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Climate Change and Ideological Denialism: Critiquing Misdiagnosis and Limited Actions in Rajat Chaudhuri's *The Butterfly Effect*

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Abstract

Climate change is a pressing concern of the current century and has acquired centre stage in scientific and academic discourses. Increasing temperature and frequent extreme weather conditions including wildfires, cyclones, precipitation, and floods have wreaked havoc in the globe and left unprecedented impacts in diverse ways. Despite intense negotiations at different levels and forums for addressing this unprecedented challenge, the world has yet to see the desired outcome of the climate change negotiations largely due to underlying contradictions that persist at numerous levels. Effective, transformative, and timely actions to deal with the climate crisis have remained stymied notwithstanding the consistent call of the scientific community with innumerable evidence of climate change. In fact, different forms of ideological denialism like techno-optimism and market fundamentalism as well as the continuation of the profit-centred existing society and structure have thwarted attempts to arrive at desired and sought-after solution of the climate crisis. Interestingly, Rajat Chaudhuri's *The Butterfly Effect* (2018) addresses these pressing concerns of the time in a quite fascinating fashion. Chaudhuri in the novel reminds everyone through the various facets of his narrative that time has come to take climate change seriously and to change things for a better future. In the backdrop of the rapidly unfolding climate crisis in the world, the present paper argues how ideological denialism, as propounded by Petersen et al., has limited effective actions in addressing the root causes and real drivers of climate change based on a reading of Rajat Chaudhuri's novel *The Butterfly Effect*. The paper contends through instances taken from the novel how techno-optimism and market fundamentalism have prevented the unearthing of the real drivers of climate change and ensured the continuation of the current growth-centred system. The paper argues further how the misdiagnosis of the climate crisis has made the poor and resourceless the most vulnerable through illustrations from the chosen text. Besides these, the paper shows that the impact of climate change is borderless and nobody can escape from the disastrous impacts of climate change if not addressed on time.

Keywords: Climate change, ideological denialism, techno-optimism, market and profit, poor and vulnerable, food safety, malnutrition

Introduction

Climate change has erupted as one of the pressing concerns of the current century. The gravity of the climate crisis can be gauged from the increase in temperature around the globe and the frequent extreme weather conditions like wildfires, cyclones, precipitation, and floods, to mention a few here. Intense negotiations are underway at different levels and forums for addressing this unprecedented challenge. However, the world has yet to see the desired outcome of the climate change negotiations largely due to underlying contradictions that persist at numerous levels (Mainlay and Tan 2). Effective, transformative, and timely actions to deal with the climate crisis have remained stymied notwithstanding the consistent call of the scientific community with innumerable evidence of climate change. Most of the countries have also shied away from the recommended level of carbon emission outlined in the Paris Agreement in 2015 largely due to their countries' economic, political, and social conditions and interests. Notably, there appears a gap between the developed and the developing world in addressing the climate crisis given the fact that "industrialised countries are largely responsible for greenhouse gas emissions" (Mainlay and Tan 2).

The impacts of climate change are, however, diverse in different regions and countries in the world. It has been noticed that it is the poor regions and countries of the world that have to bear the brunt of the ill effects of the climate crisis and the rapidly changing weather patterns. Along with other reasons, different forms of denials, as numerous scholars have identified, have become "a factor in thwarting policy responses to climate change" (Petersen et al. 117). Examination of "new forms of climate change denial" (Petersen et al. 117) is critical for a deeper understanding of climate denialism.

Objectives

Against the stated backdrop, the paper argues how ideological denialism, as propounded by Petersen et al., has limited effective actions in addressing the root causes and real drivers of climate change based on a reading of Rajat Chaudhuri's novel *The Butterfly Effect*. The paper contends through instances taken from the novel how techno-optimism and market fundamentalism have prevented the unearthing of the real drivers of climate change and ensured the continuation of the current growth-centred system. The paper argues further how the misdiagnosis of the climate crisis has made the poor and resourceless the most vulnerable

through illustrations from the chosen text. Besides these, the paper shows that the impact of climate change is borderless and nobody can escape from the disastrous impacts of climate change if not addressed on time.

What is ideological denialism?

Ideological denialism, as foregrounded by Petersen et al., denotes underlying contradictions in addressing the climate crisis and the perpetuation of such contradictions in the social order of the time (Petersen et al. 117). To them, ideological denialism "involves recognizing climate change as a problem, yet fails to diagnose the root causes and prescribes solutions that maintain the current system" (117). In other words, ideological denialism demonstrates the continuous failure of the world "to recognize a growth-dependent economic system as a root driver of climate change" (117). This failure can be identified as a major reason behind the dearth of enough support for the reduction of greenhouse gases in both the developed and the developing world. The uniqueness of this denial of climate change lies in the fact that its application manifests even in the case of those who agree on the fact that climate change is a reality and is happening at a rapid scale. Therefore, understanding this form of denial is also quintessential to digging out misdiagnosis of the climate crisis and paving the way for effective action going beyond the limited solutions.

In addition to the obvious climate denialists "who claim no scientific evidence exists that humans are changing the climate" (118), the practitioners of ideological denialism have also prevented addressing the climate crisis rightfully by relying upon limited and quick-fix solutions. This new form of denialism has thus thwarted attempts to effectively cut deep emissions as envisaged in numerous treaties owing to the actors' failure to identify the root drivers of the climate crisis. This outlines the paradoxical solutions for climate change adopted by countries in different areas and such a paradoxical position eventually denies the entire reality of climate change. It is worthy to note that ideological denialism incorporates different layers and modes of denialism within its ambit- for example, literal, neo-skepticism, market fundamentalism, techno-optimism, individualism, and green growthism (119). Taking cues from Petersen et al., this paper especially emphasizes two modes of ideological denialism viz. market fundamentalism and techno-optimism, and their implications in addressing the real drivers of climate change as evident in Rajat Chaudhuri's *The Butterfly Effect*. While discussing these modes of denials and

their impacts on addressing the climate crisis in the novel, the paper contextualizes genetically engineered food for alleviating growing malnutrition in poorer countries and climate change.

