

# Green Entrepreneurial Opportunities in Climate Change Adaptation and Mitigation for Sustainable Development in Nigeria

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## Abstract

Climate Change is a global challenge which we must of necessity tackle with urgency for our sustainable development in Nigeria. Climate change education is therefore vital for preparing individuals and communities for climate change impacts and to learn how to adapt and mitigate effectively. This paper calls for an innovative approach for maximizing economic opportunities available through climate change adaptation and mitigation strategies. These economic opportunities pave the way for green entrepreneurship which includes adopting more efficient renewable energy sources, strategic tree planting activities, radical awareness approach of information dissemination, adopting good waste management and recycling strategies, etc. Through literature review and participant observation, we have discovered the need for communities, institutions and individuals to embrace green entrepreneurship which has the capacity to provide green jobs, additional sources of income and green skills to the unemployed youths in Nigeria. The use of climate change poems and blogs in climate change education for sustainable development in Nigeria are also identified as green entrepreneurial opportunities and highly encouraged. This study therefore, vividly explores the green entrepreneurial opportunities in climate change adaptation and mitigation strategies for sustainable development in Nigeria.

**Keywords:** Climate Change; Energy; Mitigation; Sustainable Development

## Introduction

The challenges and impacts of climate change in our time cannot be over emphasized. It is a challenge that affects every country in every continent all around the globe today and Nigeria is not an exception. Population growth, increase in production and consumption of goods across the globe led to the depletion of natural resources and causing severe damage to the environment. Effects of such damages include global warming, increased environmental pollution, flooding, heat waves, outbreak of multiple diseases etc. various countries in the world realized the threats to the environment and began working hard to minimize the harmful effects of business activities on the environment. The realization, concern and conscious actions towards environment led to the emergence of sustainable development which emphasizes the need to promote sustainability by advancing the form of development that emphasizes minimal damage to the environment and the society with the wellbeing of future generations in mind.

With these lines of thoughts, green entrepreneurial opportunities in climate change adaptation and mitigation activities abound. These drives for sustainable entrepreneurial investments created the platform for eco-innovations and green consumption. Eco-innovation encourages and advocates the incorporation of environmentally sustainable practices at every stage of production process and service delivery [1].

UNEP has defined the green economy as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities”. It is low carbon, resource efficient and socially inclusive. Green economy is vital for the sustainable development of developing countries like Nigeria and will in turn bring about the Green growth [2]. According to OECD: “Green growth means fostering economic growth and development while ensuring that. Natural assets continue to provide the resources and environmental services on which our well-being relies” [3].

Entrepreneurship is simply put as the process of designing, launching and running a new business, which is often initially a small business. People who create these businesses are called entrepreneurs. An entrepreneur in its unique nature is innovative, possesses ideas that foster development towards achieving a purpose. It is very good to know that green entrepreneurial opportunities abound in climate change adaptation and mitigation strategies for sustainable development and sustainable economic growth in Nigeria.

## Methodology

Generally, this paper aimed to examine the green entrepreneurial opportunities in climate change adaptation and mitigation for sustainable development in Nigeria. This paper examined current progress in green entrepreneurship in Nigeria through existing literature review. This segment provides an overview of previous literature on green entrepreneurship for sustainable development in Nigeria. It introduces the framework for this paper which consists of the objectives described earlier. The main purpose of this review work was to survey theoretical backgrounds and previous studies on earlier proposed climate change adaptation and mitigation strategies, current progress with the implementation of these strategies in Nigeria and its role in ensuring sustainable development and sustainable economic growth in Nigeria.

## Understanding Climate Change Adaptation and Mitigation

Climate change is one of the global trends which we must of necessity tackle with urgency in order to prevent a global warming too unbearable for the survival of mankind and to ensure global sustainability. The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods [4]. The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as the “adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation and autonomous and planned adaptation” [5]. Climate mitigation is any action taken to eliminate or reduce the long-term risk and hazards of climate change to human life, property and the society. The International Panel on Climate Change defines mitigation as: “An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases (Global Greenhouse Warming, 2018)”. The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as the “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” [5].

