ROBUST DATA ON GOVERNMENT EXPENDITURE ON CLIMATE CHANGE MANAGEMENT AND E FFECT ON AGRICULTURAL CONTRIBUTION TO THE GROSS DOMESTIC PRODUCT OF NIGERIA (2012 – 2022)

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ABSTRACT

Climate change management is a collective responsibility of individuals, gover nment, non-governmental organizations and donor agencies. Managing climat e change hazard has financial implications. Evidence-based information on th e sources, trend, distribution of funds for climate change management and its effect on agricultural performance, is limited and deserves critical investigatio n. The study examined government expenditure on climate change managem ent and its' effect on agricultural value added to GDP of Nigeria. The justificati on for this study lies in its potential to improve our understanding of the relati onship between government expenditure on climate change management and agricultural value added to GDP of Nigeria. Secondary data were collected fro m the statistics database of Central Bank of Nigeria (CBN). Trend analysis an d multiple regression models were used to achieve the objectives. The result s hows that annual mean amount of ₦1,137,036,363.64 was expended on clima te change management in Nigeria (2012 -2022). Further finding shows that cli mate change financing has a positive and significant (P ≤ 0.05) effect on agri cultural contribution to GDP of Nigeria. The positive coefficient indicates that a percentage increase in climate change financing will translate to proportion ate increase in agricultural contribution to GDP of Nigeria. The R^2 which is the coefficient of determination shows that 47% of the total variation in agricultur al GDP was explained by climate change financing. We found sufficient evide nce to conclude, that more funding of climate change management will boost agricultural development in Nigeria.

KEYWORDS: government expenditure, climate change management, effect, agr iculture, gross domestic product, Nigeria

INTRODUCTION

Climate change refers to any change in climate over time, whether due to natur al agents or human activity (Nnaji, 2012, IPCC, 2007). Climate change has bec ome a global issue in recent times manifesting in variations of different climat e parameters including cloud cover, precipitation, temperature ranges, sea level s and vapour pressure (Ministry of Environment of the Federal Republic of Nig eria (MoEFRN) 2003).

Climate change is a major threat to food security in many regions of the devel oping world, which are largely dependent on rain-fed and labor-intensive agricu ltural production (Emaziye, et al (2013). Developing countries, especially in Afri ca, face substantial risks from climate change due to increased vulnerability of their agricultural systems and weak adaptive potential of farmers. (Achoja, et a l (2018)

There is evidence of the worsened climate change on the performance of agric ulture globally. Climate change management in the form of adaptation and mi

tigation has financial implications. However, there is no empirical evidence on the expenditure of Nigeria Government on climate change adaptation (Achoja, et al (2018). Funding of climate change adaptation could have an underlying a ssumption in terms of it's relationship with agricultural performance and GDP. The variations in climate parameters affect different sectors of the economy s uch as agriculture, health, water resources, energy etc.

The level of Government expenditure is critical to economic development indic ators such as Gross Domestic Product (GDP). Government expenditure on hu man capital (farmers) can enhance their resilience to participate in climate cha nge adaptation.

Climate change management is increasingly becoming an area of growing inte rest and engagement for many developing countries that unfortunately bear th e brunt of an overheating planet caused by developed countries. The uncertain effects of a changing climate on Nigeria's economy pose significant setbacks for meeting development targets like Nigeria's aspiration to be among the twen ty best performing economies of the world (Stanley, 2012).

Financing climate change is a critical issue globally, and Nigeria is no differen

t. Climate change management projects in Nigeria have been funded mostly b y international organizations', even if implemented at national and sub-nationa l levels. Like most nations in Sub-Saharan Africa, Nigeria relies on foreign loan s, aid and grants to finance more than 50% of its climate adaptation and mitig ation activities.

Climate change is a global phenomenon that serious threats on human health, agriculture and natural resources. Nigeria is highly vulnerable to the impact of climate change and requires adequate financing to mitigate and adopt to thes e impacts. However, there is lack of information regarding the trend of financin g climate change management in Nigeria.

One of the major challenges facing climate change management is the lack of funding. The sources of funding for climate change management are limited a nd often insufficient to meet the needs of vulnerable communities and ecosyst em.

