjugate

nature reveals the callous disregard for the weaker sections of the society and the nonhuman species. This is demonstrated through the depiction of the utilization of dangerous insecticides and pesticides which adversely affect the ecological web through biomagnification in *Flight Behaviour*, exploitation of fossil fuels for consumerism-based capitalist economy which is alluded to in all the novels and is the underlying motif in *The Carbon Diaries: 2015*, exploitation of unconventional sources of fossil fuels like methane hydrates through fracking in *The Rapture*, all of which contribute towards the acceleration of the climate crisis at an unprecedented and exponential scale.

Most of the characters in the narratives are depicted as being unfamiliar with the occurrence of the ecological crises and its causes and consequences. They become aware of it gradually as the narrative unfolds, through various sources like scientists and media. Moreover, the scientist characters Dr. Ovid and Piya undergo significant transformation by learning from their surroundings and from their companionship with the inhabitants of the places. The eminent cli-fi writer Ian Mc Ewan has observed that climate change in literature is “intractable . . . unwieldy because of the moral weight of it” (Tonkin). However, the novels selected for this study overcome these limitations and can be aptly classified as cautionary tales because the readers are persuaded into eco-sensitive behaviour and sustainable living through the experiences and attitude of the protagonists and their eco-consciousness. Moreover, the novels can also be termed as ‘Lab Lit’ (Bouton), since it depicts realistic scientists as central characters and portrays realistic scientific practices or concepts, typically taking place in the present realistic world.

It is high time that the contributions of climate scientists were given due recognition. This is explicitly reflected in the words of Greta Thunberg, “I don’t want

you to listen to me, I want you to listen to the scientists", uttered when instead of stating her observations, she had submitted a UN climate panel report before the US Congress (Volcovici). This is a vindication of the significance of the climate scientists and the necessity of implementing their suggestions on a war-footing because finding solutions to ecological crises is humanity's shared challenge. It can be noted that the scientists are significant characters because they perform the crucial task of transmitting the knowledge and information pertaining to the various ecological crises to the readers, through the protagonists and other characters with the aid of media. Scientist characters also forewarn about significant occurrences and forthcoming disasters to the characters so that necessary action could be taken. Moreover, they provide explanation for certain phenomena and incidents that are experienced by the characters in their localities owing to climate change, about which they were hitherto unfamiliar. This can be considered as an investigation of the meaning of climate change for the wider public. Thus, we can observe a complex circulation of scientific knowledge through the interface between the narrative and the readers. It is also significant to note that their scientific pursuits are untainted by personal and monetary benefits. Hence, the scientists Ovid, Piya, Piddington, Frazer and his team, especially Harish Modak, appear as 'Earth-saving heroes'. Frazer also helps to negotiate between rational and theological explanation for natural catastrophes (Trexler, *Anthropocene Fictions* 46, 32). The scientists also realize the fact that rationalistic science is by its nature not comprehensive with regard to the understanding of the world. The readers are made aware that scientists are as limited and capable of failure as any other human being. Therefore, they cannot be expected to have all the answers and nor can they be always correct about the answers they offer. The readers are also made to understand that the complexity and partiality of scientific data needs to be

respected (K. O'Brien 184). Limitations of the scientist characters' rationalist efforts to understand and organize the world for humanity's benefits are underscored by the fact that despite taking painstaking efforts, they are helpless in preventing the catastrophes. Nonetheless, it needs to be noted that though they belong to the scientific domain where rationalist thinking is prioritized over feelings, they are genuinely concerned about humanity and other species. Moreover, the scientist characters strongly believe that the nonhuman species have equal rights on Earth and so their lives should not be jeopardized due to the self-centeredness of particular elite groups who are unmindful of the brutal consequences of their violation of nature. Therefore, it can be discerned that the scientist characters 'think with the weight of the Earth' to use the phrase of Linda Holler (2), and they engage in what Judith Plant has called 'thinking feelingly' (155).

