Climate Change Impacts And The Paris Agreement: Progress, Challenges, And The Way Forward

Offiong, A.E.A.
(https://orcid.org/0000-0003-4743-6808,
agnesoffiong04@gmail.com) [1&2]

Unung, Valentine Bishie,
(https://orcid.org/0009-0006-9122-0528
bishieunung@gmail.com) [2]

Emeka Melvin Amalu
(Amaluemeka07@gmail.com
https://orcid.org/ 0000-0003-3864-2108) [3]

Undie Peter Angiagieye
peterundie@unical.edu.ng
https://orcid.org/0009-0005-9507-1104

Adie Isidore Ashindoritiang.
0009-003-8539-7413
adieisidore2@gmail.com[5]
[1,2&5] Environmental Education Department,
University of Calabar Calabar, Nigeria
[3] **Department of Agricultural Economics,**
University of Calabar Calabar, Nigeria
[4] **Department Of Guidance And Counseling**,
University of Calabar Calabar, Nigeria

Corresponding Author: Dr. Offiong, Agnes (08035915139, agnesoffiong04@gmail.com)

Abstract

Climate change is a major pressing global issue that requires immediate attention and action. In response to this global emergency, the Paris Agreement was adopted in 2015 under the United Nations Framework Convention on Climate Change. However, the extent Paris Agreement has helped in mitigating the global effects of climate change remain a crucial issue to be critically examined. Thus, this position paper assesses climate change impacts

and the Paris agreement; progress report, challenges and the way forward. In the study, the discussion of the Causes and effects of climate change, roles of ecosystems in climate change mitigation, the Paris Agreement's objectives & progress and tracking country progress under the agreement in mitigating climate change and finally the way forward in enhancing the actualization of Paris Agreement was carried out. In conclusion, the Paris Agreement has clocked some successes in the war against the effects of climate change with many more required to derail the impact of climate change, however; the Paris Agreement is a vital international instrument, its objectives for effective climate change mitigation are not yet adequately realized. Based on the issues discussed, the study recommended among others that, Countries should step up their NDCs and long-term strategies to meet the goals set in the Paris Agreement and Developed countries must, on an urgent basis, deliver $100 billion per year for climate action in developing countries.

Keywords: Climate Change, Ecosystems, Climate Change Mitigation, Paris Agreement

Introduction

Climate change has, in the past decade, remained a concern of significant magnitude. It is also one of the most urgent global issues of the 21st century, which has profound negative impacts on human societies, ecosystems and economies (Adeleke et al., 2020). It is characterized by increase in global temperature, increased frequency of natural disasters and changing weather-pattern which pose threat to the substrata of human survival (Ilori et al., 2020). In light of this urgent situation, the Paris Agreement emerged in 2015 under the UN Framework Convention on Climate Change (UNFCCC, 2015). The Paris Agreement target is to keep global warming to well below 2°C and make efforts pursue to limiting the temperature increase to 1.5°C above pre-industrial levels (Adeniyi et al., 2020). All countries must submit Nationally Determined Contribution (NDC) indicative of their desired actions/intended cuts in their anthropogenic produced greenhouse gas (GHG) emissions (Olaniran et al., 2020). Nigeria who are a party to the Paris Agreement have pledged to decrease its greenhouse gas emission by 20% by 2030 (Federal Government of Nigeria, 2020). Adeola and Okunola (2019) opined that Nigeria might leverage on the domestication of the Paris Accord to stimulate investment in clean energy technologies and other environmentally friendly ventures through sustainable development.

However, the delivery of Nigeria's NDCs is encumbered, among others, by deficiencies in climate finance, technology transfer and enabling institutional setup (Akinbode et al., 2020). In addition, Adeoti and Oyedunni (2020) argued that the country experienced serious problems meeting its emission reduction target under the agreement because of the

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prominence of fossil fuels in its energy supply and obvious incapacity for renewable energy development. Furthermore, climate change has severe implications in terms of flooding, droughts and desertification challenges facing Nigeria's economic development, food security, and human well-being (Ogbonna et al., 2022). Recent studies from Nigeria have reported to Nigeria's alignment with Paris Agreement goals to combat the effects of climate change.