Contextualizing Rajat Chaudhuri and his The Butterfly Effect:

Rajat Chaudhuri is an Indian bilingual writer working presently in English and Bengali. He has authored two critically acclaimed novels viz. *Hotel Calcutta* and *Amber Dusk* besides *The Butterfly Effect*. He has also a short story collection in Bengali to his credit with the title *Calculus*. He also edited an anthology titled *The Best Asian Speculative Fiction* and wrote its 'Introduction' as well. *The Butterfly Effect* is his third novel published in the year 2018 and is set in the continents of Asia and Europe. His outstanding literary works have attracted the attention of readers across the globe, and he has been awarded numerous fellowships including a British Council administered Charles Wallace Creative Writing Fellowship, the UK, a Hawthornden Castle Fellowship, Scotland, a Korean Arts Council-InKo Residency in South Korea, and a Sangam House Residency, to mention a few. Interestingly, Chaudhuri himself has been an environmental activist for many years now. Being a climate change activist, he has represented civil society groups at the United Nations in New York and has spoken and written in numerous international forums and publications on environmental and climate change issues. He also contributed to the 'World Human Development Report' prepared and published by the UNDP, New York on the issues of human consumption. In an interview with Mary in 2018, Chaudhuri stated that his environmental activism assisted him immensely in translating his learning into fiction ("Interview" 2018).

Chaudhuri's *The Butterfly Effect* has interestingly blended mystery and eco-fictional elements. The novel coalesces various stories within its fabric involving characters like an Indian detective named Kar, a geneticist namely Tanmoy Sen, two North Korean sisters named Jia and Jiyoo, an English music teacher named Henry David, and an off-duty policeman Captain Old, to name a few. Welding the past, present, and future of the globe, Chaudhuri in the novel pushes his narrative from India to the UK and finally to South Korea, North Korea, and China as well. In other words, the narrative of the novel is set beyond the Asian continent and has brought to light many important issues of the time including civil war, hostility among nations, climate change, genome sequencing, and dangerous scientific experiments. What the context makes the novel more interesting is its unflinching concern for climate change and ecological devastation as well

as critical and dangerous experiments of science on earth through some interesting debates and incidents. Before embarking on these debates and incidents narrated in the novel, it would be, perhaps, proper to briefly reflect upon the contexts of ecological devastation and its vicious effects in the form of climate change and other events in the world.

Climate Change and Root Causes/ Human Intervention

Climate change, as mentioned above, "is the most serious challenge we face as a species" (Satgar 1). The continued failure to develop a decisive solution to effectively address climate change brings forth the fact that humans have "continued emitting pollutants and intensely using fossil fuels" and thus "as a geological force, we humans are heating the planet"(1). The heating of the planet by human action has put everything into jeopardy and has challenged "our fixation with growth economics, 'catch-up' development and every conception of modern progress that has incited our imaginations" (1). As argued by the leading German environmental scientist Wolfgang Haber, competition and unsustainable development processes are a driving force behind unprecedented climatic changes. To him, all human beings follow "*competition*, the general organizing principles of life on earth" (Haber 359), and because of this driving force, human beings have consistently competed to improve their conditions of living and superiority over nature. As contented by Haber, "human evolution in about 1.5 million years has taken an ecologically wrong, even fatal course" (359). This has inevitably led human beings into ecological traps, particularly of food, energy, and land. In other words, in each transition viz. hunting to agrarian to industrial economies, human beings have altered the landscape, damaged the earth's atmosphere, and produced enormous wastes resulting in challenges like climate change. Thus human actions have significantly caused climate change and emitted greenhouse gases affecting the health of the planet.

Haber also extensively pointed out various ecological traps that human beings are presently rolling in. For instance, the discovery of fire by human beings allowed them to move to colder places, to come out of the jungle, to eat things in a way that other plants and animals can't, and to improve their standard of living. With the discovery of fire, wood became a source of energy, and humans "created irreversible dependence" on this natural resource, leading us "into the energy trap" (Mauch 5) and air pollution. With the discovery of other energy sources namely peat, coal, and petroleum, to mention a few here, human beings "became more entangled in the

energy trap" (5). Again, the transition to the farming sector brought food security and ensured human sustenance on earth, resulting in a gradual increase in the human population. The transition reached such an extent that "more people were able to live on less lands" (5). But that has resulted in the loss of agricultural biodiversity and the species of crops and livestock at a massive scale, hampering in turn the entire agricultural ecosystem. The growing tendency to cultivate high-yielding varieties in the aftermath of the rising human population and application of pesticides brought irreversible loss to the plant and livestock diversity. As per scientific estimate, half of the planet's topsoil which supports countless species in our ecosystem, quite alarmingly, has been lost within the last 150 years alone, pushing humans into food traps. The Intergovernmental Report on Climate Change (IPCC) in its report titled *Climate Change Synthesis Report 2023* has also importantly noted:

> Widespread and rapid changes in the atmosphere, ocean, cryosphere, and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people (*high confidence*). Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected (*high confidence*). (5)

The report's emphases on 'widespread and rapid changes in the atmosphere' and 'human-caused… climatic extremes' starkly display the gravity of the problem and the underlying contradictions. Thus, "it is unequivocal that human influence has warmed the atmosphere, ocean, and land" ("Climate Change Synthesis Report" 5). Interestingly, Rajat Chaudhuri's *The Butterfly Effect* addresses these pressing concerns of the time in a quite fascinating fashion. Chaudhuri in the novel reminds everyone through the various facets of his narrative that time has come to take climate change seriously and to change things for a better future. He here shows how the threats of climate change have been growing exponentially and are impacting the entire globe in various scales and measures. Chaudhuri also embarks upon the concerns of numerous people on the planet about dangerous technologies and how these technologies are pushed into the lives of people without proper testing and adhering to 'precautionary' and 'bio-safety' protocols. Thus Chaudhuri in the novel has creatively engaged the "unimaginable aspects of worldwide disaster caused by human actions in the Anthropocene" ("Interview" 2018).

