



# Impact of Climate Change on the Economy: A Review

Hadija Afiya J.M.

Department of Public Administration Kampala International University Uganda

## ABSTRACT

In most developing countries, the impact of climate change is of great importance given the high temperature level, poor adaptation capacity, and lack of early warning system. Apart from the above, climate change affects economies whose economic activities are natural resource sensitive such as agricultural activities. Climate change will have an impact on the global economy; hence, this paper attempted to understand these impacts. Consequently, data indicates that, more extreme weather has the potential to weaken economic growth through damage to the capital stock and labor supply, and labor productivity will weaken as the world economy adjusts to higher temperatures. Similarly, inflation will rise through the growing cost of food, energy and insurance, just as monetary policy will be limited as it attempts to combat the stagflationary pressures of climate change. The general consensus, which is supported by a growing amount of evidence, suggests that economies should act sooner rather than later to avoid potential future costs. Successful mitigation policies will necessitate actions from all parties thus, this paper concluded that recognizing that quantifying the impact of climate change on shareholder's investments is critical in creating an incentive to act, will enable stakeholders incorporate climate change effects into an extended long-run return forecast for different asset classes.

**Keywords:** Climate change, Economy, Impact, Labour supply, Stakeholders

## INTRODUCTION

For the developed countries, the impact of climate change has been perceived to be less severe due to natural advantage, high adaptation techniques, high technology, mechanized agricultural system and wealth status. These factors have enabled the developed economies to curtail the adverse effects of climate change. For developing countries like Nigeria, the impact of climate change is of great importance given the high temperature level, poor adaptation capacity, and lack of early warning system. Apart from the above, climate change affects economies whose economic activities are natural resource sensitive such as agricultural activities. Unfortunately, some aspects of the existing literature show that climate change may lead to significant reductions in agricultural productivity in developing countries [1]. Indeed, the effect of climate change on agricultural activities can be viewed from various aspects. Climate change affects the distribution of rainfall and temperature during a year and this determines crop yields especially those crops cultivated under rain-fed conditions [2]. Excessive rainfall leads to destruction of arable land, impairment of cultivated crops, increased growth of weeds and greater post-harvest loss while a significant reduction in rainfall may culminate in drier land, reduction in water level in streams and rivers, increase in farmers' search for water for irrigation and consequently resulting in invaluable man hour losses and reductions in crop yield [3]. Climate change also affects livestock production due to reduction in the available pasture land, reduction in surface water resources for animals, increase in salinity of water resources for animals, increase in salinity at watering points due to increased temperature and evaporation in the face of reduced rainfall. This implies that there would be a decline in the production of livestock, resulting in a reduction in the supply and availability of animal protein including meat, egg, milk and other animal produce such as hides and skins [3]. In Nigeria, climate change also affects forestry due to erosion and excessive wind thereby resulting in decline in forest produce such as wood and cane. Consequently, it leads to reduction in forestry produce and low income, as well as an increase in the costs of building and furniture materials. [4], estimated the cost of deforestation and losses in non-timber forest products in the last 5 years in Nigeria at N120 billion per year, which is equivalent of 1.7% of gross domestic product (GDP) in 2003. Obviously, climate change portrays a potential threat to the composition of agricultural output in particular and to aggregate national output in general. In 2012, Nigeria adopted its Climate Change Policy Response and Strategy (CCPRS) to ensure an effective national response to the multi-faceted impacts of climate change. The main goals of the CCPRS include: Implementation of mitigation measures that will promote low carbon as well as sustainable and high economic growth; enhancement of national capacity to adapt to climate change; raising climate change related science, technology and research and development to a new level that will enable the country to better participate in international scientific and technological cooperation on climate change; significantly increase public awareness and involve private sector

