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Climate Change and the Poor: Reasons, Impacts, Inequities, and Sustainable Solutions

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Abstract: This paper thoroughly analyzes the complex and challenging impacts of climate change, driven by human activities like as greenhouse gas emissions, deforestation, and scenery- use changes. It examines the consequences, especially sea level rise, extreme weather events, and ecosystem disruption. The research demonstrates how these issues, especially those that affect the poor, exacerbating their vulnerability through increased natural disasters, leading to loss of essential resources and widespread displacement. The problems become more complicated as a result of deteriorating water, food security, and severe health threats. Such conditions undermine impoverished communities' ability to sustain their livelihoods and resilience. Additionally, the study demonstrates how women and marginalized groups face more serious effects, with gender-specific vulnerabilities worsening their social and economic hardships. Scattered barriers to resources and systemic inequalities increase risks for these populations, limiting adaptive capacity and deepening socio-economic disparities. The most impoverished are fewer likely to receive resources and assistance programs, which worsens unequal opportunities. In response, the paper proposed a multi-layered method that combines adaptation and mitigation. For adaptation efforts, they include enhancing agricultural resilience, improving health systems, strengthening disaster response. Sustainable forest management, green energy promotion, and emissions reduction are among the mitigation approaches that are most important. Moreoverm, the paper emphasizes the value of public participation, policy support, and international cooperation in order to effectively implement these strategies for a more profound and sustainable future.

Keywords: Climate change, poverty, adaptation, mitigation, sustainable development.

1. Introduction

Climate change is a profound global challenge that affects every facet of human life, Greenhouse

Every aspect of human life is affected by climate change, but its impacts are most pronounced for the world's poor and marginalized communities. Greenhouse gas emissions, deforestation, and land-use changes driven by human activities are accelerating global climate change, leading to extreme weather events, sea-level rise, and the degradation of ecosystems. For poor communities, these modifications raise the risk of natural disasters, food and water insecurity, health risks, and economic instability. Women and other vulnerable groups frequently face disproportionate issues, which emphasizes the need for a inclusive, equitabe solution. While international efforts, such as the Paris

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Agreement, have initiated global climate action, addressing the specific challenges faced by the poor is critical. This paper examines the various adverse effects of climate change on the poor and provides an overview of adaptation and mitigation strategies intended to promote sustainable development while at the same time reducing these negative effects.

2. The Concept and Reasons of Climate Change and its Impacts

2.1. Climate Change and Human Activities

According to NASA, climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates [1]. The United Nations Office for Disaster Risk Reduction (UNISDR) reports a steady increase in disasters linked to climate change, with projections suggesting that the frequency of medium and large disasters could reach 560 per year by 2030 [2]. Developing countries bear the brunt of these disasters, a trend that is particularly worrying [2].

While natural factors, such as volcanic eruptions and changes in solar activity, can contribute to climate shifts, human activities since the Industrial Revolution have predominantly driven climate change. The main contributors include:.

1) Greenhouse Gas Emissions: Activities in energy production, industry, transportation, and agriculture release significant amounts of CO2, methane, and other greenhouse gases. These particles contribute to the greenhouse effect, which causes raises in global temperatures.

2) Deforestation: Large-scale deforestation reduces the number of trees that can absorb CO2, producing more CO2 into the environment and contributing to global warming.

3) Land Use Changes: Urbanization and agricultural expansion have altered the environment, affected the local climate and exacerbated environmental degradation.

2.2. Impact of Climate Change on the Earth

On a variety of related resources, including the global environment, climate change has a wide range of outcomes. The main outcomes are as follows:

1) Sea Level Rise: The melting of polar ice caps and the development of ocean lakes are the causes of rising sea levels, according to the UN [3]. These modifications stifle fishing industry and endanger people who depend on fishing for their livelihood.

2) Weather Instability: As a result of climate change, wind patterns become unstable, leading to strange weather problems that persist for an extended period of time. As a result, there are instances of extreme drought or severe storms, both of which threaten food security and agrarian productivity.

3) Ecosystem Disruption: Variations in temperature and precipitation can result in biodiversity loss, influencing various species, and altering normal levels.

3. Specific Impacts of Climate Change on the Poor

Climate change highlights and deepens existing inequalities. In Hallegatte's opinion, the poorest countries contribute minimally to global greenhouse gas emissions but are often the most vulnerable to its effects [4].

