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# CLIMATE CHANGE AND ITS IMPLICATIONS: FROM ENVIRONMENTAL RISKS TO GLOBAL POLICIES

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## ABSTRACT
Climate change is an inexorable phenomenon with far-reaching environmental ramifications, imperilling the very foundations of life on Earth. It precipitates profound disruptions in seasonal cyclicity, accelerates glacial ablation, and exacerbates eustatic sea-level rise, thereby destabilizing global ecological equilibria. These perturbations have already engendered discernible adversities, including escalating thermal anomalies, precipitous groundwater depletion, biodiversity attrition, attenuated agricultural productivity, and burgeoning public health crises. The economic ramifications of these environmental aberrations are profound, with developing and economically marginalized nations disproportionately shouldering the deleterious burdens of climate-induced cataclysms.
At a macrocosmic scale, anthropogenic carbon emissions constitute the principal vector of climatic destabilization. In a concerted effort to ameliorate this exigency, sovereign entities coalesced under the auspices of the Kyoto Protocol, an international accord predicated upon the doctrine of "Common but Differentiated Responsibilities" (CBDR). This framework underscores the intrinsic asymmetries in national capacities to confront climatic vicissitudes, advocating an equitable yet stratified approach to mitigation and adaptation. The accord delineates a paradigm wherein nations are enjoined to undertake proportionate commitments commensurate with their historical emissions, economic fortitude, and technological aptitude in combating the inexorable crisis of anthropogenic climate change.

**Keywords:**
Climate change; environment; economy; low-income states

## 1. INTRODUCTION
Climate change stands as an inexorable force of environmental perturbation, exerting profound ramifications on the intricate equilibrium of life systems. The multifaceted and enigmatic interplay between anthropogenic activity and geophysical processes engenders formidable challenges in delineating its impact within a singular analytical framework. The United States Environmental Change Agencies, in conjunction with Nodal and the Climate Impact Risk Assessment (CIRA), have meticulously delineated six critical sectors acutely susceptible to temperature flux, thereby elucidating the overarching economic ramifications. These investigative initiatives have primarily sought to quantify the correlative nexus between thermal escalation and macroeconomic stability. Empirical inquiries by Heal and Park (2013) and Horowitz (2009) have demonstrated a detrimental contraction of 8.5% in per capita income within tropical zones, highlighting the disproportionate fiscal burden borne by equatorial economies.
Further corroborative research underscores that, notwithstanding the imposition of a 2˚C global temperature ceiling, 33% of the global populace will endure catastrophic heat waves at quinquennial intervals (Dosio et al., 2018). Human thermoregulatory mechanisms, constrained by the physiological threshold of wet-bulb temperatures exceeding 35˚C, falter in dissipating excess heat, precipitating systemic failure, morbidity, and mortality. From a clinical standpoint, a

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healthy individual exposed to 45˚C with 50% humidity will succumb within six hours, underscoring the existential peril posed by extreme thermal environments. These climactic anomalies manifest predominantly across the Persian Gulf, Eastern China, and the northern latitudes of South Asia, where unprecedented heat surges imperil large swathes of the population.

Climate change, an impending cataclysm, threatens to eviscerate global agricultural yields with inexorable severity as the century unfolds. The African agronomic model, emblematic of a microcosm of impending devastation, illustrates the disproportionate impact of thermal amplification on food security. While global mean temperatures are projected to surge by 1.5˚C by 2050**,** the African landmass is anticipated to experience an anomalous **3–**4˚C escalation**,** exerting a deleterious effect on staple crop yields, diminishing output by 8% to 22% unless mitigatory interventions are instituted on an exigent scale (Schlenker & Lobel, 2010). The asymmetric manifestation of climatic disequilibrium—wherein certain regions undergo exacerbated pluvial intensification**,** while others confront aridification—precipitates perturbations in the hydrological cycle, disrupting agro-ecological stability**.** De Fries et al. (2019) have elucidated the exacerbation of hydrological droughts as a direct corollary of precipitation deficits**,** amplifying the precariousness of agrarian livelihoods.

