



Addressing climate change management in Africa: Challenges and prospects

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Abstract

This article notes that Africa has already begun to feel climate change's socio-economic and political effects. The paper argues that Africa is now in a race against time to implement mitigative approaches to reduce climate change's adverse effects in the quest for sustainable long-term development. The article contends that such mitigative approaches would be complex to fully implement without the support of developed nations. This paper employs a review of the literature and employs the functionalist theory as a theoretical lens. The paper finds that climate change has drastically affected Africa's socio-economic developmental prospects. It has led to conflict, displacement, poverty, famine and long-lasting inequalities. Nevertheless, with its natural resources, Africa can use their financial trade value to invest in technologies to promote climate change mitigation strategies. However, this will depend on the unity of African states. Without implementing mitigative strategies against climate change, issues such as widespread conflicts and ending poverty, food insecurity and political destabilization will characterize Africa in the future.

Keywords: Climate Change; Mitigation Strategies; Sustainable Development; Socio-economic Impacts; Environmental Policy; Africa

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1. Introduction

For the last century, there have been great debates around climate change and its implications within socio-economic-development and sustainability. These debates have revolved around the notion that climate change poses a significant threat to human sustainability in the long run, and without effective mitigation strategies, societies can expect frequent occurrences of natural disasters such as droughts, floods, changes in destructive species such as locust and agricultural decline (Lydie, 2022) factors which can give rise to increasing competition for resources, paving the way for conflicts, especially in developing countries. Various studies (BuRke et al., 2009; Tarif and Grand, 2021; Cappelli et al., 2023) agree the climate change will likely give rise to conflict and destabilization as communities and nation states struggle to cope with the changing weather patterns. The authors agree that developing nations will be the hardest hit. To support this reflection, the United Nations (2022) claimed that that climate change has become the biggest threat to humans, and there is an urgent need to ensure a reduction in greenhouse gas emissions. The World Bank (2013) argues that in developing regions such as African, Asia and Latin America, the implications will be severe. In Sub-Saharan Africa food security will be the overarching challenge, with dangers from droughts, flooding, and shifts in rainfall, which will further give to conflicts and direct confrontations. In Southeast Asia and South Asia, coastal cities will be under intense stress due to climate change and water scarcity in some areas and overabundance of water in others are the hallmarks of climate change in South Asia. The above reflection reflects those ongoing challenges around climate change in developing regions will give rise conflicts over vital resources such as water, housing and land. In 2022, the World Bank Group delivered a record \$31.7 billion for climate-related investments. \$31.7 billion – or 36% of overall lending – exceeds the climate co-benefits target set out in the Climate Change Action Plan, 2021-2025: an average of 35% throughout the plan (The World Bank, 2022).

However, while what needs to be done to reduce climate change is known, the question has centred around the political will of nation-states. The extraction and burning of fossil fuels in the latter parts of the 19th and early 20th centuries gave rise to mass industrialization and economic development for many countries in Western Europe and North America. Thus, fossil fuels were at the heart of this development (Mgbemene et al., 2016). However, in the process, less developed countries, seen as low emitters, have become affected by climate change. With their economies struggling to ensure consistent levels of economic growth and having been confronted with challenges such as poverty, inequality and political instability, the need to put in place an effective policy to mitigate the effects of climate change seems to have been delegated to developed countries who are seen as the most significant contributors to climate change. Climate has already begun to bear negative implications in Africa as argued by the farmer and herder conflict in Nigeria is a prime example where the increase in banditry has been linked to climate change. Kidnappers, argue how their cattle are being killed and how various vigilante units disturb them. Recent large-scale armed attacks are suspected to have been carried out by the semi-nomadic Fulani community. This is part of a wider trend of growing organised violence between pastoralists and settled farmers, representing a similar dynamic to the Darfur war (Hussona, 2021), In the Sahel region, there are ongoing confrontations between nomadic herders and farmers in various rural communities throughout the West African sub-region for water, crop land and grazing options. These conflicts have raged for decades in the Sahel in the aftermath of the drought of the 1970s and 1980s, affecting the region's security, agriculture, human security and human (im)mobility. (Kuusaana and Bukari, 2015; Olumba et al., 2022; Ajala, 2020).

