

## Climate Change and Africa's Economic Development

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### Abstract

*Africa, in the 21st century and for decades to come, is faced with a formidable adversary, climate change. As the global temperature rises, Africa is faced with a non-tangible enemy that threatens its continental security, development and interests in the global arena. Will Africa be able to stand the tests of time against global warming? Can anything be done to mitigate or promote the adaptation to the inevitable? This article seeks to give a comprehensive review of what climate change is and its causes, pointing out its impacts on the economic development of African states. It also hopes to view some of the obstacles faced by Africa in the face of this great challenge and revisit certain recommendations that must be adopted to effectively combat the menace that is caused by climate change. The article portrays that the war against global warming is not to be fought by the governments and agencies alone, but also by the individuals living in both rural and urban areas. As a sore that has been allowed to fester and grow infected, climate change must be dealt with quickly and effectively before an entire limb or continent, in this case, is destroyed.*

*Keywords: Africa, climate change, economic development*

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## Introduction

As in other parts of the world, Africa is experiencing changes in the atmosphere and environment that may prove to be either positive and promotional or negative and destructive, depending on how it is managed. Climate change as a phenomenon was brought to the attention of the majority of the world in the early 1990s and has continued to develop and transform over the years. The study of Green House Gases (GHGs), carbon footprints and global warming were matters that seemed inconsequential and unimportant when compared to other matters of national interest like national security and the likes. However, with natural disasters becoming more extreme, especially in East Africa with reports of abnormal droughts, flooding and tropical storms, climate change is starting to turn a lot of heads and earn many concerned glances. Though the carbon footprint of African states is not large as that of first or second world countries, it stands a chance of being completely devastated by climate change or reformed by it as the case may be.

This article views climate change and the impacts it will have on the availability of water sources, food, human health, the ecosystem and economic development of African states. It also hopes to re-emphasize recommendations that have been likely postulated previously, but have not been fully or properly implemented yet, while showing that the role of protecting the environment is not the job of the government alone, but it is also a cross that rests on the shoulders of each and every African and also every individual around the world.

## Conceptual and Theoretical Clarification

### a. The concept of climate change

Over the years, multiple scholars have engaged themselves in the study of climate change and its effects on human existence. Helldén & Tottrup (2008) define climate as ‘a regional or global synthesis of weather extended through time’ In simpler words, while a meteorological forecaster would analyse atmospheric conditions over a couple of days, a climatologist

would study these conditions over periods ranging from several years, to decades, or even millennia (Palmer, 2002). Similarly, NASA describes climate as “the average of weather over time and space” (Hong, *et al.*, 2006). Thus, climate readings are the result of analysis carried out on the weather experienced in a particular place over a long period of time, often in order to predict changes in weather patterns whether slight, or severe.

While there are factors that naturally influence climate change, there are also human-influenced factors which can be linked either directly or indirectly to the patterns of climate change.

### **b. The theory of anthropogenic global warming**

In terms of juridical inclination, the study’s approach is dominated by the influence of Anthropogenic Global Warning theory which is the first theory of climate change and contends (Green & Armstrong, 2007) that human emissions of greenhouse gases, principally carbon dioxide (CO<sub>2</sub>), methane, and nitrous oxide, are causing a catastrophic rise in global temperatures.

### **Historical Background**

Climate change as a global phenomenon has been experienced on earth since the introduction and development of agriculture about ten millennia ago (Steffen, *et al.*, 2007) and possibly even before then, though not experienced directly by man. These changes had great impact on the human cultures and civilizations in existence at the time with annual and decadal climatic shifts (Palmer, 2002), influencing the growth of trees and forestation, corals and other aquatic flora, the distribution and reproduction of wild life (flora and fauna), the chemical composition of oceans and lakes, the freezing and melting of ice in cold regions, erosion and the distribution of materials on the surface of the earth (Steffen, *et al.*, 2007). Humans have always adapted and changed their ways of life in response to these changes, however, there is evidence to show that not all civilizations survived all severe climatic changes in the past (Hong, *et al.*,

2006). This alone is reason enough for the developing continent of Africa to take climate change in the 21<sup>st</sup> century very seriously.