The agricultural sector is an essential part of any country's economy as it provi des food, fiber and other raw materials that are required for industrial producti on. Therefore, it is crucial to analyze the trend of agricultural value added to G

DP to understand the overall health of the agricultural sector and it's contributi on to the economy.

The relationship between climate change financing and agricultural value add ed to GDP is an important topic to, it can help to understand the impact of clim ate change financing on agriculture which is one of the critical sectors affecte d by climate change.

Climate change management can be costly, and it is necessary to understand how the expenditure on such management is distributed. : Government expend iture includes investments in climate-specific projects, such as renewable ener gy, sustainable agriculture, and disaster preparedness, Expenditure on Adaptati on, Expenditure on Mitigation, Expenditure on Disaster management, Expendit ure on Climate change research and development, Expenditure on Climate cha nge intervention funding, Expenditure on human resource development for cli mate change (Achoja, et al, 2018, Ajiboye, et al., 2020).

Several studies (Adeniyi et al., 2021; Oladele &Agbonlahor, 2019) have explore d domestic financing mechanisms to support climate-smart agriculture in Nige ria. These mechanisms include government budget allocations, climate bonds,

and attracting private sector investments into the agricultural sector. Research indicates that enhancing domestic funding for climate-resilient agriculture is e ssential to complement international climate finance.

The nexus between climate finance and agricultural value added to Nigeria's G DP has been investigated by scholars. Some studies suggest that increased cli mate finance leads to higher agricultural productivity and resilience (UNEP, 202 1). Climate-smart agricultural practices, such as improved irrigation systems a nd the introduction of drought-resistant crop varieties, funded through climate finance, have the potential to increase crop yields, thereby contributing positive ly to GDP (Ojo, et al., 2021).

While climate finance holds promise, numerous challenges and barriers must be addressed to maximize its impact. Challenges include a lack of transparenc y and accountability in fund disbursement (Ajiboye et al., 2020) as well as frag mented nature of climate finance sources and ineffective governance of finan cing of climate change management.

However, studies suggest that Nigeria faces challenges in efficiently accessing these funds due to bureaucratic procedures and limited capacity (Ajiboye et al.,

2020).

The study's significance lies in its potential to improve our understanding of th e relationship between government expenditure on climate change manageme nt and agricultural value added to GDP of Nigeria, thus providing valuable insi ghts for policymakers and contributing to the overall development of the count ry.

The broad objective of this study is to investigate the relationship between gov ernment expenditure on climate change management and its effect on agricult ural value added to GDP in the period under review.

Specifically the study was designed to:

i. ascertain the trend of financing of climate change management;

ii. identify the sources of funding for climate change management ;

iii. examine the trend of agricultural value added to GDP of Nigeria f or the past 10 years (2010 – 2022); and

iv. estimate the relationship between climate change financing and agricultural value added to GDP of Nigeria for the past 10 years.

(2010 – 2022)

The following hypotheses were tested to guide the study.

Ho1: Climate change financing has no significant effect on agricultural value added to GDP of Nigeria.

MATERIALS AND METHODS

The Study Area

Figure 1: Map of the Federal Republic of Nigeria.

Wikipedia (2016)

The Federal Republic of Nigeria was the study area. Geographically, Nigeria oc cupies a landmass of 923,768sq km in the West Coast of Africa between the l atitudes of 4° and 14`N and longitudes of 2° 45` and 14° 30`E. Nigeria shares boundaries with Niger Republic to the North, Benin Republic to the West. Chad

and Cameroon to the East and Gulf of Guinea (Atlantic Ocean) to the South (Figure 1) with a population of 140,003,542 Persons (NPC, 2007). Although the country is blessed with abundant land, natural resources and Labour, it is highly vulnerable to extreme climate events. **Methods of Data Collection**

Secondary data (Time series) were collected from the statistics database of Central Bank of Nigeria and Green Climate Fund from 2012 to 2022 which includes variables as follows, expenditure on climate change, agricultural value added to GDP and total agricultural GDP of Nigeria.

