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Climate Change and Sustainable Development: Exploring the Linkages

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Abstract: *Climate change is a contemporary global socio-economic and ecological challenge, that threatens the existence of humans. It is a developmental problem borne out of the ingenuity of man's exploitation of nature, and will require man's ingenuity to be addressed. Climate change is a common global challenge to sustainable development. Consequently, the objective of this study is to explore the linkages between climate change and sustainable development, obstacles to the linkages, and recommend the way forward from the growing reality of global climate challenge to a sustainable development paradigm based on a neutral or low-carbon economy. This study adopted documentary research method. Leveraging the concept of win-win, the study discovered that successfully addressing climate change is consequential or inter-linked to achieving sustainable development.*

Keywords: Climate Change, Sustainable, Development, Exploring, Linkages

1.1 Introduction

The beacon of our current civilization and development is anchored on and driven by fossil energy; derived from fossil fuels (coal, oil, and natural gas). Fossil fuels are, by far - the largest contributor to global climate change, accounting for over 75 per cent of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions - (United Nations, 2025a). The United Nations record further indicate that "greenhouse gas emissions blanket the earth; they trap the sun's heat and this leads to global warming and climate change. The world is now warming faster than at any point in recorded history". According to the ClientEarth Communication (2022), "the average global temperature has already increased by 1°C. Warming above 1.5°C risks further sea level rise, extreme weather, biodiversity loss, and species extinction, as well as food scarcity, worsening health and poverty for millions of people worldwide". According to the IPCC, "climate change has the potential to affect many aspects of human development, positively or negatively, depending on the geographic location, the economic sector, and the level of economic and social development already attained" (Parry et al, 2007). Consequently, 'climate change will serve to increase global inequality; by disproportionately impacting less developed countries, mostly in the global south" (Antrobus-Higgins, 2023). Unfortunately, the most vulnerable and impacted countries contribute minimally to carbon emissions that trigger climate change crisis. Muller (2024); captured the scenario as follows:

> *"Developing countries are hit hardest by the impact of climate change, to which they have contributed the least. Industrialized countries, particularly the G20, bear the greatest responsibility, accounting for 80% of global CO_2 emissions. However, developing countries, especially small island developing states (SIDS) and the least developed countries (LDCs), are paying the highest price. They are losing lives and harvests, and struggling to rebuild with limited resources following one extreme weather after another – money that could have been invested in their development".*

According to the African Development Bank (2025), "Africa is the continent most vulnerable to climate change impacts under all climate scenarios above 1.5 degrees Celsius. Despite having contributed the least to global warming and having the lowest emissions, Africa faces exponential collateral damage, posing systemic risks to its economies, infrastructure investments, water and food systems, public health, agriculture, and livelihoods, threatening to undo its modest development gains and slip into higher levels of extreme poverty".

In 2017, over 15,000 scientists signed an article that warned that, "to prevent widespread misery and catastrophic biodiversity loss, humanity must practice a more environmentally sustainable alternative to the business-as-usual" approach to development (Ripple et. al, 2017), which pays less attention to the associated environmental degradation. The business-as-usual approach to development refers to the prioritization of economic growth and development over environmental health and conservation. In this light, the Brundtland Report (1987); defined sustainable development as "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs". It has been argued that climate change will hinder this

model of development, if not checked. Hence, in 2015, the world under the auspices of the Paris Agreement; pledged to limit the global temperature increase to 1.5°C above pre-industrial levels. Beyond that, "the year 2015 was regarded as a landmark year for international cooperation as UN member countries also adopted the 2030 Agenda for Sustainable Development consisting of the 17 SDGs to be achieved by 2030, including SDG 13, 'Climate Action' which calls for urgent action to combat climate change and its impact. (Antrobus-Higgins, 2023). Mitigating and adapting to climate change were consequential for realizing the SDGs.

The impact of climate change on the environment cuts across countries; hence, any realistic development plan that will address the needs of the present and future must incorporate climatic factors into plans as fundamental criteria for sustainability. For instance, Krejci (2017), declared that "climate change is projected to undermine food security… exacerbate existing health threats, adversely affect water availability and supply, slow down economic growth, make poverty reduction more challenging and lead to increased displacement of populations". Consequently, climate change actions and achieving sustainable development are co-dependent (Antrobus-Higgins, 2023). According to Munasinghe (2009), "climate change and sustainable development interact in a circular manner. Climate change will have an impact on prospects for sustainable development, and in turn, alternative development paths will certainly affect future climate change". This alternative path to development is in tandem with the green economy initiative or low-carbon economy. This is a departure from fossil fuel or carbon intensive economic development in which economic growth is dotted with environmental degradation due to excessive carbon dioxide emissions. In addition, Antrobus-Higgins (2023), maintained that "the unsustainable model of development which allowed for the current developed countries to industrialize has significantly contributed to climate change. Therefore, it is not a question of whether the world can address both climate change and sustainable development, but rather that in doing so effectively, they both should be addressed as they are inextricably linked".