The narratives also direct our attention to the moral and ethical stance that needs to be taken with regard to the use of scientific knowledge. They are also testimonies to the fact that what we have is a science that is monological and instrumental that has been encouraged not to question its ends and which makes it a good servant of power. On the contrary, what is imperative for a viable future is an integrated and democratic science that is dialogical, non-reductionist and self-reflective, that can bring itself and its end under critical and democratic scrutiny (Plumwood 41, 83). It is important to note that alternative forms of science are both feasible and inevitable for survival. Kingsolver, Ghosh and Lloyd throw light on the fact that scientific knowledge is valued and preferred to vernacular or indigenous knowledge. Vandana Shiva has aptly remarked that modern science is projected as a universal, value free system of knowledge which has displaced all other beliefs and knowledge systems by its universality, value neutrality and by the logic of its method

(15). In a similar vein, it has been suggested that the dualist nature of western society, prioritizing one aspect of the society through the denigration of its opposite is seen as the cause of the ecological destructiveness (Mellor 16). However, it is very important to mentally erase this dichotomy, which is achieved by Piya who realizes the significance of incorporating the indigenous wisdom, which according to Paula Gunn Allen is to perceive the essential harmony of all things and view things as being of equal value in the scheme of things (243). Piya's incorporation of Fokir's knowledge into her project and imbibing his perspective of viewing nature, draws attention to the fact that pursuing a scientific path should never be a means to undermine other ways of thinking.

Dr. Ovid's and Piya's temperament validates the fact that the myriad forms of knowledge should be ultimately responsible for the life on planet. Therefore, what humanity needs in these turbulent times is the ecological wisdom to live and let live, keeping in mind our cohabiting species and the future generations to whom we need to bequeath the planet. This does not imply that science and technology has to be abandoned or denigrated, rather it has to be utilized to reconcile with nature in the journey towards wholeness and commitment to the Earth. Rachel Carson is an inspirational icon in this arena because though her career and writings were committed to science and took efforts to popularize it to inform the public, she was well aware of its limitations. Carson's works were imbued with ecological spirituality which was made explicit by reverential thinking and identification with nature. In this context, it needs to be noted that the eminent scientists are suggesting that science alone is not enough to solve the planetary environmental crisis and that we need to recreate for ourselves a sense of place within the biosphere that is steeped in humility and reverence for all life (Suzuki and McConnell 241). It is also relevant to note the

words of Foucault who has argued that a science of 'human' is not possible, not because man is qualitatively different from everything else in the cosmos, but because he is precisely the same as everything else. Foucault eagerly anticipated the time when the Apollonian form of science, 'hardened into Egyptian rigidity', (as remarked by Nietzsche) shall dissolve in the Dionysian celebration of a 'revel of forms' (White 32, 26). It can be observed that Carson's and Nietzche's thinking reinforces Barry Commoner's dictum that everything is connected to everything else, which conveys the interrelatedness and interconnectedness of the world, the ultimate ecological wisdom and the underlying premise of Ecology.

Hence, it can be stated that literary fiction which incorporate scientific knowledge pertaining to climate crisis and other ecological concerns, contribute to the rethinking of the relationship between the human species and the Earth.

Chapter 7

CONCLUSION

“ What use is a house if you don’t have a tolerable planet to put it on?”

- Thoreau

“The care of the Earth is our most ancient and most worthy and after all our most pleasing responsibility. To cherish what remains of it and to foster its renewal is our only hope” - Wendell Berry

This thesis attempts to study the ecological concerns delineated in the selected fiction and from the discussions in the foregoing chapters it can be concluded that the findings concur with the hypothesis in the sense that fossil-fueled capitalist mode of development and lack of ecospiritual thinking are the primary contributors for the mounting ecological crises. The arguments have been substantiated using observations, theories and concepts from diverse disciplines like sciences, politics, economics, media and others. Hence, this thesis has adopted an interdisciplinary methodology and eclectic approach which has proven beneficial for a comprehensive understanding of the thematic concerns. Further, it has also facilitated the literary analysis of various ecological concerns, which were hitherto confined to sciences and social sciences.

