Journal of Social Sciences and Development Research
ISSN 2998-243X
Vol. 2, No. 1, 2025
Published by STSL Press

Original Paper

Potential of Marine and Aquatic Resources in Nigeria's Blue Economy

Hassan David Vincent, Emmanuel Eche, Adi Pajo

Economics Department Federal University Wukari, Taraba State, Nigeria

Abstract

Industrial expert also claim that a committed and sustainable exploration of resources in the blue economy is a job creation enabler, capable of improving food security, tourism and infrastructure development just as it can give real meaning to the country's green energy pursuits among other benefit. To this backdrop, this paper explore the potentials of the blue economy in Nigeria focusing on the sustainable development of the marine and aquatic resources. Through a combination of literature review the paper sourced secondary data from the Central Bank of Nigeria and National Bureau of statistics for the period under study. The study employed the use of Augmented Dickey Fuller test to dictate the presence of unit root among the variables under study and Autoregressive Distributive lag estimate for its analysis. The study was able to identify the current state of the blue economy in Nigeria discover key challenges and opportunity, and proposed strategies for sustainable growth. The finding of the study reveals that there is exist short run, positive and significant relationship between blue economy and sustainable growth in Nigeria, the findings also found out that Nigerian coastal and marine resources has immense economic potentials, but are underutilized and facing significant environmental threats. The study recommend among others the importance of policy support, investment in infrastructure and technology, and community engagement for the successful development of the blue economy in Nigeria

Keywords: Blue Economy, Sustainable growth and Marine resources

1. Introduction

The blue economy, or the ocean or maritime economy, refers to the sustainable use of ocean resources for economic growth, improved livelihoods, and ocean health. The blue economy encompasses a range of sectors, such as fisheries, aquaculture, shipping, energy, tourism, and marine biotechnology. It's potential to contribute to sustainable development, and poverty reduction has gained attention from policymakers, scholars, and stakeholders (Smith-Godfrey, 2016).

The Nigerian economy, until the late 1960s, heavily relied on agricultural products and a few solid minerals for its foreign exchange. However, the oil discovery in abundance and subsequent boom in the oil industry during the 1970s led to the abandonment of other predominant sectors, particularly agriculture (blue economy) (Adeyemi & Abiodun, 2021). Blue economy activities, associated with ocean resources, are globally recognised for playing a crucial role in alleviating extreme poverty and hunger through employment and economic opportunities. Nigeria, endowed with a coastline of about 870km and approximately 3,000 kilometres of inland waterways, possesses various natural resources such as petroleum, natural gas, tin, columbite, iron ore, coal, zinc, limestone, lead, and other minerals. The adverse implications of over-dependence on oil underscore the need to diversify towards the blue economy, prompting a shift in focus from oil to alternative economic sectors

Proponents argue that increasing agricultural outputs, particularly from the blue economy, holds significant potential to stimulate growth and development in the Niger Delta region and the broader Nigerian economy. The blue economy, integral to biodiversity, ecosystems, food chains, livelihoods, and climate regulation, offers an innovative approach to sustainable development for a growing global population (Abdullahi, 2018). As the ocean covers about 75% of the Earth's surface and supports more than half of all living things, sustainable management becomes paramount to ensuring its ability to sustain human populations, especially for small island nations like those in the Niger Delta region.

The study recognises the potential linkage between the blue economy, sustainable development, and economic growth, aligning with the 2030 Agenda for Sustainable Development. SDG target 14.7 specifically focuses on enhancing economic benefits to Small Island developing states (SIDS), water-enclosed areas, and less developed countries (LDCs), such as the Niger Delta, through the sustainable use of marine resources. The Niger Delta region is at the forefront of blue economy development, acknowledging the crucial role oceans play in humanity's future and providing an approach to sustainable development tailored to the region's circumstances, constraints, and challenges.

However, the blue economy also faces modern challenges threatening its sustainability and potential benefits. Climate change, overfishing, pollution, and habitat destruction are significant threats to the health of oceans and their resources. These challenges affect the environment and have economic and social consequences, such as losing biodiversity, livelihoods, and cultural heritage (Bari, 2017).

From a scholarly point of view, the blue economy requires a multidisciplinary approach that combines natural, social, and economic sciences to understand the complex interactions between human activities and ocean ecosystems. Scholars have emphasised the importance of policy coherence, governance frameworks, and stakeholder engagement to ensure the sustainable use of ocean resources. The role of innovation, technology, and finance in supporting the transition to a blue economy has also been highlighted in recent literature (Abhinav et al., 2020).

Overall, the blue economy offers opportunities and challenges that require a holistic and integrated approach to balance economic growth with environmental sustainability and social equity

1.1 Origin and Conceptualization of the Blue Economy

The idea of the blue economy invented in the early 2000s when sustainable development was gaining adhesion globally. The term "blue economy" was devised by Professor Gunter Pauli a renowned 1994 as an economic philosophy reflecting business models for the future Gunter Pauli, a Belgian entrepreneur and sustainability advocate, in his book "The Blue Economy: 10 Years, 100 Innovations, 100 million Jobs", published in 2011 (Smith-Godfrey, 2016).

