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Climate-Driven Disaster Trends In India: Deepening And Taking Roots

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Abstract:
Climate-driven disasters have exhibited an increasing trend in India over the past few years. It focuses on the frequency of occurrence of disasters and their intensities. The more the frequency, the more dangerous the vulnerability is. The increasing vulnerability due to rising temperatures, extreme weather conditions, and erratic rainfall jointly contribute to this situation. A notable point is that over the last two decades, India has experienced an increase in the frequency of disasters, including floods, cyclones, droughts, landslides, and heatwaves. This paper aims to provide a preface to the climate-driven disaster situation in India. It delivers an overview of climate-driven disasters and their trends in the country. Here, the author presents an outline of the concept and opens up new possibilities for discussion in the context of climate-driven disasters. The major heads under the concept provide a methodological explanation of the inner ideas discussed under the theme. Finally, the paper introduces the scope of climate futures in the coming years as a hope for better tackling of climate change and controlling disasters.

Key Words: *Climate Change, Disaster, Climate Future, Environmental Hazards.*

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I. The Threat Of Climate Change And Its Convergence To Disasters

The primary discussion area under environmental studies is, of course, climate change. Climate change occurs through multiple cumulative actions and their subsequent reactions, and this is not a sudden response of nature, but rather a gradual outcome of these activities. The primary determinant of climate change is human activity, which leads to a long-term shift in temperature and weather patterns. When considering the factors responsible for climate change, human actions are the primary element. In contrast, other factors, such as natural causes like volcanic eruptions, solar variations, and natural climate cycles, also play a role. Natural reasons play a minor role in climate change compared to the factors caused by human actions. The human causes of climate change are generally referred to as anthropogenic factors, and these human-generated causes include deforestation, industrial processes, the burning of fossil fuels, improper waste management, agricultural and transportation pollution, among others. The rapid increase in climate change is primarily attributed to human activities rather than natural factors, resulting in a sustained rise in temperature and leading to unpredictable changes in the weather. Natural factors also contribute to impacts on the Earth's climate. Here, the paper focuses on climate change and disasters in India.

Disaster management encompasses a range of mechanisms, from disaster preparation to relief activities. The intense response to every action is vital in the context of disasters, as immediate actions play a crucial role in disaster management. We have natural disasters, anthropogenic disasters and complex disasters. About climate change, these three disasters may happen. The natural disaster arises from the natural causes of climate change, the anthropogenic disaster arises from human-driven activities related to climate change, and the complex disasters constitute a mix of the previous two, which occur as a result of both natural causes and anthropogenic factors associated with climate change. From this understanding, climate change is a cause, and disasters are the effect of it. Therefore, understanding cause and effect is crucial for the proper management of disasters related to climate change. Adequate disaster preparation and responses provide efficient risk reduction activities. The properly planned strategies ensure the targeted strategies are implemented for a better future.

By April 2023, India had become the most populous country in the world; here, population is a significant determinant of climate change, particularly given the country's geographical specifications. The total population and the geographical parameters of the country are two essential components that influence the concept

of climate change in its intense form. As we know, India is a developing economy, so geographical aspects also affect the focus on rapid economic growth. In this regard, the increasingly probable situations on these interconnections generate the most vulnerable scenes in the effects of climate change.

A large number of parameters influence climate change and, consequently, environmental disasters, making the issue more critical from a global perspective. Almost every country in the world faces the issue of climate change and the resulting disasters. When we consider the significant aftereffects of climate change on the environment, they include cyclones, rising global temperatures, Unexpected weather events, Sea level rise, Ocean changes, heatwaves, floods, droughts, wildfires, Infectious diseases, and extreme weather events. The significant impact of climate change is on the environment, and human health is another concern resulting from the effects of climate change. Then it creates economic, social, and political effects. In general, the impacts of climate change are multidimensional, meaning they affect nearly every factor and aspect of the world. Climate change is demanding more attention from a global perspective to mitigate its impacts on the environment, health, economy, and society.

II. Climate Change As A Driver Of Disaster Complexity

Here, the focus on climate change and human actions provides insight into the importance of addressing human activities that contribute to climate change, as well as the development of new strategies to mitigate its effects. The outcome of climate change has led to increased frequency of natural disasters, making disaster management a crucial area to consider. Most of the sudden and frequent disasters are a response to climate change. The continuous increase in human activity has made climate change more probable in disaster risk situations worldwide, leading to increased fluctuations in the weather and extreme weather conditions. Climate-related disasters are more prevalent in this respect, and we can expect such disasters to increase due to climate change, making climate change and disaster management closely related. Additionally, we need to adopt new strategies to address the issue of climate change and mitigate the likelihood of devastating impacts through disasters.