News reports pertaining to the emission of greenhouse gases (GHGs) and its consequent effects on the environment have been made from periods as early as 1956, where there was an article in the *New York Times*, which clearly stated that the continued release of GHGs as by-products of energy production would result in “long-lasting environmental changes” (Revkin, 2018). Even before this time, in the late 1890’s Samuel Pierpoint Langley along with Frank W. Very attempted to calculate the surface temperature of the moon, making the use of the infrared radiation of the moon reflected on the earth (Arrhenius, 1896). In 1896, Svante Arrhenius had calculated the effects of what would happen if the atmospheric carbon dioxide doubled using the results and methodology of Langley and Very, which he believed would result in an increase of 5-6 degrees Celsius in the surface temperature (Arrhenius, 1896). Similarly, in 1899, Thomas Crowder Chamberlain theorized that changes in the climate could occur as a result of an increase in the concentration of carbon dioxide within the atmosphere (United States President’s Science Advisory Committee, 1965). Thus, it can rightly be said that the threatening nature of climate change is not new in its study.

Abrupt climate change, however, a newer area of research which developed in the 1980s, is a different story entirely. Unlike the more gradual history of climate change, abrupt climate change with its unpredictability and drastic effects are very difficult to manage or adapt to, with the majority of the events not even giving much room for reaction, not to speak of adaptation. These changes put people, cultures and even whole civilizations at risk physically, economically, geographically and agriculturally (Bennett, 2017). Climate change in the 21<sup>st</sup> century is largely centred around global warming and its consequent effects on the ecosystem. Following research conducted on the issue, the Centre for Global Development (CGD) concluded that climate change and development are closely related. It was also postulated that the “poor people in the developing countries” (Bennett, 2017) will get the worst,

most severe and immediate effects of the climate fluctuations due to their underdeveloped security systems (national and geographical) and immature technological developments. According to the CGD “climate change will be awful for everyone, but catastrophic for the poor” (Revkin, 2018). Unfortunately, the developing continent of Africa falls within this category and as such the issues surrounding the developments in the atmosphere should be paramount in the national interest pursuance, foreign policy direction and general dealings of African nation states.

Climate change is experienced in different ways in different regions. Global warming, however, seems to be felt by all; though the extremities are felt at different periods within the year. It is also believed that 95percent or more of the trend can be attributed to the activities of human beings, especially those in the more industrialised and technologically advanced and machine saturated parts of the world. These contributions are referred to as carbon footprints. Though Africa (with the exception of South Africa) only contributes 2-3percent (Potter & Hotchkiss, 2012) of the global carbon footprint, it is sadly one of the most vulnerable continents, if not the most vulnerable continent in the wake of the terrifying, formidable atrocity that is climate change.

It should be mentioned that individuals, institutions and organisations have taken steps to tackle the climate change problem in Africa and some African states. Nigeria for instance, along with a number of other states joined the United Nations Framework Convention on Climate Change (UNFCCC). As a member of the Intergovernmental Organisation (IGO), Nigeria is expected to work on a status report, a programme of action and a Global Climate Observing System Report. Within the Ministry of Environment, a division was created known as the Special Climate Change Unit (Ati, *et al.*, 2018), tasked with the objective of developing Nigeria’s plans for action as regards Nigeria’s response to the UNFCCC requirements and the issue of climate change itself. It is also expected to adhere to Article 3.1 of the UNFCCC which states that member states:

Should protect the climate for the benefit of present and future generations of humankind, on the basis of equity and in

accordance with their common but differentiated responsibilities and respective capabilities (Cazorla & Toman, 2001).