Pauli presented the concept of a new kind of economy based on the efficient and sustainable use of marine resources. He argued that the oceans are a source of untapped wealth and could solve many of the world's environmental and economic problems, such as climate change, energy scarcity, and poverty (Pauli, 2011).

Pauli proposed a new business model that imitates the functioning of natural systems and creates value from waste and by-products. He highlighted the potential of aquaculture, renewable energy, and biotechnology sectors to drive economic growth while promoting environmental sustainability and social inclusion (Pauli, 2011).

Since then, the blue economy concept has gained recognition from international organisations such as the United Nations and the World Bank, as well as from governments, academia, and the private sector. It has become a key driver of sustainable development and a pathway to achieving the United Nations' Sustainable Development Goals (SDGs), particularly SDG 14, which focuses on the conservation and sustainable use of oceans, seas, and marine resources (Rees et al., 2018).

In addition to Gunter Pauli's contribution to developing the blue economy concept, other influential thinkers and initiatives have contributed to its evolution. For instance, the 1992 United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, led to the adoption of Agenda 21, a comprehensive plan of action for sustainable development that recognised the importance of the oceans, seas, and coasts in promoting sustainable development. The conference highlighted the need for the integrated management and sustainable use of ocean resources and ecosystems (McCammon, 1992).

Furthermore, the 2002 World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa, emphasised the importance of the ocean economy as a driver of economic growth and poverty reduction. The WSSD led to the establishment of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, which aims to reduce the impacts of human activities on the marine environment (Nath, 2005).

The blue economy has recently gained momentum as a critical strategy for sustainable development. The European Union, for instance, has developed a blue growth strategy that promotes the sustainable use of marine resources. In contrast, the African Union has launched the Blue Economy Strategy, which aims to promote sustainable economic growth, food security, and job creation by developing marine resources (Bond, 2019; Henderson, 2019).

Overall, the blue economy concept has its roots in the broader sustainable development agenda and has evolved to become a critical pathway to achieving environmental sustainability, economic growth, and social development

The emergence and evolution of the blue economy concept underscore its importance as an alternative economic model for sustainable development, acknowledging nations' dependence on oceans (UNECA, 2016). It reflects a modern view that emphasises sustainability, social justice, and intergenerational equity as guiding principles for further development.

The term "blue economy" was first introduced by Professor Gunter Pauli in 1994 as an economic philosophy reflecting business models for the future (Pauli, 2010). The concept gained prominence during the Rio+20 summit in 2012, introduced by the United Nations Environment Programme (UNEP) as an application of green economy principles to the ocean realm. The blue economy seeks to promote economic growth, social inclusion, and the preservation of livelihoods while ensuring environmental sustainability. It aims to decouple socioeconomic development from environmental degradation and optimise the benefits derived from marine resources.

Various definitions highlight the blue economy's focus on the sustainable use of ocean resources for economic growth, improved livelihoods, and job creation while safeguarding the health of ocean ecosystems. The concept covers a wide range of economic activities associated with oceans, seas, and coasts, including established and emerging sectors. Additionally, the blue economy recognises nonmarketable economic benefits, such as carbon storage, coastal protection, cultural values, and diversity.

In summary, the blue economy is viewed as an innovative approach to economic exploitation, encompassing oceans, lakes, rivers, and other bodies of water. The concept promotes economic growth, social inclusion, and livelihood preservation while ensuring environmental sustainability. This study aims to explore the blue economy and its potential contributions to the national economy, particularly in regions like Nigeria and the Niger Delta, emphasising job creation and improved living conditions for coastal communities and islands

2. Literature review

2.1 Growth theorist

Growth theorists argued that development is an outcome of economic growth while other scholars like (Rostow, 1952; Harrod-Domar, 1957) posited that economic development and growth result from structural changes, savings and investments in an economy. The failure of economic growth in most developing and developed countries of Latin America and Africa, in the late 1970s, to deliver corresponding social goods and solve problems of unemployment, poverty, disease, hunger, illiteracy and ever increasing crimes and wars, necessitated the new thinking, and redefinition of development from economic growth cantered perspective to human cantered approach.

Nwanegbo and Odigbo (2018) in this light Chandler (2017) sees development as a broader concept that recognizes psychological and material factors that measure human well-being. Development therefore is a multifaceted phenomenon and man cantered. It is the process of empowering people to maximize their potentials, and develop the knowledge capacity to exploit nature to meet daily human needs (Rodney, 1972; Nnoli, 1981; Ake, 2001) the transformation of the society and the emergence of new social and economic organizations are critical indicators of development.

Stieglitz (2020) cited in Nwanegbo and Odigbo (2018) Economic development is a product of development and can be defined as the process of economic transformation in a society. Economic development embraces changes taking place in the social sphere mostly of an economic nature. Thus, economic development is made up of processes caused by exogenous and endogenous factors which determine the course and direction of the development. Economic development is measured with indicators, such as GDP, economic growth, balance of payment equilibrium life expectancy, literacy and levels of employment. Changes in less-tangible factors are also considered, such as personal dignity, freedom of association, personal safety and freedom from fear of physical harm, and the extent of participation in civil society.