Kingsolver and Lloyd explicitly state in their narratives that anthropogenic factors like fossil-fueled economy are responsible for the accelerating climatic crisis which causes vast changes to the planetary landscape and severe loss of biodiversity, however, Ghosh and Jensen make subtle references to it. The authors contend that ecological crises is the manifestation of the spiritual crisis because it is the lack of holistic thinking and reverence to the ecological web of the Earth which propels

humanity towards violation of the biosphere. The altered global climatic conditions, rapidly increasing temperatures, hurricanes, storms, tsunamis, floods, droughts and the consequent inundation of the landscape or paucity of water experienced by the living organisms are depicted by all the authors alike. While *Flight Behaviour* and *The Hungry Tide* depict the climatic changes in the rural landscape, *The Rapture* and *The Carbon Diaries* depict the changes wrought to the urban landscape. Lloyd underscores the ill-effects on the mental landscape as well, by depicting the altered human relationships and emotions, including the ways of expressing love.

The various instances in the narratives establish that, feeling of connectedness and attachment to one's place would be conducive in ameliorating the ecological issues to a significant extent at the local level. While Kingsolver and Ghosh focus on the local, Jensen and Lloyd render a global perspective of the climate crisis. The climate changed landscape brings about a radical transformation in Dellarobia, Gabrielle, Laura, Nirmal and Kanai with regard to the perceptions and attitude towards their locale. It can be observed that, towards the concluding part of the narratives, the protagonists move beyond their personal happiness and motives and become genuinely concerned about the well-being of the entire planet. Moreover, the prominence attributed by the characters towards their place of dwelling and the world at large, is acquired through enculturation; whereas the feeling of oneness with their landscape showcased by the indigenous people represented by Fokir is innate or gained through acculturation by conscious emulation and unconscious adaptation. Ghosh's and Jensen's fictional narratives are apocalyptic and visionary because the disasters presaged in their narratives have later turned out to be realities, for instance, the catastrophic tsunami in the Indian Ocean which took place a few months after the publication of *The Hungry Tide*, which ends with climatic storm in the Sundarbans

and the imaginative description of the aftermath of hurricane Stella in *The Rapture* which occurred in the US, resulting in the death of many people. Hence, it can be stated that the ecofiction and cli-fi aids to hone the skills of observation and insight, because it acts as a simulator, presaging the human responses during the typical circumstances of the disasters.

The understanding that climatic changes are driven by anthropogenic factors and the observation of subsequent suffering endured by the nonhuman world, leads to the mental and emotional growth of the protagonists leading to a sense of biocentric equality. Therefore, the novels can be classified as *Bildungsroman.* Nevertheless, the term would not suffice to capture the emotional development taking place in the characters due to the altered landscapes, and hence a unique term is necessitated. The conventional climate change canaries employed like floods, melting ice caps, polar bear, dried water bodies, may not always be in the immediate experience of the readers. In the narratives examined in this study, we find butterflies, fishes, mangroves, crabs and the like, to which the readers can easily relate to, because they fall under the gamut of their observation and experiences. The climate crisis leads to unpredictable weather conditions and sea level rise which prove inhospitable for the nonhuman species like the monarchs, tigers, crabs and mangroves. Both Kingsolver and Ghosh fictionalize the actual occurrences in their narratives to throw light on the highly tragic plight of the flora and fauna caused by deforestation, logging, biomagnifications, unbridled tourism, over-exploitation of aquatic species, unethical methods of fishing and others, which result in severe loss of biodiversity. Thus, it can be stated that the climate crisis makes explicit the porous boundaries between the human and the nonhuman world. Kingsolver and Ghosh have incorporated autobiographical elements, for instance, their personal observations and experiences,

which lend much authenticity to their fiction and hence they are not mere imaginative story-telling, but realistic narratives couched in fictionalism. The vivid descriptions of the deterioration of the floral and faunal species in the unique ecosystem of the Sundarbans are reminiscent of the portrayal of Greenbangle in Aathi in the novel *Gift in Green* (translation of Malayalam novel *Aathi*) by Sarah Joseph. Similar to Ghosh, Joseph too has highlighted that the holistic ecospiritual thinking and sustainable ways of living of the indigenous communities aids in the conservation of the biodiversity. In the narratives examined in this study, the factual incidents and fictionalizations merge and overlap with each other blurring the boundaries, which is a significant aspect of cli-fi.