Moreover, the world economic forum argues that by 2050, unchecked climate change might force more than 200 million people to migrate within their own countries, pushing up to 130 million people into poverty and unravelling decades of hard-won development achievements (Bhargava and Bhagava, 2023). This paper argues that African countries face more pressing issues (poverty, inequality and unemployment), while climate is a serious threat, it is only now that African leaders realise the threat it possesses. However, addressing climate changes will not be easy. The United Nations Environment Programme commissioned research estimates that the cost of adapting to climate change across Africa could reach \$50 billion a year by 2050, if the global temperature increase is kept within 2°C above preindustrial levels (United Nations Environment Programme, 2015). This paper is guided by the following question, to what extent can climate contribute to conflict in Africa, and how can African countries mitigate the negative implications of climate change? The literature review was adopted in this paper, underpinned by the need to understand the possibility of future climate-induced conflicts in Africa and how African governments can mitigate this. The approach ensured that collected data reflected a regional and international perspective. Sources such as the World Bank, International Monetary Fund, African Union, and United Nations were vital in helping the paper validate theoretical concepts and enrich the understanding of the gathered data.

2. Theoretical support

This paper employs the functionalist's theory to better understand climate change and its environmental impact. The functionalist theory argues that within a society, institutions, roles and norms, —serve a purpose and that all are indispensable for the long-term survival of the society (Crossman, 2020). According to the theory, the progression and sustainability of a given society depend on various systems that need to work together. Functionalists also believe that a prosperous society has a stable social structure in which different institutions perform unique functions that contribute to the maintenance of the whole – in the same way that the different body organs perform different functions to keep a healthy human (Nickerson, 2023). The theory was the brainchild of Emile Durkheim, a professor of sociology who argued that Durkheim argued that societies needed to create a sense of social solidarity – making individuals feel part of something bigger and teaching them the standards of acceptable behaviour (Pope, 1975). Moreover, Durkheim argues that too much freedom is bad for the individual. When individuals have too much freedom or no clear guidance about right and wrong, they are uncertain and confused about their place in the world.

Within the context of climate change, functionalists argue that pollution and other environmental problems are inevitable consequences of today's society. Therefore, climate change is a direct consequence of human activity, which has (driven by burning fossil fuels, deforestation, oil spillage, gas flaring and sea erosion) given rise to climate change (United States Environmental Protection Agency, 2023). Like all other organisms, humans have evolved to value their own outcomes over those of others. Many people's environmental decisions are motivated by their self-interest. (Dominicis et al., 2017). However, people's self-interests may imperil collective attempts to reduce climate change in the long run; therefore, functionalists note that climate change may be addressed if countries (and their populations) agree to do what is suitable for the common good and dramatically decrease their emissions. However, people, just like countries, are driven by different goals. Therefore, persuading people to abandon what is good for them is complicated (Tyagi, 2022).

However, for functionalists, because climate change affects everyone's reducing emissions may appear sensible from a societal standpoint, persuading people to abandon what is good for them is extremely difficult. This paper argues that while developed countries are not immune to the negative effects of climate change, with their advanced economies, they have the resources to invest in research and development aimed at mitigating the effects of climate change, unlike those in the developing world. Therefore, it becomes essential to argue that without cooperation between countries undermined by good faith, mitigating the effects of climate change will be. In Africa, there is an investment in research and development; by 2019, Africa's research and development funding was only 0.42% of the GDP. The global average is 1.7% (Midega et al., 2021). for effective climate change mitigation strategies, research becomes essential in helping policymakers implement policies that reflect realities. Therefore, in relation to the case of climate change, this perspective views it as a problem that affects not only the natural environment but also the social and economic systems that depend on it.

One of the functions of addressing climate change is to ensure the long-term sustainability of human life on earth. Therefore, the proposed strategies such as imposing carbon tax, promoting the use renewable energy, afforestation and reforestation and climate change education for African citizens is directly linked to the functionalist theorists of understanding addressing climate change. For example, Afforestation and reforestation activities enjoy high attention at the policy agenda as measures for carbon sequestration to mitigate climate change (Wildburger, 2004). Moreover, Krogstrup and Oman (2019), further reiterated that Current international accords about climate change mitigation necessitate a shift towards an economy that emits less carbon. The implicit restructuring of the economy is substantial and improbable to occur solely through market mechanisms, owing to multiple instances of market inefficiencies (Krogstrup and Oman, 2019). Therefore, there is a compelling argument for taking policy action, and policy authorities are increasingly examining their role in facilitating the necessary shift. The emphasis has predominantly been on energy policy and different forms of carbon pricing regulations, while other categories of macroeconomic and financial policies have received less attention (Krogstrup and Oman, 2019).