Manifestation of Ideological Denialism in *The Butterfly Effect*

As described in the novel, Tanmoy, an Indian geneticist with a brilliant academic background, worked at the Institute of Genetic Engineering and Medicine, popularly known as GEM. It is worth noting that Tanmoy did his Postdoc in a British university and engaged in teaching in England and the United States before he came to Calcutta. Notably, GEM was recognized among its peers as one of the best in entire Asia. An expert in direct gene transfer, Tanmoy did solid works with maize and tobacco and published "more than thirty peer reviewed papers with the best in its line, which meant people like Havelock at the Israeli Centre for genomics, Datta at the Swiss centre, Turnbull of GeneLab UK, and Bykofsky in the States, who was once described rather frivolously as the Dalai Lama of epigenetics" (Chaudhuri 130). Tanmoy later became a geneticist "sought after the world over" (131). After working a year and a half, one day he went to the office of the director and chief geneticist at GEM namely Dr. Chaturvedi to look "forward to some news about money for his projects" (132). But the director informed Tanmoy that the project on food security can't be undertaken because "the additional budget for gene transfer was not granted" (132). After the refusal from GEM, Tanmoy was in desperate need of funds to work on his experiments on super rice and it was that time, the GeneLab UK showed its great interest and readiness to "lead the SuperRice Project which would have a direct impact on health and food security in unpredictable times" (148). Tanmoy's intense engagement with the 'SuperRice' project for magical seeds through the adoption of genetic engineering is aimed at bringing an end to malnutrition and food crisis in the world, especially among the poor and vulnerable. Tanmoy was seeking funding for "cutting-edge work with crops as part of a global network of laboratories, working on improved paddy varieties that would be a source of vitamins while withstanding extreme weather conditions which had become more frequent as the years went by" (148). Significantly, the GeneLab UK hunted for the best brains to keep them at the frontiers of genetics research. In the UK, he started to live in the pretty little English town Novingdon, full of impressive structures including a beautiful cathedral with a bell tower.

Tanmoy's intense engagement in finding a solution to malnutrition and the growing food crisis through genetic engineering exposes ideological denialism in addressing climate change and its impacts. Instead of exploring the root causes of malnutrition and appropriately addressing the food crisis, efforts have been drawn towards manipulating the complex problems through

deliberate alteration of the "climate system in order to alleviate impacts of climate change" (Petersen et al. 124). Notably, geoengineering is a variant that falls under this techno-optimism and has been considered by people like Tanmoy as a miracle solution to problems like nutrition and food safety. In other words, Tanmoy's techno-optimism for addressing malnutrition through the invention of a 'magic seed' that can withstand extreme weather events as well as GeneLab's intense interest in gene research for profit can be gauged as misdiagnosis of the crisis of climate change and a potential example of ideological denialism. It can be mentioned here that discussions on solutions to environmental problems often veer towards a techno-optimistic form. The techno-optimists like Tanmoy in this context strongly believe that environmental problems can effectively be addressed through technological intervention as well as manipulation of complex systems for the advantage of humanity. This over-emphasis on technology for solution of the environmental problems, in the words of Foster, is nothing but a form of denialism (qtd in Petersen et al. 120). In other words, the growing fashion of looking for technological intervention as the all-out and appropriate solution to environmental problems succinctly demonstrates the underlying denialism in addressing the climate crisis. This debunks the fact that environmental problems have been seen largely through the lens of reforms in economic and socio-technological arenas rather than the existing institutional structure and unsustainable dreams. But, as argued by York and Clark, environmental problems cannot be simply solved through technology; rather they need restructuring of the existing structure ((qtd in Petersen et al. 126).

It is worth mentioning here that The Intergovernmental Panel on Climate Change (IPCC) in its report titled *Climate Change 2023 Synthesis Report* notes that climate change has substantially damaged and caused "irreversible losses, in terrestrial, freshwater, cryospheric, and coastal and open ocean ecosystems" (5). Scores of heat waves, flooding, drought, extreme precipitation, and wildfire, as outlined in the report with scientific evidence, have pushed people and the ecosystem into unprecedented vulnerability. Interestingly, the report outlines that "increasing weather and climate extreme events have exposed millions of people to acute food insecurity" (5). The report deliberates upon this crucial context of 'food insecurity' and climate change:

> … with the largest adverse impacts observed in many locations and/or communities in Africa, Asia, Central and South America, LDCs, Small Islands, and the Arctic, and globally for Indigenous Peoples, small-scale food producers, and low-income households. Between 2010 and 2020, human mortality from floods, droughts, and storms was 15 times higher in highly vulnerable regions, compared to regions with very low vulnerability. (high confidence). (5)

This shows that accelerating climate change along with the growth of population and economy has indeed made the food security of humanity around the globe a daunting task. However, the context of food security and climate change has not acquired as much attention as it requires. As argued by Wheeler and Braun, "much lip service is given to the risks posed by climate change to food security in the scientific literature and popular press" (qtd in Antle 1). The accelerated climate change and its implications on food security have not received adequate attention in the public domain notwithstanding each one's co-relation with each other. The Intergovernmental Panel on Climate Change (IPCC) in its Report in 2014 also lucidly outlined that "all aspects of food security are potentially affected by climate change including food access, utilization, and price stability (high confidence" (qtd in Antle 1). However, it needs to be remembered that it is quite difficult to define and measure the level of food security owing to the unpredictable socio-politico-economic conditions and diversity of society/regions. Food security can be understood as:

> …a type of vulnerability, that is, the risk of not having adequate food. Nutritional experts would extend the concept to nutritional security, going beyond the consideration of available calories to consider a broader set of nutrients available from food. These concepts can be defined at various scales: an individual person may be at risk of not having enough food to eat today or an entire country may be at risk of not having enough food for its population over a year or a decade. (qtd in Antle 1)

Defining food security, the Food and Agriculture Organization (FAO) of the United Nations calls it a situation in "which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (qtd in Charles 45). With the acceleration of climate change, the yielding of crops is projected to become lower in most regions of the world. Other factors closely related to climate change like "income growth, population growth, and trends in agricultural productivity" (Antle 3) have contributed substantially to the challenges of achieving food security. In addition, climate change may increase the prices of major crops including rice, maize, and wheat.