The Federal Government of Nigeria published a National Voluntary Review in 2017, containing multiple plans and policy directives concerning various issues plaguing Nigeria's national interest. These plans have been referred to as Sustainable Development Goals (SDGs). In 2016, the government developed the Strategic Implementation Plans (SIPs). From the framework of these plans, Nigeria's Economic Recovery and Growth Plan (NERGP), a plan which was established to cover the 2017-2020 range, focusing on restoring growth, investing in the people and building a globally competitive economy, was prepared and established. Other African countries have taken similar actions internally, however, this will be discussed more elaborately under the consequent sub-topics (Olatunji, *et al.*, 2018).

### **The Ratification of Agreements on Climate Change in Nigeria**

Within his tenure, President Muhammadu Buhari has taken steps to ratify both the Paris Climate Agreement in 2016 and the Doha Amendment of the Kyoto Protocol to the United Nations Framework Convention on Climate Change in October, 2020. However, though there are multiple political/legal documents and academic papers presenting a theoretical approach to the mitigation of climate change and its impacts, there are few, if any, showing records of actual steps that have been taken (Abraham, 2018).

Combating the issue presented by climate change is not one that ends on paper, it requires immediate, diligent and consistent action. As highlighted before, this responsibility does not rest only on the shoulders of the government, but is a shared burden borne by the citizens as well. Creating awareness, educating our uninformed counterparts and being conscious of how we manage the ecosystem are steps we all need to take to support the related laws and policies enforced by the government (Olatunji, *et al.*, 2018).

### Impact of Climate Change on the Economic Development of Some Selected African Countries

Member states of the UN signed up to the Millennium Development Goals (MDGs) in 2000 in attempts to promote global development, especially for the less developed countries. A progress review report issued in 2005 showed that the goals were barely achievable, if not unachievable at the time by many African states, even without considering the threat of climate change. However, taking the potential devastation posed by climate change into consideration, the situation is far worse. As highlighted previously, climate change has impacted different parts of Africa in different ways. Some parts are more affected than others. In East Africa for instance, it is believed that facets like water availability, food security, human health, the introduction of extreme weather events, rises in the sea-level, loss of biodiversity and other related challenges will be experienced. While some experiences will be shared, others will be different when viewed in comparison with countries in West, North or South Africa (Birkmann & von Teichman, 2010).

Under the issue of water availability, the continuous increase in the surface temperature of water bodies poses a serious threat to the existence of mankind. Apart from this, over-extraction of water, the creation of multiple fresh-water diversions from rivers and lakes across Africa, increased pollution and sedimentation of the fresh water ecosystems also pose a threat to the availability of water in Africa (Siegel, 2019). It is believed that 93% of the warming of the earth can be accounted for by the warming of the oceans and other water bodies since the 1950s. Changes in the salinity (saltiness), acidity and oxygen of these water levels affect not only the creatures within it, but humans as well. Sources of fresh water and fresh water resources are expected to undergo flow reductions 6-9percent in the river Pangani and 10percent in the River Ruvu in Tanzania (Berner & Berner, 2012). The reduction in the flow of the rivers will have impacts on the flow of fresh, quality water and also the wildlife within it.

As for the terrestrial ecosystems in Africa, grasslands, deserts, shrublands, savannahs, woodlands and forests will also be affected by

the changes in the climate. During dry seasons in various parts of Africa, experiencing even less rainfall could and will result in the increased encroachment of the Sahara and Kalahari deserts as well as other desertification ravaged territories. The agricultural sector is already affected and will be affected even more in the years to come. Scientists predicted that the glaciers on Mount Kilimanjaro would likely disappear between 2015 and 2020. Although the glaciers have reduced significantly in mass coverage, the prediction itself has been postponed till 2030 with room for error (Olatunji, *et al.*, 2018).