However, greenhouse gas emissions are still at a high level and are increasing. Fossil fuels still maintain their dominant position in the global energy composition, and the cost of carbon is persistently low. Additional supplementary measures will probably be required. We will begin by presenting the rationale for taking policy action to stimulate conversations regarding potential policies. Subsequently, we will examine the extensive body of literature on the impact of macroeconomic and financial policies on climate mitigation, as outlined by Krogstrup and Oman in 2019. Therefore, strategies to address climate change, especially in developing regions, need to take into consideration the fragility of these regions. This is further supported by Guillaumon and Simonet (2011) who stated that developing nations exhibit more vulnerability to the effects of climate change due to their diminished ability to adapt. Africa's unique susceptibility to climate change results from various factors, particularly its limited ability to adapt and mitigate the impacts, exacerbated by a lack of financial resources and investment opportunities. This hinders the achievement of the 'Africa We Want' Pan-African Dream and prevents Africa from assuming its rightful position on the global stage. Africa's social vulnerability arises from inadequate governance, conflicts, diminished capabilities, a substantial disease load, food insecurity, and poverty, leading to a low human development index (United Nations Climate change, 2020). African sensitivity to climate change and African development has an adverse relationship. To surmount the difficulties associated with this connection, climate change mustn't be seen as a distinct issue from Africa's growth (United Nations Climate change, 2020).

3. The concept of climate change

While the general definition of climate change speaks to the long-term shifts in temperatures and weather patterns, where the term originates still gives rise to debates and arguments. University College London (2020) argues that in the 1960s, John Tyndall, a physicist, recognized the Earth's natural greenhouse effect and suggested that slight changes in the atmospheric composition could bring about climatic variations. In 1896, Swedish scientist Svante Arrhenius in his seminal paper, predicted that changes in the atmospheric carbon dioxide levels could alter the surface temperature through the greenhouse effect (Ponce, 2011). Guy Callender, in 1938 reflected that carbon dioxide increases in Earth's atmosphere due to global warming. While scientists argued that it was in the later parts of the 19th century that human activity started influencing the climate, new studies reflect that this could have begun as early as the 1830s (McGregor et al., 2016). Human activity was at the core of climate change because of the increased burning of fossil fuels. Svante Arrhenius, in 1896 argued that as humanity burned fossil fuels such as coal, which added carbon dioxide gas to the Earth's atmosphere, it would raise the planet's average temperature (Werat, 2012). Indeed, in 1920, people realized that the United States and North Atlantic region had warmed significantly during the previous half-century. Scientists reflect that this was a natural phase in which the cause was unknown. While Callender reflection that greenhouse warming was on the way was not a claim taken seriously in the scientific community at the time, it did, however, provoke a few scientists to probe the reflection further with improved techniques and calculations with support for government funding (Werat, 2012). Results from these studies confirmed that carbon dioxide could indeed build up in the atmosphere and should bring warming. Deadly heat waves, more substantial floods and droughts, and changes in the ranges and behaviour of sensitive species have become even harder to predict, as evident with the locust issue in Kenya. In Africa, this paper argues that as water becomes scarce in some regions, cattle herders are bound to move and seek places with abundant water supply only to find that these places belong to farmers who see them as vital for crop irrigation, thus leading to confrontation has been the case with Nigeria. Therefore, while climate change has evolved, its effects have become more severe for developing countries that do not have sufficient resources or effectively mitigate their effects.

3.1. Climate change and developing countries: Developmental conundrum

Debates in the developing world have argued that the unequal levels of development between states are another factor that gives rise to climate change. For developing countries, rich countries are the biggest emitters and thus should be liable for strategies addressing climate change. Tietjen (2022) supports this reflection and argues that many of the world's most climate-vulnerable countries have done little to cause climate change. Nevertheless, they are experiencing extreme heat waves, floods and other climate-related disasters. Climate changes may likely give rise to conflicts and destabilization. The United Nations Framework Convention on Climate Change (2022) agreed with this assertion and noted that climate change does contribute to increased conflict, but along indirect pathways. There are a variety of context factors — in particular, socioeconomic conditions, governance, and political factors — that interact and play a key role in translating climate change into conflict risks. The fundamental question is, can Africa address climate change related issues consideration the many socio-economic issues that continue to hinder the continents development post colonialism. African argue the that developed nations should support them in the transition

to climate change clean industrialization as they Tongia (2022) narrates that pushing poor countries to reach zero carbon emissions too early is unfair. Apart from the billions of dollars pledged by developed nations to help Africa transition, many African countries are preoccupied with developmental issues, such as eradicating poverty, inequality, and political instability. Current attitudes around them to play their role in addressing climate change in Africa are underpinned by “we are not the biggest emitters of greenhouse gasses”; hence we should not be forced to act. Africa is the continent that contributes the least to global warming in both absolute and per capita terms. Africa accounts for the smallest share of global greenhouse gas emissions—3.8 percent (Kamer, 2022). This compares to the most significant emitters like China, the United States, and the European Union.