In the UK, Tanmoy accidentally came into contact with an Englishman and music therapist named Henry David on a February weekend evening and became good friends. Both of them met each other on that day in a London train station while caught up in a sudden acid rain. Worthy to note that Tanmoy had been in London for "work, classes and meeting at the Central London offices of Santa Inc, the global agricultural biotech major which was funding their work" (Chaudhuri 140). Failing to return to Novingdon, they decided to spend the night in an inn named 'The Gribble Inn'. In their conversation at the inn, Tanmoy hinted at his crucial project which has "a definite impact upon human health" (157). Tanmoy's techno-optimism disturbed Henry and the latter cautioned for such "Tinkering with nature?" (157). Considering the protocols of secrecy and sharing of information, Tanmoy wanted to withdraw from any further discussion of his project by saying that "it will do a lot of good for millions, someday soon" (157). But, Henry insisted on the danger of tinkering with nature and here started an interesting debate on nature and dangerous scientific experiments. Despite his original intention to withdraw from the discussion, Tanmoy carried on and replied:

> 'There is danger in everything, in all forms of striving. We cannot sit back in a cave and warm our hands in the fire. Cave dwellers fashioned tools to hunt better. Wrongly designed bridges do come crashing, space shuttles melt in the upper atmosphere vaporizing astronauts, but there is no reason not to try'. (Chaudhuri 158)

Tanmoy's preference for risk over curtailing dangerous activities and tinkering with nature hints at the denials of climate change as noted by Petersen et al. Rather than looking at the structure of society and the ideological contradictions, the current system as contextualized by the novel is heedlessly working towards increasing economic gains and making efforts to fix the problem of climate change through technological means. Advocating nature and the necessary harmony to be retained in the globe, Henry responded that "we play too many games with the order of things and hence nature is not to be mocked…" (158). Irritated by this line of argument, Tanmoy replied "we are just trying to better understand this order of things as you put it and get it working for a greater good" (158). These words and arguments of Tanmoy in favor of technological intervention as the only appropriate means for solving the environmental problems testify to the ideological denialism and misdiagnosis of climate change and the overlooking of its severe impacts on various fronts. Protesting this misdiagnosis which has limited effective action, Henry argued:

> Greater or lesser, larger or smaller may not mean anything at all, Sir. I am a layman who doesn't understand the workings of your science but I feel we need to strike a balance. We are not the only species on this planet. Nature has rusted because of our lack of care and the violence we inflict upon her. Don't you hear how sea levels have been rising and then it rains in winter so much that we fear this country will be washed away? (Chaudhuri 158)

Henry's concern for the violence inflicted recklessly upon the earth displays the severity of the context and the ideological denials lying inherent in existing policies. Henry reminds Tanmoy that "the idea of unlimited growth and technological acceleration has reached critical limits" (Mauch 13). These ideologies of growth, anthropogenic approaches, and unsustainable dreams of mankind have ubiquitously damaged the health of the planet. Notwithstanding that, favoring dangerous scientific experiments over nature, Tanmoy continued his stance and vociferously argued:

> 'My work would keep millions of undernourished people healthy even during extreme conditions. They will get basic nutrition. If that goes against the natural order then so be it'…'Our humanity, doesn't allow us see fellow humans in pain or suffering'. (Chaudhuri 159)

Tanmoy's intention to erase malnutrition and bring food security through dangerous scientific experiments can thus be seen through the lens of ideological denialism. Instead of addressing the root causes of food insecurity and malnutrition, efforts have been put in place to redress the problem through technological fixes. These technological fixes are a manifestation of ideological denialism and it reflects upon the aspect that despite acknowledging the reality of climate change, the entire world has failed to effectively address the problem largely due to economic interests and development. This paradoxical scenario and ideological denialism have kept the root drivers of the problem away from the discussion. Significantly, the context of food insecurity and malnutrition points out another grave aspect of human evolution on earth viz. exponential growth of the human population. The human population on the planet rose ever more quickly with every transition viz. "from hunting and gathering to farming, and from agrarian to industrial economies" (Mauch 6). As per records, the human population on earth rose from one billion in 1800 to two billion in 1930 and four billion in 1975. Today it exceeds seven billion and has already put immense pressure on earth, leading to the extinction of species, extreme weather events, and loss of wildlife habitats and forests, to mention a few. Importantly, the last centuries alone had witnessed an unprecedented transformation of the land mass largely due to

industrialization and its hazardous effects on the environment. Available data suggests alarmingly that humans have modified over 77 percent of earth's land barring Antarctica and over 87 percent of the ocean for their interests. The Canadian environmentalist Vaclav Smil notes that barring the mere 5 percent large terrestrial vertebrates which include tigers, lions, rhinoceros, and zebras, the rest of the creatures on earth have been bred and raised by human beings for their uses and consumption. In a recent study, it has been significantly noted that "humans make up just 0.01 percent of all life … but humans have destroyed 83 percent of wild mammals" (Mauch 7).

It is a proven fact that the exponential growth of the human population especially in the last and current century has brought devastation to fellow earthlings including animals, forests, etc. The increase in human population has, indeed, badly damaged the inextricable relationship between human and global biodiversity. This domination of a single species on earth-that is humans-has put the other species under immense pressure and led to extinction. Elizabeth Kolbert, an environmentalist, has even predicted that 50 percent of the earth's living species will become extinct by the end of this current century. Besides, the things around which our daily lives are mainly built these days viz. metals and concrete, vehicles, electrical grids, cell phones, computers, electronics, and batteries have become sources of environmental damage and turned the lives of all the species on earth vulnerable. In other words, the increasing greed and selfishness of this species have threatened to destroy the very base of life on earth with each passing day. It appears that the mechanism that humans have chosen for their survival and interests on earth is turning against them in the form of extreme weather conditions.