The current state of the climate can be defined in terms of the statistical representation (hereafter the climate statistics) of a climate system at a particular point in time or over a period (Intergovernmental Panel on Climate Change (IPCC) 2020). Climate Change as per UNFCCC (2019) was defined as a change in the climate of the whole Earth which can be attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability with other applicable characteristics includes changes in climatic and energy parameters equal to or exceed its natural variability. Rosenzweig et al. (2019) defined climate change as the deviation from the earth climate system, such as changes in temperature, rainfall, Sea Level Rise (SLR) and other climatic variables that modify ecosystems, biodiversity and human life. Climate change is a long-term significant change in global weather patterns, including a steady rise in temperature and shift in rainfall patterns over decades to hundreds of thousands of years as a result of human activities such as burning fossil fuels and land use changes (Huang et al., 2018). (Good, 2005, p.19) Climate change has produced changes in weather patterns and extreme conditions such as heatwaves, storms, and droughts that are projected to be more regular and severe due to greenhouse gases (Jones and Johnson, 2019). Kollmuss et al, (2018) observed the necessity for global collaboration in for climate change impact action, saying since it is global issue all countries are encouraged to work in unison. Sixth Assessment Report (AR6), Synthesis Report (2023) concluded the AR6 cycle, emphasizing the unequivocal human influence on global warming.

One such attempt to work globally on climate change is the Paris Agreement, which has historically been ratified by 195 out of 197 Parties of the United Nations Framework Convention on Climate Change (UNFCCC) in 2015, also, is a critical milestone in the global effort for climate change mitigation (UNFCCC, 2015). The Paris Agreement aims to combat climate change by keeping global temperature rise this century well below 2 degrees Celsius above pre- industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius (Adeniyi & Oyinlola, 2020). Its edifice was one of the most important bricks in international climate efforts to halt global warming, with nearly 200 countries unified in a goal to reduce their greenhouse gas emissions and begin a low-carbon economy.

The agreement further recognizes the need to provide financial resources to strengthen the global response to climate change, to support the vulnerable groups such as women and the youth, to ensure that these people are actively engaged in a country's development (Akinbode & Adejuwoon, 2020). Nigeria has pledged to reduce its greenhouse gas emissions by 20% by 2030 as a party to the Paris Agreement (Federal Government of Nigeria, 2020). Of note too, is the significant outcome at Dubai, 2023 conference of Parties (COP) meetings (COP28 & COP29). COP28 marked a historic agreement to transition away from fossil fuels and operationalized the Loss and Damage Fund, alongside setting ambitious renewable energy goals. COP29 concentrated on climate finance, with developed nations pledging a lower amount than requested by developing countries. This conference also finalized Paris Agreement carbon market rules and launched the Baku Adaptation Road Map. Together, these COP outcomes underscore the persistent challenges in climate finance mobilization and the imperative for accelerated global mitigation and adaptation efforts. This directly reflects the Canvas's findings regarding the insufficiency of current progress and the need for urgent action.

In order to achieve this objective, countries are required to submit NDCs as a demonstration of their GHG reduction targets and policies (Olaniran et al., 2020). The commitment to the Accord is seen as critical for Nigeria given the adverse effects of climate change on the country. By discussing the obstacles and possibilities offered by the agreement, policymakers and interested parties may develop coordinated climate change mitigation strategies that meet Nigeria's national development objectives. Studies around climate change and the Paris Agreement in Nigeria have been on climate change mitigation and adaptation measures (Adeleke et al., 2020), climate financing and economic development (Adeniyi et al., 2020), and climate governance and policy frameworks (Olaniran et al., 2020).

As of January 2025, 64 countries have submitted their National Adaptation Plans (NAPs) to UN Climate Change. This includes recent submissions from Azerbaijan, Spain, the United States, and Zimbabwe, with Uganda submitting two sectoral NAPs. NAPs serve as crucial roadmaps for building climate resilience, outlining activities from local to national and regional levels, and addressing adaptation finance needs (PreventionWeb.net, 2025). The UN Climate Change and UNDP are actively supporting developing countries in designing and implementing NAPs, with an expectation for all nations to submit their plans by 2025. UNDP Climate Change Adaptation, n.d.; Treeapp. (2023).