Causes of economic impacts are, for example, new technologies, changes in laws, changes in the physical environment and ecological changes. Scholars have identified strong links between security and development since the cold war ended (Nwanegbo and Odigbo, 2018; Chandler, 2007) they argued that development cannot be achieved in any nation where there are conflicts, crisis and war. There is a consensus in the literature that security and development are two different and inseparable concepts that affect each other, and this has naturally triggered debates on security-development nexus.

3. Method of data analysis

3.1 Descriptive and inferential statistics

The descriptive and inferential statistic is a very important preliminary test before conducting any test on the variables. The descriptive statistics test is normally carried out to ascertain the characteristics of the variable, it show if the mean, median, maximum, minimum and standard deviation of the variables are normally distributed. The decision to accept the null hypothesis lies on the Jarque-Bera probability value.

However if the value of the Jarque-Bera probability is more than 0.5 implies accepting the null hypothesis that the variables are normally distributed and fit for estimation.

3.2 Test of stationarity

The Augmented Dickey-Fuller (ADF) unit root test is employed to test for the unit root as the disturbances or the error term in Dickey and fuller unit root test is unlikely to be white noise, the ADF unit root test includes extra lagged terms of the dependent variable in order to eliminate the problem of autocorrelation the decision to accept or to reject the null hypothesis of δ = 0 is based on the Dickey – Fuller critical values. The test was then applied as follows

$$\Delta Y_t = {}_{\gamma}Y_{t-1} + a_{2t} + \sum_{i=1}^{p}\beta\ \Delta Y_{t-1} + U_t \text{……………….…………………………….……equ(3.1)}$$

Were

Δ = difference operator

Yt = dependent Variable

Ut = white noise

Under the null hypothesis if $\gamma = 1$ becomes a random walk, that is non-stationary process if $\gamma < 1$ this means that the series Yt is stationary. The stationarity test for each of the series is stated as follows

$$\Delta RGDP_t = {}_{\gamma}RGDP_{t-1} + a_{2t} + \sum_{t-1}^{p}\beta\Delta RGDP_{t-1} + U_t \text{………………………….....…….equ(3.2)}$$

$$\Delta fAQU_t = {}_{\gamma}DAQU_{t-1} + a_{2t} + \sum_{t-1}^{p}\beta\Delta DAQU_{t-1} + U_t \text{…………………….……...….equ(3.3)}$$

$$\Delta STR_t = {}_{\gamma}STR + a_{2t} + \sum_{t-1}^{p}\beta\Delta STR_{t-1} + U_t \text{………………………… ……..…..equ(3.4)}$$

$$\Delta INF_t = {}_{\gamma}INF_{t-1} + a_{2t} + \sum_{t-1}^{p}\beta\Delta INF_{t-1} + U_t \text{……………………………………….....equ(3.5)}$$

$$\Delta GFCF_t = {}_{\gamma}GFCF_{t-1} + a_{2t} + \sum_{t-1}^{p}\beta\Delta GFCF_{t-1} + U_t \text{…………………….…..…..…,equ(3.6)}$$

$$\Delta EXR_t = {}_{\gamma}EXR_{t-1} + a_{2t} + \sum_{t-1}^{p}\beta\Delta EXR_{t-1} + U_t \text{…………………………………..…,equ(3.7)}$$

3.3 Descriptive and inferential statistics

The descriptive and inferential statistic is a very important preliminary test before conducting any test on the variables. The descriptive statistics test is normally carried out to ascertain the characteristics of the variable, it show if the mean, median, maximum, minimum and standard deviation of the variables are normally distributed. The decision to accept the null hypothesis lies on the Jarque-Bera probability value.

However if the value of the Jarque-Bera probability is more than 0.5 implies accepting the null hypothesis that the variables are normally distributed and fit for estimation.

3.4 Autoregressive Distributed Lag Estimates

ARDL model was introduced by Pesaran et al. (2001) in order to incorporate I(0) and I(1) variables in same estimation so, if your variables are stationary at I(0) then OLS is appropriate and if all are non-stationary I(1) then it is advisable to do VECM (Johanson Approach) as it is much simple model.

We cannot estimate conventional OLS on the variables if any one of them or all of them are (1) because these variable will not behave like constants which is required in OLS and as most of them are changing in time so OLS will mistakenly show high t values and significant results but in reality it would be inflated because of common time component, in econometric it is called spurious results where R square of the model becomes higher than the Durban Watson Statistic. So we move to a new set of models which can work on I(1) variable

In order to run ARDL some preconditions needed to be checked

- Dependent must be non-stationary in order for the model to behave better.
- None of the variable should be I(2) in normal conditions (ADF test)
- none of the variable should be I(2) in structural break (Zivot Andrews test)

3.5 Model Specification

$\Delta \text{InRGDP} = \alpha_0 + \partial_2 \text{ In } AQU_{t-1} + \partial_3 \text{ In } STR_{-1} + \sum_{i=0}^{q} \Omega \, \Delta\text{In } GFCF_{t-1} + \sum_{m=0}^{q} \lambda \, \Delta\text{In } INF_{t-1} + \sum_{n=0}^{q} \phi \Delta\text{In} EXR_{t-1} + \varepsilon_t$ ……………………………………………………………………...(3.7)

Were ∂_i are the long run multipliers, α_o is the intercept, Ω and λ are the speed of adjustment and ε_t is the error term.