Moreover, the inexorable rise in ambient temperatures is precipitating a latitudinal and altitudinal migration of floral and faunal taxa, engendering ecological disequilibrium and intensifying extinction susceptibility. This dislocation of biotic communities not only jeopardizes biodiversity conservation but also compromises ecosystem resilience**.** De Fries et al. (2019) underscore the heightened vulnerability of polar biota**,** whose adaptive thresholds are critically surpassed by escalating temperatures**,** portending an existential crisis for species endemic to cryospheric habitats

## 2. Temperature and economic performance

The treatise The Spirit of Laws (Montesquieu, 1750) contended that an excess of heat makes men slothful and dispirited. The debate is whether temperature is or is not central to economic development.

It is estimated that by 2100, the mean global temperature will increase by 2oC—8oC relative to pre-industrial levels (IPCC, 2014). The temperature has a significant effect on different economic and social outcomes, including agricultural outputs, labor supply, mortality, energy usage, conflict, health, poverty, labor productivity, and industrial productivity (Jain et al., 2020).

Conventionally two approaches have been used to understand the relation between temperature and aggregate economic activity. The first one laid stress on growth and development, which examines the relationship between the aggregate economic variables and the average temperature in cross-sections of the countries. (e.g., Sachs & Warner, 1997; Gallup et al., 1999; Nordhaus, 2006). The contemporary data reveals that the hot countries tend to be poor with national income below 8.5% per degree Celsius in the world cross-section (Dell et al., 2009), meanwhile, various researchers debate that this correlation is driven by spurious relation of temperature with the national characteristics like intuitional quality (Rodrik et al., 2004). The Second approach for the quantification of various climatic effects and their net effect on national income is micro-evidence. This approach is lodged inside the Integrated Assessment Models (IAM) which are used in the literature of climate change for modelling climate economy interactions and also used for various policy recommendations for greenhouse gas emission (Dell et al., 2012). At the micro-level, climate research suggests a broad line-up of temperature effects, with main effects on the productivity of agriculture, cognitive performance, crime, mortality, physical performance, and soil crisis.

Dell et al, (2012) examined the historical relationship between economic growth and temperature fluctuations. Results revealed substantial effects of temperature in poor (low-income) countries. Generally low- and middle-income countries are geographically located in low altitudes and are expected to experience heat shocks earliest (Harrington et al., 2016). It was found that the rise of 1˚C in temperature decreases the economic growth by 1.3% on average. The appraisal indicated that climate change may harm the growth of the national economy. Agricultural outputs are badly hit by the higher temperatures, along with this reduction was also seen in industrial production and political stability. Jain et al, (2020) investigated the impact of temperature on the economic activity in India from 1980- 2015. From his investigations, it was found that with the increase in temperature (1˚C) the economic growth rate reduced by 2.5 percentage points. Poor states and primary sectors like agriculture, forestry, fishing and mining were seen to have a major subtle effect.

