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# Climate Change Paradox: The Least Responsible for It Encounters the Most of Its Implications

**Hadi Allafta * and Christian Opp**

Faculty of Geography, Philipps-Universität of Marburg, Deutschhausstr. 10, 35037 Marburg, Germany; opp@staff.uni-marburg.de

* Correspondence: allafta@students.uni-marburg.de

**Abstract:** Carbon dioxide ($CO_2$) emissions are a major cause of climate change. However, $CO_2$ emissions data for 178 countries from 1960 to 2018 revealed inequality in global $CO_2$ emissions. For example, we found that 50% of the world's population (ca. 3.75 billion people) was responsible for just 8.9% of the global cumulative carbon emissions. These people are concentrated in low- and middle-income countries. Conversely, 10% of the world's population (ca. 757 million people), concentrated in high-income countries, were responsible for 46.8% of the global emissions. Furthermore, the literature review disclosed evolution of $CO_2$ emission inequalities within countries. A significant ($p < 0.001$) negative ($r^2 = -0.52$) correlation was detected between carbon emissions and climate change impacts on national incomes. Such correlation indicated that countries most likely to experience the greatest effects of climate change are also those who make the smallest contributions to its underlying causes. Similar disparities were observed within countries where low-income groups who make the smallest contributions to climate change are subjected to its worst implications. Evaluations of the data from the literature showed that migration could be the result of climate change, though such migration does not happen in isolation. In other words, this kind of migration is frequently linked to other issues such as the fragility and lack of adaptability of the communities. Furthermore, reviews showed that climate change catalyzes instability and conflict. On the other hand, conflict damages the environment and climate in multiple ways. Therefore, it is necessary to collaborate to resolve these two issues concurrently.

**Keywords:** carbon dioxide emissions; climate change; migration; conflict



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## 1. Introduction

Climate change is described as major fluctuations in average long-term climate conditions; for example, conditions become warmer, drier, or wetter for several decades or more. The long-term trend distinguishes climate change from natural weather variations. The mechanisms of the climate system on Earth are straightforward; Earth cools as energy from the sun is reflected into space primarily by clouds and ice sheets or when Earth's atmosphere emits heat. Earth warms as it absorbs solar energy or when atmospheric gases hinder heat emitted by Earth from escaping into space. Numerous natural and anthropogenic variables may affect the climate system on Earth. The solar intensity, volcanic eruptions, and variations in naturally existing greenhouse gas levels are all natural sources of climate change [1]. However, historical records indicate that the current climatic warming is occurring at an unprecedented rate, which cannot be explained by only natural sources. The National Aeronautics and Space Administration (NASA) states that natural sources are still running, but their impact is too slight to justify the current fast warming [2]. Concentrations of carbon dioxide, methane, nitrous oxide, and fluorinated gases have dramatically escalated because of anthropogenic activities [3]. Cumulative $CO_2$ emissions from 1850 to 2019 were 2400 gigatons, of which (58%) developed between 1850 and 1989,

and the remaining (42%) developed between 1990 and 2019. The atmospheric $CO_2$ concentration in 2019 reached 410 parts per million ppm, which was the highest $CO_2$ level in 2 million years [4]. In 2019, the energy, industry, transportation, and buildings sectors were responsible for 79% of carbon emissions, and the remaining 21% originated from agriculture and other land uses. The reductions in carbon emissions due to improvements in energy production are still less than the emissions increases due to the higher levels of energy supply, transport, and agriculture [4]. For every 1000 gigatons of carbon dioxide emissions, global temperature rises by 0.45 °C. Estimates indicate that if carbon emissions increase by 500 gigatons, then there is a 50% likelihood that temperatures will rise by 1.5 °C, but if carbon emissions increase by 1150 gigatons, there is a 67% likelihood that temperatures will rise by 2 °C [4]. The primary drivers of climate change are (i) combustion of fossil fuels such as oil and coal produces carbon dioxide, (ii) deforestation, as trees collect carbon dioxide from the atmosphere and release it back into the atmosphere when they are cut, and (iii) industrial farming, as ruminant animals emit considerable quantities of methane through digestion [3,5,6].

