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Climate Change In Developing Countries:- "Causes, Impact And Suggestions"

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Abstract

Climate change presents major obstacles for developing nations, exacerbating current vulnerabilities and jeopardizing efforts towards sustainable development. This paper analyzes how climate change affects developing countries, as well as their strategies for adaptation and policy implications. Utilizing a combination of literature, case studies, and empirical evidence, the study pinpoints major climate change effects in areas like agriculture, water resources, health, and infrastructure. Marginalized communities in these nations are experiencing a greater impact, encountering increased challenges with food availability, limited water resources, health crises, and severe climate events. Even with constraints on resources, developing nations have put into practice various adaptations, such as local community projects, new technologies, and policy structures. Nonetheless, ongoing obstacles like limited funding, technological expertise, and institutional backing impede successful adaptation and mitigation efforts. Collaboration and assistance from other countries are essential in overcoming these difficulties, by utilizing tools like climate finance, technology transfer, and capacity building. The article highlights the importance of comprehensive strategies that prioritize climate resilience, sustainable development, and social equity. Policy implications stress the significance of integrating climate adaptation and mitigation into development agendas, promoting partnerships with multiple stakeholders, and empowering local communities. This study enhances global initiatives for climate resilience and sustainable development by improving knowledge of climate change in developing nations and providing practical recommendations.

Keywords:- Climate Change, Health, Climate events, Mitigation, Sustainable development

Introduction

Climate change is one of the most pressing and challenging issues in the 21st century, crossing borders and affecting every part of the world. Nevertheless, its impact is not consistent; instead, it is closely linked to the social and economic structure of various countries, with less developed nations frequently experiencing the worst outcomes. The main focus of this research paper is to investigate the specific circumstances of climate change in developing nations, examining the complex dynamics, weaknesses, and consequences of this worldwide issue.

Developing nations, with their scarce resources, vulnerable infrastructures, and heavy reliance on natural resources, encounter a range of difficulties heightened by the impacts of climate change. Even though they have a small role in causing global warming through greenhouse gas

emissions, these countries are greatly impacted by its effects. From the rural communities in sub-Saharan Africa to the busy urban centres of Southeast Asia, there are clear indicators of climate change: unpredictable weather, higher sea levels, intense heat waves, and destructive natural calamities.

The issue of climate change in developing nations also brings up intricate concerns regarding fairness, equality, and global accountability. Despite having the least historical responsibility for climate change, these nations often do not have the necessary financial resources, technological know-how, and institutional capacities to effectively adapt and mitigate its impacts. Moreover, the unequal allocation of climate change impacts and advantages highlights the importance of international unity and collaboration in tackling this common issue.

This research paper aims to investigate the main causes, effects, and reactions to climate change in developing nations, considering the urgent issues involved. Our goal is to increase understanding of climate change through studying case examples, policy structures, and creative methods for adaptation and mitigation, as well as to determine ways to achieve resilience, sustainability, and fair development.

Ultimately, the situation of climate change in developing nations is marked by a complicated interaction of environmental, social, and economic elements, bringing about significant obstacles to the quality of life and sustenance of numerous individuals. However, within these difficulties, there are chances for significant change that can occur through working together, coming up with new ideas, and rededicating ourselves to worldwide unity.

CAUSES OF CLIMATE CHANGE

- **Greenhouse gases:**

The burning of fossil fuels for energy production, industrial processes, transportation and housing is the largest source of greenhouse gases worldwide. Developing countries with rapid industrialization and urbanization depend heavily on fossil fuels to meet their growing energy needs. Coal, oil and natural gas are the primary energy sources in many of these countries and are responsible for the majority of emissions. In addition, inefficient technology, aging infrastructure and lax environmental regulations increase the emission intensity and carbon footprint of these economies.