## 3. Ecosystem and climate change

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Climate has a significant environmental impact on ecosystems. It fundamentally controls the distribution of ecosystems, species ranges, and process rates on Earth. Changing climate affects ecosystems in different ways. For instance, warming may force species to mitigate to higher latitudes or higher elevations (Grimm et al., 2016) where temperatures are more conducive to survival. Ecosystem patterns and processes, for instance, rates of primary productivity or input-output balance of chemical elements, respond in complex ways to climate change due to multiple controlling factors. Physical changes in ecosystems - for instance, changes in thermal stratification patterns in lakes and oceans, flood and drying systems in streams and rivers, or escalation of the hydrologic cycle across large basins bring about changes in ecosystem structure and function that have erroneous economic and human outcomes. Blios et al, (2013) reported a significant disruption in the species interaction on account of climate change by influencing the structural and functional aspects of the marine food webs, entailing their impact on the human populations grandly reliant on the fish industry for food along with the recreation and culture which are prerequisite for the human beings (Alava et al., 2017). With the increase in greenhouse emissions, the problem of global warming in the coming decade is going to have an indelible impact on the living system. The impact is spread, ranging from scaling down the oxygen proportion to melting down ice caps which would accrete the overall sea level as we deep dive into the finishing years of the first half of the 21st century (Gattuso et al., 2015). These aberrations cumulatively affect the marine food web framework (Beaugrand, 2015). The temperature rise of the marine ecosystems on account of global warming acutely disturbs the species interaction, distorting the food web nexus besides bringing a diminution in the number of basal species which contributes to the overall decline in the population of the species. These complications preclude the marine habitats of basic ecosystem prerequisites (Chapman et al., 2020). Besides the aspect of temperature, oceanic acidification also poses a greater threat to the tropic level grid maneuvering the inter-tropic level linkages. An enhanced carbon dioxide level also perturbs the inter-tropic level balance resulting in the overall unevenness in the ecosystem.

The temperature rise disturbs the food chain balance by changing the overall folio of secondary producers, resulting in elevated numbers of predators on account of increased metabolic demand (Goldberg et al., 2017). Meanwhile, Clements and Hunt, (2015); Nagelkerken & Munday, (2016) reported that an elevated level of carbon dioxide ruined the inter-tropic level energy flow. This impairment catapults into an overall mismatch between the demand and the supply affecting the food web as a whole (Lemoine & Burkepile, 2012). Moreover, any imbalance on account of any external abiotic factor like temperature or higher levels of carbon dioxide could facilitate a forceful presence of top-staged trophic levels (Nagelkerken & Connell, 2015) leading to the heinous trophic cascade (Provost et al., 2017).

The flip side of the coin is to herald that the primary producers could use the surging carbon dioxide as a nutrient and the increasing temperature to boost their physiology which would, in turn, channel and enhance the conventional bottom-up control on the food web framework. Any aberration whatsoever in the conventional tropic level stack would trickle down to the food web network (Heath et al., 2014) ruining the essence of the ecosystem as a whole.

The calamity of climate has not just cornered ecosystem stability by deforming the food web pattern but has also mutated the arrival or departure of extreme events specifically droughts and, heat waves (Jay & Capon, 2018). These impacts are long-lasting for the overall 'nurture' of the ecosystem making it susceptible to foible. Clark et al, (2016) and Peters et al, (2015) reported the impact of undue droughts on the growth and mortality of trees in forested areas. Moreover, recurring drought patterns reduce the resilience of plants against pathogens and other invasive species (Trottier et al., 2017) besides reinforcing the wildfires (Littell et al., 2016). Along with these factors, the severity and duration of drought tremors the structure and function of the forest ecosystem (Loehman et al., 2017).

Frequently occurring biological events significantly affect ecological relationships (Rudolf, 2019) and act as a beacon to climatic responses (Staudinger et al., 2015). Any alteration in the climatic conditions, i.e., temperature rise or fluctuating downpour patterns, the species gauge these variations exquisitely. The phenological shifts in birds coupled with earlier migration (Lehilkoinen et al., 2019) and earlier breeding (Lany et al., 2016) support the above authentication. There is empirical evidence available suggesting a robust phenological shift in the case of terrestrial organisms in comparison to their aquatic counterparts due to the tiresome tracing mechanism of marine life (Staudinger et al., 2015).