Methods of Data Analysis

1. Trend analysis was used to achieve objective 1 (Trend of funding of climate change management
2. The sources of funding climate change were analyzed with the aid of bar chart
3. Trend of agricultural value added to GDP of Nigeria was achieved using trend analysis
4. The relationship between climate change financing and agricultural

value added to GDP of Nigeria were estimated using multiple regression model

Model Specification

The implicit form of the estimated model is specified as

$AGDP_t = F(ccf, CL, land, Labour, Agro\ chemicals, extension\ information, n)$

The explicit function of the model is specified as ;

$$AGDP_t = \beta_0 + \beta_1 CRD + \beta_2 EXINFO + \beta_3 CL + \beta_4 LAND + \beta_5 AGROCHM + \beta_6 LABOUR + \beta_7 CCF + Ű$$

RESULTS AND DISCUSSION

Trend of financing of climate change management in Nigeria

The data in Table 1 shows the amount put into financing climate change management in Nigeria for the past 10 years. From the trend in figure 2, it was observed that financing of climate change management had an increasing trend from $257,600,000 in year 2012 to $1,469,200,000 in year 2017. It later dropped to $140,000,000 in 2018. This drop in financing climate change could be as a r

esult of new policies implemented by the President Buhari's administration in t he year 2018. From the year 2018 the financing of climate change manageme nt continued to witness an uptrend till the year 2022. The maximum value of fi nancing of climate change management was $1,755,400,000 and was recorde d in the year 2019 while the minimum value was $140,000,000 which was reco rded in the year 2018.

In 2012, there was a flooding disaster in Nigeria. The fear of this disaster repea ting itself prompted the government to invest a lot of money into climate chan ge financing in 2013 which took effect in 2014. The disaster led to a upward in crease in funding of climate change till 2017. The funding then reduced by 9 0% in 2018 because there was no flooding disaster recorded for the past 5yea rs. From the year 2022, there was a continuous upward trend because of the a wareness by international donors agencies.

Table .1: Data on the amount invested in climate change management

Year	Amount (₦)	Yearly Rate (%)
2012	257,600,000	__
2013	288,800,000	12.11

2014	340,400,000	17.87
2015	717,600,000	110.81
2016	1,391,000,000	93.84
2017	1,469,200,000	5.62
2018	140,000,000	-90.47
2019	1,755,400,000	1,153.85
2020	1,253,000,000	-28.62
2021	1,573,000,000	25.54
2022	1,717,000,000	9.15

Annual mean amount = ₦1,137,036,363.64

Source: Data Report Generated from Statistics Database of CBN and Green Climate Fund (2023).