Climate change, or a climate emergency, is an increasingly pressing point of conversation among us, and it is the biggest threat to the world. Climate-related issues are on the rise, contributing to an increasing number of disasters caused by climate change. Climate change is also contributing to increased inequalities among countries through differences in global emissions, which means that some countries may produce the least emissions but experience the worst situations in climate emergencies. Several initiatives are underway to address the problem of climate change and reduce the likelihood of disasters, with the major one being the Sendai Framework for Disaster Risk Reduction. The sustainable development plans focus on the agenda to achieve a net-zero carbon world through the sustainable use of resources. The continuous change in the climate describes the probability of disasters as a climate threat to the society. In this respect, the influence of human-generated factors on climate change should be mitigated to reduce the intensity of environmental disasters. Climate change is directly linked to hazardous impacts on the economy in the form of a catastrophe. Therefore, we need to focus on possible solutions to reduce the probability of climate change resulting from human activities.

III. Escalation Of Climate Risks Across Indian Landscapes

In recent years, climate change has become a significant area of focus in environmental economics. Several studies have highlighted the impact of climate change on economic growth, and the interconnection between climate change and economic factors ensures a sustainable economic environment, enabling developing economies to tackle the problem of climate change gradually. Climate change is a persistent challenge to the overall development of many economies and countries worldwide. It needs to address various factors, such as carbon emissions, pollution, and the overuse of natural resources, among others. All of them are contributors to the issue of climate change. In this respect, we need to discuss each of the reasons for climate change to understand its intensity and the contribution of each component to the main problem. That will help us identify the hazardous component, and we can take proper measures to tackle the issue.

As we mentioned, India became the most populous country in the world, with 1.4 billion people, which is almost 18 per cent of the global population. This continuous increase in population has its reflections in the country's geographical and socio-economic factors. This leads to disproportionate needs in development and the environment, ultimately resulting in the country's vulnerability to climate change and disasters. Why climate change is a matter of discussion in the economy is that it is the ultimate impact of many things, and the major one of them is human activities. Here is the connection between climate change and increasing population in India: the significant influence of artificial intense pressure on the country's natural environmental system. Human activities, such as mining and quarrying, waste mismanagement, urbanisation, agricultural practices, transportation emissions, deforestation, industrialization, water misuse and pollution, energy consumption, etc., contribute to climate change in its unpredictable form and ultimately lead to disasters in the country. These activities have multiple impacts on the environment, leading to a reduction in a country's capacity to adapt and recover from environmental damage. While we concentrate on the problem of climate change in India, human

activities play a dominant role over the natural processes. Even though the main reasons for climate change in the country are deforestation, greenhouse gas emissions, changes in land use, over dependence on agriculture, pollution, urbanization, poor waste management, an increase in the number of vehicles, natural geography, and vulnerability, among others, these constitute both the human activities and natural processes that create climate change in the country. The significant factor in this is human actions, which are the dominant reason for the entire climate crisis. Additionally, human actions reinforce natural processes, creating more vulnerability and exacerbating the climate crisis.

India is planning for rapid economic development to reduce poverty, inequality, and unemployment in the country. However, this path to rapid economic growth may adversely affect the country's environmental stability, and more precisely, the ecological damage is the cost of development in the country. Here, the opportunity cost is much larger than the benefit we received from the development, because the impact increases the vulnerability of society. The trade–off between environmental damage and development in India is more debatable. Climate change has directly led to a significant disaster in the country, and India's disaster management is not adopting new trends; instead, it is still relying on traditional methods of disaster management. So this makes more vulnerable situations in the country. In this respect, the county needs to adopt more technology to tackle the problem of climate change, and it should also strive to control disasters at their earliest stages.

IV. Geographical Inequality And Climate-Induced Disasters: The Intersection Between Population And Places

As mentioned earlier, the increasing trend in population directly correlates with climate variations and an increase in anthropogenic factors of climate change. It means that the increase in population density leads to the possibility of climate change, as it directly and indirectly influences climate variations. The significant influences of climate change on population include an increase in natural resource consumption, changes in land usage, urbanization, livestock emissions, agricultural expansion, pollution, improper waste management, transportation, and industrial growth. More precisely, these factors are the actual impacts of population growth on climate change in the country. One additional fact is that population growth acts as an accelerator of climate change, and in most cases, it indirectly influences climate change through its adverse impacts on the environment.

The complexity of the relationship between population and climate change poses the risk of disaster. The growth of the population accelerates the risk of climate change, thereby increasing the likelihood of disasters occurring worldwide. It exacerbates the severity of the impact of disasters due to climate change. The role of population in climate change examines the effects of population growth on various societies and their impact on climate change. In reality, high population density leads to vulnerable conditions due to crowding. This ultimately has a profoundly negative effect on society, particularly for vulnerable communities. The pressure on the use of natural resources harmfully affect the existing climate and results in the emission of different gases to the environment. Geographical specifications always have an inherent structure in their capacity, but population growth creates an imbalance in this structure, ultimately leading to serious issues related to climate change. The climate-sensitive ecosystem demands control over its population, and the growth of the population exceeds its capacity to maintain a normal climate, resulting in severe impacts in the form of disasters. The pattern and density of population determine the geographical effects and, thereby, climate variations in the environment. It explains the indirect relationship between population and climate change. Proper management of the interconnection between population and climate change requires a planned policy enactment for a sustainable ecosystem. We can suggest some mitigation ideas for the environment by adopting sustainable development plans, utilizing renewable energy sources, and conducting proper awareness programmes.