participation in addressing the challenges of climate change; strengthen national institutions and mechanisms (policy, legislative and economic) to establish a suitable and functional framework for climate change governance. The National Adaptation Strategy and Plan of Action for Climate Change Nigeria (NASPA-CCN) describes the adaptation priorities, bringing together existing initiatives and priorities for future action. The NASPA-CCN vision is a Nigeria in which climate change adaptation is an integrated component of sustainable development, reducing the vulnerability and enhancing the resilience and adaptive capacity of all economic sectors and of all people to the adverse impacts of climate change, while also capturing the opportunities that arise as a result of climate change. It is the goal of this study to examine the impact of climate change on economic growth in Nigeria. To achieve this goal, the paper used ordinary least squares (OLS) estimation technique and data for the period 1981-2014. Changes in annual rainfall, carbon emission and forest depletion were used to capture climate change, while changes in government expenditure, domestic private investment and exchange rate were used as control variables in order to obtain robust estimation. The results indicate that both in the long-run and short-run, carbon emissions affect output growth in Nigeria adversely. In addition, forest depletion impacts negatively on national output growth in Nigeria in the short-run. These results imply that Nigerian government should evolve and implement policies to curb carbon emissions and forest depletion. In particular, a National Climate Change Commission (NCCC) is required in Nigeria to deal with all climate change issues. Furthermore, the finding that domestic private investment and naira-to-dollar exchange rate impede output growth in Nigeria means that policymakers and governments at all levels in Nigeria should evolve and implement policies to reverse these undesirable outcomes.

### **Impact of Climate Change on the Economy**

Empirical studies have also confirmed that climatic change can have substantial impacts on the overall economy. In Ethiopia, [5] examined the economic effect of climate change on agriculture productivity using a countrywide computable general equilibrium (CGE) model. The study observed that the impact of overall climate change will be relatively benign until approximately 2030, and thereafter worsen considerably. Further, the simulation results showed that, over a 50-year period, the projected reduction in agricultural productivity may lead to about 30% less average income, compared with the possible outcome in the absence of climate change. Using descriptive analysis, [3] demonstrated the processes that lead to climate change so as to enable a better understanding of the concept. The study described in details the impacts of climate change on various issues of national development such as low agricultural productivity, food insecurity, resource conflicts, unemployment, environmentally-induced migration, livelihood problems and health issues. The study also noted that these impacts are as a result of devastating effects of flooding, drought, erosion, desertification, sea level rise, heat stress, pests and diseases, and erratic rainfall patterns, arising from climate change. The study further suggested the need for climate policy in Nigeria, the establishment of NCCC, the development of a national framework for climate change adaptation, and the embracing of emerging technologies. [4] examined the threats posed by climate change across the globe with particular reference to developing countries, where agriculture is a dominant sector and in turn depends on weather and climate. The study utilized the sustainable development model in the form of the Green Wall Sahara Nigeria Program as a strategy for greening the drought-prone and desert infested areas of Northern Nigeria. The study concluded that the challenges of climate change to economic growth and sustainable development in Nigeria require creative thinking, holistic ideas, innovative solutions and the involvement of all stakeholders. [6], conducted two studies on the gender dimensions of climate change in North-Central and South-Eastern Nigeria. The North-Central study assessed the impact of climate change on the Zumba and Augie Communities in Niger and Kebbi states respectively. It highlighted the challenges and adaptation strategies of the selected communities. The study observed that communities had noticed climate change but failed to identify its causes. Some of the women in these communities attributed the climate change such as environmental degradation to the construction of the Shiroro dam and the resulting massive deforestation. Less scientifically, Augie women believed that the flood waters from Bakolori and Goronyo dams which destroyed their farms and affected the health of their people were calamities inflicted by the gods. Again, the women accepted that they had contributed to deforestation in their search of fire wood which led to the disappearance of many plant and animal species. Although these resilient communities have put various adaptation measures in place, they were not primarily targeted at reducing the impact of climate change. The study finds that Augie community is already practicing a number of coping strategies and requesting for assistance to strengthen them. Specifically, the stakeholders of the community requested for funding, awareness campaigns and capacity building. In Zumba, awareness campaigns are also needed to address traditional beliefs. The second aspect of the study focused on two South-eastern communities, namely: Enugwu Nanka in Anambra State and Akama Amankwo Ngwo in Enugu State. The study revealed that the impacts of climate change in South-Eastern Nigeria include the destruction of shelter (both human and animal), arable farmlands, access roads and economic trees by landslides and tornadoes. Climate change is also responsible for excessive heat, heightened insect activity and the drying up of streams. The study concluded that