*Climate Change Impacts*

The period 2011 to 2020 was the warmest decade on record, with the global average temperature surpassing the preindustrial levels by 1.1 °C in 2019. Currently, global warming induced by anthropogenic activities is growing at a pace of 0.2 °C per decade. A temperature rise of 2 °C relative to the preindustrial periods is linked to severe harmful effects on the environment and human wellbeing [7]. Climate change can result in the following: (i) Ice melting and sea level rising. Climate experts estimate that the sea level will remarkably rise in the next century, causing many coastal regions to be flooded. The average rate of sea level rise was 1.3 mm per year between 1901 and 1971, and increased to 1.9 and 3.7 mm per year in the periods between 1971 and 2006 and between 2006 and 2018, respectively [4]; (ii) Heat waves and droughts will become more common; (iii) Severe storms, hurricanes, and typhoons will gain strength and become more frequent, as a warmer climate increases the quantity of absorbed water in the atmosphere and increases the likelihood of violent downpours rather than steady storms; (iv) Decreased food security, as many crops grow best at quite specific temperatures, and their productivity considerably changes when such temperatures change; (v) Ecosystems change, as increasing heat will shift some species into other regions. Moreover, climate change will lead to the extinction of hundreds of species; (vi) Pests and diseases, as increasing temperatures promote the growth and spread of some agricultural pests and diseases [8]; (vii) Acidification of the oceans, as a result of rising carbon dioxide levels that alter the chemical equilibrium of the oceans. In turn, the resulting acidic environment dissolves the calcitic skeletons of numerous marine organisms such as coral reefs [3]; (viii) Climate change has had negative impacts on human health, livelihoods, and infrastructure in residential regions. Extreme climate events have caused damages to energy, transportation, water, and sanitation systems, and these negative effects had a greater impact on socially and economically marginalized groups [4].

Carbon dioxide emissions are a key source of climate change, yet data indicate that worldwide $CO_2$ emissions are unequally distributed. For instance, most of the world's $CO_2$ emissions are produced by the wealthier half (high- and upper-middle-income) countries. On the other hand, the poorer countries contribute to only a superficial ratio of global carbon emissions [9]. Nevertheless, the consequences of climate change are not uniformly perceived. Devastation is ubiquitous in their aftermath, yet there exist populations that have lost, suffered, and coped with the crises higher than others. In other words, communities that have contributed the most to the core causes of climate change will not necessarily bear the burden of its most severe consequences [10].

Climate change is presently regarded as a more significant driver for migration than political and economic factors [11–13]. Likewise, Opp et al. [14] found that due to climate change effects, sand and dust storms have been occurring more frequently and are often

linked to migration. Reviews of 55 studies on all types of conflict, ranging from assault to turmoil and to civilian war, concluded that large climate variations could affect the occurrence of conflict in various situations [15]. For instance, climate change will exacerbate ecological challenges such as water and food insecurity, resulting in malnutrition, migration, and conflict. A 25% increase in food insecurity, natural catastrophes, and lack of safe drinking water raises the likelihood of conflict by 36%, 21%, and 18%, respectively. To be more specific, 13% of the world's population is now experiencing extreme food insecurity [16]. A total of 25% of the population does not have consistent access to safe drinking water [17]. A total of 35% of the world's population would live in countries encountering severe environmental catastrophes by 2050 compared to 22% presently [18]. The susceptibility to conflict triggered by environmental distresses varies across different countries and zones. More than 60% of the world's greatest cities are fast expanding and are situated in countries with substantial rates of violence or conflict. These cities lack finances to accommodate population growth. Countries with high populations, inadequate development, and limited social resilience are more likely to experience conflict as a result of climate change [19]. Transition zones, which exist between dry environments and regions with sufficient precipitation, are especially prone to violence. Nearly 15% of transition zones reported at least one fatality, compared to 5% in nontransitional areas [20].

It is well documented that developed nations utilize more energy and contribute more to global emissions than developing countries [21–24]. On the contrary, the climate change impact in developing countries vastly exceeds that in developed countries, resulting in obvious global inequality [25,26]. Therefore, the current study addresses the following questions: Which countries are more responsible for fossil fuel combustion and, consequently, for climate change? Are these countries the same as those that experience its harshest effects? Does climate change truly stimulate migration, drive resettlement, collapse governments, stoke violence, and alter human societies? In addition, does conflict contribute to climate change?

## 2. Methodology

Carbon dioxide emissions (metric ton per capita) data for 178 countries from 1960 to 2019 were sourced from the World Bank data [27]. Data for the impacts of global warming (3 °C increment) on the world gross domestic product (GDP) (% change/year) for 117 countries were retrieved from Kompas et al. [28]. We reviewed the literature emerging from geography, political ecology, and history that deals with the connections between climate change and conflict to further the understanding of how climate issues are linked to conflict as well as environmental inequality. More specifically, we investigated these studies' findings to uncover points of agreement about the relationship between climate change and conflict and to highlight significant research slots for the field, e.g., [29–32]. Moreover, we utilized Google Scholar to find the literature that explores these relationships as it provides the most comprehensive coverage of social science research and because some important publications can be realized in the gray literature. The gray literature, which is not always peer-reviewed, has performed an essential role in creating a climate–conflict relationship. Moreover, because such material is employed in lobbying and policy-making, it was critical to incorporate this work within the review to properly explain how climate–conflict discourses have evolved [33].