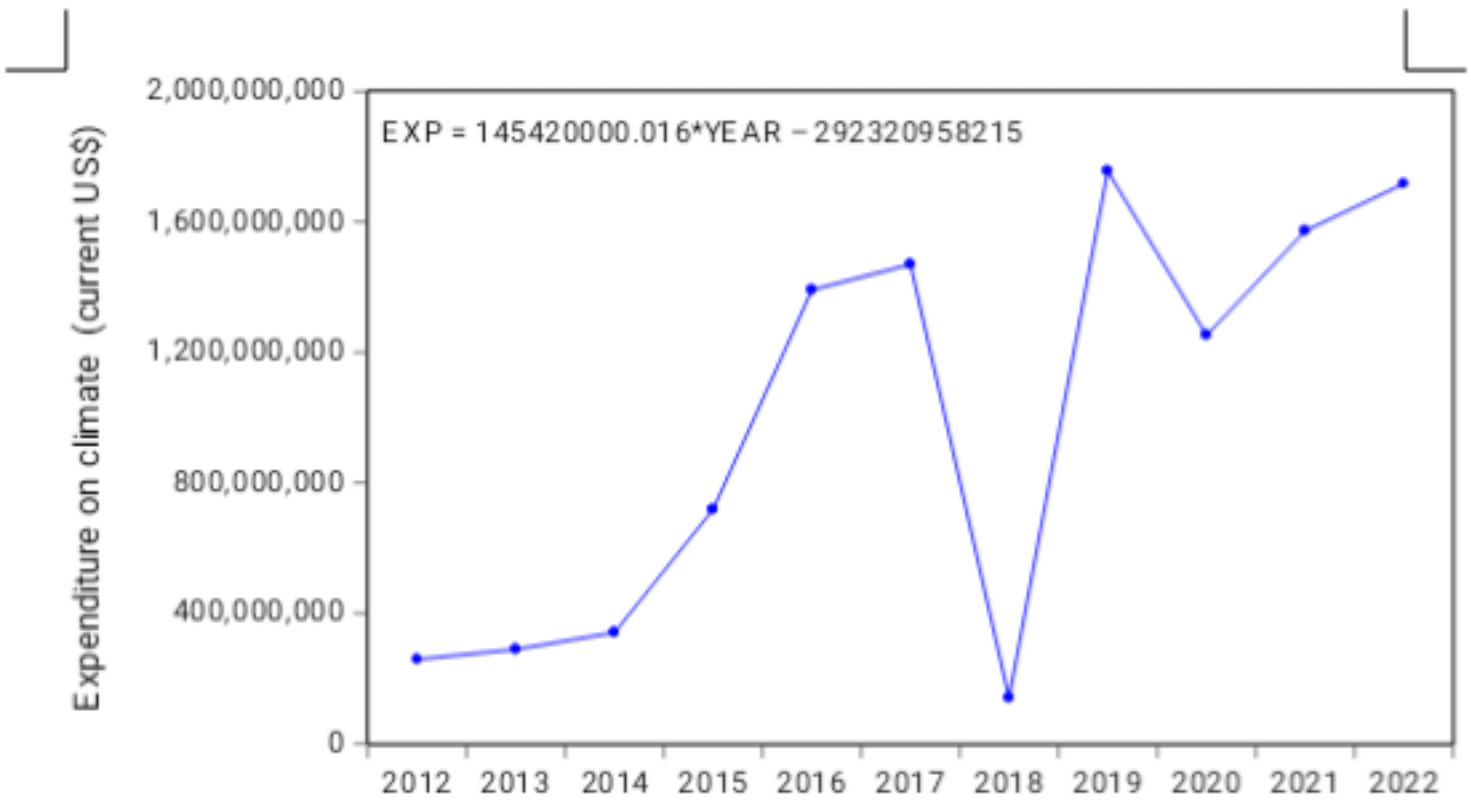

Figure 2: Trend of financing of climate change management in Nigeria

4.2 Sources of funding for climate change management in Nigeria

The result in figure 4.2 shows the sources of funding of climate change mana gement. It is observed that Domestic public budgets which is Nigeria's budget on climate change has the highest amount of funding with $10,000 million foll owed by multilateral development banks with a total of $5,000.

The domestic public budget in Nigeria refers to the annual financial plan or bu dget prepared and approved by the Nigerian government for the fiscal year. Th is budget outlines the government's projected revenues and planned expenditu

re on climate change financing. This body is responsible for majority of the fu nding of climate change because it is the government's responsibility.

Multilateral development banks (MDBs) are financial institutions that provide f inancial and technical assistance to developing countries for various purpose s, including climate change financing. MDBs play a significant role in providin g climate change financing to Nigeria. These institutions offer financial resour ces, technical expertise and policy advice to support Nigeria's effort to mitigate and adapt to the impacts of climate change.

The main goals of the sources of funding climate change management in figu re 4.2 are to provide the financial resources necessary to address climate chan ge challenges effectively. These sources of financing aim to support both miti gation (reducing greenhouse gas emissions) and adaptation (building resilienc e to the impacts of climate change) efforts.

The low funding of climate change management from sources like adaptation fund, carbon markets, NSIA, can be attributed to several factors ,including com peting priorities, budget constraints, capacity constraints, inadequate coordina tion. To address these challenges, and increase funding for climate change m

anagement in Nigeria, it is essential to improve project readiness, raise awaren ess and ensure effective coordination among government agencies and stake holders