while ingenious adaptive and mitigation strategies developed by women were found in the sample states, better policy making to combat climate change is urgently needed. [7], examined the long-term potential effect of global climate change on agricultural production and trade in the People's Republic of China.

Utilizing an economy-wide, global CGE model as well as simulation scenarios of how global agricultural productivity may be affected by climate change up to 2080, the study suggested that with a declining share of agriculture in GDP, the impact of climate change on the overall macro economy may be moderate. In Sri Lanka, [8] analyzed the effect of climate change on agriculture productivity using the Ricardian method. The model analyze the net revenue per hectare for four most important crops (namely rice, coconut, rubber, and tea) in the country. The study focused more on the precipitation effect on crop production due to the greater range of precipitation across the country although the limited range of temperature variation allowed only a simple test of temperature impacts in the study. The study finds that the effects of increase in precipitation are predicted to be beneficial to all crops tested and the benefit ranged from 11% to 122% of the current net revenue of the crops in the model. On the other hand, the impacts of increase in temperature were predicted to be injurious to the economy and the loss ranged from -18% to -50% of the current agricultural productivity. [9], examined the impact of climatic change on the level of total agricultural production of Sub-Saharan Africa (SSA) and non-SSA (NSSA) developing countries. The study utilized a new cross-country panel climatic dataset in an agricultural production framework. The findings of the study revealed that climate change, measured as change in countrywide rainfall and temperature has been a major factor influencing agricultural production in SSA while in NSSA countries agricultural production seems not to be affected by climate change. In addition, simulations using the estimates suggest that the detrimental changes in climate since the 1960s can account for a substantial portion of the gap in agricultural production between SSA and the rest of the developing world.

[10], noted that the effects of global warming and climate change in Nigeria are currently of concern to governments, institutions, environmentalists and firms. They noted that the effects of climate change in the country generally manifests as shifting weather variations or patterns involving unprecedented and overall changes in weather patterns, excessively heavy precipitation, unusual high temperature, propelling significant changes in different parts of the country, rising sea levels, disappearance of the coastal strips and noticeable increases in the frequency of some extreme weather events in the country. The study concluded by recommending that governments have a big role in disseminating information on the potential and actual impacts of climate change as well as on forecast impacts on agriculture, water resources and diseases. [11], studied the threat of climate change to food security and livelihoods in selected states in Nigeria, while [12] examined the effects of climate change on food productivity in the Niger delta. They find that climate change impacts significantly on all aspects of crop yields, availability of seeds, and access and utilization of foods. They noted that there were decreases in crop yields due to decreases in temperatures in the study areas and that most of the farmers had low level of awareness on the dangers of climate change. [11], highlighted the implications of climate change-induced variability's on food security and livelihoods and recommended that management issues raised by the study be translated into decision and policy making by stakeholders in order to ensure food security in northern Nigeria. [13], discovered a downward trend in rainy days per annum in Sokoto and Kano, with Kaduna having only a slight reduction in its rain day per annum. This observed climate change induced variability was found to have a negative effect on annual crop yields. The study also found that a decrease in food crops availability occurred as rainfall and temperatures decreased in the study areas. [14], finds that most of the environmental consequences of climate change manifest as physical changes such as sea level rises, higher local temperature and changes in rainfall pattern. [15], also studied the effects of climate change on the socio-economic development of Nigeria, and finds that climate change and existing climatic variability will have harsh effects on the low-income and marginalized poor people in Nigeria and will, in addition, make the process of eradicating poverty more difficult because of the negative effects of climate change on economic growth, poor people's livelihoods and assets and the level of risks to which the people are exposed.