3.1. Climate Change Leading to Natural Disasters

1) Loss of Natural Resources: Environmental degradation caused by climate change leads to the depletion of essential natural resources. For many poor communities, livelihoods depend on agriculture, forestry, and fisheries. Changes in climate can devastate these sectors, resulting in decreased productivity and income. For instance, according to Pinsky and Byler, droughts can

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diminish crop yields, while warming oceans can disrupt fish populations, leaving communities that rely on fishing for sustenance at risk [5]. In East Africa, severe drought has affected millions, eroding the livelihoods of farmers and pastoralists [6].

2) Homelessness and Displacement: Natural disasters linked to climate change, such as hurricanes, floods, and wildfires, disproportionately impact the poor, who often live in vulnerable, poorly constructed housing. According to Richards and Bradshaw, events like Cyclone Winston in Fiji displaced over 55,000 people and caused damage equivalent to one-fifth of the country's GDP [7]. When disasters strike, poor communities lack the resources to recover, leaving many homeless and unable to rebuild.

3.2. Climate Change Creates Security Issues

1) Water Security: A higher water scarcity is brought on by climate change's increased evaporation rates and altered precipitation patterns. Regions already facing water stress are likely to experience even greater challenges, impacting drinking water availability, agricultural irrigation, and industrial use. Water shortages can lead to conflict over resources and further entrench poverty in vulnerable communities.

2) Food Security: The production of foods is severely impacted by climate change. Shifts in weather patterns can alter growing seasons, reduce crop yields, and affect food quality. For instance, according toWheat Initiative, staple crops like rice and wheat are particularly sensitive to temperature changes, with projections indicating that rising temperatures may reduce yields significantly by 2030 [8]. This poses a serious threat to food security, particularly in developing regions where millions already face hunger and malnutrition. WHO data show that 2 billion people lack access to safe drinking water and 600 million people suffer from foodborne illnesses each year, with children under the age of 5 accounting for 30% of foodborne deaths [9].

3) Health Risks: Climate change significantly threatens human health, especially for impoverished populations. Extreme weather events, such as blizzards, heatwaves, droughts, and floods—are becoming more frequent, leading to serious health impacts. When climate conditions exceed the body’s limits, individuals may suffer from discomfort or illnesses such as rheumatism, strokes, and infectious diseases.

High temperatures directly affect health, with rising heatwave intensity increasing heat-related illnesses, particularly among poorer populations lacking adequate medical care. Studies attribute 37% of heat-related deaths to human-induced climate change, with a 70% increase in deaths among those over 65 in the past two decades [9]. The WHO conservatively projects 250 000 additional yearly deaths by the 2030s due to climate change impacts on diseases like malaria and coastal flooding [9].

Climate warming also accelerates the spread of infectious diseases. Warmer temperatures expand habitats for disease vectors, raising prevalence rates. Additionally, greenhouse gas emissions worsen air and water quality, contributing to respiratory diseases and allergies. The IPCC's Sixth Assessment Report (AR6) notes that 3.6 billion people live in areas of high vulnerability to climate change [10]. Low-income communities face severe health challenges despite their minimal contribution to global emissions.

3.3. Impact of Climate Change on Women and Vulnerable Groups

3.3.1. Women Unequally Affected by Climate Change

Climate change exacerbates gender inequalities and increases the vulnerability of women. According to the UN, people who are displaced by climate-related events, with 80% being women [11]. Among the 1.3 billion people living in poverty, 70% are women, and 40% of the poorest urban households are female-headed [12]. Despite contributing most of global food production, women own only 14%

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of agricultural land [13]. Bilateral aid aimed at gender equality remains low at 4%, with 62% of aid being "gender-blind" [13].

Women often face increased workloads due to climate impacts on water, food, and energy resources. For instance, as the primary collectors of water and firewood, they endure heightened responsibilities when resources become scarce. Additionally, women in agriculture are more exposed to climate disasters and pollution, with limited access to protective resources, information and support. Climate crises also undermine women's sexual and reproductive health by disrupting access to healthcare services.

Women's social status and decision-making power are affected as well. In 2020, only 15% of ministers in the environmental sector were women, a modest increase from 12% in 2015 [14]. Structural barriers, including unpaid domestic work and gender-based violence, further limit women's participation in policy-making. In poorer communities, these challenges are magnified, resulting in reduced employment opportunities and increased domestic violence.