Climate change is already having significant impacts in Nigeria and these impacts are expected to increase in the future. Recent estimates suggest that, in the absence of adaptation, climate change could result in a loss of between 2% and 11% of Nigeria’s GDP by 2020, rising to between 6% and 30% by the year 2050. This loss is equivalent to between N15 trillion (US\$100 billion) and N69 trillion (US\$460 billion) [6]. Unfortunately, some degree of climate change is inevitable, therefore nations must reactively learn and implement adaptation strategies to adjust to these changes and mitigation strategies to protect the populace from its adverse effects.

## Green Entrepreneurial Opportunities in Climate Change Adaptation and Mitigation in Nigeria

Entrepreneurship can be defined as the act of creating a business while scaling it to generate profit. A broader definition of the term is sometimes used, especially in the field of economics. In this usage, an entrepreneur is an entity which has the ability to find and act upon opportunities to translate inventions or technology into new products; “the entrepreneur is able to recognize the commercial potential of the invention and organize the capital, talent and other resources that turn an invention into a commercially viable innovation” [7].

Green entrepreneurs see possibilities and solutions to environmental problems, climate change and global warming issues where an average person can only see these as impediment and obstacles. Therefore, in this vital project of climate change adaptation and mitigation, Green entrepreneurs are of a fundamental factor to drive the course. The concept of green entrepreneurship evolved as a result of environmental concerns such as pollutions, global warming, climate change, scarcity of natural resources and other disturbances in the ecosystem.

Green entrepreneurship is the activity of consciously addressing an environmental and social problem or need through the realization of entrepreneurial ideas with a high level of risks, which has a net positive effect on the natural environment and at the same time is financially sustainable. Owing to the growing awareness of environmental challenges, sustainable development and green economy; individuals, corporations and many institutions are becoming more responsive towards the environment such factors are also responsible for the changing consumer behavior towards green products and the perception of green products which creates opportunities for the development of the green market [8].

In further definition of the term green entrepreneur, Demuth further elaborated that green entrepreneur is an actor in the green economy that embodies the marriage of economy and environment taking into account the human factor and social development. It is a concept that gives rise to new economic opportunities, job creation and environmental innovations. Suffice to say that in our world today, green entrepreneurs are important to a nation’s economic development as they are the significant contributors in providing green jobs and are also the driving force towards the desired change [9].

Although, entrepreneurs are individuals or entities who conceive new businesses and innovative opportunities and take on the risk required to convert those ideas into reality, there is a difference between the green entrepreneur and the traditional entrepreneur. Both are designed, launched, summed and managed in new business and innovation, which is often to generate profit. However, only the green entrepreneur seeks to create a business model that is both economically profitable and same time create environmental and social value in climate change adaption and mitigation for sustainable development.

In developing countries like Nigeria, agriculture plays significant roles in the socio-economic wellbeing of the people. Unfortunately, this sector of the economy (agriculture) has suffered a great deal by the impacts of climate change disasters and other associated risks thereof [10]. Agriculture involves the cultivation of the soil, production of crops, rising of livestock and fisheries, and in different degree how these agricultural produce are prepared and sold in the market.

Agriculture today in Nigeria like any other part of the world is highly dependent on climatic factors like good temperature, precipitation and water supply, etc. and vast majority of the people depend on agriculture as their source of livelihood which provides food, income from investment and employment [11].

It is therefore evident that Green entrepreneurs are very much needed in our communities today to help to drive Nigeria's agricultural sector towards a sustainable path using the green technology and green skills to help achieve a green economy.

For each effect of climate change, there is a money making opportunity, which is why necessary green transformation will be beneficial. Only forward-thinking, innovative green entrepreneur can exploit these huge business potentials. The impacts of climate change on our environment and society are of a great pressing global risk that involves taking and solving these risks by presenting them as major business opportunities.

These include:

**A) The Use of Renewable Energy in Nigeria:** Nigeria is amply endowed with renewable energy sources and is environment-friendly in nature, but the renewable energy capacities are grossly under-utilized, particularly from biomass to wind energy and solar energy. As seen in quite a number of successful countries in promoting renewable energy such as Germany, Denmark and Japan, strong and long-term commitment from the government is crucial in implementing any kind of policies which will lead to renewable energy development [12].