Photosynthetic organisms/primary producers form the base of major food web systems feeding all other food directly or indirectly to all forms of life besides also enriching the environment with oxygen and simultaneously compressing the overall carbon footprint. Le fort et al, (2015) reported how poor primary production output yields over other trophic

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levels and, in the process, shake the equilibrium of the ecosystem as a whole. The last half of the 20th century, as well as the first quarter of the 21st century, has recorded a net increased terrestrial primary production reinforced by both natural and anthropogenic activities like increased carbon footprint, longer growing seasons, etc. (Domke et al., 2018). So far, we counted all climatic component contributions in the same orientation, there are studies about the counteraction of the climatic components on the overall production levels. For example, an increased temperature supplemented by a surplus carbon dioxide level may impact underground processes by distorting natural cycles (carbon and nitrogen cycles) (Mellilo et al., 2017). This distortion would enormously affect terrestrial production (Campbell et al., 2009) by limiting the overall growth (Anderegg et al., 2015) of the primary producers irrespective of the dynamics of the ecosystem.

## 4. Potential impact of thermal stress on mankind

The rise in global temperature due to climatic change is causing increasing concern for occupational heat stress among working people around the world, especially in areas with a hot climate (Al-Bouwarthen et al., 2020). To facilitate the transfer of heat from the body to the atmosphere to maintain core body temperature, environmental and metabolic heat stress leads to physiological responses (heat strain) (Nerbass et al., 2017). Higher temperature exposure can contribute to higher stress with more regular heat cycles, likely leading to more cases of heat-related diseases like, heat stroke, heat exhaustion, increased chemical exposure susceptibility and fatigue. Increased exposure to temperature can also result in reduced vigilance creating an increased risk of injury or lapses in protection. In addition, elevated temperatures can increase air pollution levels, such as ground-level ozone; outdoor workers are more prone to air pollutants linked to chronic health effects, like respiratory diseases and allergic reactions (Gubernot et al., 2014). The urban heat island (UHI) is an area with higher temperatures than the surrounding rural or suburban climate. The UHI effect is due to multiple factors such as air pollution, anthropogenic heat, urban architecture and changes in the pattern of precipitation (Heaviside et al., 2017). Via exposure to increased temperatures, the UHI affects human health and can be problematic, especially during heat waves. During the summer season of immensely high temperatures or heat waves, the health effects of UHI are more intense. Thus, due to climate change, heat-related mortality is likely to rise in the future. There is a powerful connection between the UHI effect and urban planning. This is because the lack of trees and plants in urban areas affects the transpiration process. The introduction of sufficient vegetation in urban areas contributes to climate cooling, contributing to increased transpiration and reducing the UHI effect (Leal Filho et al., 2018). The UHI effect is partly responsible for the recent temperature fluctuations in various cities. Outdoor residents, such as traffic wardens, road sweepers, police, building staff and small landscaper vendors work throughout the hottest times and an additional 3-5ºC makes heavy work very challenging (Moda & Minhas, 2019). The well-being of outdoor women staff is another problem that has recently gained attention; in particular, during pregnancy as it causes additional heat stress issues. The combination of exposure to heat in the workplace (both from weather and man-made heat) and body heat from metabolic processes (related to workload) can induce heat gain in the body (Xiang et al., 2014). Heat-related illnesses are the acute detrimental effects of extended exposure to elevated temperatures. These effects vary from mild heat-related conditions and symptoms, such as heat exhaustion, heat rash, heat edema, heat cramps and syncope to serious heat injuries that cause death, such as exertional heat-injury, exertional rhabdomyolysis and heat-stroke. The effect of climate change is expected to increase the susceptibility of people in equatorial climates to heat and heat-related illness and would primarily lower socio-economic status of workers with non-automatic labour jobs (Boonruksa et al., 2020). According to Kjellsstrom et al., (2017), there are six fundamental factors including air temperature; radiant temperature; humidity; air movement (Wind speed); clothing and the metabolic heat produced by human physical activity, which decide psychological activities and heat balance within the human body. As such, in addition to regulating work environments, work rates and work limits, perceptual knowledge is an immediate adaption mechanism for individual workers against heat exposure. These were designated to assist in the prediction of physiological stress among employees due to exposure to stressful environmental conditions (Lucas et al., 2014; Varghese et al., 2018). The fig.1 shows the health effects of thermal stress.