Another impact of climate change in countries in East Africa caused by the warming of the oceans is the issue of “El Niño”. The El Niño was a period between 1997 and 1998 when rainfall patterns were unusually heavy. It caused very serious flooding in certain parts of East and West Africa and also an increase in the spread of food and water-borne diseases like cholera and dengue fever; vector-borne diseases like Malaria, Leishmaniasis (a disease that is particularly a problem in North Africa), Rift Valley Fever around Ethiopia, ticks and tick-borne diseases affecting both humans and domestic animals; schistosomiasis, meningococcal meningitis, hantavirus and other health issues. El Niño itself refers to the warming of the central to Eastern Tropical Pacific Ocean which usually affects the rainfall pattern and temperature of countries all over the world. However, tropical regions in Africa are affected the most (Oesterheld, *et al.*, 1999). As highlighted above, during periods like these, while some countries may receive more rainfall others would receive less. In East Africa, the former is usually the case, resulting not only in flooding but also a decrease in agricultural yield, internal displacement of persons, destruction of infrastructure and facilities all of which greatly affect the economies of these states (Hussein, 2011).

Furthermore, extreme weather events such as fires, hurricanes, tropical storms, El Niño events, heavy rainstorms, and flooding are likely to wreak a lot of havoc in years to come. Africa, a continent usually free from natural disasters will have certain countries, especially the coastal states experiencing tropical storms and hurricanes. The warming of the



surface temperature of the seas, the temperature increase of 1.2percent and the consequent changes in rainfall will greatly affect large masses of land segregated for the production of tea in Kenya. Similarly, in Kenya as various species of creatures struggle to adapt to the changes in their environment, their numbers continue to diminish rapidly. The breeding periods of certain animals which breed in certain seasons will also be affected and are already being affected (Siegel, 2019). A reduction in reproduction would result in an equal reduction in the number of animals in the wild. A large portion of Kenya's national income, up to 21percent at a time is generated from tourism. Wildlife reserves and animal conservations are visited by people from different parts of the world. The loss of these animals would have severe impacts on the Kenyan economy (Hussein, 2011).

In Southern Africa, Botswana to be precise, multiple vulnerabilities and challenges to the socio-economic development of Botswana have been observed. Due to climate change, Botswana is subject to a wide range of natural disasters including droughts, floods, veld fires (wildfires), thunderstorms, strong winds, pest infestations, epidemics, the most serious of which are the droughts and floods. These disasters threaten to increase the rates of poverty, the prevalence of HIV/AIDS, the rate of unemployment and thus the general economic development of Botswana at large. Botswana's lands are plagued with overgrazing and overstocking, promoting desertification; there is a large deficit in crop production in comparison to previous periods due to shortened growing seasons and increased pests and pestilence. Like in other parts of Africa, human health, water resources, woodlands and forests are also greatly affected by climate change. Not unlike the other states, its sources of energy and power are also threatened (Raimi, *et al.*, 2021).

In West Africa, the impacts are similar. In Nigeria for instance, it has been stipulated that the changes that will be experienced include drought, desertification, agricultural changes, rising sea-levels, the spread of pests and diseases, increased flooding and erosion, loss of biodiversity, gas flaring and oil and gas pollution, changes in rainfall patterns (which can

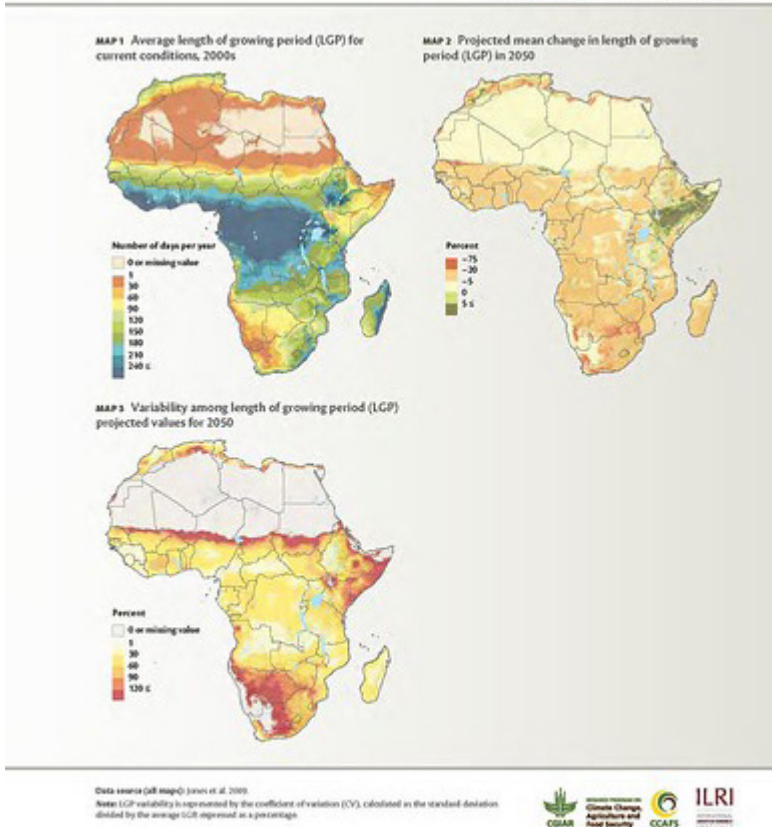
already be observed) and severe ecological degradation. Considering the great dependence by Nigerians on subsistent farming, climate change is a great threat to the economic development and survival of the Nigerians and Nigeria in a plethora of ways (Olajumoke, 2021).