RGDP = Real gross domestic product

AQU =proceed from Aqua resources

STR = proceed from Sea Transportation

INF= Inflation

GFCF= Gross fixed capital formation

EXR = Exchange rate

3.6 Error Correction Model

The error correction model was used to answer objective III of the study it express the relationship between RGDP and INSDEX. The error correction model (ECM) was specified below

$\Delta\text{In } RGDP_t = \alpha_0 + \sum_{j=1}^{q} \gamma \, j \Delta InAQU_{t-j} + \sum_{m=0}^{q} \Omega m \, j \Delta InSTR_{t-m} + \sum_{z=0}^{q} \phi z \, \Delta InGFCF_{t-z} + \sum_{m=0}^{q} \Omega m \, j \Delta InINF_{t-m} + \sum_{z=0}^{q} \phi z \, \Delta InEXR_{t-z} \Pi ecm_{t-1} + \varepsilon_t$ …………………………….(3.8)

4. Results and Discussion

Table 1.

	RGDP	AQU	GFCF	EXR	INF	STR
Mean	27.44581	22.89638	25.28356	207.7500	23.73626	68.61546
Median	27.43547	22.15243	25.33990	138.0000	24.94306	67.49200
Maximum	30.67273	25.15591	28.29214	800.0000	27.35679	103.0810
Minimum	24.64067	20.64135	22.89796	45.00000	19.23400	44.34520

Std. Dev.	2.092329	1.542474	1.697130	184.7552	2.621560	19.90482
Skewness	0.014014	0.281014	0.148851	1.987143	-0.354514	0.248450
Kurtosis	1.544439	1.587295	1.716431	6.354992	1.685155	1.663229
Jarque-Bera	2.472683	2.696880	2.025537	31.55941	2.603463	2.372846
Probability	0.00455	0.000645	0.00012	0.000000	0.000060	0.000011
Sum	768.4827	641.0987	707.9396	5817.000	664.6152	1921.233
Sum Sq. Dev.	118.2017	64.23913	77.76673	921631.3	185.5596	10697.45
Observations	28	28	28	28	28	28

Source: Computed by Authors Using Evies 10

From table 4.1 is the descriptive statistics which one of the pre-condition on a data before analysis is carried out the above result of the descriptive statistics reveal that all variable under consideration are suitable and fir for the analysis. This is reveal by the Jarque-Beran probability values of the 0.00455, 0.00645, 0.00012, 0.000000, 0.000060, and 0.000011 of the variable RGDP, AQU.GFCF, EXR, INF and STR respectively are less than 0.005 which fall within the acceptances level while the values of the kurtosis fall with the acceptance region and the variable is not skewed to one direction as shown by the values of it skewness.

Table 2. Augmented Dickey-Fuller Test

Variable	test statistic	critical values	probability	Stationarity
RGDP	-4.142737	-3.711457	0.0036	I(I)
AQU	-6.494575	-3.711457	0.0000	I(I)
GFCF	-4.070136	-3.737853	0.0004	I(I)
EXR	-1.524725	-3.752946	0.0008	I(I)
STR	-5.674493	-3.711457	0.0001	I(I)
INF	-4.876025	-3.711457	0.0005	I(0)

Source: Computed by Authors

Table 1 is the augmented Dickey-Fuller unit root test carried out to determine the stationary condition of each variable which is a necessary condition in other to determine the suitable method of analysis to avoid a spurious result. From the analysis the test statistics value of -4.142737 for RGDP is less that the critical value of -3.711457 and the probability value of 0.0036 is less than 0.005 which denotes rejection of the hypothesis that RGDP has unit root and accept the alternative that RGDP has no unit at 1%, similarly the test statistics value of -6.494575 for AQU is less that the critical value of -3.711457 and the probability value of 0.0000 is less than 0.005 which denotes rejection of the hypothesis that AQU has unit root and accept the alternative that AQU has no unit at 1%, similarly on the same vein the test statistics value of -4.070135 for GFCF is less that the critical value of -3.737853 and the probability value of 0.0036 is less than 0.005 which denotes rejection of the hypothesis that GFCF has unit root and accept the alternative that GFCF has no unit at 1%, similarly.

Furthermore, the test statistics value of -1.524725 for EXR is less that the critical value of -3.752946 and the probability value of 0.0008 is less than 0.005 which denotes rejection of the hypothesis that EXR has unit root and accept the alternative that EXR has no unit at 1%, also the test statistics value of -5.674493 for STR is less that the critical value of -3.711457 and the probability value of 0.0001 is less than 0.005

which denotes rejection of the hypothesis that STR has unit root and accept the alternative that STR has no unit at 1% this show that all variable are non-stationary variable but became stationary after first differencing at 1% level also and on a different measurement INF is a stationationary series as it is reveals by the test statistics value of -4.876025 which is less that critical test value of -3.711457 with a probability value of 0.0005 which denotes accepted the alternative that INF is a stationary series.