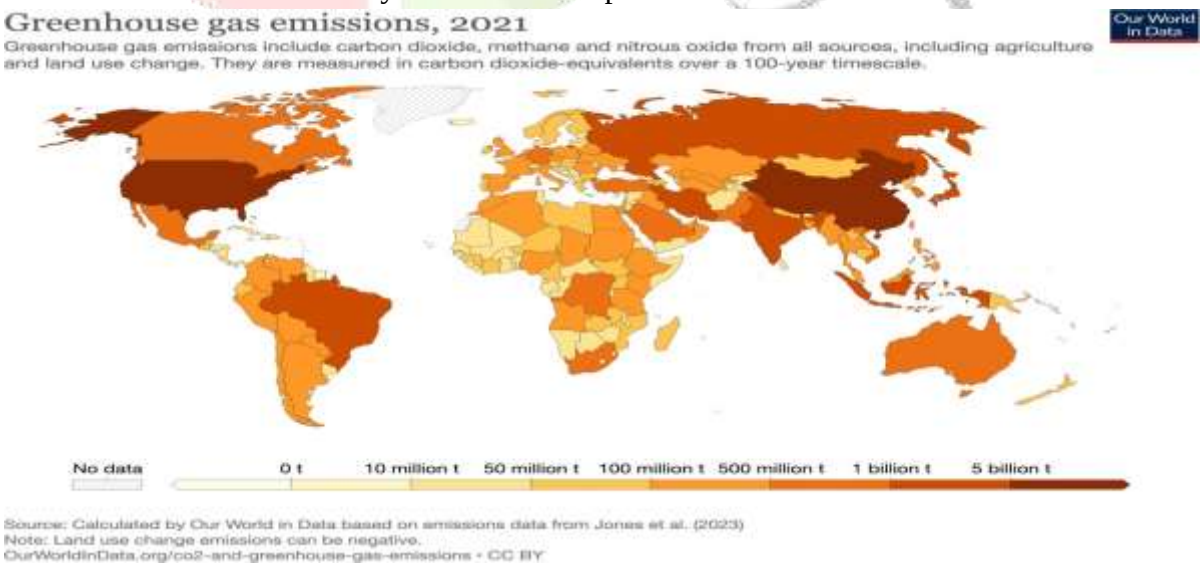

Fig - 1 Global map of greenhouse gas (GHG) emissions. 2024 Data source: Jones et al. (2024)