Issues surrounding drought, can be viewed closely in relation with desertification and deforestation as all are connected. All these are especially evident in the Northern part of Nigeria where the Sahara desert encroaches more and more annually. Nigeria lost over 3.7 million hectares of forests between 1981 and 1994 and this continues to increase at a rate of over 3.5percent annually (Gasu, *et al.*, 2021). Between 2005 and 2010, Nigeria lost over 2 million hectares to agricultural expansion and infrastructural development. A growing population and a consequent increase in the pressure placed on food resources, infrastructure and social amenities has resulted in poverty and corruption from one angle. From another perspective, deforestation has hampered efforts to reduce the concentration of carbon dioxide in the atmosphere, thus increasing the concentration of greenhouse gases and the greenhouse effect (Ogboru & Anga, 2015).

Gas flaring and oil and gas pollution have affected people especially in the Delta regions. Oil pollution has rendered water, and land resources unfit for use by the indigenes of these societies. The release of carbon monoxide, other harmful gases and CFCs (chlorofluorocarbons) also contribute to an increase in the greenhouse effect.

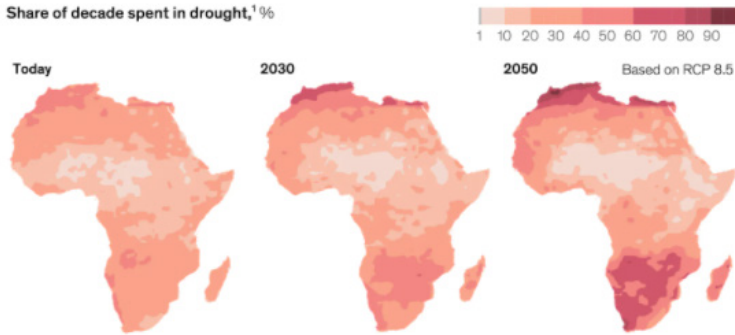
Apart from these, the effects of climate change on the water supply will also affect the generation of energy powering not just Nigeria but also other countries in Africa. Most of Nigeria's energy, with the exception of the use of solar power, on a very small scale in some more sophisticated areas depends on the use of energy generated by water turbines. Reductions in the flow of water where these turbines operate would result in a subsequent reduction in the production of energy. This will affect various factories all over Africa and the Gross Domestic Product (GDP) at large. The decrease in energy supply will push Nigerians to seek alternative means of power, the majority of which will choose the fossil-fuel powered generators of

solar power because of the difference in expenses and the low standard of living. The emissions from these generators will only worsen the situation (Olajumoke, 2021).



*Map showing the impacts of climate change on the length of growing periods in Nigeria*

Expected evolution of drought differs by region in Africa, with the most affected areas in the north and south.



(2000-2050) (Thornton, 2014).