Nevertheless, the climate change pressure on global ecosystems, human health, and economic development remains high even with the commitments made in the Paris Agreement to

reduce the climate change (hold global warming well below 2°C and to pursue efforts to limit it to 1.5°C). Such actions in the PA are not attainable with the existing NDCs and implementation of the agreement is hampered by limitations on climate finance, technology transfer, and capacity building (Rogelj et al., 2019). Thus, there is necessity to assess how far has Paris Agreement come in reducing the impact of climate change and advance suggestion on the way forward. This paper thus looked into the implication of climate change and the impact of the Paris Agreement and the way forward.

Causes of Climate Change

Climate change has multiple causes. They are as follows:

Fossil Fuel Burning: The use of fossil fuels for energy production is a major contributor of climate change in Nigeria (Akindoju et al., 2020). Furthermore, the use of fossil fuels in transportation, particularly in aviation and maritime sectors, is a major source of greenhouse gas emissions (Akinbode & Adejuwon 2020). When fossil fuels (coal, oil, and gas) are burned, they release large amount of CO2a potent greenhouse gas, and they are also known to contribute to global climate change (Adeleke & Ogugyemi 2020). There is a huge release of carbon dioxide to the atmosphere through the burning of fossil fuels, which is one of the primary contributors to global warming and the impacts of climate change.

***Greenhouse gases emissions*:** Akpınar-Sönmez and Tütüncü (2020) reported that the increase in greenhouse gas emissions - carbon dioxide, methane, and nitrous oxide - are among the major causes of climate change in Nigeria. These gases create a greenhouse effect that heats our atmosphere and leads to warming.

***Deforestation*:** Also, Okeke (2019) identified deforestation as a major contributor of climate change in Nigeria. The clearing of forests for farming, logging and infrastructure cuts down the Earth's ability to absorb carbon dioxide, leading to higher levels of greenhouse gases in the atmosphere. The losses in sequestered carbon affected sequestration processes and drove the release of locked-up carbon stock (Ilori & Oyebanji, 2020).

Industrial processes: Industrial activities and processing, such as cement production and steel production generate high amount of greenhouse gases (Adeniyi et al., 2020). Abubakar (2018) suggest industrial activities such as manufacturing, mining and oil extraction as notable factors of climate change in Nigeria. These sectors richly account for emission of c02 and other pollutants that contribute to global warming.

Farming: Farming activities including rearing of livestock emit methane and nitrous oxide, powerful greenhouse gases (Ogbonna and Odukoya 2022). Unsustainable farming methods particularly slash-and-burn farming, chemical fertilizers and clearing of forest for farmland expansion are among the main contributors to the climate change in Nigeria (Yahaya, 2018). For example, synthetic fertilizers and pesticides in the industrial agriculture give rise to

nitrous oxide emission and soil degradation (Ogbonna & Odukoya, 2022). These techniques produce emissions of greenhouse gases and degrade soil quality, with associated environmental consequences.

Urbanization: Okechukwu (2018) indicates that high rate of urbanization in Nigeria is one of the factors causing climate change. Greenhouse gases in urban areas are mainly emitted from energy usage, transportation activity and waste production, and bring about global warming and other climate changes.

Bad waste management: The inadequate management process of waste like open dumping and incineration has been identified as one of the causes of climate change in Nigeria by Adeyemo and Yusuf (2019). Those practices pollute the aquifers and release methane, a powerful greenhouse gas, into the air and contribute to global warming. Furthermore, poor management of waste particularly in developing countries results in emission of methane and other GHGs (Ilori & Oyebanji, 2020).

Effects of Climate Change in Nigeria

Climate change has brought so many challenges to humanity. It has several adverse effects in the life of human beings, never the less on livestock and crop productions. Some of which includes the following:

Rising sea levels: One fallout of climate change in Nigeria is rising sea levels resulting from the melting of polar ice caps and the thermal expansion of seawater. This endangers coastlines and infrastructure. According to Okonkwo et al. (2018), mean sea levels across Nigeria is expected to rise by 1.05meter by the year 2100, causing massive flooding and erosion along the coast.

More frequent and intense extreme weather events: Climate change is leading to increasingly frequent and severe extreme weather events, including droughts, floods, and storms in Nigeria. As reported by Adejuwon (2019), the above events affect agricultural productivity, water supply, and infrastructure with economic and social losses, and displacement of the local people.

Altered precipitation patterns: Climate change in Nigeria affects its precipitation patterns: as such, rainfall distribution and timing both shift. This can lead to a decline in crop yield, water scarcity, and increased vulnerability to food shortage in rural communities (Nwagbara 2020).