The characters Najeeb Muhammed in *Goat Days* (translation of *Aadujeevitham* in Malayalam by Benyamin) and Pi Patel in Yann Martle's *Life of Pi* attain ecospiritual attitude towards Earth, through their voyage under perilous circumstances. Similarly Santiago in Paulo Coelho's *The Alchemist* realizes his interconnectedness with the Soul of the universe in the process of a hazardous journey. These novels are few instances of popular and contemporary fiction in which the thematic aspect of ecospirituality can be discerned.

From this study it can be gleaned that, scientific knowledge is very crucial and significant with regard to the ecological crises because it is based on logic and facts, although it cannot be claimed as the ultimate way to deal with it. While this aspect is explicitly dealt in *The Hungry Tide*, it is implicit in *Flight Behaviour* and subtly hinted in *The Carbon Diaries*. Ghosh juxtaposes scientific investigation of the natural world with indigenous forms of knowledge. It can be noted that Ghosh does not privilege either Western science or indigenous wisdom because it is the fusion of different epistemologies which is essential for an increasingly precarious world. The

authors appear to suggest that scientific expertise needs to be complemented with indigenous wisdom for preserving the landscape and perpetuating the lives of the nonhuman species, a crucial fact which Ghosh tries to convey through Piya.

The authors depict the role of scientist characters in a positive light because they take great efforts to study the detrimental effects of humans on the ecological web and planetary landscape. However, the authors point out the limitations of science in its incapacity to avert the disasters, forewarn the humanity about the forthcoming catastrophes or persuade the humans to divert and divest from the reigning fossil-fueled development and lifestyle. Similarly, the helplessness of the meteorology department in predicting and communicating the accurate position of the climate and weather which consequently leads to great loss of lives, is underscored in the narratives. The scientist characters Ovid and Piya are not climate skeptics and utilize science in the interests of the society. They are genuinely concerned about the state of the planet and it is their dedication to their research work which influences Dellarobia, Kanai and other characters to become ecologically sensitive and evolve into better individuals. It also needs to be noted that Ovid and Piya represent the group of scientists who face various obstacles with regard to their professional obligations due to the overpowering of crony capitalism. Lloyd and Kingsolver make a dig at the global political scenario and succeed in capturing the apathy of the politicians who refuse to address the climate crisis on a war-footing.

The characters' families are taken as a microcosm by Kingsolver and Lloyd and by doing so, they have succeeded in drawing attention to the enormity of the implications of catastrophic climate change at the familial level which is the basic unit of society. The female protagonists Dellarobia, Laura, Piya, Gabrielle and Bethany showcase their individual anxieties and conflicting responses to the consequences of

ecological crises. However, it is significant to note that Dellarobia, Laura, Piya, Gabrielle do not mull over their negative circumstances. Rather they use them as spurs for solution-oriented action to deal with the mounting crises in their own modest yet significant ways, which instills optimism and hope in the minds of the readers. The writers do not primarily focus on typical anthropocentric character studies, rather they depict the critical interface between the human and the nonhuman species, geography and ecology along with the technology, economy and politics. The authors depict the extent to which the characters are forced to adapt to new ways of living due to the climate changed world, which assists the readers to understand the significance of voluntarily shifting to circular small-scale economy and sustainable ways of living. Therefore, it can be stated that the protagonists function as spokespersons to convey the thoughts of the authors pertaining to the degenerating planet.

The fact that fossil-fueled development is the primary causative factor of climate change is explicitly stated in the narratives of *Flight Behaviour* and *The Carbon Diaries*. However, it is not mentioned in *The Hungry Tide,* though Ghosh discusses it in detail in *The Great Derangement* and *Gun Island*. The trajectory of the novels suggests that preserving the ecological integrity of life on the planet should be of utmost priority than striving for mere economic development. It is the tendency of humans to treat with respect and care which they regard as sacred. Therefore, re-acknowledging the sacredness of creation would go a long way in revitalizing the planet and ecospiritual thinking proves to be a viable alternative paradigm for the same. It is not possible for humans to go back to primitive ways of living amidst nature and neither it is desirable. Nonetheless, we can definitely unlearn our present exploitative consumerist lifestyle and relearn to live more sustainably. Correspondingly, it can be discerned from the narratives that apart from explicitly