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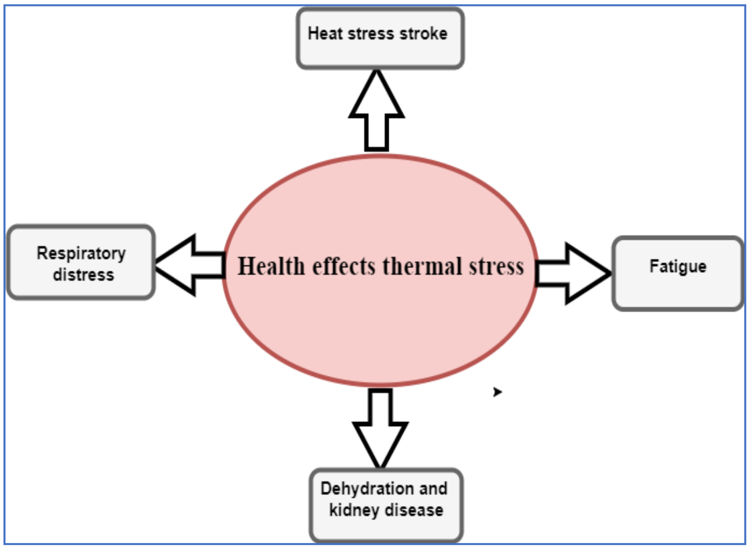


***Fig.1: Health effects of thermal stress***

Heat stress is measured by various methods, the two most used approaches are the environmental/meteorological variables and multiple indices. Some matrices like National Weather Service Heat Index and Humidex, use temperature and moisture combinations while others use solar radiation. (e.g., Wet bulb Globe Temperature (WBGT) and environmental stress index (Singh et al., 2015). The core human body temperature of 37 degrees Celsius is increased by extreme heat stress, resulting in heat stroke (severe hyperpyrexia), which clumsily influences the ability to physically work. The increased exposure to heat is associated with occupational health hazards and has a negative effect on job efficiency (Rao et al, .2020). The most critical thermoregulatory parameter is known to be the body core temperature; a mere 3-degree difference in the body core temperature can cause injury or even death. The heart and skin temperatures of healthy individuals are 36.8ºC and 34.1ºC respectively in neutral conditions. Clinical studies suggest that ageing, obesity and cardiovascular diseases may have a major effect on human thermoregulatory ability (Zhang et al., 2016). In combination with dehydration, heat stress often causes a series of heat-related manifestations such as exhaustion, headache, muscle cramps, weakness, dizziness, nausea, vomiting, tachycardia, hyperventilation, ataxia, hypotension and transient mental state shifts (Crowe et al., 2015). Epidemiological studies have shown the greater occurrence and prevalence of kidney stones in populations subjected to persistent dehydration, with elevated ambient temperature and intensive physical activity (Nerbass et al., 2017).

5. **Drought**

A prolonged deficit in the water supply and reduction of precipitation leads to the depletion of groundwater throughout the globe, the said area is known to be under the severe condition called “Drought” (Tallaksen & Van Lanen, 2004). Climatologists struggled for decades to define drought (Redmond, 2002), and categorized it into various types including meteorological, agricultural, hydrological, and socioeconomic (Slette et al., 2019).

Drought negatively affects the quality and quantity of water by intervening in the hydrological cycle (Mosely, 2015). Safavi & Ahmadi, (2015) elucidated how drought influences the water quantity. Drought is associated with the scarcity of precipitation in a particular region, immensely affecting rain-fed systems like agriculture. Short-term drought can be handled by setting aquifers with the usage of drought buffers, however, these buffers are not helpful in persistent drought. Drought mainly affects the water table of that land, this lowered water table results in the equilibrium disturbance of the aquatic ecosystem. Mohammad et al., (2018) study reclaimed that there is a direct relationship between groundwater recharge and climatic abnormalities culminating in an overall decrease in groundwater. About 40% of the modern world depends upon agriculture as their prime source of economy, nevertheless, this drought is an enormous disaster to the farmers and communities dependent on agriculture. Most eminent draughts in the past few years are recorded in central/SW Asia (1998-2003), Western North America (1999-2007), Australia (2002-2003),