## 3. Results

### *3.1. Global $CO_2$ Emissions and Climate Change Impacts on National Incomes*

$CO_2$ emissions analysis showed inequality among countries around the world. For example, for 115 countries out of the investigated 178 countries, each releases less than the world average emission (i.e., 4.1 metric tons per capita), while each of the remaining 63 countries releases more than the world average emission (Figure 1). We found that 50% of the world's population (ca. 3.75 billion people) was responsible for just 8.9% of the global cumulative carbon emissions. These people are concentrated in low- and middle-income

countries. On the other hand, 10% of the world's population (ca. 757 million people), concentrated in high-income countries, was responsible for 46.8% of the global emissions. Furthermore, the literature review disclosed the evolution of $CO_2$ emission inequalities within countries. For example, Chancel [34] found that 62% of the global $CO_2$ emission inequality was due to between-country inequality, and the rest (i.e., 38%) of the global $CO_2$ inequality was due to within-country inequality in 1990. Since 1990, such ratios (i.e., 62% and 38%) have changed almost to the opposite. More precisely, 64% of the global $CO_2$ inequality was due to within-country inequality, and the rest (i.e., 36%) of the global $CO_2$ inequality was due to between-country inequality in 2019. Similar findings were detected by Arora et al. [35] and Chancel and Piketty [36], who distinguished considerable inequities between the richest and the poorest populations within countries. The current study also revealed a high increase in $CO_2$ emissions in recent decades. Our data showed that the time period from 1960 to 2019 was identified as a critical period in which the global cumulative emissions grew by 294% (Table 1). Likewise, assessing climate change impacts on the national incomes revealed a high inequality between countries (Figure 2). A significant ($p < 0.001$) negative ($r^2 = -0.52$) correlation was detected between carbon emissions and climate change impacts on national incomes (Figure 3).