Further, Tanmoy is now at the midway of his SuperRice project, and "in six years Tanmoy's research group had almost perfected the gene insertion techniques that will be used to splice donor genes into paddy" (Chaudhuri 162). Meanwhile, Henry offered Tanmoy to come to his camping ground and the latter visited after the invitation. This time, in an intense discussion Henry lamented the rapid loss of pub culture in his country and firmly critiqued predatory developments in the name of income, growth, and neoliberal approaches. Unlike Henry, Tanmoy argued that "whatever shows signs of aging is pulled down and has to give way for new development, high rises, shopping malls" (165). Citing an instance from his hometown Calcutta about the saving of one of the oldest Raj-era hotels after a major court battle, Tanmoy stated that

"that was saved by a miracle but that's a different story" (165). Listening to that, Henry responded quickly:

> Why don't you tell us about it. This is what we are fighting against and we would like to learn from others. Mindless development, exploiting nature to the hilt in the name of a better future, often driven by the hubris of science. (Chaudhuri 165).

Henry's worry about the exploitation of nature in the name of a better future hints at the paradoxical approaches to addressing climate change. Reminding Tanmoy about the limitation of science and the hazards of any 'superhuman' efforts on earth, Henry once again cautioned:

> 'Science has been throwing stones at the darkness for long and it has become good with practice. But stones can be thrown only this way or that. You can't participate in the great work that is within us and all around us just by aiming stones and listening for the sound; that way you knock the world out of kilter' (Chaudhuri 165)

Pointing out the hazardous consequences of any irrational superhuman intervention on the laws of nature as well as dangerous scientific experiments, Henry reminded Tanmoy that "without a healthy atmosphere and self-regulating climate, we would not be able to survive, and money would be worthless" (Park 192). Henry's caution compelled Tanmoy at least for some time to think about the possible risks that he too was taking in the form of dangerous scientific experiments. He also thought about how "he had learned to ignore" (Chaudhuri 167) the risks involved in dangerous scientific experiments. These thoughts about risks penetrated his mind at this point and forced him to think about his risky SuperRice project:

> …Risks which are hard to anticipate and so not to be taken seriously. Even if some tests were done, no one could be completely sure how the human body would react in the long run to the transgenic rice they were creating. These thoughts occurred to him briefly, then they quickly disappeared. In the balance, wasn't SuperRice going to feed the hungry millions affected by drought or untimely frost besides providing nutrients? (Chaudhuri 167)

Thereafter they arrived at a beautiful brook and sat against stones on the bank. Henry highlighted the exceptional beauty of the oak trees and asked Tanmoy to feel the pleasure of nature. Tanmoy too gradually started to like the words of the music teacher and even shared at this time the details and secrets of his SuperRice project. Focusing on the pleasure that nature offers and her matchless beauty, Henry pointed out the living spirit of nature and increasingly insisted Tanmoy to harmonize with nature:

> 'You can too. It takes time but the world of animals and plants communicate with us if we are prepared to hear. The earth is alive and whatever grows out of it, walks over it or flies its skies are its sense organs. The earth speaks through them. …Life

> follows death as the seasons grow old making way for the new as it does in our lives. Being one and the same we remember and respect that' (Chaudhuri 170)

Henry's insistence on a harmonious living with nature on earth made surely an impact in Tanmoy's mind. He showed Tanmoy that "it is important for humans and other creatures on this planet to keep the natural world 'intact' even in areas that humans have never entered" (Mauch 27). Despite that, Tanmoy wanted to advance in his SuperRice project due to the possibility that it might end malnutrition for millions of people around the world. This paradoxical approach of Tanmoy epitomizes the ideological contradictions and the existence of numerous forms of denials in the existing climate change-related policies in the world and their inadequacy. Continuing their discussions further "about right and wrong, risks and rewards" (Chaudhuri 170), Tanmoy this time asked Henry, 'That's good but wasn't the world created for humans? That's why we were given a powerful brain, to be masters of creation (170). At night, Tanmoy brought the context of the great scientist and the father of the steam engine namely James Watt, and told about Watt's great influence upon him. He asked Henry this crucial question-"now leave aside the great inventors, even if you think of an innovator like Watt, hasn't he made a difference to the lives of millions?" (174). Emphasizing Watt's great invention and diligence, Tanmoy remarked that the Scot was a great mind having expertise and inventions in numerous areas. But, Henry remarkably counterattacked:

> He could have been anything but he committed grave mistakes. The steam engine drove the industrial age and that was the beginning of pea soupers, ugly cities, new diseases and a lack of harmony with nature. well, you can give him this much that his age was different and most people didn't think ahead of the possible effects on the environment. But this is blindness, a ruinous innocence…Come on, you are not allowed to behave like a child! And pardon me for saying this, even your work, tinkering with the codes of creation, it could backfire, you know…. (Chaudhuri 174-75)

Henry's reference to the 'industrial age and that was the beginning of pea soupers, ugly cities, new diseases' puts forth an interesting ideological conundrum. It is worth mentioning here that in the on-going debate over climate change across the globe, perceptible divides can also be seen in the approaches of developed and developing countries. With the emergence of the voices of developing countries like India, China, and Brazil, to mention a few, it has been demanded that developed countries were the source of the most past and even current greenhouse gas emissions and therefore they have to support and invest substantially in the mitigation of climate

change. With the income levels of the developing countries far below the developed countries, the developing countries will continue their emissions in their efforts to acquire a quality and better life as well as economic growth. This ideological loggerhead has led to claims in some sections in the developed world that the developing countries especially the big emitters of carbon like India and China are not doing enough to mitigate climate change. The Bush administration in the United States even rejected the 1997 Kyoto Protocol claiming that the binding emission targets are unfair for the country because the protocol does not mandate any action to the large developing countries for mitigation of climate change. This ideological loggerhead and contradiction have turned the mitigation efforts of climate change ineffective, deeply fractured, and ridiculous. Amidst this ideological contraction in taking effective action for mitigation of the climate crisis, it has now become clear from numerous studies and scientific investigations that "although industrialised countries are largely responsible for greenhouse gas emissions, it is people living in developing countries who will bear the brunt of the effects of increasing temperatures, severe weather events and changes in rainfall patterns" (Mainlay and Tan 2).

