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The Analysis of the Impact of Climate Change on Human

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Abstract. Since the Industrial Revolution in the 19th century, social productivity has made a qualitative leap. At the same time, diseases and climate change caused by industrialization have also brought new challenges to the earth's ecology and human health. This paper will focus on the impact of climate change and extreme temperature events (ETEs) on the Earth's ecology to date, as well as the threat to human's health and living environment. The heat that is produced as a result of global warming brought on by climate change will offer enormous kinetic energy to the air and oceans, which will lead to the formation of devastating storms such as typhoons, hurricanes, and tsunamis. In the meanwhile, climate change will also influence the physiological function of human beings. The spread of various physiological diseases will breed new physiological diseases, such as respiratory diseases, heart diseases, viral diseases, bacterial diseases, etc., which will greatly affect the living environment of human beings.The potential benefits of climate change in particular regions will also be analyzed. Finally, this paper summarizes the coping and adaptation methods of climate change, which may provide ideas for future research.

Keywords: Climate Change, Environment Science, Human Health, Living Environment.

1. Introduction

Even though increasing attention has been paid to the health and economic risks associated with pandemics, the impacts of anthropogenic climate change on people's health have continued to worsen. Accelerating glacier retreat threatens to flood Huaraz, Peru; And Australia's devastating 2019-20 bushfire season [1-4]. Climate change was the cause of unusually high temperatures in the UK and Siberia in 2020; The record-breaking heat wave of June 2021 that affected populations in the United States and Canada's Pacific Northwest, causing more than 1,000 deaths (that number is expected to increase). As a result of its influence on both the natural environment and the relationships that exist between humans and ecosystems, climate change is widely regarded as the most significant threat to global health in the 21st century [5-7].

This paper will focus on the impact of climate change and extreme temperature events (ETEs) on the Earth's ecology to date, as well as the threat to human's health and living environment. The potential benefits of climate change in particular regions will also be analyzed. Finally, this paper summarizes the coping and adaptation methods of climate change, which may provide ideas for future research.At the same time, to some extent, it provides some instructive suggestions and makes some contributions to the research in this field.

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2. Climate change and human health

2.1. Extreme weather events

Extreme weather events include some rare natural phenomena such as extreme heat and cold, droughts, wildfires floods and hurricanes. Areas experiencing extreme weather face reduced food production and some levels of chemical and biological contamination, resulting in malnutrition, mental disorders and epidemics of infectious diseases in some less developed areas. Behind the frequent occurrence of extreme weather events, the factors of global warming cannot be ignored. Unprecedented heat in 2020 increased the number of people exposed to heat waves by 3.1 billion a day, according to a study [8]. For instance, the total number of severe heat waves recorded between 2015 and 2020 is more than double the number recorded between 1951 and 1980. In addition, more floods, storms, droughts and wildfires have occurred in the 15 years since 1900 [8]. As shown in figure 1, temperature extremes have a disproportionately negative impact on nations with low and medium levels of human development index (HDI). At the same time, the heat brought by high temperature weather makes people more and more dependent on air conditioning, and many people in low development countries even die of heat stroke. In addition, in countries that are low to medium on the UN-defined human development index, the population's heat vulnerability has increased the most over the past 30 years, and the low availability of cooling mechanisms and urban green space further exacerbates their health risks. Extreme temperatures and rainfall increase the risk of transmission of DF infection, increasing health risks. Studies have shown that mosquito populations and the risk of dengue infection increase remarkably after several days of high temperatures due to increased hatching rates and shorter incubation periods in vitro [9].

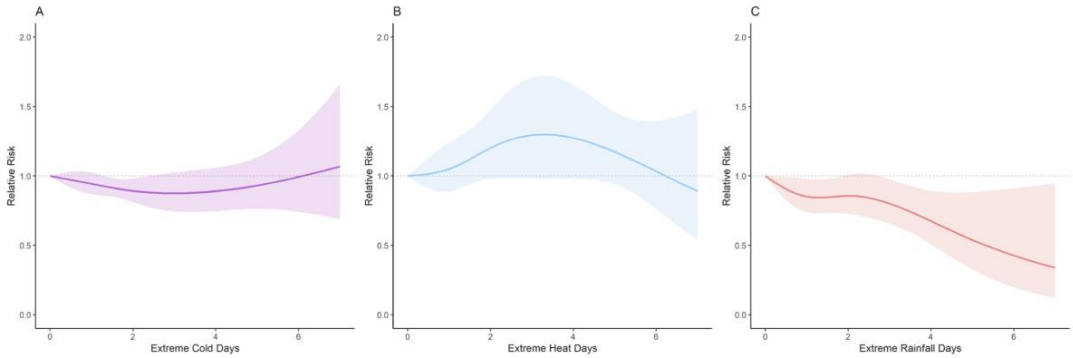


Figure 1. Relative risks with 95% confidence interval on infection of dengue fever against the number of days with (A) extreme cold, (B) extremely heat, and (C) extreme rainfall. Zero reference points were used [10].