Leveraging the concept of win-win, this study, explores the linkages, between climate change and sustainable development, obstacles to the linkages and the way forward.

1.2 Method of Research

Documentary research method and Trend Analysis were adopted for this study. This study synthesized data from 23 documents of which five were journal articles, four were from the United Nations, one from African Development Bank, one unpublished document, and nine electronic publications based on climate change, global warming, fossil fuels, and sustainable development. They were analyzed based on trends within the objective of the study, and from rationale deduction, the study established linkages between climate change and sustainable development and made recommendations on the way forward from the growing reality of the global climate challenge to a sustainable development paradigm based on neutral or low carbon economy.

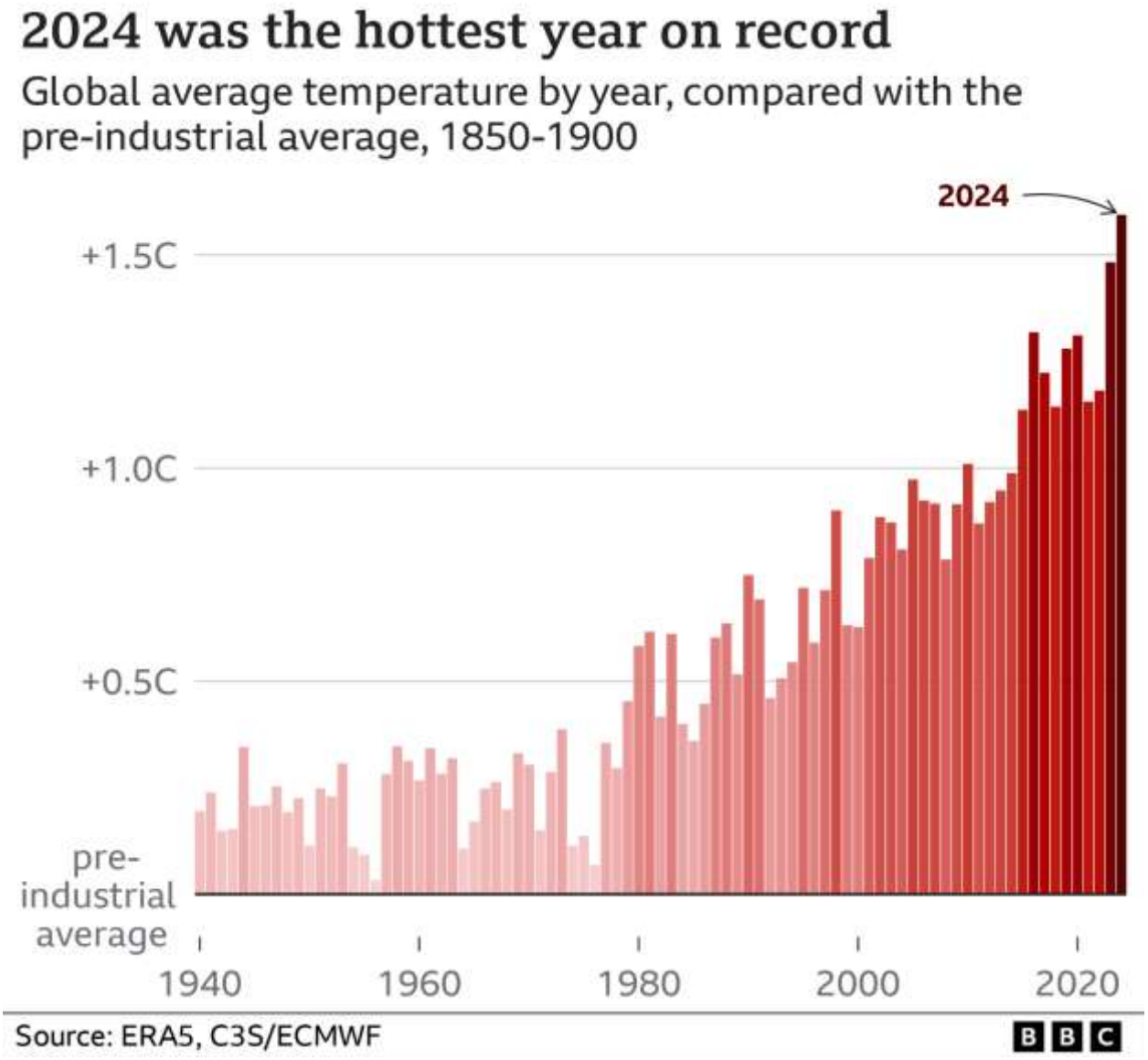
1.3 Concept of Win-Win

The concept upon which this study is based is a win/win solution. It is an approach in which parties collaborate or contribute towards a common plan of action to achieve a common goal for their common benefit (Ezinna et al, 2021). According to the UN Climate Change and UN Department of Economic and Social Affairs (UN DESA), governments must seek win-win synergies by tackling climate and sustainable development crises together (UN Climate Press Release, 2023). Stabilizing our climate to achieve sustainable development is a win-win for the society by halting climate catastrophes and preserving the earth's planet for future generations. However, it requires partnership, commitment and collaboration of all sectors and countries.

1.4 Climate Change

In scientific literature, climate change is a clear and remarkable shift in the climate system of an area. The shifts are usually due to natural or anthropogenic factors and often occur over a comparable period of time. However, 95% of the shifts are attributed to anthropogenic factors. According to the United Nations (2025b), "climate change refers to the long-term shifts in temperatures and weather patterns. Such shifts can be natural due to changes in the sun's activity or large volcanic eruptions". In other words, it is a long-term shift in the Earth's average temperatures and weather conditions, usually from 35 years and above. Scientific records also indicate that since the 1980s, each decade has been warmer than the previous one, and between 2015 and 2024, global temperatures were on average of 1.2°C above that of the 19th century. Hence, the year 2024 was identified as the world's hottest on record and the first calendar year to surpass 1.5°C of warming compared to pre-industrial levels (BBC, 2025). The figure below shows a further illustration of the earth's temperature changes between 1940 – 2024.

Figure 1: Global average temperature from 1940 – 2024.



The cardinal factor driving climate change is the rise in global temperature due to excessive carbon emissions into the atmosphere. Figure 1, shows global temperature incremental record of +0.5°C per increase culminating at 1.5°C in 2023 and above 1.5°C in 2024, making 2024 the hottest year on record. This poses a challenge to the Paris Climate Agreement of limiting global temperature to 1.5°C while ensuring that it does not exceed 2°C.