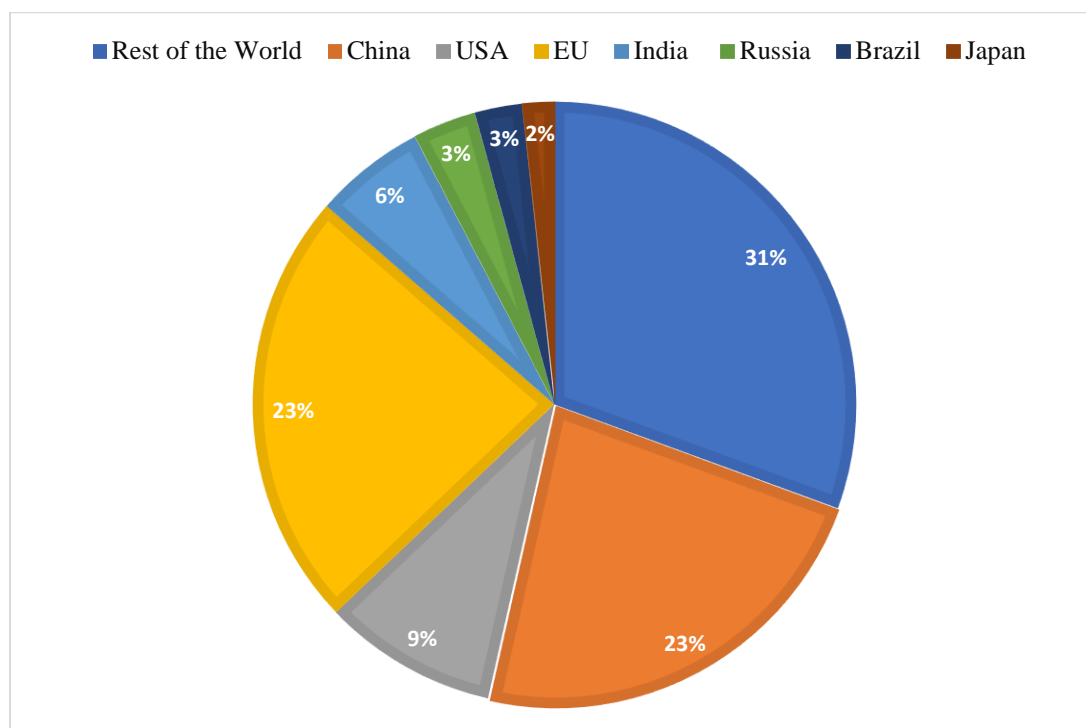


Figure 1. 2021 net GHG emissions from the world’s largest emitters (Source: Rivera et al., 2022)

Apart from Africa, The ISEAS-Yusof Ishak Institute (2020) notes that case studies in Asia demonstrate that climate change can provide an avenue for local elites to assert control over resources, which might, in turn, spark conflict. In many Southeast Asian countries where land rights for rural communities are often lacking, there will be risks of elite exploitation leading to conflict. In South Asia, Bhattacharyya and Werz (2012) communicate that the region will be among the regions hardest hit by climate change. Climate change will increase resource conflicts within and among countries, increase migration pressures on hundreds of millions of people, increase the number of humanitarian disasters, disrupt economies all over the world, and threaten military preparedness. In Latin America, the Red Cross Red Crescent Climate Centre (2023) notes that Central and South America are “highly exposed, vulnerable and strongly impacted by climate change,” a situation further aggravated by inequality, poverty and increasing deforestation. Floods and landslides triggered by heavy rainfall led to hundreds of fatalities and billions of dollars in economic losses regionwide. Glacier melt

worsened, Extreme heat, coincided with dry soil to fuel record wildfires, has led to carbon dioxide emissions reaching their highest level in 20 years (Red Cross Red Crescent Climate Centre, 2023).