2.2. Warmer season

The huge emissions of anthropogenic greenhouse gases have turned global warming into the primary trend of the Earth's climate change. A longer warm season is more favorable to the survival of vectors, which means that global warming has become the major trend of climate change on Earth. The influence of climate change on the transmission of diseases carried by vectors has already been felt, and it is only expected to grow in the coming years. If current levels of greenhouse gas emissions continue, it is anticipated that global average temperatures would rise by between 4 and 5 degrees Celsius above pre-industrial levels by the end of the century. This would result in a rapid amplification of changes that are already occurring. Continued emissions of greenhouse gases will lead to further warming and lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive, and irreversible impacts on people and ecosystems, as stated by the authoritative Intergovernmental Panel on Climate Change (IPCC). There is a significant risk that the number of vector-borne diseases, the length of transmission seasons, and the severity of transmission would all increase as a result of climate change [11]. Malaria, filariasis, vampirism, trypanosomiasis, dengue fever, yellow fever, Rift Valley fever, and encephalitis are only some of the diseases that have been related to global warming. Malaria

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pandemics broke out in Pakistan, Kenya, and Colombia in 1997 as a direct result of El Nino's contribution to an increase in global temperature. As a result of the warming environment, the source of the trypanosoma disease, which is transmitted by setse flies, is moving southward from the Sahara desert, which is located in the north, to South Africa, which is located in the south, where there is a dense population. The weather phenomenon known as El Nino in 1997 caused temperatures and rainfall to rise in Kenya and Somalia, which led to the breeding of Aedes mosquitoes that were infected with Rift Valley fever, which in turn led to an outbreak of Rift Valley fever. Climate warming is conducive to the propagation of schistosomiasis intermediate host, which increases the likelihood of human infection. In tropical and subtropical countries, the incidence of water-borne infectious diseases is increased due to the influence of climate warming on water distribution and the propagation of microbes. Additionally, the rise in rainfall is beneficial to the spawning of mosquitoes.

2.3. Sea temperature change

The study shows that the North Atlantic Ocean (NTA) sea temperature variability is characterized by almost uniform warming during its positive phase, and this variability is also one of the resulting models of air temperature variability. As shown in figure 2, warm anomalies in the North Atlantic are influenced by the El Nino Southern Oscillation (ENSO) and the North Atlantic Oscillation. The NTA warm anomaly can cause La Nina episodes, droughts in northeastern Brazil, and an increase in the frequency of extremely powerful hurricanes [12]. The occurrence of drought has a negative impact on human health. During droughts, food shortages increase the prevalence of malnutrition. Severe droughts can also lead to famine and higher mortality rates. In arid areas, the soil is dry and the dust is more likely to be inhaled by the human body, which not only causes direct damage to the respiratory system, but also becomes the carrier of the disease source.