As the novel divulges further, Tanmoy's SuperRice project thereafter approached towards final splicing experiments. "The first experimental crops of transgenic rice" (Chaudhuri 177) were about to become a reality and fruition. Unfortunately, Tanmoy slipped on the slippery floor in a bar one day and lost consciousness for some time. An unknown woman named Jia who later became a close friend of him helped him to recover from that condition, admitted him to a hospital, and even drove to Novingdon after his discharge from the hospital. Jia in his life entered suddenly and was kind to him. She almost settled in his world and Tanmoy too sheltered her in his house. As told by Jia, she was making her efforts to return to South Korea, and in this direction, she had already written to the South Korean embassy for the necessary papers. She even went to London twice for appointments to acquire the papers. Jia also told him in detail how she was accidentally teleported to London from South Korea. Tanmoy believed this narrative of Jia, who appeared in his life mysteriously, without thinking for a second time and knowing her real identity. Later in an interesting debate happening between Tanmoy, Jia, Henry, and a couple named Alex and Georgina whom Henry knew well, the novel unearths the misdiagnosis of the climate crisis and the limited effective actions due to the anthropogenic

approach, 'mindless development', techno-optimism and growth dependent economy. Like Henry, Alex and Georgina are also advocates of environmental protection. Tanmoy and Jia became defenders of scientific experiments for solutions to problems including environmental while Alex Georgina and Henry critiqued market fundamentalism, consumer culture, mindless development, and risky experiments. Later, the discussion moved to Tanmoy's research and he informed the couple that he was working on a genetically improved crop project. Hearing that, the couple looked at each other and said with a questioning glance to Henry, '"These are exactly the kind of things we are up against'" (213). Alex thereafter "went on like an encyclopedia about the dangers posed by genetically modified food and how countries have sold out of corporations" (213). But Jia countered Alex's contention and noted:

> 'Who do you think you are talking to?... This gentleman has made innovations in his field which right at the moment are saving lives of people, do you know that? …His work has the potential to benefit millions around the world. It's easy to speak of saving the planet sitting and enjoying the good life of a highly advanced capitalist economy, but do you know how millions live in abject hunger and poverty? Have you seen men roasting rats or chewing up dragonflies to escape starvation?' (Chaudhuri 214)

This onslaught from Jia put Alex in perplexity. Henry who has clear sympathies for Alex came forward to rescue his friend and thoughtfully asked these crucial questions-"What if there is a mistake?" "Are we adopting enough precautions, going forward?" (214). Jia strongly counterattacked Henry:

> 'If people like you were given to run the world, then half the planet would have perished. There would be no medicine, no transport, and no electricity. You wouldn't be sitting in the warm shadow of a tree knowing very well that if you fall sick or need to go somewhere quickly then a vehicle will come to your aid. And you will be quietly saying thanks to Rudolf Diesel while assaulting him in public. Have you ever heard of hungry children looking for undigested morsels of food in cow dung?' (Chaudhuri 215)

Jia's counterattack and strong avowal for development and risky experiments lays bare the fallacies and contradictions in taking effective action to mitigate the climate crisis and its projected harms despite widespread acknowledgment that "climate change is real and primarily driven by human activities" (Petersen et al. 131). The overemphasis of Tanmoy and Jia on technological solutions to environmental challenges deciphers the continuous failure "to see a central root cause of climate change: a society structured around ever-increasing production and economic growth" (131). After all, the debates and conversations incorporated in the text have

amply shown the misdiagnosis in addressing the climate crisis and continuation of the "current social order that drives climate change" (131) instead of dissociation and adoption of de-growth.

Climate Change and Vulnerability of the poor

As noted above, Chaudhuri has chosen both the developed and the developing world to emphasize the aspect that if the world encounters any major biotechnology disasters in the future, every one of this world will be affected in one way or another. However, the impacts might vary among nations depending on their preparedness for such disasters. What the text interestingly fares, in this case, is the context that if any worldwide disaster unfolds someday, then the developing world will be worse off due to "a lack of preparedness, vulnerable populations, limited resources, corruption, the business-as-usual mentality, lack of awareness, and the attraction of high consumption of lifestyles" Interview (Interview 2018). This implies the vulnerability of the poor and disposed of in the wake of extreme climatic conditions and any catastrophe. This scenario reminds the concept of 'slow violence' formulated by the environmentalist Rob Nixon and his environmentalism of the poor. Before contextualizing the vulnerability of the poor, it is pertinent to briefly deal with the concept for a better understanding of the underlying aspects. In the book *Slow Violence and the Environmentalism of the Poor*, Rob Nixon crucially states that "by slow violence I mean 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 as well" (Nixon 2). To Nixon, slow violence is a kind of violence which is "neither spectacular nor instantaneous, but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal scales" (2). Hence climate change, deforestation, acidifying oceans, etc. are "slowly unfolding environmental catastrophes" (2). Nixon's innovative concept of 'slow violence' braces away from conventional assumptions and definitions of violence and thus requires a rethinking of events like climate change. To him, the consequences of slow violence can have multiple ramifications including increasing unsustainable conditions for life and proliferation of conflict. As Nixon pointed out, instances of avalanches, volcanic eruptions, tsunamis, accelerated loss of species, rising greenhouse gases, etc. are tales of slow violence. In these cases, causalities don't occur immediately; rather "postponed, often for generations" (3). These are tales of slow-moving disasters and take a long time to their making and manifestation. The notable aspect is that the

repercussions of these casualties that often remain invisible for generations are quite serious and challenging to deal with. The interesting fact is that "it is those people lacking resources who are principal causalities of slow violence" (4). Nixon terms this vulnerability of the poor due to a crisis like climate change as "the environmentalism of the poor" (4). In other words, it is the poor and resourceless who have to bear mostly the brunt of the fast-unfolding climate crisis. Through the innovative notion of slow violence, Nixon seeks to "address our inattention to calamities that are slow and long lasting, calamities that patiently disperse their devastation, while remaining outside our flickering attention spans-and outside the purview of a spectacle driven corporate media" (6). Therefore, it is important to critically analyze self-interest, dissembling, and tales of slow violence to avert catastrophe and "slow-acting violence…like climate change" (9-10). The ever-increasing intensity of the neoliberal assault on resources has put unprecedented pressure on the planet earth, unleashing poverty and invisible violence.