According to the National Aeronautics and Space Administration (2024), climate data records provide evidence of climate change key indicators, such as global land and ocean temperature increases; rising sea levels; ice loss at Earth's poles and in mountain glaciers; and frequency and severity changes in extreme weather such as hurricanes, heatwaves, wildfires, droughts, floods, precipitation, cloud and vegetation cover changes".

1.5 Sustainable Development

From the lay perspective, sustainable development is the development that is sustainable. In other words, it is the development that last as long as possible with minimal or no negative effects on the environment. However, the Brundtland definition of sustainable development remains the most cited definition – "the development that meets the needs of the present without compromising the

ability of future generations to meet their own needs". According to SDG Explainer (2023), "sustainable development is how we must live today if we want a better tomorrow, by meeting present needs without compromising the chances of future generations to meet their needs". According to Cerin (2006) and Abubakar (2017), sustainable development, "is a core concept within global development policy and agenda and serves as a mechanism through which society can interact with the environment while not risking damaging the resource for the future". Thus, "it is a development paradigm as well as concept that calls for improving living standards without jeopardizing the earth's ecosystems or causing environmental challenges such as deforestation and water and air pollution that can result in problems such as climate change and extinction of species (Benaim & Raftis, 2008 and Browning & Rigolon, 2019).

The SDG Explainer further noted that sustainable development is "a bit of a juggling act where three different balls must be kept in the air at once: economic growth, social inclusion, and environmental protection and if one or two fall to the ground, the act is over". In real terms, the United Nations Member States in 2015, "translated their vision of sustainable development into a blueprint for achieving it: the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals, with ambitious targets to achieve by 2030, which cover the three dimensions of sustainable development: economy, social development and environment" (SDG Explainer, 2023). The 17 Sustainable Development Goals as provided by United Nations, are as follows: " Goal 1: No poverty, Goal 2: Zero hunger, Goal 3: Good health and well-being, Goal 4: Quality education, Goal 5: Gender equality, Goal 6: Clean water and sanitation, Goal 7: Affordable and clean energy, Goal 8: Decent work and economic growth, Goal 9: Industry, innovation and infrastructure, Goal 10: Reduced inequalities, Goal 11: Sustainable cities and communities, Goal 12: Responsible consumption and production, Goal 13: Climate action, Goal 14: Life below water, Goal 15: Life on land, Goal 16: Peace, justice, and strong institutions, and Goal 17: Partnerships for the goals".