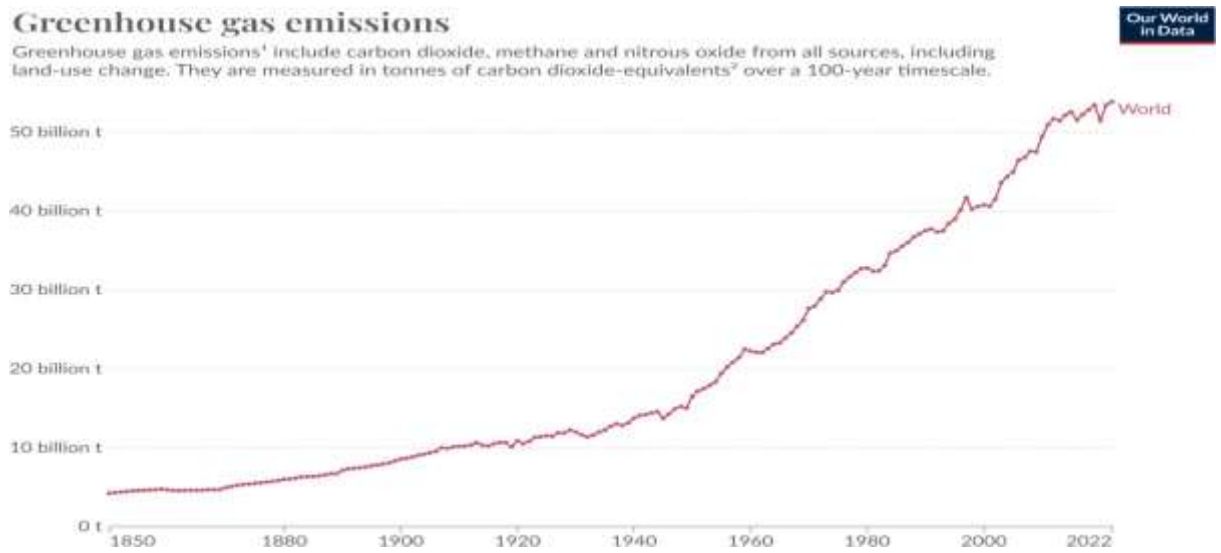

Fig - 2 Global map of greenhouse gas (GHG) emissions. 2021 Source:-Jones et al. (2024)

- **Deforestation and land use change**

Deforestation is a major driver of climate change, especially in tropical regions with rich biodiversity. In developing countries, a large number of forests are destroyed due to agricultural expansion, logging, infrastructure development and urban sprawl. Forests act as important carbon sinks and bind carbon dioxide to the atmosphere through photosynthesis. Deforestation, however, releases stored carbon back into the atmosphere and weakens the ability of ecosystems to absorb greenhouse gases.

- **Agricultural practices**

Developing countries Traditional agricultural practices, including pure farming and monoculture farming, contribute to deforestation, soil degradation, and loss of biodiversity. In addition, animal husbandry, especially animal husbandry through enteric fermentation and manure processing, produces methane, a potent greenhouse gas.

- **Vulnerability Extreme weather conditions**

Developing countries are disproportionately vulnerable to extreme weather events induced by climate change such as floods, droughts, cyclones and heat waves. These events threaten significant human lives, infrastructure, ecosystems and livelihoods, increase poverty and undermine socio-economic development. Factors such as inadequate infrastructure, weak governance, limited access to health and emergency services, and high population density increase the vulnerability of communities to climate-related disasters.

- **Global inequality and historical responsibility**

Climate change is inextricably linked. . . Despite their small contribution to global emissions, developing countries bear most of the impacts of climate change due to their vulnerability and limited adaptive capacity. This disparity underscores the need for global cooperation, equity and climate justice to address the root causes of climate change and support vulnerable countries to mitigate and adapt to its effects.

- **Climate Change Impacts in Developing Countries**

1. Agriculture and Food Security

Agriculture is the mainstay of economies in many developing nations, supporting millions of people's livelihoods and guaranteeing food security for their populations. Nevertheless, climate change affects agricultural systems by altering temperature, precipitation patterns, and the frequency of extreme

weather events. Extended periods without rain and unpredictable rainfall decrease the amount of crops produced, causing food scarcity, malnourishment, and financial hardship for small-scale farmers who do not have irrigation and other means to cope.