3.3.2. Vulnerable Groups Unequally Affected by Climate Change

Other vulnerable groups also suffer from climate change. Air pollution can permanently hinder children's growth and cognitive development, jeopardizing their future. A study from Israel found high PM2.5 exposure significantly reduces student achievement [15]. Moreover, food instability due to climate impacts increases malnutrition, with serious long-term health consequences. For example, lack of adequate nutrition can lead to impaired physical and mental development of children.

3.4. Climate Change Creates Unequal Opportunities

Climate change fosters inequality of opportunity, intensifying competition for scarce resources. According to IPCC, poorer communities often lack the technology and means to adapt, increasing their vulnerability. Households with the highest per capita emissions contribute 34–45% of global consumption-based household GHG emissions, while the bottom 50% contribute 13–15% [10]. Populations in low- and middle-income countries are five times more likely to be displaced by extreme weather than those in high-income countries [16]. According to Oxfam, currently, 3.3-3.6 billion people live in areas with high climate vulnerability [10].

Poor people face serious inequalities of opportunity, which negatively affect their education, employment, health and social resources. Poor groups often lack quality education, which limits their career prospects and can be discriminated against in the job market, leading to unequal pay and promotion opportunities. Their inadequate access to health care and poor living conditions contribute to health disparities. Limited access to social resources further hinders their development and mobility. Moreover, systemic inequalities and conflicts increase vulnerability to climate-related disasters. For example, according to the IPCC, people in low - and middle-income countries are five times more likely to be displaced by extreme weather than people in high-income countries [16].

Mitigation efforts can exacerbate existing inequalities. For example, closing coal plants may displace workers and destabilize local economies. Policymakers must consider the distributional impacts of climate policies to promote equity. For example, carbon pricing disproportionately burdens low-income households, further entrenching inequality. In addition, certain climate policies, like carbon taxes on emission-intensive goods such as gasoline, fail to promote equity, as the generated revenues do not support programs that benefit low-income communities.

4. Strategies to Address the Negative Impacts of Climate Change on the Poor

In response to climate change, 197 countries adopted the Paris Agreement during COP 21 in December 2015. This landmark agreement aims to substantially reduce global greenhouse gas

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emissions, limiting the global temperature increase to well below 2°C while striving for a limit of 1.5°C [17]. Developed countries are urged to take the lead in emissions reduction and to provide financial and technical support to developing nations, helping them mitigate and adapt to climate change. While this global framework represents a positive step forward, it is crucial to implement specific measures that directly address the immediate and severe impacts of climate change on poor populations. Implementing these measures requires collaboration among governments, businesses, and communities.

4.1. Adaptation Measures

4.1.1. Improving the Adaptability of Agricultural Production

Agriculture sector depends heavily on the environment, and climate change has a significant impact on crop yields, system, and industry patterns as well as drying from processed goods and livestock . The impact of climate change on the poor is worrying, so improving the resilience of agricultural production is crucial. To this end, Climate-Resilient Agriculture (CRA) should be established. According to Yu et al., CRA mainly includes three aspects of adaptation: continuous improvement of agricultural productivity, adaptation to climate change, and reduction of greenhouse gas emissions [18].

1. Diversified Agricultural Production: The threat of climate change can be reduced by incorporating newly developed farming technologies into agricultural production. Farmers grow many different crops instead of relying on just one. This diversification not only improves food security, but also stabilizes farmers' incomes.

2. Modern Agricultural Technology: Integrate modern agricultural technology, optimize resource utilization, and improve the adaptability of agricultural system. These technologies can help farmers analyze the environmental conditions their crops need, enabling them to make better decisions and increase resilience to climate change.

3. Agri-Climatic Early Warning Systems: The establishment of agri-climate hazard monitoring systems can reduce potential agricultural damage because it increases farmers' ability to respond to the challenges posed by climate-related threats. As a result, early warning systems can greatly reduce costs.

4.1.2. Improvement of Health and Habitat Adaptation

To address the impacts of climate change on the poor and improve their health and the resilience of their living environments, a number of measures can be taken:

1. Climate-resilient Housing: Giving loans or offers for home improvement projects can drastically improve energy efficiency and resilience. Making disaster-resistant apartments in places that are prone to disasters can save lives and property, for example. By replacing their homes with more energy-efficient and better-coated devices, low-income properties can also save cash.