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Europe (2003), and Amazonia (2005) (Daiz & Moore, 2017). In India, droughts have become the main cause of major Indian famines including the Bengal famine of 1770 which resulted in the death of one-third of people in affected areas, five million people lost their lives in the 1876-1877 famine and the famine of 1899 almost 4.5 million people went heavenly abode. In 1972 drought in the state of Maharashtra badly affected 2.5 crore people (Nashh, 2002; Collier & webb, 2002). Drought has increased geographically throughout the globe at an alarming rate (Dai et al., 2004).). Researchers like Knorr et al, (2007) reported that spasmodic droughts cause an unusual increase in Carbon dioxide (CO2), and hence the carbon cycle is expected to be affected more robustly shortly.

Drought, a multifaceted environmental constraint that evokes the response of flora from different levels (molecular and forest stand level) (Hamanishi & Campbell, 2011). The adverse effects of drought on the plants can be observed in the form of productivity, death of mature trees, pathogen susceptibility, vulnerability to damage from fire, and seedling recruitment (Reichstein et al., 2013). Drought has adverse global effects on forests, forest decline is one of them (Anderegg et al., 2012; Choat et al., 2012).

## 6. Agricultural sensitivity to climate change

Agriculture is considered to be the most vulnerable sector among many sectors affected by climate change (Raju & Phanindra, 2018). Catastrophic weather-related events cause economic losses of USD 225 billion worldwide (Arora et al., 2019). Agriculture and climate change are internally linked, as climate change is the key cause of biotic and abiotic stresses that have adverse effects on the region's agriculture. Different aspects like changes in annual rainfall, average temperature, heat waves, changes in weeds, pests, or microbes, global changes in atmospheric CO2and sea-level fluctuations are influenced by climate change. Increasing food demand due to the ever-increasing population has resulted in intensive agricultural practices, including unparalleled use of agrochemicals, livestock production (for meat and other sources of income), exploitation of water supplies, etc. have further exacerbated the situation, with the emission of greenhouse gases (due to agricultural activities) resulting in natural resource pollution. Agricultural yields in developing countries are primarily influenced by unfavourable environmental conditions (Rosenzweig et al., 2014). As a result of climate change, floods and droughts severity is expected to increase in the coming years, which can reduce crop productivity (Lesk & Ramankutty, 2016). Agricultural farming practices and the essence of a region are highly affected by prolonged climate condition. Generally speaking, the experience and infrastructure of local farming communities are appropriate for specific types of farming and for a specific group of crops known to be productive in the current climate. To sustain productivity, changes in the mean climate aside from current states may require adjustments to current practices, and, in some cases, the optimal type of farming may change.

Higher temperature is promptly detrimental in the regions where the temperature is already close to the physiological limit of crops, such as in the crops of seasonally arid and tropical regions heat stress is increased along with the loss of water through evaporation. Water is important for plant growth, so different patterns of precipitation have a major effect on agriculture. Projections of potential changes in precipitation also affect the extent and course of climate impacts on crop production, since more than 80% of total agriculture is rain-fed (Olesen & Bindi, 2002; Tubielli et al., 2002; Reilly et al., 2003). However, changes in seasonal rainfall may be more important to agriculture than changes in the mean annual rainfall. Increased drought, heavy rainfall frequency, and temperature volatility will reduce crop production leading to higher risks of hunger (Dhankher et al., 2018).