#### **Economic Opportunities from Climate Change in Nigeria**

Addressing climate change is necessary to build a sustainable and prosperous future. There will be many opportunities for clean energy, green buildings and energy efficiency. Hybrid and electric car production and the electric public transport sector will grow. The green infrastructure and construction of office spaces on the waterfront has the potential to create many new jobs. It also provides new financial opportunities to create green job growth. [16], identified some financial opportunities including but not limited to:

##### **a. A Growing Market for Renewable Energy**

Renewable energy often tops the list of changes the world can use to avoid the negative effects of global warming. This is because renewable energy sources such as solar and wind do not release carbon dioxide and other greenhouse gases that cause global warming. There is more to clean energy than just being "green". Replacing fossil fuel-dependent power plants with renewable energy sources such as wind and solar is an important part of

<https://rijournals.com/current-issues-in-arts-and-management/>

sustaining climate change and achieving net zero carbon emissions. Therefore, using fossil fuels to produce energy that does not produce greenhouse gases and reduces some pollution, diversifying energy sources and reducing reliance on imported oil presents an economic opportunity for individuals, groups or national governments.

Renewable energy is energy that can be renewed continuously throughout human life. Renewable energy is often referred to as sustainable energy. The main renewable energy sources are solar, wind, hydroelectric, tidal, geothermal and biomass and waste from burning plants or animals [17]. Replacing human reliance on fossil fuels with renewable energy sources that produce fewer or no greenhouse gas emissions is critical to solving the climate crisis. By doing so, renewable energy will create jobs across the board, increase Nigeria's energy independence and increase affordability as many types of renewable energy are expensive – in competition with conventional energy.

#### **b. Opportunities in Eco-Friendly Construction**

As eco-consumer rates increase in Nigeria and globally; industries and individuals now search for pollution reduction methods to shift towards sustainable development [18]. This is because it established a goal of reducing society's greenhouse gas emissions and preserving the planet with the creation of independent regulations as well as improved conservation efforts following its high atmospheric and surface level pollution production. The tangible benefits may not be easily recognizable to tenants or visitors, but through sustainable design, construction and operations green buildings are reducing carbon emissions, energy and waste; conserving water; prioritizing safer materials; and lowering human exposure to toxins. Green buildings use less energy and water; rely more on recycled and renewable materials; cost less to operate; produce less construction waste; and provide a healthier indoor environment [19]. Typical green building guidelines require that at least 50 per cent of construction waste be recycled or reused which is an economic opportunity. Investing in climate, and investing in growth indicated that bringing together the growth and climate agendas, rather than treating climate as a separate issue, could add 1% to the average economic output in Nigeria and lift 2050 output by up to 2.8%. If the economic benefits of avoiding climate change impact such as coastal flooding or storm damage are factored in, the net increase to 2050 GDP would be nearly 5%.

#### **c. Increased Research and Development**

High economic growth leads to increased profitability for firms, enabling more spending on research and development. This can lead to technological breakthroughs, such as improved medicine and greener technology [20]. Also, sustained economic growth increases confidence and encourages firms to take risks and innovate.