1.6 Linkages Between Climate Change Mitigation and Sustainable Development

Climate change mitigation, adaptation actions, and Sustainable Development Goals (SDGs) are interdependent and mutually reinforcing. They are designed to address the wellbeing of humans for both immediate and future purposes. Hence," it is counterproductive to think of climate change actions and achieving the SDGs as separate and combative. An effective climate change policy needs to work towards achieving the SDGs and vice versa" (Antonia Antrobus-Higgins, 2023).

For instance, "the Paris Agreement and the 2030 Agenda for Sustainable Development are practically twins: both were adopted in 2015. Like most twins, these two pacts are closely linked, since climate mitigation and adaptation were essential to eradicate poverty and share prosperity, two central aspects of the 2030 Agenda" (O'Connor & Biru, 2017). Voluntary National Reviews (VNRs) also link climate change with the broader SDGs and 2030 Agenda; around half explicitly refer to climate plans, including National Determined Contributions (NDCs) as integral elements of their strategies for achieving the SDGs (O'Connor & Biru, 2017). The linkages are further illustrated by the fact that "15 out of the 17 SDGs have one or more means of implementation targets that enable… or reinforce… climate action" (Fuso Nerini et al, 2019).

Progressively, governments and Non-Governmental Organizations have realized that climate action and sustainable development are two sides of the same coin and are inseparably linked. Consequently, SDGs cannot be achieved without simultaneously tackling climate change. Therefore, the global community cannot focus on achieving the SDGs without trying to limit the global rising temperature to 1.5°C, as a necessary condition to curtail extreme weather conditions and their devastating impacts. This is based on the fact that the impacts of climate change pose as obstacles to achieving the SDGs.

1.7 Obstacles to Linkages Between Climate Change Mitigation and Sustainable Development

Ranging from an individualistic disposition, institutional and governmental actions, obstacles to the integration of climate mitigation plans and Sustainable Development Goals abound. The UN Climate Press Release (2023), enumerated them thus:

> *"The factors blocking more synergistic actions revolve around knowledge gaps, political and institutional arrangements, and economic disruptions. In particular, the main barriers include lack of funding to analyze and finance more integrated policy actions; institutional rigidity that puts climate and development policy in separate silos; the dominance of top-down policy making; a general lack of data and indicators, and a lack of understanding about the value of synergies and the capacity to identify and implement them".*

In a specific sense, the following factors are further elaborated:

1. Funding Gap: This is particular true for less developed countries that are equally less contributors to global warming but more vulnerable to the impact of climate change. Mitigating climate change is costly, particularly with regards to transitioning to renewable energy or low-carbon economy. In this instance and other global climate policies, it is unfortunate to discover that countries that are minor contributors to climate change depend on major contributors to fund the implementation of their ratified global climate policies. For instance, countries such as Vanuatu, Venezuela, and Ethiopia in their updated 2021 National Determined Contribution

(NDC) submission, systematically linked policy actions to relevant sustainable development goals but specified the level of international financial support required for implementation. Many of them "emphasize that they need financial and technological support from wealthier nations to meet their commitments" (Savin & King, 2025).

2. Climate Injustice: Climate justice requires that those countries (Developed Countries) whose development is spurred by fossil energy should consequentially or proportionally to their contribution to carbon emissions bear the burden of funding global climate change mitigation. Unfortunately, this was not the case, as records have shown. What we have is a situation where uniform climate policies are imposed on countries with vastly different economic capacities and historical contributions to global carbon emissions. Developed nations with historically high emissions should bear the economic burden of implementing climate policies. Muller (2024), submits that "carbon emission reduction plans designed by developed nations can – whether by intention or not – deny developing nations the opportunity to develop. Therefore, balancing climate action with economic progress is critical to creating an inclusive and resilient future for all"

3. Lack of Data and Detailed Climate Policy Implementation Plan: Evidence has shown that this situation is informed by the deliberate act of data manipulation and intransparency usually by high carbon emitting countries. At the early stage of the climate policy of National Determined Contributions (NDCs), records indicated that countries were often broad in their statements of intent, focusing on general commitments rather than concrete actions. Although, "recent updates tend to be more detailed, with some countries breaking down mitigation strategies by sectors, such as energy, agriculture and transportation. However, transparency remains an issue, and many pledges still lack specifics and details on how governments plan to finance or implement their climate goals, leaving uncertainty about whether pledges will translate into action" (Savin & King, 2025). In a clearer instance, according to Savin & King, "wealthier nations such as the US, Japan and the EU (which speaks for its 27 member states) tend to focus on emissions reduction targets but often lack detailed roadmaps of policies or regulatory measures to achieve them".