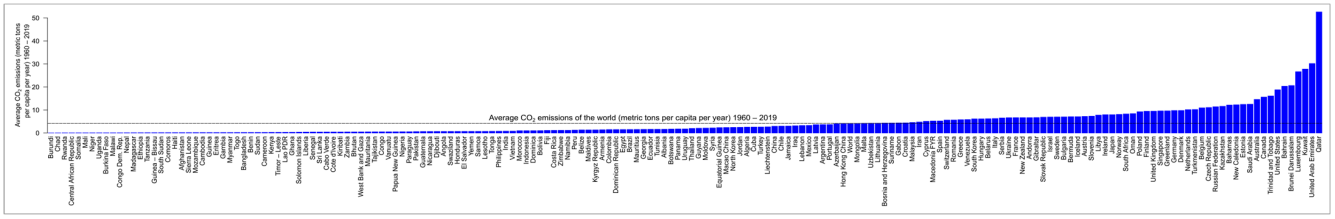


**Figure 1.** Average $CO_2$ emissions (metric tons per capita per year) for 1960–2019.

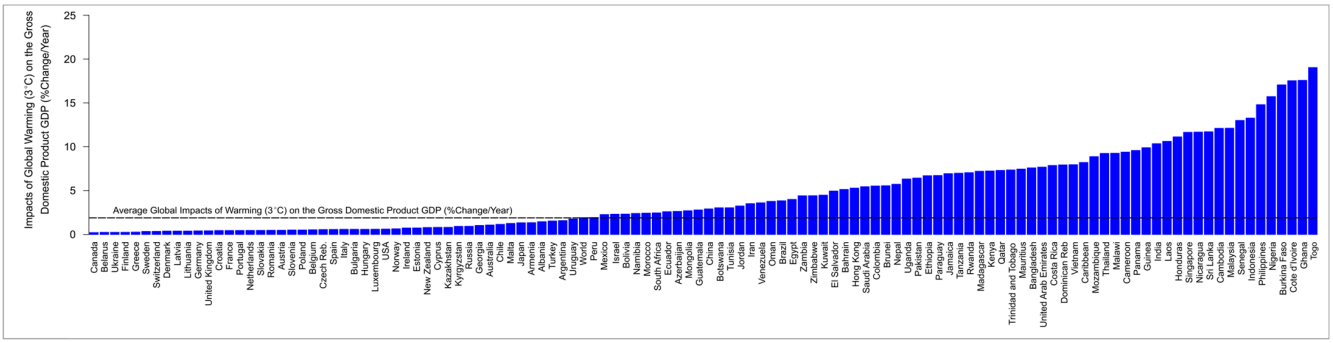


**Figure 2.** Impact of global warming on the world gross domestic product (GDP).

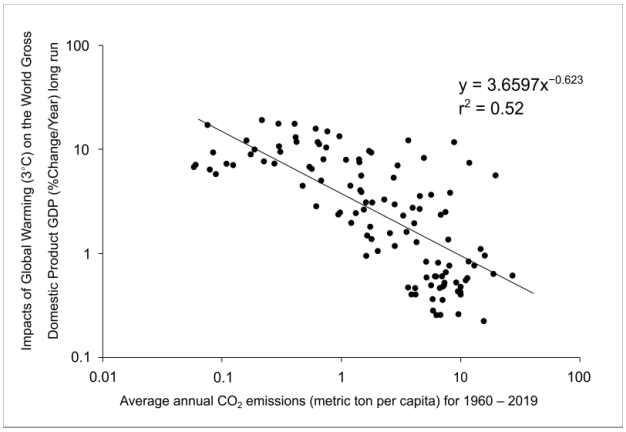


**Figure 3.** Average annual $CO_2$ emissions versus impact of global warming on the world gross domestic product (GDP).

**Table 1.** World $CO_2$ emissions in 1960 and 2019.

| | 1960 | 2019 | Change (%) |
|---|---|---|---|
| World $CO_2$ emissions (ton) | $9.39 \times 10^9$ | $3.7 \times 10^{10}$ | +294 |

### *3.2. History Lessons for the Consequences of Climate Change*

Droughts, sea-level rise, severe storms, and climate migration may appear to be present-day events. However, similar catastrophes in the past provide crucial insights into the role of climate change in disrupting human communities [37]. For example, extreme climatic conditions combined with political and social factors triggered various crises in different regions around the world, including, but not limited to, Anatolia, Rwanda, Syria, and Central America, as discussed in the next section [38–46].

## 4. Discussion

### *4.1. Global $CO_2$ Emissions and Climate Change Impacts on National Incomes*

The disparity in $CO_2$ emissions between high-income and low-income populations both between and within nations may be explained by the fact that prosperity is the principal cause of carbon emissions. In other words, populations with high living standards have higher carbon footprints [47,48]. The steep rise in $CO_2$ emissions from 1960 to 2019 can be attributed to the substantial expansion in fossil fuels used for energy generation during this period [49]. The negative correlation between $CO_2$ emissions and the effects of climate change on national incomes may be illustrated by vulnerability and preparation. Low-income nations are likely to suffer the negative consequences of climate change owing to high exposure and vulnerability [50]. The poorest people in the world usually reside in the most fragile environments and are generally socially, economically, and politically marginalized, leaving them more susceptible to climate change's effects [51]. This impact may be inspected by comparing the results of two severe storms in the United States and Bangladesh. While Hurricane Andrew in the United States killed 23 people in 1992, a tropical storm in Bangladesh killed almost 100,000 people in 1991. Bangladesh was less adapted to the storm due to its low-income population and lack of adequate weather forecasting systems required to anticipate climatic disasters [52,53]. In addition, it is reported that three out of every four people living in poverty depend mainly on agricultural and natural resources for survival. The food and income of the world's 2.5 billion farmers, fishers, and herders are dependent on the climate and natural resources. Progressively unpredictable weather conditions, natural catastrophes, and the absence of adequate weather-prediction systems affect these groups, threatening their livelihoods and elevating their susceptibility to undernourishment and poverty [54]. Such disparities can be seen within the same nation. For example, Tessum et al. [55] found that low-income groups in the United States are subjected to significantly higher air pollution levels than they are responsible for producing through activities such as driving and utilizing electricity. High-income groups, on the other hand, have a superior air quality than the typical American, although they are more responsible for pollution. Morse [56] and Hsiang et al. [57] found that America's poorest counties experience harder financial damage after climate-related catastrophes, reflecting obvious inequality. Similarly, London City Airport in the United Kingdom, which is located in Newham, is an equivalent example. It is the prototypical sacrifice zone, that is, a polluted and noisy place that low-income people inhabit; nonetheless, the airport caters to the wealthy passengers from London's financial district [58]. These disparities result from worldwide inequalities. Individuals who are rich and have sufficient supplies are better able to predict and adjust to climate change than those who are poor or reside in impoverished nations or counties.