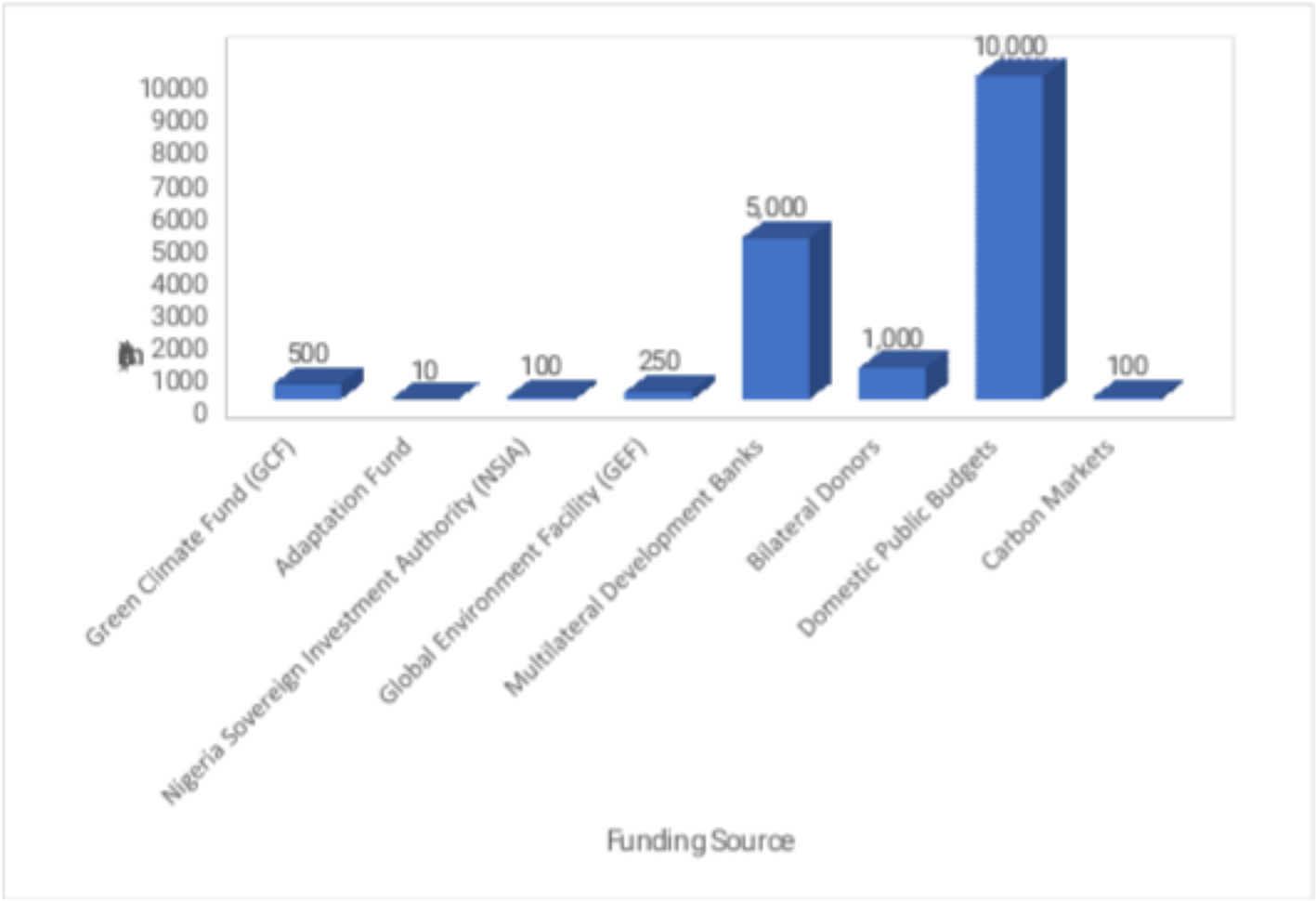

Figure 3 Sources of funding for climate change management

Trend of agricultural value added to GDP for the past 10 years (2012 - 2022)

The result in Table 2 shows the data of agricultural GDP between the years 20

12 to 2022. From the trend in Figure 3, it is observed that agricultural GDP had a decreasing trend from $114,780,809,570.22 in year 2014 to $78,330,102,476.90 in the year 2017. From 2017, it increased to $104,347,111,075.56. The highest value of agricultural GDP was $114,780,809,570.22 and was recorded in the year 2014 (World Bank/IMF/OECD/RDBs, 2014).