Climate change results in tremendous land loss, resulting in increased desertification and soils that are nutrient deficient, at the same time, floods cause topsoil and soil nutrients to be washed out, resulting in low productivity for several coming years. The accelerated rate of climate change would have protracted effects on the productivity of the agroecosystems. It is therefore high time that we prepare ourselves for the challenges ahead to combat the impact of climate change and to ensure food security not only for human beings but also for other living beings.

## 7. Effect of climate change on health

Climate change influences diverse aspects of our lives, for example, the environment, health, safety and protection, natural resources, and agricultural and food production (IPCC, 2014). However, among all these aspects, health is the most important facet since we must be familiar that health is not only the key means to achieve progress; health itself is the definitive goal of development as it aims to ensure healthy lives and promote well-being for everyone at all ages (Oleribe, 2015). As one of the essential means to attain development, health guarantees the quality of human resources, which in developing countries is necessary to achieve economic growth and lessen poverty and social difference (Oleribe, 2015). Climate change and other environmental disruptions can cause direct and indirect water-borne

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diseases (Nahian et al., 2018). Besides this, research brings strong evidence that the increased number and intensity of heat waves can aggravate high blood pressure issues that lead to cardiovascular disease, particularly among elderly people, leading to an increased number of deaths (Watts et al., 2015). Moreover, elevated levels of salinity in the water bodies are increasing blood pressure-related issues resulting in hypertension and cardiovascular diseases (Nahian et al., 2018). This can be considered a serious health concern, particularly in Asian countries like Bangladesh, as a hitherto coastal population is exposed to receiving water from sources highly vulnerable to salinity intrusion, and thus more likely to consume higher levels of sodium (Scheelbeek et al., 2017), likewise in India, there is a growing trend in "Sundarbans" to increase salinity because of the difference of the lower amount of freshwater coming in, during the monsoon season from the north and the rise of salt water coming from Bengal Bay (Sadik et al., 2018).
Scientific findings showed that from the tropics to the poles, climate is manipulating living organisms directly and indirectly in terms of driving social dynamics and health situations. The world must be prepared to invest and fund public health systems, overloading both infrastructure and the economy (Watts et al., 2015). In the future, in most climate change scenarios, more regular occurrences of heavy rainfall are expected on giant regions of the planet which will directly or indirectly produce adverse effects on living creatures. In some South Asian countries, such as India and Bangladesh, snow melting from the Himalayas is a fundamental determinant of river flows and essential in sustaining upstream flows (Sadik et al., 2018). Modifications in the rainfall pattern and hot temperature are the factors that significantly affect the melting process, thereby declining the icy masses which can reduce the water sources for human use (Sadik et al., 2018). As the sea level rises, water sources become more vulnerable to salinity, which can worsen health problems not directly related to water-borne diseases, but hypertension and strokes (Sadik et al., 2018; Nahian et al., 2018).

## 8. Climate change and mitigation

Due to climate change all over the world, most of calamities (Table 1) are vulnerable to human livelihoods. The main strategies to deal with climate change and its cost are focused on mitigation and adaptation actions (IPCC, 2014). How to share reductions in carbon emissions has been debatable at the UNFCCC after the completion of the first commitment cycle of the Kyoto Protocol circuit in 2012 (Bueno & Pascual, 2016). In the 1990s, during the Kyoto Protocol era, UNFCCC recognized and applied the opinion of Common but differentiated responsibilities, so, no nation under development until 1990 got any compromise to curb emissions at that time. But in the post-Kyoto horizon supported by the Paris Agreement what become a current speech during climate negotiations, and has been gaining voice from the developed world, is the focus on sharing responsibilities with everyone. Even though the post-2020 agreement is non-binding, just voluntary according to the capacity of UNFCCC Parties (Salinas, 2018), it has emerged as an international pressure from the developed world to curb emissions from developing countries.
The disparity between developed and developing nations concerning carbon emissions over time has been a central focus of the United Nations Framework Convention on Climate Change (UNFCCC). The concept of Common but Differentiated Responsibilities (CBDR), as outlined by Shue (2014), underscores historical emissions as a key determinant in assessing responsibility for climate change. Based on this principle, developing nations were not obligated to meet specific emission reduction targets (Bueno & Pascual, 2016).
However, the inability of developing nations to meet the objectives set for both the first (2005–2012) and second (2013–2020) commitment periods of the Kyoto Protocol highlighted the necessity for broader international cooperation, particularly among the Least Developed Countries (LDCs) (Bueno & Pascual, 2016). The signing of the Paris Agreement in 2015 marked a significant milestone in global climate policy. As part of its framework, all UNFCCC parties submitted their revised emissions reduction commitments for the decade 2020–2030, under the Intended Nationally Determined Contributions (INDC) (Dion & Laurent, 2015). The extensive participation of UNFCCC member states in mitigation initiatives has reinforced the Paris Agreement's innovative role in climate negotiations (Salinas, 2018).
The LDC group, comprising 47 nations, is geographically distributed across various regions, with a significant concentration in Africa (33 states) and Asia (9 states). Among these, Bangladesh—which gained sovereignty in 1971—has historically maintained low per capita carbon emissions, aligning with its status as an LDC nation.