Based on the stationary condition of the variables Autoregressive Distributed Lag Estimates is selected for the analysis which is capable of incorporation I (0) and I (0) in the same estimation

Table 3. Autoregressive Distributed Lag Estimate

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
AQU	.19858	.074555	2.6636[.001]
STR	.00441269	.0049818	.82839[.417]
EXR	-.01618E-4	.2971E-3	.054456[.007]
GFCF	.0127137	.11549	2.3497[.002]
INF	-.16570	.045271	3.6603[.002]

Source: Computed by Authurs Using Microfit

Table 3 is the estimate for the variable under consideration from the analysis is reveals that 1 unit increase in real gross domestic product RGDP in Nigeria, is as a result 19.855 percent of AQU which is the proxy for proceed from marine resources in the model secondly the finding of the study reveals that 1 unit increase in real gross domestic product is influence by only 4 percent of STR which is a proxy for proceed from sea transportation.

The analysis of the finding also reveal that exchange rate has affected marine transport negatively during the period under review. The analysis reveals that 1 unit increase in exchange rate will lead to 6 percent decrease in real gross domestic product in Nigeria for the period under study, similarly the findings of the study reveals that 1 unit increase in gross domestic product is influence 0127 percent of gross fixed capital formation and lastly 1 unit increase in real gross domestic product will lead to 0.1657 percent decrease in inflation. The probability values for AUQ, EXR, INF and GFCF show that the variables are significant.

Table 4. Error Correction Representation for the Selected ARDL Model

Regressor	Coefficient	Standard Error	Ratio [Prob]
dAQU	.19858	.074555	2.6636[.015]
dSTR	-.0041269	.0049818	.82839[.417]
dEXR	.1618E-4	.2971E-3	.054456[.957]
dGFCF	.27137	.11549	2.3497[.029]
dINF	.16570	.045271	3.6603[.001]
ecm(-1)	-.62003	.16937	3.6609[.001]

Source: Computed by Authors Using Microfit.

Table 4 is the error correction model which show that if there is deviation from equilibrium from the variables under consideration it adjust back to equilibrium by 62 percent as the speed of adjustment.

The analysis reveal that even the variables exhibit random work will converge after 6 year 2month which show a short run relation.

4.1 Discussion of Findings.

The findings of the study reveals that proceed from marine resources contributes to 19% to the real gross domestic product which is the proxy for economic growth, while only 4% of the proceed from sea transportation contributes to real gross domestic product, the result of the finding reveals that both exchange rate and inflation affect real gross domestic product negatively while only 12% of the access to marine potentials have been utilized which in summary entails that Nigeria is not harnessing up to 15% of its marine resources which is capable of contributing to its real gross domestic product

5. Recommendations

Having fund out the positive contribution of marine resources and it potentials to the Nigerian economy, the study recommend that;

Government should ensure proper utilization of Nigerian water ways in other to harness it potential secondly government should build more infrastructure in and acquire modern technology to deal with illegal fishing and improper use of Nigerian water ways and thirdly the ministry of blue and marine economy need necessary legislative framework to strengthen its activities and also to be able to monitor the Nigerian water ways effectively.

References

Abhinav, K. A., Collu, M., Benjamins, S., Cai, H., Hughes, A., Jiang, B., Jude, S., Leithead, W., Lin, C., Liu, H., Recalde-Camacho, L., Serpetti, N., Sun, K., Wilson, B., Yue, H., & Zhou, B. Z. (2020). Offshore multi-purpose platforms for a blue growth: A technological, environmental and socio-economic review. *Science of the Total Environment*, *734*, 138256. https://doi.org/10.1016/j.scitotenv.2020.138256

Abdullahi, N. J. (2018). Navigating a just and inclusive path towards Sustainable Oceans. *Marine Policy*, *97*, 139-146. https://doi.org/10.1016/j.marpol.2018.06.001

Adeyemi, R. J., & Abiodum, S. C. (2021). Climate change mitigation potential of wind energy. *Climate*, *9*(9), 136. https://doi.org/10.3390/cli9090136

Bari, A. (2017). Our Oceans and the Blue Economy: Opportunities and challenges. *Procedia Engineering*, *194*, 5-11. https://doi.org/10.1016/j.proeng.2017.08.109

Bond, P. (2019). Blue Economy Threats, contradictions and resistances seen from South Africa. *Journal of Political Ecology*, *26*(1). https://doi.org/10.2458/v26i1.23504

Chandler, D. (2017). The Security Development Nexus and the Rise of Anti-Foreign Policy. *Journal for International Relations and Development*. 10. 362-386

Harrod, R.F & Domar, E. (1957). Essay on the Theories of Economic Growth. *London. Oxford University Press*

McCammon, A. L. T. (1992). United Nations Conference on Environment and Development, held in Rio de Janeiro, Brazil, during 3–14 June 1992, and the '92 global forum, Rio de Janeiro, Brazil, 1–14 June 1992. *Environmental Conservation*, *19*(4), 372-373. https://doi.org/10.1017/s0376892900031647