There are great deal of renewable energy technologies and industries emerging, shifting away from burning fossil fuels for electrical generation and transportation. The use of renewable energy which is one of the climate change mitigation strategies is vital for the sustainable development and economic growth in Nigeria. Renewable energy is free to mankind, it is God's gift to man. The wind, the energy of the sun and many other natural resources which are abundant with vast potentials in Nigeria should be utilized by green entrepreneurs in Nigeria to achieve our sustainable economic growth.

These renewable energy sources include:

**i) Wind Energy:** The wind is a very huge source of clean energy which generates electricity from the wind for huge industry globalization. It is a source of electricity through the wind using kinetic energy. Many developing countries like Nigeria are all working on diversification of power generation through wind energy. Green entrepreneurs and investors are also working tirelessly to ensure a sustainable wind energy projects in Nigeria.

Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines to make electricity, windmills for mechanical power, wind pumps for water pumping or drainage or sails to propel ships. A large wind farm may consist of several of hundred individual wind turbines which are connected to the electric transmission network. Wind power, as an alternative to fossil fuel is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation and uses little land. Any effects on the environment are generally less problematic than those from other power sources.

**ii) Solar Energy:** This is simply the light and heat that comes from the Sun. It is the most abundant energy resource on earth. There are two common ways to convert solar energy into electricity: photovoltaic and solar-thermal technologies. In Nigeria, renewable energy economic potentials cannot be over emphasized. Insufficient electricity has been a huge setback to the country's economic growth and development, but with investments in renewable energy products, there will be a significant improvement to solving the deficient electricity energy of the country.

Sambo identified that a large number of renewable energy devices have been developed by Nigerian researchers in various parts of the country. The devices which are ready for incorporation into the economy are as follows: Solar Cookers, Solar Water Heaters, Solar dryers, Solar stills, Photovoltaic Street lights and Traffic Controllers, etc [13].

The use of renewable energy in Nigeria offers employment opportunities to teeming unemployed youths in Nigeria and offers green entrepreneurial opportunities to those who are willing to avail themselves of the opportunity. The use of this renewable energy in Nigeria is a climate change mitigation strategy which will in turn help us to achieve our sustainable development goals locally, nationally and also globally

**B) Climate Change Education:** There is a great need to educate communities and various institutions in Nigeria on climate change

adaptation and mitigation for sustainable development. This has in turn created green entrepreneurial opportunities for the willing educators. Climate change educators both paid and volunteers should be well trained and encouraged in the task of educating communities, cities and institutions on the impacts of climate change along with strategies for adaptation and mitigation. Climate change education is therefore one of the green entrepreneurial opportunities in Nigeria which creates radical awareness and provides enlightenment to people towards a better life and sustainable environment for our sustainable development.

**C) Waste Management And Recycling:** Green entrepreneurial opportunities abound in waste management and recycling in Nigeria today. The reduction and recycling of solid waste can help address global warming and climate change as they are potent strategies for reducing greenhouse gas emissions. The waste management business is one with a plethora of opportunities in its industry. Thousands of businesses operate within several niches in its space, and they all go on to serve a varying number of clients seeking different solutions to their waste management problems [14].

### Innovative Approach for Maximizing Economic Opportunities Available through Climate Change Adaptation and Mitigation in Nigeria

In recent times in Nigeria, the impacts of climate change have posed serious threat to the sustainable development [15-17]. Its consequences on poverty reduction, erosion, bio-depletion, flooding, drought, energy inefficiency and sea level rise in developing countries like Nigeria cannot be overemphasized, and the profound impacts from the above forces on the environment have forced key decision makers in the developing countries like Nigeria to re-examine and continue to negotiate a way out of this dilemma of climate crisis which has affected sustainable development [10,18].

Literatures on climate change mitigation and adaptation have singled out developing countries as region worst hit by the crisis of climate variations over the years and that the long years of developed economies emission of greenhouse gases into the atmosphere has exacerbated the crisis more [19].