2. Improving the Living Environment: Creating open spaces like parks and community parks can improve air quality and encourage physical well-being. The overall quality of life is improved when community facilities, such as libraries and medical centers are combined. In addition, maintaining clear water and equipment is essential in the face of climate-related problems.

3. Encourage Participation: Governments can encourage business participation in climate action through subsidies, tax incentives, and grants. Helping those who are most in need can be achieved by increasing social security benefits for vulnerable groups and lowering climate change's negative consequences.

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4.1.3. Strengthening Disaster Response and Recovery Capacity

To enhance disaster response and recovery, the following measures should be taken:

1) Investing in public health systems: Addressing the health risks of climate change is important. Effective disease surveillance systems and focused prevention of climate-sensitive diseases should be developed.

2) Improve catastrophe insurance system: The government and enterprises should actively promote disaster prevention, post-disaster recovery and compensation insurance by establishing a comprehensive catastrophe insurance system. This can provide financial support for disaster recovery and help rebuild quickly after a disaster. According to Liu et al., the main modes of international catastrophe insurance operation mainly include three modes: government-led, commercialized operation, and joint operation between the government and other institutions [20]. For instance:

i) Government-Led Model: The California Earthquake Authority (CEA), established in 1996, is an example of a government-led, corporatized organization. According to CEA, it operates with market-based financing and tax exemption, with private insurance companies participating voluntarily [21]. These companies commit to covering a percentage of losses in extreme events, while those not participating must offer their own earthquake insurance independently. The CEA uses a risk-based pricing model to provide coverage for homes, contents, and additional living expenses caused by earthquakes [21].

ii) Commercialized Model: In the UK, the government introduced flood insurance in the 1960s. This model operates on a purely commercial basis, with the government focusing on flood defense infrastructure but not directly managing or financing the insurance operations. The well-developed private insurance sector handles the flood risk independently [20].

iii) Joint Government-Private Model: The Turkish Catastrophe Insurance Pool (TCIP), a non-profit platform under the Turkish Ministry of Finance, combines efforts from government, private, and academic sectors. According to Gurenko et al., TCIP designs a national risk model, sets actuarial rates for earthquake insurance, and design the size of the insurance fund and the risk transfer mechanism, etc [22]. At the same time, it conducts research on disaster prevention and mitigation and promotes the popularization of seismic standards [22]. The operational aspects, such as policy sales and claims assessment, are outsourced to insurance companies and external agencies through a bidding process [22].

3) Pre-position Emergency Supplies: In areas vulnerable to climate impacts, governments should pre-stock emergency supplies like food, water, and medical resources, ensuring a swift response during emergencies.

4.2. Mitigating Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are a primary driver of climate change, and mitigation is essential.

4.2.1. Promoting Sustainable Forest Development

Forests are essential for absorbing carbon dioxide (CO2) from the atmosphere and preventing climate change. Through photosynthesis, forests absorb CO2, storing it in biomass (trunks, branches, leaves, roots), making them essential carbon sinks. On average, forests in natural and mixed UNESCO World Heritage sites have absorbed approximately 190 million tonnes of CO2 from the atmosphere annually since the year 2000 [23]. This net CO2 removal by forests is equivalent to roughly half of the United Kingdom's annual CO2 emissions from fossil fuels in 2019 [23].

After forest resources have become the object of human production and management activities, a series of activities, such as changing the use of forest land, forest logging, etc., produce a lot of greenhouse gases, such as CO2, being emitted into the atmosphere. Deforestation remains a

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significant problem. The researchers found that in the Amazon Basin, from 1999 to 2002, selective logging led to a 60-128% increase in forest destruction, releasing 10-15 million tons of carbon[24]. As a result of selective logging in the top five wood-producing states of the Brazilian Amazon, about 100 million metric tons of total carbon fluxes are released into the atmosphere through logging each year [24].

Key strategies for sustainable forest development include:

1) Enacting Forestry Regulations: Governments must implement strict forestry management policies to prevent illegal logging and unsustainable land-use practices. Advanced technologies, such as satellite monitoring, can enhance forest cover monitoring, while stronger law enforcement can help curb deforestation.

2) Promoting Alternative Livelihoods: Encouraging local communities to adopt sustainable livelihoods and diversified economic model—such as harvesting non-timber forest products (fruits, herbs, resins or others) or eco-tourism—can reduce dependence on logging. These initiatives promote forest conservation while providing economic benefits.