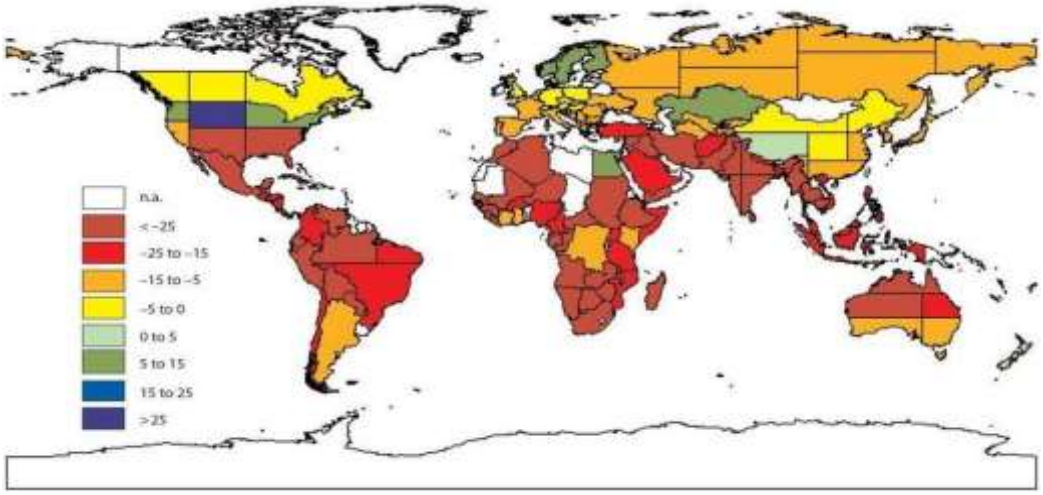

Fig - 2 Impact of temperature rise on agricultural productivity Source: Cline, 2007

Moreover, increasing temperatures and changing climate zones change the appropriateness of specific crops, causing farmers to adjust by using different varieties or switching to alternative crops. Nevertheless, these adjustments might not always be possible because of restricted information, resources, and markets, which worsen food insecurity and poverty in rural areas. For example, Sub-Saharan Africa, maize harvests have dropped by an average of 10% as a result of droughts and unpredictable rainfall patterns. In South Asia, rice production has also suffered from floods and heat stress, causing smaller harvests and higher levels of food insecurity.

2. Water Scarcity

The lack of water is a critical problem in numerous developing nations, made worse by alterations in precipitation, higher rates of evaporation, and glacier melting linked to climate change. Observational evidence suggests that areas under water stress are seeing a decrease in freshwater supply, causing difficulties for both rural and urban populations to obtain clean water for drinking, sanitation, and agriculture. In some regions of Africa and Asia, there has been a significant decrease in groundwater levels in the last ten years, resulting in shortages for both irrigation and household purposes.

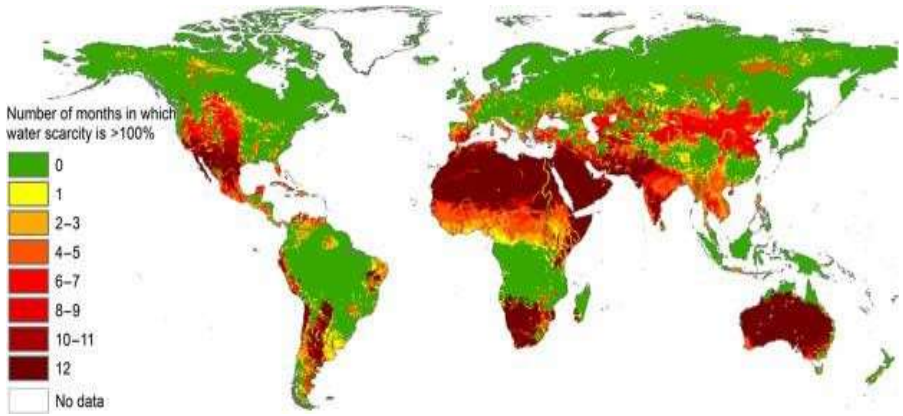

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Fig - 3 The global distribution of regions affected by water scarcity Source:-Jones et al. (2024)

3. Economic Performance

Climate change has major economic effects on developing nations, impacting crucial industries like farming, tourism, fishing, and production. Over the last ten years, economic indicators have shown a decrease in GDP growth rates, a rise in poverty rates, and a decrease in infrastructure and human capital investment. In Latin America, the agricultural industry has decreased by around 5% each year starting from 2020, resulting in a decline in employment opportunities and an increase in rural impoverishment.

4. Health Outcomes

Climate change impacts the health of people in developing nations in multiple ways, such as the increase in diseases carried by vectors, heat-related sickness, and malnutrition. Data collected from health surveys and epidemiological studies indicate a rise in health risks linked to climate change in the last ten years, especially among vulnerable groups.