### *4.2. History Lessons for the Consequences of Climate Change*

#### 4.2.1. Turkey

Anatolia's climate twenty years before the 1600s was exceptionally harsh. According to tree rings and other paleoclimate evidence, some of the coldest and driest periods in Anatolia's history occurred at that time [38]. Concurrently, the Anatolian population was afflicted by a plague outbreak and government practices, such as the seizure of grains and poultry to fund the expensive war in Hungary. While severe climate negatively affected the official attempts to distribute scarce food supplies, a fatal famine emerged. Such conditions, which coerced many people to flee their lands and induced serious political implications, were caused by harsh weather events. Extended low harvests and conflict exposed serious deficiencies in the Ottoman supply chain. A set of revolts erupted and became the longest national threat to the Ottoman Empire's six centuries of existence. The rebellions impaired the Ottoman Empire's power and halted its growth. Hundreds of bandits infiltrated the Anatolian territories, stirring unrest, attacking villages, and undermining the Sultanate's centuries-old authority. The Ottoman government's control over the provinces was irreparably debilitated, which had enormous political repercussions. The series slammed the door on the golden era of the Ottoman Empire, sending it into a downward cycle of decentralization, military losses, and governmental instability that would haunt it for the next three centuries [37].

#### 4.2.2. Rwanda

With a land area of around 26,000 $km^2$, Rwanda had a population of 9.6 million in 2008 [36]. Rwanda has a population density of 365 inhabitants per square kilometer and is considered one of the most populous nations in Africa. The population pressure on restricted land has endangered the nation's environment and social cohesion [40]. Rwanda's reliance on agriculture to support its economy makes it susceptible to environmental pressure. Environmental deterioration and population expansion are major concerns in Rwanda [59,60]. Fast population expansion, faulty land use acts, and a drought in the 1990s are the underlying causes of environmental deterioration in Rwanda. The country developed a financial surplus based on exports of tea and coffee and attracted considerable investment by the World Bank. The first cause of the crisis was the sharp drop in the global price of tea and coffee, followed by the termination of foreign financial aid. The second cause was inappropriate land use actions, and the third cause was a severe drought, especially in East Africa and Rwanda, in the 1990s. The drought revealed fundamental problems emanating from unsustainable land use practices, such as land erosion, deforestation, and soil depletion [61]. The high population density in Rwanda meant that its resources were rapidly running out due to unsustainable habits and drought. These factors in conjunction with the inherent political instability and ethnic conflicts had driven the country over the edge and resulted in the genocide [62]. Between April and August of 1994, one million people were murdered, and more than two million more were forced to flee their homes [42].

#### 4.2.3. Syria

The tragic Syrian conflict sprang out as a result of societal instability and environmental strain. According to the American Academy, the Syrian war occurred in the backdrop of the Arab Spring and one of the worst droughts in recent Syria's history [43]. There have been significant droughts in different parts of Syria since the 1980s. The most recent episode of extreme drought was from 2006 to 2010. The 2011 revolution erupted partially because of the drought wave, which led to agricultural failure and, consequently, a strong hardship [37]. Due to the drought wave, which largely hit the country's east, 800,000 individuals lost their livelihoods, 85% of livestock industry collapsed, and 1.5 million Syrians fled to city centers. The regime's act to limit citizens' access to water, electricity, and gasoline subsidies exacerbated the problem [37]. The problem became worse with drought and water shortages. The environmental implications have usually

been intertwined with political and social disturbance; therefore, it is challenging to determine their exact role in igniting the Syrian civil war. However, it may be impossible to ignore the dreadful combination of environmental, political, and social factors in triggering the crises. For this reason, military experts nowadays refer to climate change as a "threat multiplier" [63]. United Nations estimates indicate that more than 400,000 people have been murdered in Syria since the onset of the crisis in 2011. In 2019, more than 5.5 million people have left the country, and more than 6 million have been internally displaced. Over 3.4 million Syrians have escaped to Turkey, and many have sought shelter in Europe [44]. Syrian asylum applications to Germany were more than 900,000 [45]. Many others have fled to Jordan and Lebanon, stressing infrastructures and resources that were already inadequate.

#### 4.2.4. Central America

Hurricanes Eta and Iota, both devastating Category 4 hurricanes that occurred in November 2020, were two of the most severe storms of the Atlantic's storm season in recorded history. These powerful storms, exacerbated by climate change, were driven by some of the warmest waters in the northern part of the globe, with the latter also influenced by a temporally low developed transatlantic dust air layer (Saharan Air Layer). Climate change has caused the water temperature in the Caribbean to rise steadily since the 1980s. Storms such as Eta and Iota may evolve into hurricanes due to the hotter water. Catastrophic hurricanes forces are far greater than those of normal tropical storms that Central America's infrastructure might be able to endure. Central America experienced migration waves in 2020. After these two destructive hurricanes, over 10,000 individuals migrated northward, and many more are likely to depart soon. In Honduras, Guatemala, and Nicaragua, the hurricanes affected six million people, damaged thousands of houses, and displaced around 600,000 people due to severe winds and heavy rainfall. With limited aid from the authorities, many displaced people stayed in shelters with insufficient supplies. The Honduran Ministry of Agriculture and Livestock reported that around 80% of the agriculture sector was destroyed by the storms: a sector that employed one-third of the country's workforce in 2020. In the quest for opportunity, more than 10,000 individuals gathered in Honduras to form a caravan headed towards Mexico and, eventually, to the United States [46]. However, it is not only sudden weather phenomena such as hurricanes that are causing misery and displacement from Central America. Slow-onset phenomena like extended drought can adversely affect many marginalized people, particularly in the area that extends from southern Mexico to Costa Rica [46].