The lowest was $78,330,102,476.90 which was recorded in the year 2017. 16.24% was the maximum percentage increase which was recorded in the year 2019. It is also observed that from the year 2019, there was a continuous upward trend which suggests that agricultural value added to GDP has been increasing since 2019. Although there was a downward trend in 2014 to 2017, agriculture still accounted for over 21% of the total GDP of Nigeria

Table .2: Data report

Year	Amount (N)	Yearly Rate
2012	101,423,868,677.36	—
2013	107,969,160,281.68	6.45
2014	114,780,809,570.22	6.31
2015	101,720,760,574.32	-11.38

2016	84,907,953,806.49	-16.53
2017	78,330,102,476.90	-7.75
2018	89,424,627,812.52	14.16
2019	103,949,201,381.79	16.24
2020	104,347,111,075.56	0.38
2021	102,965,759,257.10	-1.32
2022	113,101,707,886.40	9.84

Source: Data Report Generated from Statistics Database of CBN and Green Climate Fund (2023)

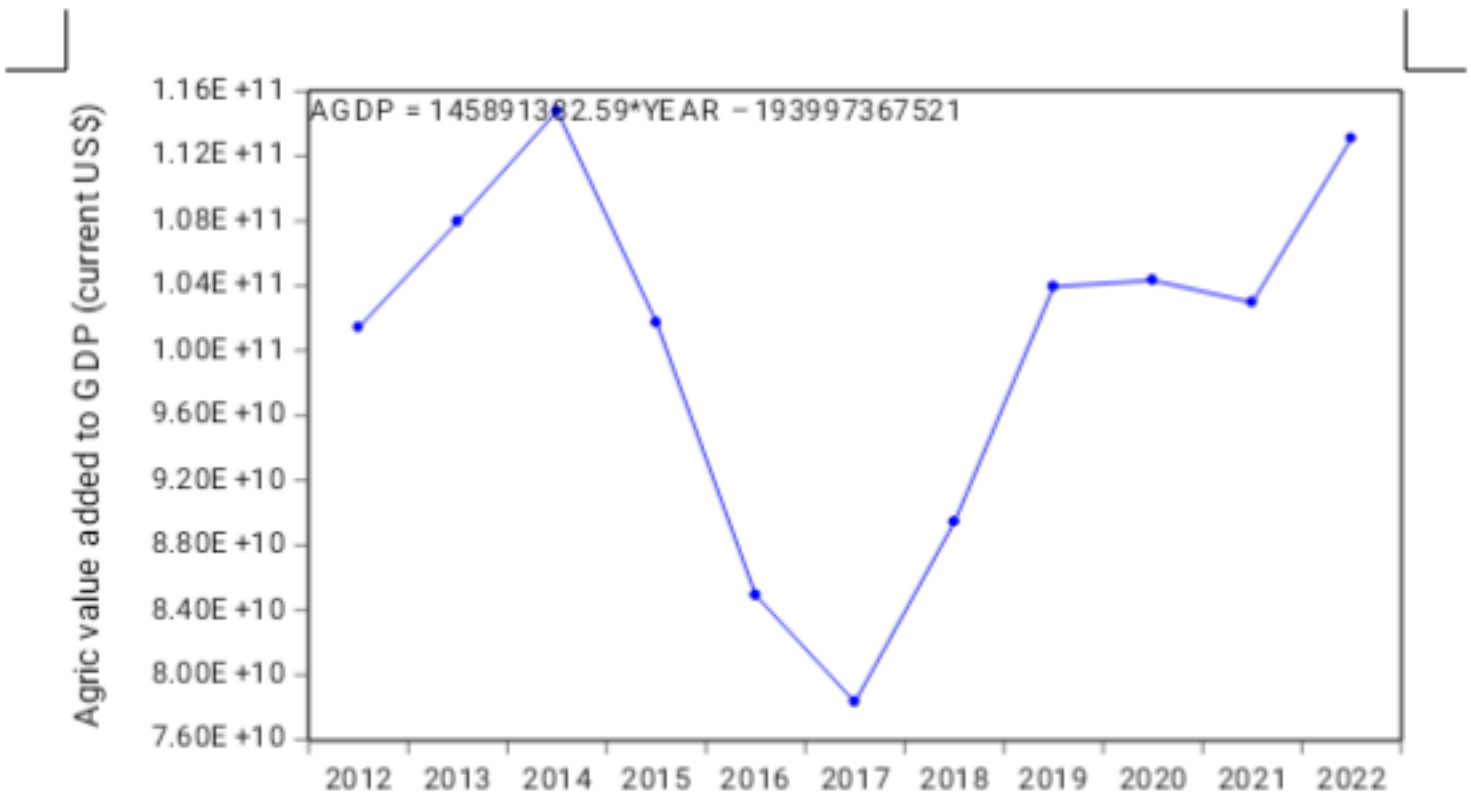

Figure .3: Trend agricultural GDP for the past 10yrs

Relationship between climate change financing and agricultural value added to GDP for the past 10years

Figure 4.shows the result of Pearson product moment correlation between clim ate change financing and agriculture value added to GDP. The result shows th at there is a positive and strong (0.7**) relationship between climate change fi nancing and agriculture value addition to GDP of Nigeria. This result implies th at increasing climate change financing will translate to increase in agriculture value added to GDP of Nigeria. Agriculture value added to GDP is a measure of the performance of agricultural sector in Nigeria. The result of this study implie s that climate change financing will enhance the overall agricultural performan

ce in Nigeria.

Table 3: Correlations Matrix showing the relationship between climate change financing and agricultural GDP for the past 10yrs.

Variables		Expenditure on climate (current US$)	Agric value added to GDP (current US$)
Expenditure on climate (current US$)	Pearson Correlation	1.000	0.729**
	Sig. (2-tailed)		0.008
Agric value added to GDP (current US$)	Pearson Correlation	0.729**	1.000
	Sig. (2-tailed)	0.008	

Effect of climate change financing on agricultural GDP of Nigeria

The effect of climate change on agriculture's GDP (2012 to 2022) is as presented in the regression result in Table 4. The finding shows that climate change financing has a positive and significant ($P \leq 0.05$) effect on agriculture value added to GDP of Nigeria. The positive coefficient (1.02) indicates that a percentage increase in climate change financing will translate to proportionate increase in agricultural contribution to GDP of Nigeria. This finding supports that of Olayide et al. (2017) who stated there was a positive and significant relationship between government expenditure on climate change and agricultural GDP. Speci

