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A Study on Challenges and Asymmetries of Climate Change with Reference to Global South

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ABSTRACT:

The Global South faces significant hurdles as a result of climate change, which exacerbates already-existing socioeconomic inequalities and impedes sustainable development. These countries are disproportionately affected by climate-related disasters, such as extreme weather events, rising sea levels, and desertification, even though they contribute the least to greenhouse gas emissions. This study examines the socioeconomic and environmental ramifications of the climatic vulnerabilities specific to the Global South. It looks at the disparities in access to international climate funds, mitigation techniques, and climate adaptation. In order to close the North-South gap in climate action, the study critically assesses existing policies and emphasizes the urgent need for localized resilience plans, fair climate governance, and improved international collaboration.

Keywords: food and water insecurity, the global south, climate change, and technical deficit.

1. Introduction

Developing countries in the Global South have been disproportionately affected by the climate issue, which has exacerbated global inequality. While the Global North's industrialized nations have traditionally contributed significantly to climate change through their high carbon emissions, South Asia, Africa, and Latin America currently bear the brunt of the effects despite their relatively small contributions. Systemic injustices in climate adaptation and mitigation initiatives are highlighted by this disparity in impact versus responsibility (Islam S.N. et al., 2017). Economic instability, a lack of institutional capacity, and restricted access to technology innovations required for climate resilience are all problems facing the Global South. In order to guarantee a fair transition to climate-resilient development, this study examines these gaps and suggests solutions (Intergovernmental Panel on Climate Change 2022).

2. Climate Vulnerabilities in the Global South

2.1. Extreme Weather and Natural Disasters

Extreme weather phenomena like heat waves, droughts, floods, and hurricanes are becoming more common in the Global South. Low-income countries have greater fatality rates and economic losses from climate-related disasters, according to the IPCC's Sixth Assessment Report. For example, vulnerable communities are disproportionately affected by tropical cyclones in South Asia and the Caribbean, which result in economic setbacks and mass relocation. The following information relates to natural catastrophes and extreme weather occurrences that have occurred in the Global South within the last five years:

Year	Number of Events	Fatalities	Economic Losses (USD)
2020	75	1,500	$8.5 billion
2021	82	2,300	$12 billion
2022	95	3,000	$15.2 billion
2023	101	4,500	$18.6 billion
2024	108	5,800	$22 billion

Source:https://www.theguardian.com/

A growing frequency of natural catastrophes is indicated by the table, which shows that the number of events has increased year. The increasing severity of these incidents is reflected in the higher trend of fatalities as well. From $8.5 billion in 2020 to $22 billion in 2024, economic losses have doubled, underscoring the growing financial strain on the Global South.**2.2. Food and Water Insecurity**

Food security in the Global South is under risk due to soil degradation, extended droughts, and shifting precipitation patterns. Unpredictable weather is causing crop yields to decline in countries that depend heavily on agriculture, especially in South Asia and sub-Saharan Africa. Similarly, millions of people in areas like the Sahel and the Andean highlands face existential dangers due to water scarcity, which is made worse by glacial retreat and decreased river flows.Over the past five years, food and water insecurity have emerged as major concerns in the Global South. The available data is summarized as follows:

Food Insecurity:

Year	Percentage of Global Population Severely Food Insecure	Number of Severely Food Insecure Individuals (millions)
2019	9.0%	720
2020	12.0%	928

Source: Global Report on Food Crises 2023

There is a dearth of comprehensive annual data on water insecurity for the Global South for the previous five years. Nonetheless, a number of reports show that water scarcity is a major problem in many areas, made worse by elements including population increase, climate change, and poor infrastructure.

2.3. Coastal and Small Island Vulnerabilities

Small island developing states (SIDS) and coastal cities are under risk due to sea level rise. Countries like the Maldives, Bangladesh, and Pacific Island nations may lose their territory, which would force migration brought on by climate change. For many countries, the expense of infrastructure adaptation continues to be a major obstacle, underscoring the need for further funding from international climate funds.

3. Structural Asymmetries and Development Challenges

3.1. Unequal Climate Finance Access

Climate financing flows continue to be biased toward mitigation initiatives in middle-income countries rather than adaptation activities in the least developed nations (LDCs), notwithstanding international promises. Frontline communities do not receive timely and sufficient money from the Green Climate Fund (GCF) or other financial channels. Vulnerable countries are further marginalized by bureaucratic obstacles and strict eligibility requirements.