Approximately 24 million people were displaced globally in 2019 due to climate-related disasters, according to the Internal Displacement Monitoring Centre (IDMC). According to World Bank projections [64], by 2050, unmitigated $CO_2$ emissions might cause 144 million internal climate migrants throughout South Asia, Sub-Saharan Africa, Latin America, and the Caribbean. Zittis et al. [65] detected that the Middle East and North Africa (MENA) area would experience extremely high heat waves, especially in the second half of the 21st century. During these times, there will be unusually high temperatures in urban areas (i.e., 56 °C or higher) that might last for many weeks and pose a risk to humans and livestock. In the second half of the century, around 50% of the MENA region population may experience such severe weather events. Vulnerable people may lack the resources to adjust to such extreme climatic events. There is a chance that a large-scale migration to the colder northern areas will result from a combination of harsh weather conditions with social, political, economic, and demographic issues [46].

### *4.3. Climate Change and Conflict*

Conflict, which is a primary cause of hardship and misery, has been demonstrated to be worsened by climate change. Because climate change intensifies preexisting environmental, economic, political, and social challenges, it increases the likelihood of conflict and disputes over resources [54]. For instance, in the Democratic Republic of the Congo, variations in

the quantity and timing of rain decreased crop yields, increased rivalry for the surviving agricultural land, and resulted in ethnic conflict and violence. Likewise, in Karamoja, Uganda, and central Nigeria, where resource scarcity has historically been a problem, climate change has further reduced water supplies and grazing lands and, thus, increased competition and violence [54]. Climate change is also linked to the recurring conflicts and clashes in the Sahel region, West Africa [66]. The United Nations Environment Programme UNEP [66] concluded that the conflicts have been prompted by the climate change impact on the natural resources as well as by other factors such as inappropriate administration, population expansion, and land tenure issues. These factors have amplified competition over the limited natural resources. The UNEP study claimed that as the desert moves south, there is a limit to what natural systems can sustain, resulting in one group pushing out the other. The Southern Nuba tribe has warned that the Arab nomads who have been driven into Nuban territories by drought are using their lands for grazing, which could result in the renewal of a half-century war between Sudan and South Sudan [67]. Other researchers investigating the reasons behind war contended that climate change has a significant role in triggering warfare. However, it is crucial to proceed cautiously when drawing connections between climate change and war. For instance, inappropriate responses to climate change in an area lead to the exhaustion of resources, and improper solutions to the scarcity of resources increase the likelihood of conflicts. Burke et al. [68] examined the association between conflict and temperature increases by evaluating 55 publications that investigated different types of conflict such as violations, revolts, and civilian war. They found that climate change has a considerable impact on how often violence and conflict can occur. Specifically, it was shown that an increase in temperature might significantly worsen interpersonal and intergroup disputes. Similarly, Von Uexkull [69] investigated the connection between turmoil and drought in Sub-Saharan Africa. After an extended drought or dependence on rain-fed farming, inhabitants of these areas are more likely to rebel in order to resolve their financial issues or to obtain nourishment and livelihoods, which raises the possibility of riots.

While climate change plays a considerable role in triggering war, war, in turn, can trigger climate change, both directly and indirectly. The worldwide military carbon footprint contributes directly to climate change, representing 5.5% of global carbon emissions. This is higher than Africa's total carbon footprint, which is less than 4% of the world's emissions [70]. Although merely maintaining a military force contributes to climate change, actual war increases this likelihood [71]. Indirect measures include (i) large-scale land use changes, i.e., the intentional destruction and subsequent abandonment of agricultural areas due to war can significantly increase $CO_2$ emissions [72]. Furthermore, disrupting wetlands converts them from substantial carbon sinks to carbon producers [73]. The deliberate desiccation and devastation of the Iraqi Marshes after the 1991 uprisings resulted in the loss of 90% of this vital ecosystem. Thus, topsoils and their carbon storage capability were remarkably impacted by conflict [72,74]. Desertification and soil erosion associated with war have been observed in Iraq, Syria, Bosnia, and Afghanistan. Desertification and soil erosion can increase the loss of carbon from soils, reducing their capacity to be efficient carbon sinks [72]; (ii) According to the United Nations Refugee Agency estimates, 110 million people were compelled to relocate in 2022. Refugees placed additional burden on the resources that could have been used to address climate change [70]; (iii) War-induced authority vacuums can lead to unlawful rivalry over natural resources. Unauthorized logging, deliberately starting forest fires to remove land, and mining using very harmful techniques are widely associated with war. Such operations have the potential to harm animals and plants and eradicate biodiversity [73,75,76]. Eradication of biodiversity from organic soils to trees to swamps that are significant carbon sinks can induce climate change [77]; (iv) Military activities and a shortage of firemen caused 25 times more fires in 2022 than in 2021, which released massive volumes of carbon dioxide [78]; (v) Higher oil prices induced by war, combined with declining economic expansion and a significant rise in military spending, may have a negative impact on climate plans by reducing wealthier nations'