4. Geopolitical Conflicts: Geopolitical conflicts such as that of Russian-Ukraine, got the biggest global carbon emitters like the USA, EU and China locked into the war, thereby diverting attention and resources from global climate change mitigation targets, such as Net-Zero emission target, the Paris Agreement and National Determined Contribution (NDCs). Geopolitical conflicts hamper global cooperation in climate change mitigation and sustainable development. Therefore, it is important to overcome geopolitical conflicts and divisions to foster a unified global response to climate change mitigation and sustainable development.

5. Political Obstacle: As the saying goes, politics is everything and everything is politics. Impliedly, if the politics is right, almost every other thing gets right, including climate change mitigation and sustainable development. The United States of America, as the highest global carbon emitter is a perfect case at hand. In Donald Trump's first term, he pulled the USA out of the Paris Agreement but when President Biden took over, he returned the USA to the Paris Climate Change Agreement. On Trump's second return," the United States dropped out of the Just Energy Transition Partnership (JETP), a financing initiative that aims to help South Africa, Vietnam and other developing nations transition from coal to clean energy sources" (Mirza, 2025). The withdrawal of the USA from JETP was in line with the executive order Trump signed on his first day in office, January 20, 2025. According to order, "labeled 'Putting America First in International Environmental Agreements' Trump stated that the country had previously joined initiatives that do not reflect its values or its contributions to the pursuit of economic and environmental objectives, and also withdrew the U.S. from the Paris Agreement for a second time. The order also revoked and rescinded the U.S. International Climate Finance Plan" (Mirza, 2025). In a more stunning manner, the United States under Trump has withdrawn from the United Nations SDGs and its 2030 Agenda for Sustainable Development. All these are about politics and leadership interest.

1.8 The Way Forward

i. **Objective commitment by political leadership:** In this era of deglobalization and the hedge principle approach to common global concerns like climate change, political leaders should be objective in politics and national interest as against common global interests such as climate change, for the survival and preservation of the human community. This will be a win-win for both the national government and the global community because climate change is not restricted to any national boundaries.

ii. **Climate Justice:** Developed countries that maximized the fossil economy to reach the stage they are now in development before it became unstainable and ecologically risky to power the 21st century economic growth and development solely by fossil energy should objectively bear the economic burden of climate change and mitigation policies in order to guarantee inclusive climate change mitigation and resilient future for all.

iii. **Technological and Funding Partnership:** The transition to low-carbon economy requires significant funds and technological investment. The only way to guarantee inclusive transition to low-carbon economy is for developed countries to enter into more funding and technological partnerships with less developed countries while maintaining existing ones. This should not be misconceived as charity; it is for the preservation of the earth eco-system for human habitation and

wellbeing. It is also a win-win for all because to successfully mitigate any climate change indicator, collective global action is required.

iv. **Transparency:** Every country needs to be transparent in their climate change data and mitigation reports for the measurability of results and progress of emission reduction and mitigation targets. The failure to do so will be counter-productive, derail the mitigation target, and make the entire global eco-system vulnerable to extreme weather events due to rising global temperature.

v. **Climate Change Education and Research:** Climate denials are predominantly a function of ignorance or a predisposition to false climate science or information. Unfortunately, ignorance of climate change realities does not deter its occurrence or impact. Therefore, knowledge and awareness of climate change are the first steps towards its mitigation. Currently, the government should continuously fund research on climate change mitigation and adaptation as a component of sustainable development.

Conclusion

The result of this study, indicates an inseparable link between climate change mitigation and sustainable development. Advancements in the mitigation of climate change have improved sustainable development and the realization of SDGs. Addressing climate change simultaneously with 2030 Agenda implementation is a win-win strategy for ecological restoration and sustainable development. Co-benefits or a win-win approach to climate action often directly result to sustainable development. Evidence has shown that the immediate and future benefits of a win-win approach outweigh trade-offs in matters of climate change and sustainable development.

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