Considering the importance of agriculture to the growth of the African economy, it is alarming to the changes we may be witnessing only 8 years from now (Mavunganidze & Nyambo, 2022).

### Challenges Posed by Climate Change to the African Continent

Climate change has introduced a number of challenges to the African continent. If these challenges are not addressed effectively, states in Africa will be faced with serious problems. About two-thirds of the Africans living in rural areas of the African continent and a quarter of the Africans in the urban areas do not have access to safe, drinkable water (Ogboru & Anga, 2015). In Tanzania, two of three rivers have not been flowing as freely as before due to the decline in regional rainfall. This has left the country with issues like shortages of water, lowered agricultural production, increased fungal and insect infestations, decreased biodiversity and reduced hydropower production.

Another challenge posed is the link between the climate and the livelihood of Africans. Africans all over the continent depend greatly on agricultural produce both internally for domestic use and as a means of

income through exportation. In East Africa, agriculture contributes as much as 40percent of the country's GDP and also serves a source of income to about 80percent of its populace. Long cycle crops and other crops are greatly affected. Likewise in places where there is excess rainfall, the soil is flooded and unfit for planting. Erosion and the creation of gulleys also make it increasingly difficult to plant anything (Raimi, *et al.*, 2021).

Apart from agriculture, climate change also affects fishing. As discussed previously, climate change has a role to play in the changes in the chemical composition of water sources and the increasing temperature of water bodies. These conditions make the water bodies uncondusive for fish and other forms of marine life. Apart from climate change itself, the water bodies have been greatly polluted by Africans with poor waste management, ignorance and the illegal dumping of waste products from factories. These actions have caused great harm to existing wildlife causing them to develop various kinds of growths and sicknesses and also greatly reducing the biodiversity present in the water. These effects on the economy can be discussed in light of the situation in which fishermen are left in with reduced variety of marine life. Fishermen spend longer periods of time on the water and also have to fish further into the ocean than usual as fish and other marine creatures search for more convenient habitats (Hussein, 2011).

Human health has also been threatened by diseases, sicknesses and discomfort including heat stress and faint spells from heat waves, respiratory problems from air pollution, asthma attacks, vector-borne diseases (including malaria, dengue fever, yellow fever, etc., water-borne and food-borne diseases (such as cholera and other diseases affecting the stomach and intestinal tract. With the existence of diseases like malaria which thrive in warmer climates with shallow often stagnant water, it is very likely that disease outbreaks of this nature will intensify.

Another perspective from which challenges posed by global warming can be viewed is the lack of awareness and ignorance of Africans across the continent. Majority of those in the less developed, more rural areas are not even aware of the reasons behind the changes in their environment.

This is even without considering the notion that they stand as part of the problem with the rest of the world as culprits behind the manifestation of this problem. While the majority do not even know about climate change and its effects, others are indifferent and others do not believe it as serious as the world makes it to be. Some are unbothered considering the possibility that the more drastic effects of climate change may not be felt or experienced in their lifetimes. This, in itself, is a challenge as the problem cannot be effectively dealt with if it is not even acknowledged as a problem. Unfortunately, the issue of climate change is not one that can be solved by the government alone, no matter how much revenue is raised. It is an issue that must be dealt with through a concert of efforts from each and every individual making efforts to reduce their carbon foot prints in the environment and if possible, reverse the effects of global warming, as farfetched as it may seem (Olajumoke, 2021).

### **Conclusion**

Global warming is an issue that should be handled with all seriousness, efficiency and care. It affects not just the present state of development in Africa, but also threatens its existence in the future. The government and individuals will have to apply both short and long-term strategies in order to achieve the desired result for each African state. Though combating and reversing climate change may be a herculean task and possibly a dream, Africans must work towards achieving a balance or an effective means of adapting to and controlling their environments and how they are affected by their surroundings. One major aspect that should be addressed is poverty alleviation, an item which has been on the agenda of African states for many decades. Considering the already high level of poverty in African states, as resources become scarcer, the level of poverty will only increase. However, if the level of poverty is managed effectively, the effects of global warming may not be devastating (Siegel, 2019).