addressing the climate change concerns, the authors advocate for a better connection or reconnection with the planet. It is ironic that when a society finally detects a dissonance in the world it expects science to provide solutions. But science appeals only to logic and reason, whereas, humans are also creatures of intuition and emotion. Here lies the significance of fiction because reading helps us to ponder about the world around us. To adapt W.H. Auden's phrase, eco-fiction or cli-fi 'makes nothing happen' by itself, but it can nurture concern about the planet's ecological future. It can be rightly claimed that the genre of cli-fi functions as an eye-opener to the readers with regard to the various scientific truths pertaining to climate change, coerces public towards positive action by developing a sense of eco-consciousness and enhances our perception of quality of life in these testing times. There are explicit instances in the narratives which express the threats related to the climate crisis and provide suggestions regarding pragmatic actions that could be taken by the readers to become resilient and mitigate the crisis.

Reading ecofiction and cli-fi may not have immediate and tangible effects like reversing global warming or putting an end to pollution or population explosion. Nevertheless, they serve as wake-up calls to make the readers more conscious about what is at stake while the ecology of the planet deteriorates. It can be observed that Jensen attempts to conclude the novel on a positive note by hinting at Gabrielle's pregnancy, in spite of the fact that she believed herself to be infertile after her fatal accident. This can be read as an attempt to make the readers responsible for the planet by imagining the future of the Earth with life. This is quite similar to the *Flight Behaviour* which concludes with the survival and the migration of the monarchs from Appalachia. Kingsolver is an optimist because she believes that wishful thinking is the only practical and conscionable option, despite the fact that we are living through

the end of the world. After the visit to Australia's Great Barrier Reef, Kingsolver had commented that the reports of its death are greatly exaggerated and gave a clear account of why these particular corals with their particular micro-climates can still survive, heal and adapt. Kingsolver comments, "You are hearing about everything that dies, you are not hearing about everything that's still alive, if you think it's dead already then you're not going to be bothered. I almost think, people gravitate towards 'It's too late' because then they don't have to put themselves out. Only if you love something will you inconvenience yourself to work on its behalf" (Haas). It can be discerned that Kingsolver has much faith in dealing with the crisis at individual level and this explains her attempt to conclude the novel on a hopeful note. Conversely, Ghosh had opined that climate change cannot be addressed at individual levels ("Products of Folly"). But that does not mean that we should evade our responsibilities and hesitate to do our bit. In this context it is pertinent to mention the significant contributions made by Greta Thunberg, the climate activist, who has proved that apart from NGOs and other organizations, individuals, especially the students and the youth have immense potential to speak up and force the ruling governments to act against the causes of climate change.

In these times of trials and tribulations, when climate change has become the new normal, cli-fi should be made a compulsory part of the syllabi at all levels of education. It is assumed that monarchs like all butterflies teach the power of transformation, to utilize one's individual opportunities for metamorphosis and thereby evolve into a better person. Monarch butterflies signal mental and emotional growth and in the present scenario of proliferating ecological crises, they can be our icons to steer us away from our self-centered and dismal ways of lifestyles and transform ourselves into better individuals with ecological wisdom.

It needs to be stressed that this study has been primarily concerned with the theme or issue of ecological concerns. This thesis limits its analysis to the genre of fiction. An examination of ecological concerns could have been attempted in other genres like poetry, drama, films, graphic novels and others. Though works of both female and male writers have been taken up for analysis, an examination of the similarities and differences of their perspectives with regard to ecological concerns has not been attempted.

To better understand the implications of the results of this thesis, future studies could examine areas such as the role of media in eco-fiction, eco-feminist reading of women and climate change action in cli-fi, climate related concerns in Victorian fiction and others. The protagonists of the novels examined in this thesis are women, hence an ecofeminist reading of the novels could be attempted. *The Hungry Tide* and *Gift in Green* share various thematic similarities, hence their comparative study has much scope for research.

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