Biodiversity loss: Habitat loss and disturbance in Nigeria due to climate change are leading to biodiversity loss and diminished ecosystem services. Okeke (2018) present arguments for the necessity to conserve biodiversity to promote ecosystem functioning and to contribute to sustainable development in the context of climate change.

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Rising prevalence of epidemics: Climate change enhances the favourable environment for the transmission of vector borne diseases, notably, malaria and dengue fever, in Nigeria. Ugboko (2021) suggested that elevated temperatures and alterations in rain fall patterns might promote the reproduction and dispersion of disease vectors that transmit bugs to humans, men or women or children.

Agricultural disruption: Climate change is also affecting the productivity of agriculture in Nigeria – changing growing seasons and water availability and pest pressure. Oluwasegun (2019) reiterated that these changes are affecting farmers who are finding it difficult to adapt and survive, with cases of crop failure and food insecurity being experienced in the rural areas.

Water stress: Climate change is worsening the water stress in Nigeria, including those in the arid and semi-arid climate zones. Ogundana (2018) argued that the higher temperatures and the irregularity of rainfall pattern are making it difficult for water for drinking, irrigation and industrial purposes, thereby, increasing pressure on both water resources and infrastructure.

Migration and displacement: Climate change is driving displacement and migration in Nigeria as populations are forced to move because of rising sea levels, severe weather, flooding and resource shortages. Ajakaiye (2021) reinforced that the social and economic consequences of climate-induced migration in Nigeria such as resource competition and potential conflict among displaced communities is highly disturbing.

Roles of Ecosystems in climate change mitigation

Habitats are critical for buffering against the impacts of climate change. Roles Scholars have identified the roles of:

Carbon capture: Forests and wetlands, for example, absorb carbon dioxide from the atmosphere. According to Ojea et al. (2019) the natural mangrove ecosystem in the Niger Delta area of Nigeria sequesters huge biomass of carbon for climate change mitigation.

Water regulation: Ecosystems regulate the availability and quality of water, essential for climate change adaptation including the adaptation to the consequences of droughts and floods. Adeyemi et al. (2018) explained that Nigeria's Wetlands aids in controlling water levels and minimizing the risk of flood within urban settlements.

Preserving biodiversity: Ecosystem diversity is a key factor in creating resilience to the impacts of climate change. Oyeniran et al. (2018) underscored the need to protect biodiversity in Nigeria forests in order to foster stability in ecosystem and ability to adapt with climate change.

Soil fertility and erosion control: Grassland and forest ecosystems contribute to soil fertility and erosion control, which underpin sustainable agriculture and food security to counteract

climate change (Okolo et al., 2019). Accelerated weathering of silicate minerals as a consequence integrated agroforestry/rural development systems of Nigeria are an important process in increasing both organic matter and nutrients, and in decreasing erosion.

Coastal protection: Coastal systems such as mangroves and coral reefs also provide natural barriers against storm surges, and rising sea levels, while the same ecosystems protect coastal communities from the impact of climate change. Akinbiola et al. (2018) concluded that mangrove forests in Nigeria support the decrease of coastal erosion and community adaptation to climate-induced disasters.

Climate regulation: Ecosystems contribute to local climate regulation through modulation of temperature, precipitation and humidity (Adekoya et al., 2020).

The Paris Agreement: Objectives and Progress in Climate Change Mitigation

The Paris Agreement is a global deal that attempts to halt climate change by limiting global warming to less than 2°C (3.6°F) above pre-industrial temperatures and striving to keep that temperature rise below 1.5°C (2.7°F) (UNFCCC, 2015). The ambition of Paris Agreement in the fight against climate change is as follows:

1. The Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels; and to limit the increase to 1.5 °C, since this would substantially reduce the risks and the impacts of climate change. According to Rogelj et al. (2018) constraining global warming to 1.5 °C, instead of 2 °C, could reduce dramatically climate change-related risks, such as extreme weather and sea level rise. This goal is considered important for the long term sustainability of the planet.
2. In order to enhance countries' capacity to address the impacts of climate change and to promote climate resilience. According to Schipper et al. (2018) underlines, it is necessary that the accommodation to unavoidable impacts of climate change allows the society to adjust to it and to enhance the resilience of people to these impacts. The objective of this is to strengthen climate resistance and decrease vulnerability.
3. To mobilize financial resources for the low-carbon and climate-resilient development pathways. According to Schmidt et al. (2019), financial mobilization is crucial for developing countries to mitigate and adapt, and to meet their climate targets. This target relates to financing of the climate projects.
4. According to Persson et al. (2018), improving transparency and accountability is critical to ensure countries comply with their Paris Agreement pledges and to measure progress toward long-term climate aspiration. This aim is oriented towards confidence building

between the Parties and the strengthening of the confidence in the different parts of the global climate regime.