Nath, B. (2005). Education for Sustainable Development: The Johannesburg Summit and beyond. *The World Summit on Sustainable Development*, 275-298. https://doi.org/10.1007/1-4020-3653-1_12

Nwaneogbo, C.J. & Odigbo J. (2013). Security and the challenges of development in Nigeria. *Journal of Humanities and social Science 3(4) 285-291.*

Smith-Godfrey, S. (2016). Defining the blue economy. *Maritime Affairs: Journal of the National Maritime Foundation of India*, *12*(1), 58-64. https://doi.org/10.1080/09733159.2016.1175131

Stieglitz, B.(2010). Ethno-Religious Conflict in Nigeria. Causes and Proposal for New Management

Strategies. *European Journal of Social Science.* 13(3),:345-353.

Pauli, G. A. (2011). *The Blue Economy*. Paradigm Publications.

Rees, S. E., Foster, N. L., Longhead, O., Pittman, S., & Johnson, D. E. (2018). Defining the qualitative elements of Aichi Biodiversity target 11 with regard to the Marine and coastal environment in order to strengthen global efforts for marine biodiversity conservation outlined in the United Nations Sustainable Development goal 14. *Marine Policy*, *93*, 241-250. https://doi.org/10.1016/j.marpol.2017.05.016

Rostow, W. (1952). *The Process of Economic Growth*. New York. Morton & Co.Inc.

APPENDIX

	RGDP	AQU	GFCF	EXR	INF	STR
Mean	27.44581	22.89638	25.28356	207.7500	23.73626	68.61546
Median	27.43547	22.15243	25.33990	138.0000	24.94306	67.49200
Maximum	30.67273	25.15591	28.29214	800.0000	27.35679	103.0810
Minimum	24.64067	20.64135	22.89796	45.00000	19.23400	44.34520
Std. Dev.	2.092329	1.542474	1.697130	184.7552	2.621560	19.90482
Skewness	0.014014	0.281014	0.148851	1.987143	-0.354514	0.248450
Kurtosis	1.544439	1.587295	1.716431	6.354992	1.685155	1.663229
Jarque-Bera	2.472683	2.696880	2.025537	31.55941	2.603463	2.372846
Probability	0.290445	0.259645	0.363212	0.000000	0.272060	0.305311
Sum	768.4827	641.0987	707.9396	5817.000	664.6152	1921.233
Sum Sq. Dev.	118.2017	64.23913	77.76673	921631.3	185.5596	10697.45
Observations	28	28	28	28	28	28

Null Hypothesis: RGDP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.485144	0.9829
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RGDP)

Method: Least Squares

Date: 04/21/24 Time: 10:15

Sample (adjusted): 1997 2023

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP(-1)	0.008453	0.017423	0.485144	0.6318
C	-0.007569	0.477369	-0.015856	0.9875

R-squared	0.009327	Mean dependent var	0.223410
Adjusted R-squared	-0.030300	S.D. dependent var	0.177888
S.E. of regression	0.180563	Akaike info criterion	-0.514289
Sum squared resid	0.815073	Schwarz criterion	-0.418301
Log likelihood	8.942902	Hannan-Quinn criter.	-0.485747
F-statistic	0.235365	Durbin-Watson stat	1.605207
Prob(F-statistic)	0.631798		

Null Hypothesis: D(RGDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.142737	0.0036
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RGDP,2)

Method: Least Squares

Date: 04/21/24 Time: 10:16

Sample (adjusted): 1998 2023

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RGDP(-1))	-0.817098	0.197236	-4.142737	0.0004
C	0.189259	0.056819	3.330905	0.0028

R-squared	0.416942	Mean dependent var	0.003230
Adjusted R-squared	0.392648	S.D. dependent var	0.227778
S.E. of regression	0.177514	Akaike info criterion	-0.545734
Sum squared resid	0.756267	Schwarz criterion	-0.448957
Log likelihood	9.094536	Hannan-Quinn criter.	-0.517865
F-statistic	17.16227	Durbin-Watson stat	2.023945
Prob(F-statistic)	0.000367		

Null Hypothesis: AQU has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.648149	0.8434
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(AQU)

Method: Least Squares

Date: 04/21/24 Time: 10:17

Sample (adjusted): 1997 2023

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AQU(-1)	-0.025747	0.039724	-0.648149	0.5228

C	0.748990	0.908365	0.824547	0.4174

R-squared	0.016526	Mean dependent var	0.161479
Adjusted R-squared	-0.022813	S.D. dependent var	0.303349
S.E. of regression	0.306789	Akaike info criterion	0.545877
Sum squared resid	2.352994	Schwarz criterion	0.641865
Log likelihood	-5.369336	Hannan-Quinn criter.	0.574419
F-statistic	0.420097	Durbin-Watson stat	2.503600
Prob(F-statistic)	0.522798		

Null Hypothesis: D(AQU) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.494575	0.0000
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(AQU,2)