Meanwhile, Tanmoy's research arrived at "the final years of creating new splices with a variety of alien species genes to bring out the desired traits in the experimental paddy crop" (Chaudhuri 220). Unfortunately his 'magic seed' was stolen from the highly secured laboratory and it was revealed later that Jia stole the seeds from there. But by the time the mystery unfolded, Jia left the country and headed to Pyongyang in an old Soviet Antonov military aircraft. She was indeed a North Korean agent and was given the responsibility to steal the magic seeds from GeneLab, UK so that the growing starvation and malnutrition among people in North Korea can be dealt with. Before her mysterious arrival in Tanmoy's life, she was properly trained by the North Korean officials to accomplish the mission of stealing the seeds from the laboratory. Jia was also caught up in a complex situation back at home. All her family members were arrested in North Korea in charge of treason and the condition for her that if she needed her family members alive, she had to accomplish that mission. She had no other option, but to comply with the order. After she arrived in Pyongyang along with Eugene, a Korean-origin fellow scientist of Tanmoy in the UK, they were taken to the prison facility in which her family members were kept. The prison guards were very rude and inexplicably tortured the prisoners. Even though Jia stole the seeds from the designated laboratory as per instruction of the North Korean officials, she was not sure about the release of her family members from the clutch of totalitarian officials and the regime. Therefore, before handing the seeds to the official, Jia

secretly passed on a few tubes of paddy to her emaciated sister Jiyoo, thinking that "perhaps she could find some use for the seeds and in any case no one would miss a few samples" (229). Meanwhile, a prison guard informed Hyon Mansik, an official from the State Security Department, about this passing of a package to her sister and Mansik thrashed Jia badly for daring to do that. Importantly, Jiyoo became successful this time in escaping from the prison with the help of a generous prison guard and entered the territory of South Korea after numerous challenges with the small packages containing the magic seeds.

Jiyoo wanted to evade the eyes of the South Korean police and that's why remained there as carefully as possible. At that time, a group of Indians containing twelve tourists and a tour manager named Bikas Roy were there in South Korea as part of an organized tour to Cambodia, Vietnam, Japan, and Korea by the tour agency Lamplighter Travels. The tourists were from various backgrounds like Bidisha, a postgraduate; Ujaaan Banerjee, a bank manager; Harvinder Singh, a businessman; Tara, etc. However, the tour to Japan had to be cancelled due to an earthquake that happened in the country at the time of making this tour. So, the tourists and the tour doubled their time in Korea. The forty-three-year tour manager Bikas Roy intimated to the manager of the company all the details via email and all programmes were going on as per plan and schedule. In Seoul, Ujaan came into contact with Jiyoo in a dessert café and their friendship gradually grew. Meanwhile, the local Korean guide fell sick and Bikas babu was desperately in need of a guide to continue the tour. Bikas babu promised the tourists to make up with extra destinations and it was Jiyoo who wanted to help the group with the tour program. Jiyoo promised the tour manager and the group to take them for a trek on White Cloud Mountain and show the mountain's pleasantry and bounty. It was decided finally to add these additional attractions to their schedule- "a temple visit, trips to Busan and Incheon, and finally a leisurely last few days in the White Cloud Mountain" (125), and Jiyoo would lead them to these attractive destinations at the absence of the local tour guide. The Indian tourists along with Bikas Roy ventured to these destinations following the guidance of Jiyoo and wanted to spend some days in the mountain. But the tourists mysteriously disappeared in White Cloud Mountain. The investigative officers had also no clue what went wrong with the tourists and couldn't ascertain the reason for their mysterious disappearance.

Back in India, the relatives of the tourists wanted an answer from the manager of the company about their whereabouts, but the manager also became clueless just like any other. Therefore, some of the relatives of the tourists sought the help of a private detective named Kar. He arrived in Seoul and made every possible effort to locate the lost Indian tourist group. But, nothing bore any fruition. An unnamed woman to Kar namely Jia in Seoul approached him and later led him to the hidden valley i.e. the White Cloud Mountain. Observing the corpses lying bare in the valley including some Indian tourists as well as the frail movements of the people there, Kar found that all these people were spiritless and had great problems in breathing. Kar further noticed:

> More and more of them appeared. All old and feeble, doubled over with age. Dragging their feet, some leaning against trees to catch their breath, before hobbling on towards the stream. As he watched this procession of the decrepit, the music grew harsh and piercing. (Chaudhuri 316)

Watching these unusual scenes, Kar looked puzzled and couldn't understand the cause behind this pain of people. He wanted to know from Miss Jia what happened to these people and why these people were looking like "hundred years old!" (329). Jia told him the sequence of events and sought his help. At that time, Kar even felt that "It would require a superhuman feat to get them out of here" (330). Still, he wanted to know every possible detail about these changes in people's lives from Jia. She detailed:

> "It's difficult to be exact. But we have been noticing certain signs even before the tourist arrived. Forgetfulness for one. People seemed to be getting confused about their daily routines. Someone who made the hanji paper began turning up at the kitchen instead, another didn't remember when he had arrived. In a few weeks, everyone was looking different. Their skin turned pale, their memories dripped away like water from a faulty tap.' (Chaudhuri 330)