fically, it found that an increase in government expenditure on climate change by one percent led to an increase of 0.6 percent in agricultural GDP.

The R^2 which is the coefficient of determination shows that 47% of the total va riation in agricultural GDP was explained by climate change financing. The adj usted R^2 implies that 44% of agricultural GDP has been explained by climate c hange financing.

F-statistic of 9.13 is significant at 1% indicating the goodness of fit or the over all significance of the model

From this findings, the null hypothesis which states that climate change finan cing has no significant effect on agricultural value added to GDP of Nigeria is hereby rejected and the alternative hypothesis which states that climate chang e financing has a significant effect of agricultural contribution to GDP of Niger ia .

Table 4: Effect of climate change on agricultural GDP of Nigeria

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Expenditure_on_climate managem ent current_(@US$)	1.02E+11	6.85E+09	14.93687	0.0000
Constant	-2.098653	5.873974	-0.357280	0.7291

R-squared	0.47(47%)
Adjusted R-squared	0.45(45%)
Akaike info criterion	49.41410
Durbin-Watson stat	1.789615
F-statistic	9.127649
Prob(F-statistic)	0.000000

Conclusion and Policy Recommendations

This study has been able to establish that climate change financing is positive ly related to agricultural growth. Expenditure of climate change explains 47% o f agricultural performance in terms of GDP. Agriculture accounts largely for th e food needs of the country, and it's contribution to GDP is overwhelming, and yet, the sector suffers neglect which is expressed in terms of the fluctuating all ocation of funds towards climate change management. Low sources of fundin g climate change such as adaptation fund, carbon markets, Nigeria sovereign i nvestment authority and global environmental banks should be scaled up. Oth er donors and agencies need to also take climate change financing more serio usly. In the light of this, it becomes very obvious that climate change financing needs to be further strengthened in terms of increased funding in order to enha nce the quality and quality of agricultural output, thus, enhancing and improvi ng the national development and growth as a whole.