Method: Least Squares

Date: 04/21/24 Time: 10:18

Sample (adjusted): 1998 2023

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AQU(-1))	-1.296975	0.199701	-6.494575	0.0000
C	0.212873	0.068652	3.100773	0.0049

R-squared	0.637350	Mean dependent var	-0.012330
Adjusted R-squared	0.622240	S.D. dependent var	0.491556

S.E. of regression	0.302121	Akaike info criterion	0.517828
Sum squared resid	2.190656	Schwarz criterion	0.614605
Log likelihood	-4.731763	Hannan-Quinn criter.	0.545696
F-statistic	42.17951	Durbin-Watson stat	1.872034
Prob(F-statistic)	0.000001		

Null Hypothesis: GFCF has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.537406	0.8670
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GFCF)

Method: Least Squares

Date: 04/21/24 Time: 10:18

Sample (adjusted): 2000 2023

Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCF(-1)	-0.017538	0.032635	-0.537406	0.5972
D(GFCF(-1))	0.348396	0.203003	1.716212	0.1024
D(GFCF(-2))	-0.366984	0.227056	-1.616270	0.1225
D(GFCF(-3))	0.556276	0.237645	2.340786	0.0303
C	0.555362	0.801545	0.692864	0.4968

R-squared	0.281385	Mean dependent var	0.207436
Adjusted R-squared	0.130097	S.D. dependent var	0.229393
S.E. of regression	0.213952	Akaike info criterion	-0.063079

Sum squared resid	0.869733	Schwarz criterion	0.182349
Log likelihood	5.756949	Hannan-Quinn criter.	0.002033
F-statistic	1.859936	Durbin-Watson stat	1.812858
Prob(F-statistic)	0.159131		

Null Hypothesis: D(GFCF) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.070136	0.0004
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GFCF,2)

Method: Least Squares

Date: 04/21/24 Time: 10:19

Sample (adjusted): 2000 2023

Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFCF(-1))	-0.552576	0.266927	-2.070136	0.0516
D(GFCF(-1),2)	-0.136702	0.228089	-0.599338	0.5557
D(GFCF(-2),2)	-0.507151	0.215425	-2.354188	0.0289
C	0.125976	0.062700	2.009185	0.0582

R-squared	0.563224	Mean dependent var	0.019852
Adjusted R-squared	0.497708	S.D. dependent var	0.296467
S.E. of regression	0.210113	Akaike info criterion	-0.131326
Sum squared resid	0.882953	Schwarz criterion	0.065016
Log likelihood	5.575918	Hannan-Quinn criter.	-0.079237

F-statistic	8.596696	Durbin-Watson stat	1.778574
Prob(F-statistic)	0.000726		

Null Hypothesis: EXR has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.194244	1.0000
Test critical values:	1% level	-3.724070	
	5% level	-2.986225	
	10% level	-2.632604	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(EXR)

Method: Least Squares

Date: 04/21/24 Time: 10:20

Sample (adjusted): 1999 2023

Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR(-1)	0.331544	0.103794	3.194244	0.0044
D(EXR(-1))	0.363550	0.300735	1.208869	0.2401
D(EXR(-2))	-1.056835	0.338167	-3.125186	0.0051
C	-25.72750	13.94223	-1.845292	0.0791

R-squared	0.716374	Mean dependent var	29.32000
Adjusted R-squared	0.675856	S.D. dependent var	49.63342
S.E. of regression	28.25810	Akaike info criterion	9.666284
Sum squared resid	16768.92	Schwarz criterion	9.861304
Log likelihood	-116.8285	Hannan-Quinn criter.	9.720374
F-statistic	17.68042	Durbin-Watson stat	1.861630
Prob(F-statistic)	0.000006		

Null Hypothesis: D(EXR) has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.524725	0.0008
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(EXR,2)

Method: Least Squares

Date: 04/21/24 Time: 10:21

Sample (adjusted): 2001 2023

Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR(-1))	1.116532	0.732284	1.524725	0.1447
D(EXR(-1),2)	-1.278588	0.884142	-1.446134	0.1653
D(EXR(-2),2)	-1.849458	0.769060	-2.404830	0.0272
D(EXR(-3),2)	-0.955852	0.576419	-1.658258	0.1146
C	-3.545769	10.51780	-0.337121	0.7399

R-squared	0.398550	Mean dependent var	3.391304
Adjusted R-squared	0.264894	S.D. dependent var	37.69946
S.E. of regression	32.32287	Akaike info criterion	9.979087
Sum squared resid	18805.82	Schwarz criterion	10.22593
Log likelihood	-109.7595	Hannan-Quinn criter.	10.04117
F-statistic	2.981919	Durbin-Watson stat	2.053667
Prob(F-statistic)	0.047241		

Null Hypothesis: STR has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.573648	0.9862
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(STR)

Method: Least Squares

Date: 04/21/24 Time: 10:22

Sample (adjusted): 1997 2023

Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STR(-1)	0.019851	0.034605	0.573648	0.5713
C	0.798131	2.418844	0.329964	0.7442