capacity and willingness to fund climate programs [79–81]. Hence, while conflict exacerbates the impacts of climate change, the latter can indirectly fuel conflict. Climate change can cause widespread human relocation. Competition for already limited resources in the regions where displaced people settle as well as inflationary price surges may heighten social instability [78,82].

### *4.4. Recommendations*

Contraction and convergence (C&C) may be the best strategy for enabling developing nations to grow as the world lowers the greenhouse gas emissions. The Intergovernmental Panel on Climate Change (IPCC) estimates that the concentration of greenhouse gases in the atmosphere should be 450 ppm of $CO_2$ equivalents to control the temperature rise to 2 °C [4]. To maintain this threshold, it is essential to allocate an equal carbon footprint per capita to all populations around the world. This allocation will be approximately 2 tons per capita currently, and should be reduced to 1.5 tons per capita in 2050 due to the expected population increase [4], and this is the contraction. As for convergence, average carbon emissions are presently more than 4 tons per person. For example, in some wealthy countries, emissions exceed this number by many times. Therefore, emissions should be reduced to 4 tons, then to 2 and 1.5 tons in each country [83]. However, the C&C feasibility and effectiveness are subjected to debate and criticism. For instance, C&C is considered to remarkably limit the developing world access to energy sources and technologies that have historically enabled the developed countries to grow. Developing world negotiators might claim that the remaining atmospheric space is very constrained; in other words, their emissions must peak a few years later than those of developed countries, and then must decline by 5% per year until 2050. This will be a major challenge for the developing nations that fight poverty and struggle to improve their living standards [84]. C&C is also criticized for not considering the historical emissions, which were primarily caused by developed countries [85]. Furthermore, emissions limitations in developing countries without providing the necessary technology, training, and financial aid can produce further inequality. Transitioning to low carbon emissions can lead to job loss and economic and social problems, especially in countries that depend on coal, oil, and gas extraction [86]. Finally, C&C implementation is not easy due to conflicting interests, different priorities, and geopolitical tensions among countries around the world [87]. There are several methods for burden-sharing regarding climate change consequences that can be beneficial to developing countries. For example, the developed world can provide support to renewable energy programs, climate-resilient infrastructure, and preparing to confront climate disasters in developing countries. The developed world can also support the transfer of modern technologies, such as clean energy generation technologies and efficient methods of using energy. In addition, the wealthy nations can support capacity-building initiatives to enhance the skills and resources necessary to assess and predict climate risks in the developing world. International climate agreements can provide fair and equitable burden-sharing mechanisms whereby the developed world bears responsibility for the emissions it has caused and developing countries receive adequate support for low-carbon development [88]. The Green Climate Fund (GCF) was established in 2010 because of the realization of persistent inequities. The paradigm, which was first presented by India in 1995, suggests that richer countries cut back on their $CO_2$ emissions while poorer nations might keep raising their emissions in order to develop their economy to draw their citizens out of poverty. Poorer countries would eventually start cutting back on their emissions, too. Schemes such as GCF are essential initial efforts toward lowering the risk of disaster, adapting for the climate change adverse influences, and fostering resilience [89]. Nevertheless, policies such as carbon taxes to reduce emissions might target low-income communities. For instance, the 2018 increase in carbon taxes by the French government mostly affected low-income and rural residents, with negligible impact on consumption patterns of the rich. Many households were unable to cut back on their emissions (for example, they must use their automobiles in order to travel to