***Table: 1. Projected impacts of climate change people encountered at different extents of global warming***

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| Flooding: Global warming with the increase of 1.5°C temperature, the number of people affected by flooding is expected to double compared to current levels. (Alfieri et al., 2016). |
| Sea-level rise: At 2 °C of global warming, sea-level rise will cause lands to be permanently flooded in 2150 that now is home to 60 million people. (Rasmussen et al., 2018). |
| Hurricanes: The expected damage of hurricanes due to climate change will double in 2100 compared to current levels. Tropical cyclones could form in regions where they have not been recorded before, such as the Persian Gulf (Lin et al., 2016). |
| Heatwaves: By 2100, 48% (under conditions of strong mitigation) to 74% (if no mitigation takes place) of the world's population could be exposed to conditions of deadly heat (i.e., a combination of critical heat and humidity levels where exposure can lead to fatality) for more than 20 days in a year (Mora et al., 2017). |
| Wildfires: Wildfire is expected to increase in the United States, South America, southern Europe, southern Africa, Australia, and Central Asia when the global temperature increases. (Liu et al., 2010). |
| Vector-borne disease: The region inhabited by mosquitoes transmitting diseases such as malaria, dengue, and yellow fever, will expand when global temperature increases, exposing an increasing number of people to these diseases (Campbell et al., 2015) |
| Loss of coral reefs: 99% of coral reefs will disappear under 2°C of global temperature increase (IPCC, 2018). The loss of coral reefs will make coastal communities more vulnerable to sea-level rise and flooding which would have negative economic impacts on fisheries and tourism industries (Chen et al., 2015). |

**Conclusion**

It is a fact that climate change is a global threat, and it has adverse effects on the sustenance of life. Climate change affects all parts of the globe causing a rise in global temperature, affecting agricultural productivity, and disturbing terrestrial and aquatic ecological processes causing potential health problems along with other calamities like floods, acid rain, drought, famine, air-water pollution and much more. It is the need of the hour that institutions and individuals must investigate all the parameters that are linked directly or indirectly to this disaster. These effects worsen day by day affecting mainly poor income countries. Adverse changes in the climate can be restrained by using renewable energy sources. We need to introduce various alternative technologies for electricity generation and cost-effectively reduce greenhouse gas emissions. We should make appropriate planning and strategies to save the climate from

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adverse effects. To continue the survive, we need to cope with the circumstances by adopting various planning and strategies like afforestation, reforestation, reducing the use of fossil fuels, becoming dependent on renewable energy sources like wind, solar, and geothermal energy, so the emission of products like, chloro-fluoro carbons, methane, Carbon dioxide can be controlled which are the potential threat to the climate. At the same time, globally all the countries need to cooperate well in time and play their role to meet the challenges of carbon emission.

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