In manner which accommodates climate objectives and promotes sustainable development and poverty eradication. According to Kallis et al. (2018), sustainable development needs to be addressed so that actions taken with respect to climate do not jeopardize the objectives of poverty reduction and human welfare. This objective is intended to strengthen the degree of integration between climate and development policy and to support the shift to climate compatible development. There's also requirement to engage all actors and stakeholders such as civil society, private sector, and local communities in the combat of global warming. According to Meckling et al. (2019) cross-sectional perspectives crucial to moving the implementation of climate actions, stimulating stakeholders' involvement and cross-sector cooperation. This objective seeking to provide a participative and open process empowering all parts of society towards climate objective.

Additionally, there is a need to promote international cooperation and solidarity to reinforce the international response to the climate challenge. Falkner (2018) concludes that reinforcing global cooperation will be key to tackling the transboundary dimension of climate change and ensuring that actions are convergent towards a common direction. This target is designed to foster trust between nations and advertise a common vision for a sustainable and resilient future.

Tracking Country Progress under the Paris Agreement in Mitigating Climate Change

It has done some progress in climate change mitigation since the Paris Agreement adopted in 2015. The described advances to date have been:

- **i.** Scaling up global ambition on emissions reductions: Rogelj et al. (2018) observed an encouraging development in the degree of global ambition for greenhouse gas (GHG) mitigation since the Paris Agreement in 2015. Nations have promised to take stronger actions to hold global warming to no more than well below 2 degrees Celsius, and to aim for 1.5 degrees Celsius. The increased ambition is considered crucial to deliver the purpose of the agreement.
- ii. NDC Implementation: Under the Paris Agreement, Parties have committed to implementing the NDCs; the NDCs, in turn, are commitments by countries to reduce national emissions and to adapt to the impact of climate change. Winkler et al. (2018) noted that many countries have submitted their NDCs and work to achieve the NDCs

is underway, indicating that the NDC process is advancing in that the global response to climate change continues to move forwards.

iii. Strengthened transparency and accountability: The Paris Agreement includes provisions for strengthened transparency and accountability, which are necessary to track and evaluate the progress of countries in meeting their climate commitments. As noted by Haya et al. (2019) these facilitative processes are strengthened through a number of mechanisms, such as the Enhanced Transparency Framework, in order to build trust among countries and have them be accountable for their actions.

iv. Mobilised climate finance: Tajinder Mukherjee The overarching objective of the Paris Agreement is to enhance support for climate action – through financing, investment and support – for developing countries. According to Bals et al. (2018), there have been some advancements as a result of the enhancement of funds available for climate change mitigation and adaptation actions, following financial contributions from developed countries pledged to make US$ 100 billion annually available by 2020. Such additional support is crucial in assisting developing countries to transition to low-carbon economies and to address climate adaptation.

v. Renewables ramping up: The shift from conventional power sources to renewables such as solar and wind has been progressing faster than expected in the recent past, resulting in a slowdown in global economy decarbonization. Sovacool et al. (2020) showed that this increasing trend is also driven by the cost reduction of renewable energy technology [-ies] during the last decade, and by a policy-action towards the achievement of the Paris Agreement target.

vi. The advance in climate science and technology Recent progresses in climate science and technology have provided valuable hints to determine the impacts of climate change and its mitigation and adaptation practices. According to Clarke et al. (2019), where enhanced models and data collection have allowed more precise predictions of future climate conditions, on which policy makers should base strategic choices in the matter of climate.

vii. Scaling carbon pricing: Carbon pricing, via a carbon tax, or by capping emissions and letting markets trade them, is gaining in use around the world, refocusing attention on what it might take to reduce liability and expanding the incentives to invest in low-carbon options. As noted by Koesler et al. (Energy Information Administration. 2018), there is a growing number of nations and sub-national entities are adopting carbon pricing programs as a way to internalize the costs associated with carbon pollution and incentivize the economy away from dirtier energy sources.