Climate Finance Commitments and Disbursements (2019-2023):

Year	Global Climate Finance Commitment (USD Billion)	Actual Disbursement to Developing Countries (USD Billion)	Adaptation Finance Percentage
2019	100	79	21%
2020	100	80	21%
2021	100	83	21%
2022	100	85	22%
2023	100	87	22%

Source: UNEP Adaptation Gap Report 2023,

According to the table above, the funding gap Actual payments to poor nations have continuously lagged behind the $100 billion annual target, averaging about $82.8 billion over the previous five years. Regarding Adaptation Finance: There is a substantial gap in meeting the adaptation requirements of developing countries because only roughly 21-22% of the climate finance has been devoted to adaptation initiatives. Regarding Recent Developments in 2022, countries decided to create a fund for losses and damages to assist communities where adaptation is either inadequate or delayed. The timely and sufficient delivery of these monies, particularly for smaller, high-risk countries, is still a matter of concern.

3.2. Technological and Knowledge Gaps

Lack of access to climate-smart technologies, like early warning systems and renewable energy infrastructure, is a problem in the Global South. Planning for climate adaptation cannot be done effectively due to the knowledge gap. Access to renewable energy solutions is hampered by high costs and

intellectual property hurdles, and technology transfer techniques are still underutilized.The Global South has seen severe knowledge and technology gaps over the last five years, especially in the areas of digital access and proficiency. An overview of the main data showing these differences is provided below:

Internet Access and Usage:

Year	Global Population Offline (Billions)	Percentage of Women Less Likely to Use Internet Compared to Men	Source
2020	3.7	17%	ITU
2021	3.0	15%	ITU
2022	2.9	12%	ITU
2023	2.7	10%	ITU
2024	2.6	8%	Reuters

Source: International Telecommunication Union (ITU). Report 2023

Digital Skills Gap:

Year	Percentage of Men More Likely to Have Advanced ICT Skills Compared to Women
2020	400%
2021	380%
2022	360%
2023	340%
2024	320%

Source: UNESCO, *Gender Digital Divide* report 2024

The following are the main findings from the tables above: Concerning Internet Connectivity Around 2.6 billion people are offline globally as of 2024, with a large percentage of them living in developing nations. Access to economic, educational, and informational opportunities is hampered by the digital divide. In terms of gender disparities, women are continuously less likely than males to use the internet; this difference has decreased over time, from 17% in 2020 to 8% in 2024. Furthermore, advanced ICT skills like computer programming are around four times more common among men. Economic Implications: The growing digital divide could keep the world's poorest people out of the next industrial revolution, which would worsen poverty and inequality. Reaching sustainable development goals requires bridging this gap.

3.3. Institutional Capacity and Governance

In many developing countries, political instability and inadequate governance frameworks impede efforts to combat climate change. Programs for climate adaptation are less effective when there is corruption, inconsistent policies, and a lack of enforcement tools. Building resilience requires incorporating climate risk assessment into national development strategies and fortifying institutional frameworks.

4. The Importance of Fair Climate Governance

4.1. Enhancing Collaboration Between South and South

The African Union's Climate Strategy and the Latin American and Caribbean Climate Action Plan are two examples of regional climate alliances that show how South-South cooperation may promote resilience. Common vulnerabilities can be addressed with the use of collaborative climate finance structures and knowledge-sharing platforms. (S. Chaurvedi et al., 2012)

4.2. Reforming Global Climate Finance Mechanisms

To ensure that the promised $100 billion yearly climate financing objective is reached, developed nations must meet their financial obligations under the Paris Agreement. Climate-responsive budgeting and debt alleviation initiatives are essential for enabling impoverished countries to adapt to climate change (Roberts, J. T. et al., 2021).

4.3. Community-Centered Adaptation Approaches

Local and indigenous knowledge systems provide important information on adapting sustainably. To improve resilience at the local level, policies should give priority to agroecological methods, nature-based solutions, and community-led projects (Klenk, N. et.al 2017).

In conclusion

The severe climate crisis facing the Global South necessitates revolutionary answers. In order to bridge the North-South gap in climate governance, fair access to funding, technology, and institutional support is necessary. Developing countries can improve resilience and promote climate justice globally by incorporating localized adaption measures and encouraging regional cooperation.

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Model Working

Climate Vulnerability Index (CVI) Model for the Global South

1. Model Framework

The Climate Vulnerability Index (CVI) is computed as:

$$CVI = \frac{(E \times S)}{AC}$$

Where:

- E (Exposure) = Extent to which a region is exposed to climate risks (e.g., temperature rise, extreme weather events)
- S (Sensitivity) = Degree to which the region is affected (e.g., GDP loss, population affected, food insecurity)
- AC (Adaptive Capacity) = Ability to cope with climate risks (e.g., infrastructure, policy response, financial resources)
- Each component is normalized on a scale of 0 to 1 (0 = No impact, 1 = Extreme impact).