V. From Reactive To Resilient: Strategical Upholdings In India

The trends in climate-driven disasters explain the vulnerability of climate-evoked disasters in the country. Of course, its geographical specifications and population lead to vulnerability due to climate change. Several climate-driven disasters occurred in the country, among them, floods are a major disaster, and their frequency of occurrence is increasing. Another significant contribution to disaster-driven climate change is from cyclones. Recently, several cyclones have occurred in the country. Heatwaves and droughts are other components that contribute to disasters resulting from climate change. The erratic monsoon poses the primary threat to the government, particularly in South Asia. Extreme climate changes sometimes accelerate glacier melt in the Himalayas, leading to floods in certain regions of the country. The warming ocean temperature causes an increase in the frequency of disasters and intensifies the vulnerability due to the changes. By analyzing the recent trends in disaster management and the Disaster Management Act of 2005, notable changes are evident. In 2024, an Amendment to the Disaster Management Act of 2005 places greater importance on precautionary measures to prevent the occurrence of disasters. That is, the amendment diminished the power of the National Disaster Management Authorities' (NDMAs) role and allocated more attention to proactive disaster management measures

to mitigate the impact of vulnerability on the environment and the lives of people. It ensures an advisory role and increases the funds for mitigation activities.

Recently, the United Nations Intergovernmental Panel on Climate Change (UN-IPCC) Reports marked India as a climate hot spot, providing a detailed description of the country's current situation. Along with this, the India Meteorological Department (IMD) noted that climate change in the country is associated with increased frequency of heavy rainfall. The primary reasons for the rising number of climate-driven disasters are the increase in global temperature, unreliable monsoon practices, deforestation, urbanization, poor disaster management, and inadequate precautionary measures against climate change. Nowadays, several agencies collect disaster-related data and work on it to develop more reliable methods for tackling these problems. Climate Modelling, Disaster Risk Mapping, Hydrology, urban planning, and urban heat island monitoring are new methods used to address the issue of climate-driven disasters in India. When we discussed the trends in policy and infrastructure, it is essential that our priority shifts to response activities from resilience. Several public-private partnerships and collaborations are aimed at ensuring the timely implementation of effective policies. Digital India, along with climate resilience, brings a drastic change in this field. The major focusing areas under this trend are India's floods and their associated risks, rainfall, drought, cyclones, coastal risks, urban warming, heatwaves, and Himalayan hazards.

In short, the frequency, severity, geographical spread, and vulnerability are the main concerns in this field for understanding the trend in climate-driven disasters. Climate instability is always a significant threat to all the inconsistencies in climate change. Emergency resilience planning, proactive measures, and faster and more thoughtful responses are needed to handle the issue smoothly. The recently emerged community resilience schemes are a relevant method that we should focus on to manage the disasters. Moreover, we need to develop more action plans and adopt newer innovations in this area.

VI. Climate Future

The concept of climate future considers a scientific collaborative approach in the field of climate change and disaster management. It is the projection of future climate possibilities, not just predictions. It considers valid evidence in the climate projections for the future. It employs scenario-based approaches, such as Representative Concentration Pathways (RCPs) or Shared Socioeconomic Pathways (SSPs), to explain future possibilities in climate variations and expected future climate conditions. It provides a range of variations in climate action related to climate change. It also examines future uncertainties in this field and plans for improved risk management. The planning under climate future adapts the major policy framework to build resilience to climate variations.

The climate future refers to the projected climate conditions on Earth in the coming years or decades. The concept is more relevant because it is not far removed from our dream of a sustainable world and is closely aligned with our outreach. The transition to a new sustainable world is underway through various changes in our activities, including the use of renewable energy sources, the adoption of climate-resilient infrastructure, the promotion of sustainable land use, and the protection and restoration of ecosystems, among others. Moreover, the concept of a climate future is not a pre-cooked or pre-packaged one; it is shaped through various activities, policies, innovations, research, cooperative action plans, and the adoption of sustainable development goals. It considers the global commitment of people to a sustainable future and supports human activities that focus on eco-friendly practices.

Recent trends in climate change and disaster management aim to provide a safe climate future for the world, with a strong focus on comprehensive disaster and climate risk management policies. The global priority is to ensure the concept of a modified climate future, which delivers a better future for the world. Disaster risk reduction strategies often aim to target the future climate for effective implementation of such methods. The Sustainable Development Goals, along with the Sendai Framework targets, play a key role in transitioning from a climate emergency to a climate-resilient future. Ultimately, the concept of a climate future is not a rigid one; it is subject to numerous factors and outcomes, and therefore results from the human activities of today and in the future. It incorporates both physical characteristics and human actions. In this respect, this concept is particularly relevant for showing the reflections that will guide future decisions on adopting sustainable development policies to mitigate the impact of climate change.

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