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viii. Enhanced partnerships between the different actors: The Paris Agreement has led to greater collaboration between diverse actors working together across governments, companies, civil society and academia. According to Brandi et al. (in Berger and Emmerling, 2020), this multi-sectoral engagement is crucial for innovation, sharing best practice and scaling up climate action efforts and is key to the success of the agreement.

Way Forward for Enhancing the Actualization of Paris Agreement

Paris agreement has seen some huge success on combating climate change however, impacts of climate change are still increasing. This calls for more actions. What do we do to increase in realize the Paris Agreement?

1. Increasingly ambitious national pledges: One path for strengthening the Paris Agreement is to promote increased ambition of the national pledges that countries make to reduce their greenhouse gas emissions. According to Lenton et al. Although the current state of affairs under the agreement are not enough to keep global warming less than well below 2 degrees C.G.., the ambition level of current commitments. Through more ambitious and aggressive targets, they can also align with the emissions reductions that are essential.
2. Raising Transparency and Accountability: Transparency and accountability will be crucial to the Paris Agreement. According to Jordan et al. (2019), improved transparency will also help to verify accountable fulfillment of pledges and allow progress towards the Agreement Common Timeframes to be effectively tracked. Transparency, for through obligating conduct of countries, in public interest, can maintain trust between parties and lead to greater ambition.
3. Integrating nature-based solutions: Nature-based solutions such as afforestation and ecosystem restoration may provide significant contributions to climate mitigation. According to Griscom et al. (2017) these solutions may offer the potential to sequester carbon and enhance climate change resilience. Country climate plans, which include nature-based solutions, would build on national efforts to cut emissions.
4. Adapt and strengthen: Alongside mitigation, adapting and strengthening are key themes in how we respond to the impacts of climate change. According to Ford et al. (2018) have stressed the importance of adaptation in safeguarding communities and nature from climate change effects. By concentrating on adaptation and resiliency solutions, countries can better safeguard the people least able to defend against climate impacts and increase the likelihood that the Paris Agreement will work.

5. Fostering an environment for international cooperation and solidarity: International cooperation is essential for the achievement of the Paris Agreement goals. Bodansky (2018) contended that enhanced international solidarity is required to move above shared problems and channel collective action toward a sustainable future. The Agreement can establish processes that bring countries together to cooperate in addressing the challenge of climate change.
6. Financing and investment mobilization: Adequate financial resources are required to carry out climate actions and the Paris Agreement objectives. According to Bollen et al. (2019), that there is a key financing resource that needs to be properly mobilized to assist developing countries in their transition to climate-smart, lowcarbon economies. By facilitating capital flow and encouraging sustainable investment we can accelerate progress towards a sustainable future.
7. Engaging non-state actors: Non-state actors' businesses men and women, cities and civil society organizations are critical motors of action and innovation on climate. According to Steffen et al. (2018), the participation of non-state actors in the process can create new opportunities for reducing emissions and galvanize the ambition of the Paris Agreement. By reaching out to non-state actors, countries are able to access the expertise and resources of the non-state community and accelerate the implementation of the objectives agreed to in the Agreement.

Conclusion

The Paris Agreement is a landmark agreement, which aimed for global action the world's parties to address the pressing issue of climate change. And though it is not without frustrations and has so far been imperfectly implemented, it is also crucial as a "touchstone," she said, for countries to work together to reduce emissions and build resilience to the impacts of climate change. The Paris Agreement has clocked some successes in the war against the effects of climate change with many more required to derail the impact of climate change, however; It's remains a vital international instrument, its objectives for effective climate change mitigation are not yet adequately realized. The report thus recommends that countries must strengthen their NDCs, take action to mobilize climate finance, and make adaptation and resilience a priority if they hope to address the dire outcomes climate change has had.

Recommendations

Based on the issues discussed, the study recommended the following:

1. Countries should step up their NDCs and long-term strategies to meet the goals set in the Paris Agreement.

2. Developed countries must, on an urgent basis, deliver $100 billion per year for climate action in developing countries.
3. The priority for the parties must be to focus and fund climate resilience and adaptation measures, especially in vulnerable communities.
4. Clean energy and carbon capture and climate-resilient infrastructure should receive priority for research and development.

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