World strategies to combat climate change

1. International agreements

Paris Agreement: The Paris Agreement, established in 2015 within the United Nations Framework Convention on Climate Change (UNFCCC), seeks to restrict global warming to below 2 degrees Celsius from pre-industrial levels, striving to cap it at 1.5 degrees Celsius. Important components consist of nationally determined contributions (NDCs) that define the emissions reduction goals and tactics of every nation.

Kyoto Protocol: While not as thorough as the Paris Agreement, the Kyoto Protocol (1997) set mandatory emissions reduction goals for developed nations. It implemented flexible strategies like emissions trading and clean development mechanisms (CDM) to help decrease emissions.

Montreal Protocol: In addition to its main goal of reducing ozone depletion, the Montreal Protocol has also helped in the fight against climate change by eliminating ozone-depleting substances (ODS), which are powerful greenhouse gases.

2. Climate finance

Green Climate Fund (GCF): Mobilizing financial resources from developed countries to support climate change mitigation and adaptation projects in developing countries

Climate Finance Mechanisms :
Establishing ways to finance climate projects, such as grants, loans, and financial tools, to support investments in infrastructure and technologies that can withstand climate challenges.

3. Carbon Pricing and Market Mechanisms

Introducing carbon taxes or emissions trading systems to incorporate the costs of greenhouse gas emissions and encourage reductions in emissions.
Implementation of emissions trading involves setting up cap-and-trade systems, allowing corporations to purchase and trade emission permits for cost-efficient achievement of reduction goals.

Case studies:-

Outlining some of the key aspects of declining snow fall in Kashmir region due to climate change

- **Temperature rise**

Due to climate change, in places such as Kashmir, this warming could lead to higher temperatures in the winter months, causing a shift from snow to rain. This change occurs especially at lower elevations,

where temperatures can rise above freezing, leading to reduced snowpack.

- **Altered precipitation patterns**

Climate change can disrupt traditional precipitation patterns, including the timing, intensity, and distribution of snowfall. Warmer temperatures can cause snowfall to be less frequent or of shorter duration. In addition, changes in atmospheric circulation can affect the trajectory and intensity of weather systems, which affects the amount of snowfall that an area receives.

- **Changes in the dynamics of snowmelt**

Higher temperatures due to climate change accelerate the melting of the snowpack. This can lead to earlier snowmelt and shorter snow cover. As a result, the timing and magnitude of snowmelt runoff can change, affecting water availability and hydrologic cycles in the region.

- **Glacier retreat**

Climate change is accelerating the retreat of glaciers in the Himalayan region, including Kashmir. Glaciers act as a natural reservoir of fresh water, which contributes to the melting of snow during the dry season. The retreat of glaciers reduces the availability of snowmelt water, which can exacerbate water scarcity problems in the region.

The impact of climate change on the mangroves in the Sundarbans

- **Sea level rise**

One of the most pressing problems in the Sundarbans is sea level rise. As the Earth's temperature rises, the polar ice caps melt, causing sea levels to rise. That threatens the existence of the Sundarbans because much of the region is low and prone
to flooding. Increased salinity due to sea level rise can also damage mangrove ecosystems and associated biodiversity.

- **Extreme weather events**

Climate change will increase the frequency and intensity of extreme weather events such as cyclones and storms. The Sundarbans are particularly prone to such incidents because they lie in the Bay of Bengal. Cyclones can cause widespread destruction of mangrove forests, erode coastlines and cover land with salt water, causing habitat loss and ecosystem degradation.

- **Changes in precipitation**

Climate change can change precipitation, causing drying or increased precipitation. Both scenarios could have negative effects on the Sundarbans. Drought can increase soil and water salinity, affecting the growth and survival of mangrove species. On the other hand, increased rainfall can cause floods that can disturb the delicate balance of the ecosystem.

- **Rising temperature**

Rising temperature can also affect the Sundarbans. Warmer temperatures can affect the reproductive cycles of flora and fauna, change habitat suitability and increase the susceptibility of species to diseases and pathogens.