With the context of Africa, rich countries alleged that they would spend about \$25 billion by 2025 to boost Africa's efforts to adapt to climate change as the continent continues to struggle with drought, cyclones and extreme heat (Kabukuru, 2022). Ray (2021) argues that heavy carbon emitters, like China and the United States, have a moral obligation to help the nations of Africa, particularly the rural areas of these countries, mitigate the impact of climate change. The McKinsey Global Institute (2020) argues that climate change could destabilize local markets, increase food insecurity, limit economic growth, and increase risk for agriculture sector investors without practical mitigation approaches. African agriculture is particularly vulnerable to the impacts of climate change because it is heavily dependent on rainfall, and climate change has seriously affected rainfall throughout the continent. The Sahel, for instance, is mainly dependent on rain-fed agriculture, and it is already hit regularly by droughts and floods, both of which kill crops and reduce yield, giving rise to displacement and increased competition for resources. Moreover, climate change conflicts in Africa have become prevalent in the continent. Muggah (2021) notes that with 60 percent of the sub-Saharan population depending on agriculture to survive, food insecurity is intensified by disruptions to rain cycles, planting seasons, and harvests. Rising sea levels will threaten vulnerable coastal communities due to flooding and erosion, salinizing arable land, and disrupting inland and coastal fisheries. As people migrate and tensions over diminishing resources escalate, the threats of social unrest and organized violence are already apparent (Muggah, 2021).

3.2. Climate change in Africa: Observational challenges

Climate change may severely threaten political and economic stability in Africa, such as conflicts over resources, grazing land, and agricultural development, which may threaten regional security (Lisk, 2009). Climate change measures are urgently needed in developing countries since they are most affected by climate change. However apart from climate change, within the context of climate change, many other factors need to be addressed that feed into the need to address climate change, such as policy, finances, technology, and expertise. While the Africa rhetoric has been that wealthy countries have been the most significant contributors to greenhouse gas emissions, Africa, as a developing continent, has many struggles and cannot escape from the worldwide effects of climate change. The International Monetary Fund (IMF) (2021) argued that from a policy perspective, Africa Cannot Confront Climate Change Alone as the continent contributes almost nothing to global warming. Policymakers in Africa must embrace the inevitable global transition to a low-carbon economy. In addition to pursuing economic programs to raise living standards, they urgently need to build resilience against climate shocks, especially in countries that depend on rain-fed agriculture (International Monetary Fund, 2021).

The African Union (AU) understands that the continent is in a race against time to come with policy recommendations to address these issues. For the continental body (AU), the Africa Adaptation Acceleration Plan important in helping the continent address climate change. The plan calls for investments in resilient infrastructure, climate-adaptive agriculture, digitalization, trade reforms, and a broadening of safety nets. Not only are these measures up to 12 times more cost-effective than disaster relief; they also will generate jobs, raise incomes, and improve living standards (International Monetary Fund, 2021). However, from a policy perspective, this has inherent constraints, most notably, finances. In the next two decades African leaders

indicated that the region would need \$1.3 trillion over the next two decades for climate adaptation and mitigation. The required sums are out of reach for African countries (International Monetary Fund, 2021).

Therefore, even though African leaders have come to understand the long-lasting implication of climate change especially in relation to migration, this paper argues that the taking into consideration the multitude of factors hindering collective development, it will be impossible for African countries (even if supported by the AU) to raise such funds needed for climate change adaptation. As a result, novel approaches for supporting Africa in this area are required. It is noted that immediate assistance interventions are required; they must involve the utilisation of grants and more efficient use of concessional finance. To provide funding to where it is needed more quickly, development banks, multilateral climate funds, and other providers should search for ways to expedite project approvals (while preserving safety measures) (International Monetary Fund, 2021). Secondly, Africa needs to expand new financing mechanisms across the public and private sectors. Green bonds can help finance climate-related initiatives at comparatively low rates, but Africa trails other regions in this crucial area. From 2007 to 2018, the region accounted for only around \$2 billion in issuances – just 0.4% of the global market for green bonds (International Monetary Fund, 2021). Thirdly, there should be a need to help African government domestically, improve governance – especially through reforms in the procurement and management of public investment, public finances, and debt – and ensuring carefully costed and fiscally sustainable investment plans (International Monetary Fund, 2021).