R-squared	0.012992	Mean dependent var	2.134952
Adjusted R-squared	-0.026488	S.D. dependent var	3.324226
S.E. of regression	3.367965	Akaike info criterion	5.337682
Sum squared resid	283.5797	Schwarz criterion	5.433670
Log likelihood	-70.05870	Hannan-Quinn criter.	5.366224
F-statistic	0.329073	Durbin-Watson stat	2.332393
Prob(F-statistic)	0.571331		

Null Hypothesis: D(STR) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.674493	0.0001
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(STR,2)

Method: Least Squares

Date: 04/21/24 Time: 10:22

Sample (adjusted): 1998 2023

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(STR(-1))	-1.147459	0.202213	-5.674493	0.0000
C	2.540556	0.803362	3.162407	0.0042

R-squared	0.572953	Mean dependent var	-0.007627
Adjusted R-squared	0.555159	S.D. dependent var	5.092681
S.E. of regression	3.396635	Akaike info criterion	5.357251
Sum squared resid	276.8911	Schwarz criterion	5.454028
Log likelihood	-67.64426	Hannan-Quinn criter.	5.385119
F-statistic	32.19987	Durbin-Watson stat	2.019605
Prob(F-statistic)	0.000008		

Null Hypothesis: INF has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.876025	0.0005
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INF)

Method: Least Squares

Date: 04/21/24 Time: 10:24

Sample (adjusted): 1998 2023

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	-0.041776	0.047688	-0.876025	0.3901
D(INF(-1))	-0.514468	0.173350	-2.967800	0.0069
C	1.434840	1.137566	1.261324	0.2198

R-squared	0.301122	Mean dependent var	0.284968
Adjusted R-squared	0.240350	S.D. dependent var	0.673768
S.E. of regression	0.587242	Akaike info criterion	1.881407
Sum squared resid	7.931617	Schwarz criterion	2.026572
Log likelihood	-21.45829	Hannan-Quinn criter.	1.923209
F-statistic	4.954937	Durbin-Watson stat	1.861807
Prob(F-statistic)	0.016241		

Autoregressive Distributed Lag Estimates

ARDL(1,0,0,0,0,1) selected based on Schwarz Bayesian Criterion

****

Dependent variable is RGDP

27 observations used for estimation from 1997 to 2023

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RGDP(-1)	.37997	.16937	2.2435[.036]
AQU	.19858	.074555	2.6636[.001]
STR	.00441269	.0049818	.82839[.417]
EXR	-.01618E-4	.2971E-3	.054456[.007]
GFCF	.0127137	.11549	2.3497[.001]
INF	-.16570	.045271	3.6603[.002]
INF(-1)	.086742	.053667	1.6163[.002]

****

R-Squared	.99684	R-Bar-Squared	.99589
S.E. of Regression	.13182	F-stat. F(6, 20)	1052.1[.000]
Mean of Dependent Variable	27.5497	S.D. of Dependent Variable	2.0573
Residual Sum of Squares	.34753	Equation Log-likelihood	20.4508
Akaike Info. Criterion	13.4508	Schwarz Bayesian Criterion	8.9154
DW-statistic	2.1873	Durbin's h-statistic	1.0247[.306]

****

Diagnostic Tests

****

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(1)= .38935[.533]	F(1, 19).27799[.604]
B:Functional Form	CHSQ(1)= .80787[.369]	F(1, 19).58604[.453]
C:Normality	CHSQ(2)= 5.6122[.060]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .028152[.867]	F(1, 25)026094[.873]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted valu

Error Correction Representation for the Selected ARDL Model

ARDL(1,0,0,0,0,1) selected based on Schwarz Bayesian Criterion

****

Dependent variable is dRGDP

27 observations used for estimation from 1997 to 2023

****

Regressor	Coefficient	Standard Error	Ratio[Prob]
dAQU	.19858	.074555	2.6636[.015]
dSTR	-.0041269	.0049818	.82839[.417]
dEXR	.1618E-4	.2971E-3	.054456[.957]
dGFCF	.27137	.11549	2.3497[.029]
dINF	.16570	.045271	3.6603[.001]
ecm(-1)	-.62003	.16937	3.6609[.001]

****

List of additional temporary variables created:

dRGDP = RGDP-RGDP(-1)

dAQU = AQU-AQU(-1)

dSTR = STR-STR(-1)

dEXR = EXR-EXR(-1)

dGFCF = GFCF-GFCF(-1)

dINF = INF-INF(-1) ecm
= RGDP -.32028*AQU + .0066559*STR -.2610E-4*EXR -.43768*GFCF .4071 5*INF

****

R-Squared	.57760	R-Bar-Squared	.45088
S.E. of Regression	.13182	F-stat. F(5, 21)	5.4698[.002]
Mean of Dependent Variable	.22341	S.D. of Dependent Variable	.17789
Residual Sum of Squares	.34753	Equation Log-likelihood	20.4508
Akaike Info. Criterion	13.4508	Schwarz Bayesian Criterion	8.9154
DW-statistic	2.1873		

****

R-Squared and R-Bar-Squared measures refer to the dependent variable

dRGDP and in cases where the error correction model is highly

Restricted, these measures could become negative.