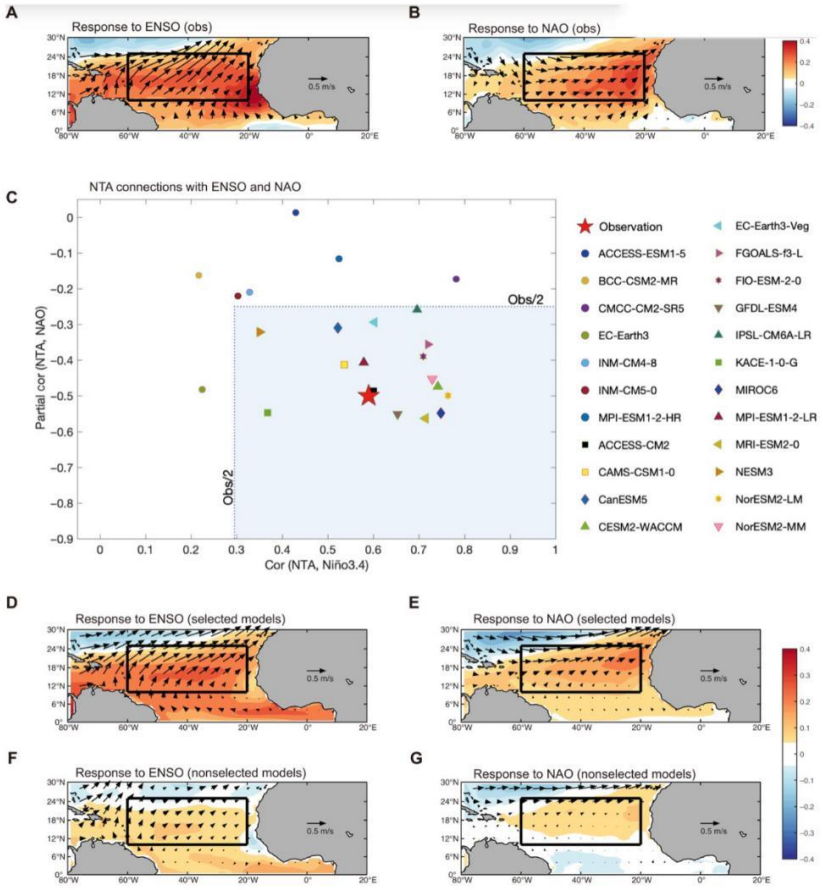


Figure 2. NTA connections with ENSO and the North Atlantic Oscillation (NAO) in observation [12].

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3. The impact of Climate change on living environment

The effects of climate change are harmful to humans in a variety of ways, including the loss of species, the pollution of the air we breathe, the melting of glaciers, and the rise in sea level. The melting of icebergs, which is caused by rising temperatures, is a significant contributor to the loss of fresh water sources. Temperature increases are causing a disruption in the natural food chain. The oceans will become more acidic as a result of rising levels of carbon dioxide in the atmosphere, which would cause the extinction of a huge number of bacteria and the disruption of a big number of biological chains focused on coral. River flow has a tendency to diminish as evaporation increases, which might lead to an increase in the river's initial pollution level, particularly during the dry season. The rise in river temperature will, at the same time, accelerate the deposition of contaminants within the water body and diminish the water body's ability for self-purification, which will ultimately result in a decline in the quality of the water. People who live in coastal areas may face increased risks to their health and safety as a result of rising sea levels, which will cause some coastal areas to become submerged in salt water. However, if water evaporates at a rate that is too high, this will have an effect on the entire process of the water cycle, which will alter the regional rainfall and the pattern of rainfall distribution, as well as the surface runoff. An increase in rainfall in metropolitan areas will cause urban waterlogging, which will have a significant impact on urban transportation. The production in rural fields would also suffer as a result of the severe rains.

4. Possible benefit

Despite the many adverse effects of climate change on the Earth, for some areas, the effects of climate change are not entirely negative. For some extreme cold regions, global warming may reduce the number of cold-related deaths each year; And melting glaciers due to global warming could provide more fresh drinking and domestic water for people living in polar glacial regions[13]. While prolonged warm seasons can lead to epidemics of vector-borne diseases, extreme weather, such as droughts and floods in some areas, can damage the vector's habitat and disrupt egg hatching. Longer warm seasons could also boost plant growth, bringing more economic benefits to crops in some areas.

The beneficial effects of climate change are extremely weak, with small gains in particular areas often offset by negative effects in a short period of time. Therefore, the future research direction of human beings should also focus on how to mitigate the global greenhouse effect, how to timely and effectively avoid the harm caused by extreme weather, transform the negative impact into economic benefits, and maximize the guarantee of human development and health.

5. Conclusion

Climate change has become an increasingly grave ecological concern, and its threat to human health cannot be disregarded. For social development, the government should actively improve public health facilities and related policies, ensure the living conditions of low-income and vulnerable groups, and offer the necessary financial support and humanitarian relief. Simultaneously, urban green space should be increased, green space should be produced, air quality should be enhanced, and urban adaptability should be improved. For instance, the creation of 156 sponge cities in China has demonstrated excellent adaptability to environmental changes and resilience in the face of natural disasters. Beginning with ecosystem services, green building development has been advocated to efficiently mitigate the urban heat island effect. Consequently, the creation of green cities can not only boost the adaptation to natural climatic change, but also fundamentally guarantee human health.

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