Thus, the greatest challenge facing the Governments in the developing countries like Nigeria is the difficult task of reconciling economic growth, resource management and climate change mitigation and adaptation [20]. Though, there abounds multiplicities in adverse effects inherent in climate change, the following approach could be deployed towards maximizing the economic opportunities in climate change mitigation and adaptation in Nigeria:

- i. Radical awareness approach of information disseminations. The emergence of information communication and technology (ICT) around the world to a large extent has proven as very effective and efficient vehicle of letting people becoming aware of economic opportunities in climate change mitigation and adaptation. These information dissemination platforms besides the internet include, radio, television and telephone.
- ii. The government at all levels in Nigeria should provide enabling environment and sustainable fund in form of grants and loans to the teeming unemployed and underemployed nigerian youths who may want to be involved in the renewable energy industry, waste management and recycling businesses, in their different capacities. This approach when incorporated into long term policy planning in climate change mitigation and adaptation in Nigeria will go a long way in reducing unemployment among the youths in the country.
- iii. The use and involvement of Non-governmental organizations that are environmental driven and climate change oriented can assist in providing green entrepreneurial opportunities for a lot of individuals in Nigeria. Awareness of the economic opportunities in climate change mitigation and adaptation can be made known to communities and cities through the various outreaches, seminars and workshops initiated by these Green NGOs in Nigeria.
- iv. Annual National budgetary allocation towards maximizing economic opportunities in climate change mitigation and adaptation should be increased.
- v. Planting of economic trees or afforestation to curb incessant cases of flooding that affect agricultural yield should be encouraged. Tree planting activities also has the capacity to provide employment and good source of income to the unemployed while enjoying other fringe benefits derived from it.
- vi. Building the capacity of the locals through adequate sensitizations, through the use of traditional and religious institutions in reaching the people through training and retraining of farmers and green entrepreneurs towards adapting to the challenges of climate change.
- vii. Educational blogs can be used to inform, enlighten and educate communities, institutions and individuals in Nigeria especially the internet literate ones about climate change mitigation and adaptation. These blogs which are meant to be highly interactive allows them to also contribute their ideas, suggestions and feedback to the climate change educators and green bloggers for sustainability. Green blogging also has the capacity to provide a good source of income to those who engage in it profitably.
- viii. Poetry has also been discovered as a great tool which can be used to educate individuals in Nigeria about climate change mitigation and adaptation. The Project Green Initiative which is an arm of the Benjy Poetry and Music Global Concepts, a company registered in 2017 with the corporate affairs commission, Nigeria is a good example of a company which is very passionate about

educating the communities in Nigeria about the green entrepreneurial opportunities in climate change mitigation and adaptation.

Below is a poem advanced by the Benjy Poetry and Music Global Concepts which further helps to illustrate how poetry can be used efficiently and effectively in educating communities in Nigeria about climate change adaptation and mitigation for global sustainability. Do enjoy the poem:

## Poem

### Go Green, Keep Clean

Go make the world a better place  
Beautifully occupy your space  
Go spread joy and beauty everywhere  
Spread like a breath of fresh air.

Go green, Keep clean  
Keep the simple laws of hygiene  
Our planet is our responsibility  
Our vision is to make it green truly.

Go green, Keep clean  
Stay cool, Stay keen  
Keen to put in your very best  
To clean and tidy our environment.

Go make the world a better place  
As beauty and bliss sweetly embrace  
Go spread joy and beauty everywhere  
Spread like a breath of fresh air.

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## Conclusion

Through this study, it is clearly seen that the green entrepreneurs are assets which are highly sought for and urgently needed in various communities and institutions in Nigeria today. The green entrepreneur uses his green skills to provide green jobs which helps to achieve a green economy that brings about the green growth of his community, city or country. It is good to know that there are numerous green entrepreneurial opportunities for the many unemployed and underemployed youths in Nigeria. Furthermore, there is great need to create awareness of Renewable Energy, Waste Management and Recycling Industry in Nigeria for maximizing green entrepreneurial opportunities for sustainable development. It is also our recommendation that poetry should be used as one of the valuable tools in climate change education which can help to create awareness about the green entrepreneurial opportunities in climate change mitigation and adaptation for sustainable development in Nigeria [22-26].

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