their workplace). On the other hand, the wealthy received exemption from the aviation fuel tax [90]. Caratini et al. [91] concluded that aversion to a carbon tax occurs primarily for the following reasons: (i) the tax is regressive, that is, it has greater impacts on low-income groups; (ii) it is significantly high; (iii) it can negatively impact the economy, for instance, through job losses; (iv) it does not necessarily reduce high-carbon behaviors; (v) governments may use it to increase their revenues. Caratini et al. [91] also detected that the carbon tax raises concerns about how its revenues are spent. However, it was found that the public acceptance for the tax enhances when it is clearly stated how the tax revenue would be used. For example, public support for fuel taxes becomes higher when the revenues are allocated to environmental purposes such as supporting public transportation, building bicycle and pedestrian paths, and developing environmentally friendly technologies [92]. Likewise, the carbon tax receives higher support when its revenues are used to compensate low-income households [91]. Doda [93] suggested that it is necessary to build confidence and trust in the carbon tax by imposing the tax gradually. In other words, a gradual increase in the tax or even a trial period will provide the public with an opportunity to measure its benefits. Moreover, the public acceptance for the tax can be enhanced by making the tax redistribution transparent, that is, by publishing periodic updates to the public on how revenues are spent [91]. Other strategies, such as a proportionate wealth tax with carbon emissions consideration, may prove more effective. By increasing the cost of access to the fossil fuel industry, the transition away from fossil fuels would be accelerated. Additionally, it may bring in substantial finances for authorities that they might use to fund the green sector. Since these tariffs only apply to a portion of the population, they would be relatively simpler to enact than a regular carbon tax. Global revenue generated by a small wealth tax on wealthy individuals can finance initiatives and efforts to mitigate climate change impacts [90]. Finally, and as previously shown that war can contribute to climate change, it is noteworthy that rising defense budgets of one side of the conflict will simply convince the other side to increase military investment in turn. Efforts to tackle the crisis can only succeed if all countries work together. It is necessary to work for ceasefire, followed by measures to build trust such as international disarmament treaties. Otherwise, unchecked climate change would be catastrophic, though in different degrees, for the planet's entire population [94]. The Montreal Protocol 1987 on ozone-depleting substances was one of the most successful environmental treaties. The protocol has resulted in the substantial reduction of ozone-depleting substances and a transition to ozone-friendly alternatives. The treaty has led to significant declines in ozone-depleting emissions and has induced gradual restoration of the ozone layer. The problem of ozone depletion has been solved through international collaboration, political commitments, and the exchange of experience and technology [95]. While the ozone depletion problem has been limited to specific types of chemicals that can be replaced with readily available alternatives, climate change, on the other hand, is a more sophisticated issue that needs broader international collaboration, transition to green energy, societal transfigurations, and influential development actions. Yet, the effectiveness of international cooperation in regulating the problem of ozone depletion provides lessons for tackling the problem of climate change [96].

## 5. Conclusions

Inequality has a role in climate change, both in terms of who caused the crisis and who will bear the brunt of its negative consequences. The previous six decades have witnessed significant growth in the combustion of fossil fuels for energy generation, which has resulted in a remarkable rise in global $CO_2$ emissions of 294%. However, an assessment of $CO_2$ emissions indicated significant differences in the average emissions between and within nations. Analyzing the effects of climate change on the economy also revealed significant disparity. In other words, population groups with lower carbon emissions experience a disproportionate loss of their national income, and vice versa. According to reviews from the expanding rigorous research in political ecology, geography, and history, unfavorable climatic occurrences raise the likelihood of migration and conflict at both

internal and external levels. According to some adaptation plans, the developed nations should make the largest contribution to reducing emissions, with the developing nations continuing to emit carbon as they develop their infrastructure. Regretfully, the situation is almost the opposite. Climate change mitigation strategies, such as contraction and convergence, have faced criticism for not considering historical carbon emissions. Moreover, such strategies were considered to cause socioeconomic problems in developing nations. Similarly, carbon taxation policies might raise concerns about tax regressivity. However, research has shown that public support for carbon taxes increases when tax revenues are allocated to support specific purposes, such as improving public transportation, building bicycle and pedestrian paths, developing environmentally friendly technologies, and compensating low-income households. A more workable path would be a wealth-based progressive tax on $CO_2$ climate pollution. Increasing the cost of access to the fossil fuel industry would hasten the transition away from fossil fuels. Additionally, it may bring in significant funds that governments might use to fund innovation and the green sector.

Climate change and conflict are intertwined, and overlooking one of them can eventually recharge the other. In fact, climate adaptation plans can be used as a starting point to connect opposing communities together. Such plans facilitate joint evaluation of climate and conflict challenges by different and conflicting groups and assist them in establishing collaborative peace and resilience programs. Finally, while the pathways of climate change and conflict are most likely to converge, and evolution of one of them can trigger the other, the authors believe that resolving one of them can help in resolving the other. The solution is straightforward; efforts in conflict prevention, peacemaking, and trust building can save sufficient finances to treat climate change implications.

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