Hearing all these, Kar wanted to know from Jia this time -who are the other people living here apart from the tourists? She told him that since this was an old settlement, therefore Keun Sunim, a Buddhist priest living up in the forest, could tell him everything. She, however, said that many of the Koreans belonging to the other Korea are also living in this hidden valley due to adjustment issues in their new country. Later they arrived at the house of the Keun Sunim and found him inside the temple. Jia asked Kar whether he would take some tea or not. When Jia left, Kar heard the footsteps of another woman with a heavy breath. The woman apologized for her slow movement and said that she couldn't walk fast like her sister. Before Kar could settle his

puzzle, the woman said that 'She is Jia" and they "are twins" (334). She further said that her "name is Jiyoo Park" (334) and he can call her Jiyoo. She, thereafter, gave Kar all the details ranging from the escape bid of her family, their pushing back by Chinese soldiers, their imprisonment, and "how she was offered a chance to free her family" (336). Kar appeared thoughtful for some time and tried to jot down the things. While trying to unfold the mystery, he questioned Jia:

> 'What had gone wrong? Do you mean the spliced paddy had some defect and is somehow responsible for what is happening to the settlers down in the valley? But how did it end up here? Was that paddy planted in the valley below?' (Chaudhuri 338)

Jia also told him how and when Jiyoo started trekking in the White Cloud Mountain. Living away from her family members who were there in prison in the other Korea, Jiyoo felt lonely and suffered. To keep her frustration in check, Jiyoo started trekking in the mountains and "at first went on short trips with groups walking for a few hours" (348). The beauty and fresh air of the mountain attracted her and she even started walking deep inside the mountain. Once while walking deep inside the mountain, she met the monk "outside a Buddhist temple, frequented by tourists and locals alike" (348) and acquainted with him. The monk had been very kind to her and "invited her to the little settlement in the hidden valley of White Cloud mountain" (349). Also, the people living in the settlement were very friendly and Jiyoo "began to visit more often and help the people at the retreat" (349). Every year the people living in the settlement sowed the seeds of "*Ssal*…the Korean word for paddy before it is cooked…" (349). They grew it "in the little terraces on the hillside" (349). Jiyoo further added, "They sowed it every year and this time they had planted the seeds she had gifted, alongside the original paddy crop" (349). What she said thereafter is of great concern:

> The seeds were sown and the saplings transplanted to the terraced plots on the hillside. And wherever they were planted, the crop burst out in a shimmer of burnished gold in a matter of weeks. Everyone was surprised at how quickly the new paddy had matured. They were very happy. The settlers thanked her over and over again for those magic seeds. Last year's grain was still being used, they hadn't touched this newly harvested paddy till months had passed. Till around the time she had arrived with the Indian travelers. (Chaudhuri 351)

Hearing these words from Jiyoo, Kar at this point concludes that "the poison is in that paddy from the British laboratory" (352). He further remarked:

> Instead of health the spliced paddy was pumping death and decay into their system. And I am sure the same has happened with the samples your sister delivered to her bosses in the North. Genes are unpredictable and who knows what else had gone into those artificially created seeds. We have to destroy all stocks.' (Chaudhuri 352)

Kar then realized that the area had been completely contaminated by these deadly seeds stolen from the British laboratory. Witnessing all these unusual circumstances firsthand, Kar too startled and became speechless. Before these circumstances, he was never serious about climate change and found this time that the rapidly unfolding climate crisis is an outcome of human greed, jealousy, and desire. In other words, for the first time in his life, he wholeheartedly realized that most of the crimes are rooted in greed and jealousy. It has also been clear from the narrative that it is the poor who are mostly vulnerable to the effects of climate change. Additionally, "there are indeed significant risks to food security for the most vulnerable populations" (Antle 6), and thus poor households and countries will find it increasingly difficult to ensure adequate nutrition and food. As argued by Susan Charles, "the most significant changes in temperature and precipitation are expected to impact the poorest and most vulnerable regions of the world many of which lack the sociopolitical stability and technological resources to adapt to these climatic shifts" (Charles 44). Charles also significantly outlines that owing to climate change "already hungry regions of the world are expected to be impacted negatively and, in some cases, severely" (44). Thus, "the poorest regions with the highest levels of chronic undernourishment will be exposed to the highest degree of instability in food production" (Charles 46). The novel further puts forth the fact that the impacts of climate change are borderless which will potentially affect all the places and societies in the world.

Conclusion

It has thus been established from the various instances extracted from the chosen text that techno-industrial, economic, and predatory developments have done severe harm to ecology. Chaudhuri's *The Butterfly Effect* has candidly outlined how the actions of human beings over the last few centuries have scripted a future of apocalypse through some interesting and thoughtful contentions. The text divulges ideological denialism of various sorts and displays that ideological denialism has really limited the adoption of effective measures and prevented addressing the root causes and drivers of climate change. Through Tanmoy's SuperRice project and Henry's continuous cautions, the text lucidly underlines the contradictions that persist in the existing

climate change policies and their inadequacies as well. It has also been noticed from the discussions that overemphasis on techno-optimism for the solutions of environmental problems has, in fact, fuelled in the continuation of the current system which is totally centred around growth and income. These signs of impending danger are well enough to re-think the approach and actions of humans towards ecology and to make the conservation efforts robust. What humanity needs at present is "grassroots initiatives, community restoration projects, the courage of politicians, and "ecotopian" vision of a future that is fundamentally different from the present" (Mauch 33). In addition, the novel shows how different variants of ideological denialism have made the poor and the resourceless the most vulnerable of the climate crisis. Along with that, the text puts a huge thrust on the aspect that time is ripe to discover ways to halt permanently ecological destruction and create the much-necessary balance between growth and ecology. By traversing the plot and characters through different countries, Chaudhuri has justified the important point that environmental disasters and effects are often borderless, and these need to be addressed across the globe with great urgency.

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