- **Loss of biodiversity**

The Sundarbans mangrove forest is home to a wide variety of plant and animal species, many of which are unique adapted to brackish water environments. Climate change threatens this biodiversity by changing living conditions, causing habitat loss and increasing the vulnerability of species to extinction.

India has put into action various successful strategies and initiatives in addressing climate change, which serve as excellent examples and models. Here are a few illustrations:

- **National Solar Mission (NSM)**

India's National Solar Mission, which was initiated in 2010, has the goal of encouraging the use of solar power and decreasing dependence on fossil fuels.
Main features consist of establishing challenging goals for installation of solar energy capacity, encouraging local production of solar equipment, and offering financial benefits like subsidies and tax breaks.
India surpassed its original goal of 20 GW of solar capacity by 2022 and has now set new targets of 100 GW by 2022 and 450 GW by 2030, demonstrating considerable progress in the adoption of solar energy.

- **Ujjwala Scheme**

The Pradhan Mantri Ujjwala Yojana (PMUY) was initiated in 2016 with the goal of offering rural homes clean cooking fuel through the distribution of liquefied petroleum gas (LPG) connections.
Replacing traditional biomass fuels with LPG not only reduces indoor air pollution, deforestation, and associated health risks but also helps in addressing climate change.

- **National Afforestation Program (NAP)**

India's National Afforestation Program aims to boost forest cover and improve ecosystem services by implementing afforestation, reforestation, and agro forestry.
The program includes community involvement, offering jobs to rural areas and encouraging sustainable land management techniques.
Effective execution of the NAP has led to a growth in carbon sequestration, preservation of biodiversity, and enhancement of living standards in rural regions.

- **Climate Resilience Initiatives**

India has implemented various projects to increase resilience to climate change effects, specifically in sectors like agriculture, water resources, and coastal regions.
Efforts consist of the National Mission for Sustainable Agriculture, the National Water Mission, and the Coastal Zone Management Program, aiming to increase resilience, improve adaptability, and support sustainable methods.

Suggestion for developing countries on climate change

- **Prioritize the adoption of renewable energy**

Invest in renewable energy sources such as solar, wind, hydropower and geothermal energy to reduce dependence on fossil fuels. Implement policies and incentives to promote the adoption of renewable energy, such as feed-in tariffs, tax credits and subsidies for renewable energy projects. Develops renewable energy infrastructure and builds capacity to deploy clean energy technology

- **Promote sustainable farming and forestry:**

Adopt sustainable farming practices including afforestation, afforestation, agro forestry and sustainable agriculture to promote carbon sequestration, biodiversity conservation and soil health .Strengthens forest management and conservation measures to reduce deforestation and forest degradation. Support

community-based forestry initiatives and secure land tenure rights for indigenous peoples and local communities

- **Invest in green infrastructure and transportation**

Develop sustainable transportation systems, including mass transit, cycling infrastructure, and pedestrian-friendly urban design to reduce traffic emissions and improve air quality. Invest in green infrastructure projects such as green buildings, urban parks and green spaces to improve the resilience of cities and promote sustainability. Promote the use of electric vehicles and low- emission vehicles through incentives, subsidies and infrastructure development

Conclusion

Ultimately, developing countries face unique challenges and opportunities to combat climate change. Although they contribute relatively less global greenhouse gases than industrialized countries, they often suffer the greatest climate impacts due to their socio-economic vulnerability and limited adaptation capacity. However, these challenges offer opportunities for innovation, sustainability and transformative change.

Developing countries have the potential to deviate from traditional development paths by introducing clean energy technologies, promoting sustainable land management, improving climate resilience and promoting climate intelligence. in agriculture. By integrating climate considerations into development planning processes and policies, these countries can simultaneously reduce emissions, adapt to climate impacts and achieve sustainability goals. Effective climate governance, institutional capacity building and stakeholder participation are essential to catalyze climate action. At national and local level.

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