Apart from the above issues, urban regions house 3.9 billion people, or slightly more than half of the world's population. This figure is expected to rise to 6.3 billion by 2050, when urbanization will account for 66% of the global population (The United Nations, 2018). In absolute terms, this indicates an increase in the global urban population of nearly 2.4 billion people. In Africa and Asia, extreme climate change events such as floods can increase the risks of infectious diseases spreading through water systems. Sub-Saharan Africa is expected to have the highest burden of climate-change-related mortality consequences in 2030, followed by Asia in 2050 (World Health Organization, 2014). As the temperature rises, natural disasters caused by climate change and a lack of safe drinking water due to droughts are all critical contributors to the spread of infectious and water-borne communicable diseases in Africa. Many more people are becoming exposed to malaria, which is already one of the leading causes of mortality in Africa, as temperatures rise, and rains intensify in previously malaria-free places such as Kenya and Ethiopia (Lisk, 2009). However European Parliament (2022), argues that to help Africa, there is also a need for technology transfer and the development of local technologies to help African countries better mitigate and adapt to climate change.

3.3. Climate change mitigation strategies that African countries should implement

Figure 2 presents the bibliometric analysis of research on climate change mitigation: (a) network visualization map and (b) density visualization map, showing the recent state of scientific research on the topic of climate change mitigation by highlighting trends and gaps in the literature during 5 years between 2015 and 2020.

3.3.1. Imposing carbon tax

Though climate change is a natural phenomenon, it has been exacerbated by human and industrial activity. This includes deforestation, the usage of fossil fuels, and the consumption of polluting energy. Such actions have contributed to negative externalities such as increased climate volatility, drought, disease transmission, and soil erosion. Carbon taxes cut emissions, boost energy output, and mitigate the effects of climate change. (Kaufman and Krause, 2016). African countries must advocate for legislation that requires corporations that pollute the environment to pay a carbon tax; this would guarantee that these companies minimise the amount of green gases emitted during their activities.

3.3.2. Promoting the use renewable energy

Renewable energy is a cost-effective alternative to fossil fuels, which have finite resources and negative environmental effects (Olabi and Abdelkareem, 2022). Renewable energy is a viable method for addressing climate change (Kang et al., 2020). To ensure that the challenges posed by climate change are lessened, African nations must invest in renewable energies for use by their citizens and businesses.

3.3.3. Afforestation and reforestation

Afforestation and reforestation can turn fragile forests into more diversified, productive, and climate resilient mixed forests (Hazarika et al., 2021). Afforestation is a cost-effective and easily accessible climate change mitigation strategy (Doelman et al., 2020). The government of African countries, along with citizens, civil society organisations, businesses, and non-governmental organisations, should collaborate on the project of planting more trees to mitigate climate change challenges, as this is an easily accessible climate change mitigation strategy.

3.3.4. Climate change education for African citizens

Education is an important weapon that the government may utilise to inform residents about climate change and how it may influence their lives. African citizens can benefit from greater climate change education because they are the most affected by its effects. African governments should campaign for climate change through educational initiatives.

3.3.5. Nuclear power

Nuclear energy has attracted renewed attention in recent years as people have become more aware of the impact of climate change. Positions stating that nuclear energy plays a major role in climate change mitigation development (Muellner et al., 2021). Nuclear power is a low-carbon energy source that contributes significantly to a sustainable economy and energy infrastructure. Globally, 442 nuclear power reactors provide 393 GWe of electricity, providing dependable, low-carbon power. Nuclear electricity accounts for 11% of global electricity generation, making up one-third of low-carbon electricity production worldwide. New breakthroughs are taking place, making nuclear power a more cheap and appealing energy choice (Mathew, 2022). To combat climate change, African countries must invest in nuclear power and education programmes.

As a result of this financial necessity, nuclear power is a low-carbon energy source that greatly contributes to a sustainable economy and infrastructure.

4. Conclusion and recommendation

Africa needs to invest in climate change mitigation strategies. Arguments that Africa is not the biggest emitter of greenhouse gases do not spare the continent from the negative implications of climate change. Africa is worse off than developed nations. Lack of resources, technological know-how, and lack of political will to invest and support renewable energy remain consolidated in the continent. Therefore, African countries must unite to develop strategies to mitigate the effects of climate change. This will ensure that Africa can ensure increase investments in innovative and technological solutions to address climate change, increase collaboration with developed countries, invest in climate change education at the grassroots and unite in the shared vision of climate resilient Africa. Without immediate interventions to mitigate the effects of climate change, issues such as conflicts, famines, poverty, and inequality will likely impede Africa's developmental potential. Therefore, to implement be able to address climate change issues, it is important for the African union to be at the center of the developmental process in Africa through ensuring effective cooperation with regional economic communities. Africa is home to some of the fastest growing countries economically, hence, leveraging regional communities has become important in the quest to address climate change. National governments should implement environmentally friendly policies, increase research funding for strategies to address climate change and invest in education to that people understand the importance of addressing climate.

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