3) Restoration and Reforestation: Apply modern technologies, such as advanced agricultural and forestry management techniques, to increase productivity, reduce resource waste, and ensure sustainable land and forest management including afforestation, restoration of degraded lands, and promotion of natural forest restoration to increase forest carbon stocks. Reforestation efforts also reduce soil erosion, support biodiversity, and improve ecosystem services.

4.2.2. Promoting Green Energy for the Global Energy Transition

Promoting green energy is a critical part of the global energy transition to address climate change. Forests in UNESCO World Heritage sites absorb about 190 million tons of CO_2 annually, but this is only half of the UK's annual fossil fuel-induced emissions [23]. Therefore, accelerating the shift to clean energy and reducing fossil fuel dependence is urgent.

1) Enhancing International Cooperation: For developing countries to transition to low-carbon economies, international cooperation is essential. Rich countries must provide financial support and help transfer modern, clean technologies. Developing nations risk being left behind without access to new 21st-century technologies. If these countries can adopt clean technologies early, they can bypass the outdated, polluting systems still in place in developed countries [4]. Investments in clean energy will enhance sustainability and ensure that energy access expands to all regions, especially low-income and remote areas. Rich countries have pledged substantial financial support to help developing nations adopt green technologies. For example, Global Environment Facility (GEF), an international financial institution of 184 member countries that provides grants and low-interest loans to developing countries to support global environmental protection projects, including climate change.

2) Government-Led Renewable Energy Investment: Governments play a pivotal role in reducing dependence on fossil fuels by encouraging investments in renewable energy. According to Wang et al., countries like Mexico, Indonesia, and Oman have demonstrated that government subsidies for fossil fuels hinder productivity and create dependence on unsustainable resources [25]. Renewable energy is now cheaper than fossil fuels in many regions, especially when considering the environmental and social costs. Low-density, far-off sites can use cleaner electricity sources like heat pumps and renewable energy, as well as increasing strength access. The transition to cleaner energy can be accelerated by government policies, financial support, tax incentives, and carbon pricing mechanisms. Countries are also investing in electric transportation to reduce fossil fuel dependence. This trend is best illustrated by the growth of charging infrastructure and the development of electric vehicles (EVs). In many regions, EVs have life cycle costs on par with traditional vehicles, making them a viable alternative for reducing emissions and improving air quality [4].

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3) Improving Energy Efficiency: Governments are also working to improve energy efficiency in various sectors such as buildings, transport and industry. Establish a standard system, promote the application of new technology, and reduce energy waste. By reducing commute times and increasing public transportation options, cities can significantly reduce emissions [4]. For example, urban rapid transit systems and initiatives on cycling can help create greener cities. However, the OECD reports that while strict environmental regulations can promote innovation, over-regulation can hinder economic growth if the costs outweigh the benefits [24].

4.3. Enhancing Public Awareness and Participation

1) Public Awareness and Participation: Governmrnt can increase public awareness on weather problems by educating people about climate change and encouraging public participation in activities such as reducing energy consumption, reducing pollution, and planting trees. In addition, greater communication and increased international cooperation are necessary to combat climate change.

2) Policy Support and Supervision: To promote the adoption of clean energy solutions by both businesses and individuals, government must provide policy support, such as financial support and technical assistance. Stronger regulation is essential to ensure that companies comply with regulations and take action to reduce emissions.

5. Conclusion

In conclusion, this article explored the causes and impacts of climate change, determining its significant effects on the weak and vulnerable groups. Climate change is not only an environmental issue but even a test of social equity and justice. Deforestation, land use, and greenhouse gas emissions are contributing factors to the increasing occurrence of natural disasters, which threaten livelihoods, worsens food and water security, and exacerbates health risks and inequalities, particularly affecting women and marginalized communities.

To address these challenges, adaptation strategies such as improving agricultural resilience, enhancing living environments, and strengthening disaster response systems are crucial. Furthermore, mitigating greenhouse gas emissions through sustainable forest development and a global shift to green energy is vital. A global effort to combat climate change requires international cooperation, public awareness, and government policy support.

Moving forward, protecting the rights of the poor and ensuring social equity should be essential in addressing climate challenges, requiring a collective, global response to achieve sustainable development for all.

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