#### **d. Improved Public Services**

Higher economic growth leads to higher tax revenues and this enables the government to spend more on public services, such as health care and education etc [21]. This can enable higher living standards, such as increased life expectancy, higher rates of literacy and a greater understanding of civic and political issues. This can be achieved through policy making with the place of fines to protect and also checkmate the activities of greenhouse emission. Transitioning to a zero-carbon society will also lead to new economic and industrial opportunities. As bringing down greenhouse gas emissions becomes the norm, businesses will compete to offer new, low-carbon technologies, goods and services such as offshore wind power, high-capacity batteries and advisory services for low-emissions urban planning. Companies that are successful in establishing this advantage early on, can access the new market opportunities that come from the need to reduce emissions in other sectors or other countries. This can bring new benefits to the economy [22]. Investments in zero-carbon infrastructure also present new opportunities for economic development and growth. With the costs of renewable energy technologies, such as solar panels and wind turbines, rapidly falling and global demand growing, if Nigeria invests in zero-carbon infrastructure, it will benefit from the expansion of new markets across the country and the world at large [23]. Investment in zero-carbon infrastructure forms the structures Nigeria need to create a low-carbon economy, such as new transport systems that are designed for electric or hydrogen-powered vehicles. While this is not expected to be costlier than fossil-fuel-based infrastructure in the long run, large upfront investments are required. Such investments also have larger benefits, beyond helping to avoid the impacts of climate change. Smart, clean and modern power networks reduce air pollution and waste; likewise, upgrading industrial processes to zero-carbon alternatives can increase efficiency and lower production costs [24]. Lastly, there are great opportunities for climate-smart financial solutions. These run the gamut from green bonds issued by governments and international institutions to micro-loans for entrepreneurs, although, borrowers will need to invest at least \$700 billion annually in infrastructure, clean energy, resource efficiency, and green construction between now and 2030, according to estimates. Interestingly, Nigeria can enjoy economic opportunities of climate by applying an economic model.

### **CONCLUSION**

Climate change will have an impact on the global economy. Attempting to understand, let alone quantify, these impacts is, however, a particularly difficult exercise subject to great error. Despite this, from what we know today, we are able to make inferences about how global warming will influence various economic factors. More extreme weather has the potential to weaken economic growth through damage to the capital stock and labor supply, and

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited

labor productivity will weaken as the world economy adjusts to higher temperatures. Inflation will rise through the growing cost of food, energy and insurance. Monetary policy will be limited as it attempts to combat the stagflationary pressures of climate change. The general consensus, which is supported by a growing amount of evidence, suggests we should act sooner rather than later to avoid potential future costs. Successful mitigation policies will necessitate actions from all parties. The insurance industry is already moving to incorporate some of these costs, but without a broader coordinated correct policy response, the world economy is unlikely to factor in one of the greatest negative externalities ever faced. Recognizing that quantifying the impact of climate change on shareholder's investments is critical in creating an incentive to act, we will be looking to incorporate climate change effects into an extended long-run return forecast for different asset classes.