Another recommendation would be introducing more effective waste management and sanitation schemes. The proper disposal of waste materials in the least atmosphere-destructive manner would be another

great step to take in order to combat climate change. It is believed that close to 75percent of all waste can be recycled; however, waste can also be turned into energy. Individuals all over Africa need to be reoriented on issues surrounding waste. Rather than it being viewed as unwanted garbage, it should be viewed as a resource with potential. In Sweden, waste is converted to energy and it is working so well that Sweden imports waste from other countries which it converts into energy. From this waste, they generate enough energy to power a quarter of a million homes. The same can be said about efforts to introduce bio-fuel and biogas which are far more eco-friendly than the forms of energy currently in use. Similarly, proper disposal of waste as opposed to littering and also recycling are cultures that must be adopted by every African. The failure to properly dispose of plastic bottles and wrappers, as well as other non-biodegradable objects, greatly increase the levels of land and water pollution in African states, rendering many terrains and water bodies unfit for use/human consumption.

Proper waste disposal also involves effectively getting rid of industrial waste and reducing oil and gas pollution. As highlighted previously, the indigenes of the Niger Delta have always been greatly affected by oil pollution and gas flaring. These affect the availability of water and ability to engage in food production, both of which affect the development and growth of these communities. As a matter of fact, rather than seeking out ways to dispose of these non-biodegradable elements, research and efforts should be made to discover new, eco-friendly means of producing energy like solar power and the use of biogas. These would also reduce the emissions of carbon and CFCs into the atmosphere.

In addition to these, the importance of afforestation cannot be overemphasized. As trees are cut down it is only fair for at least two new trees to be planted in their stead. Trees and flora in general play a part in absorbing the amount of carbon in the atmosphere, reducing its saturation and creating a balance. While there is an annual tree planting day which falls on the 14th of July, the efforts made to plant trees should not be taken by government officials alone. Each person should be made



to understand the importance of planting trees and as such should do so without much coercion (Mavunganidze & Nyambo, 2022).

Another very important recommendation is the preservation and conservation of biodiversity and wildlife. Many animals in Africa which used to be recorded in large numbers have drastically reduced over the years, with some creatures on the brink of extinction due to various human activities. As if climate change were not enough to cut down the numbers of flora and fauna in the wild, humans have engaged in activities such as poaching, hunting, capturing, torturing and genetically altering animals that would originally have no reason to come in contact with humans. Tampering with their natural habitats through deforestation and pollution has displaced many of these animals, forcing them to migrate to less convenient areas where they either struggle to reproduce or survive. Efforts must be made to conserve and preserve wildlife. Man is the greatest predator on earth and is one of a kind because he kills millions of animals annually for reasons usually beyond sustenance.

As regards land usage, farmers, construction workers and residents must be educated and made aware of the adoption of preventive land use measures to prevent erosion and flooding. The drainage system should also be addressed especially in places like Lagos where reclaimed land is causing water levels to rise and overflow shores in different parts when the tide is high. Interestingly, multiple agencies and bodies have been set up to address these issues, modus operandi and proper implementation processes have to be employed as soon as possible.

Also, more adaptive measures need to be taken by farmers and other individuals within the African continent. Some farmers in East Africa have already used information gathered and disseminated in preparing for more arid, harsh weather conditions by planting 'drought-tolerant' crops. Crops that thrive with little water would be ideal in the time. Farmers should generally maximise the present and make the most of the access they have to water now. Agriculture should also be done applying the practices of shifting cultivation, crop rotation and the likes to give the



land time to regain nutrients and important elements it needs to remain fertile.

In conclusion, climate change is not an issue to be taken lightly or with a pinch of salt. It is real and it is happening right now. We have waited long enough to address the situation and it is almost too late to do anything about it. We must not wait until the changes are completely irreversible or exceedingly difficult to adapt to. We must protect and preserve our continent and earth at large at all costs for the sake of ourselves and more especially for the sakes of the future generations to come.

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