#### REFERENCES

1. Mcguigan, C., Reynolds, R., Wiedmer, D. (2002), Poverty and Climate Change: Assessing Impacts in Developing Countries and the Initiatives of the International Community. London: School of Economics Consultancy Project for the Overseas Development Institute.
2. Thurlow, J., Zhu, T., Diao, X. (2009). The Impact of Climate Variability and Change on Economic Growth and Poverty in Zambia. IFPRI Discussion Paper 00890. Washington, DC: International Food Policy Research Institute, Development Strategy and Governance Division, and Environment and Production Technology Division.
3. Ozor, N. (2009), Implications of Climate Change for National Development - The Way Forward, African Institute for Applied Economics (AIAE), Enugu Forum Policy Paper 10.
4. Onuoha, C.M. (2009), Climate Change and Sustainable Development in Nigeria: The Mitigating Role of Green Wall Sahara Nigeria Programme. African Institute for Applied Economics (AIAE), Enugu Forum Policy Paper 10.
5. Gebreegziabher, Z., Stage, J., Mekonnen, A., Alemu, A. (2011), Climate Change and the Ethiopian Economy: A Computable General Equilibrium Analysis. Environment for Development, Discussion Paper Series, Efd DP 11-09.
6. Agwu, J., Okhimamhe, A. (2009), Climate Change, Its Impacts and Adaptation: Gender Perspective from the Northern and Eastern Nigerian. Available from: [http://www.ng.boell.org/downloads/Gender\\_Climate\\_Change\\_in\\_Nigeria.pdf](http://www.ng.boell.org/downloads/Gender_Climate_Change_in_Nigeria.pdf).
7. Zhai, F., Lin, T., Byambdorj, E. (2009), A general equilibrium analysis of the impact of climate change on agriculture in the people's Republic of China. *Asian Development Review*, 26(1), 206-225.
8. Seo, S.N., Mendelsohn, R., Dinar, A., Hassan, R., Kurukulasuriya, P. (2009), A Ricardian analysis of the distribution of climate change impacts on agriculture across agro-ecological zones in Africa. *Environmental and Resource Economics*, 43, 313-332.
9. Barrios, S., Ouattara, B., Strobl, E. (2004). The Impact of Climatic Change on Agricultural Production: Is It different for Africa? MPRA Paper No. 6240.
10. Umar, A.T. (2008), Global Warming and the Millennium Development Goals (MDGS) in Nigeria: A Way Forward. Paper Delivered at the 5th Annual Conference of the Association of Nigerian Geographers (ANG) at the University of Calabar, 25th-28th August. p47-55.
11. Efe, S.I. (2009), Climate change and food security in African: Delta state Nigeria experience. In: Anyadike, R.N.C., Madu, L.A., Ajaero, C.K., editors. Conference Proceeding on Climate Change and the Nigerian Environment, Nsukka, 105
12. Ubachukwu, N.N. (2005), Climate and Agriculture in Northwestern Nigeria. Unpublished B.Sc. Project. Nsukka: University of Nigeria
13. Njoku, J.D. (2006), Analysis of the Effect of Global Warming on Forests of Southeastern Nigeria Using Remotely-sensed Data. Unpublished PhD Dissertation, Department of Geography and Environmental Management. Owerri: Imo State University.
14. Okoli, C. K. (2008); Global Warming and its Implications on Sustainable Development. *International of Africa Hospitality and Tourism*. Vol 12. No 3.
15. Odugbo, P. O. (2008): Climate impact on Tourism participation in Nigeria. *Journal of research in Tourism* Vol 2. Nihotour Abuja.
16. Rubin, J. (2017). Economic opportunities from a changing climate. Carol Bonnett. Centre for International Governance Innovation.
17. Rahman, A., Farrok, O., & Haque, M. M. (2022). Environmental impact of renewable energy source-based electrical power plants: Solar, wind, hydroelectric, biomass, geothermal, tidal, ocean, and osmotic. *Renewable and Sustainable Energy Reviews*, 161, 112279.
18. Pörtner, H., et al., 2022, 'Technical Summary', in: *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the

<https://rijournals.com/current-issues-in-arts-and-management/>

Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK and New York, NY, USA  
([https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC\\_AR6\\_WGII\\_TechnicalSummary.pdf](https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_TechnicalSummary.pdf)).

19. Meena, C. S., Kumar, A., Jain, S., Rehman, A. U., Mishra, S., Sharma, N. K., ... & Eldin, E. T. (2022). Innovation in the green building sector for a sustainable future. *Energies*, 15(18), 6631.
20. Habib, M., Abbas, J., & Noman, R. (2019). Are human capital, intellectual property rights, and research and development expenditures really important for total factor productivity? An empirical analysis. *International Journal of Social Economics*, 46(6), 756-774.
21. Shelton, C. A. (2007). The size and composition of government expenditure. *Journal of Public Economics*, 91(11-12), 2230-2260.
22. Romm, J. J. (2022). *Climate change: What everyone needs to know*. Oxford University Press.
23. Ansar, A., Flyvbjerg, B., Budzier, A., & Lunn, D. (2016). Does infrastructure investment lead to economic growth or economic fragility? Evidence from China. *Oxford Review of Economic Policy*, 32(3), 360-390.
24. New Climate Economy (NCE) (2018). *Unlocking the inclusive growth story of the 21st Century: Accelerating climate action in urgent times*. The Global Commission on the Economy and the Climate.

**CITE AS: Hadija Afiya J. M. (2024). Impact of Climate Change on the Economy: A Review. RESEARCH INVENTION JOURNAL OF CURRENT ISSUES IN ARTS AND MANAGEMENT 3(1):7-12.**