Innovations

The Cashew Plantation: Green growth for environmental management and sustainable livelihood in Dekina, Nigeria.

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Abstract
The last century has suffered significant changes associated with global warming and biodiversity loss; these environmental problems are triggered by man's anthropogenic activities in the form of land use/land cover change, and emission of Green House Gases. This causes the environment and inhabitants to be more vulnerable to the impacts of climate change such as heat waves, flood events, biodiversity loss and loss of livelihood, as unstable climate conditions threaten agricultural activities. However, embracing a strategy that will promote a green economy by reducing the effects of climate change and enhancing food security may secure and boost the livelihood of the inhabitants. This study examined the cashew plantation as a panacea to extreme poverty, a tool for environmental management and sustainable development. To achieve this, the variation in cashew areal extent between 2002 and 2018 was determined using ArcGIS; a structured questionnaire was designed to identify the contribution of cashew farming to food supply, household income and environmental sustainability, among others. Seven hundred twelve cashew farmers were sampled in Dekina LGA of Kogi State. It was revealed that there has been an increase in the areal extent of cashew plantation from 261.9261sq/km in 2002 to 301.7943sq/km in 2018 indicating an annual increase of about 2.5 sq/km. An average of 25 bags of cashew nuts are harvested each season and sold at an average cost of N24,100.00 per bag. Therefore, within a farming season, the sum of N602,500.00 is earned by a cashew farmer. The Nagelkerke R Square result further revealed that 7.1% (0.071) of the variability in livelihood sustainability was explained by cashew farming. The economic viability of cashew farming in Dekina LGA is attracting more investments in expanding cashew farmland. Consequently, cashew farming is increasing the vegetal cover of the study area, which also enhances the ecosystem services and livelihood of the inhabitants. The government is encouraged to invest more in cashew farming as it has proven to be a green strategy for protecting the environment and enhancing local livelihood.

Keywords: 1.*Climate change, 2.Sustainable Livelihood, 3.cashew plantation, 4.Cashew farmers, 5.Green infrastructure*

Introduction

The last century has suffered significant changes associated with global warming and biodiversity loss. These environmental problems are triggered by man's anthropogenic activities in the form of land use/land cover changes. The conversion of natural, agricultural and other low-population density lands to cities or urban areas has brought unprecedented environmental changes. This lack of respect for the environment has resulted in the increasing effect of climate change coupled withthe countless environmental problems experienced today such as flooding, the urban heat island effect, soil erosion and biodiversity loss among others(Celik, 2013).Consequently, the livelihood of millions of people in 3rd world countries is being threatened by the effects of climate change because of its direct impact on

agriculture (Chambwera and Stage, 2010; Aid, 2014),jeopardising the security of household income and food supply (Selvaraju, Subbiah, Baas, and Juergens, 2006).

Conceptually, livelihoods include all the assets, rights, means and activities people undertake to earn a living(Elasha, Elhassan, Ahmed and Sumaya, 2005).For a livelihood to be sustainable, it should have the capability to cope with stress and shocks as well as recover from them; it should also be able to improve its assets and capabilities in a manner that does not undermine the natural resource base(Department For International Development DFID, 2001). In contrast, climate change which is evident in the variation of rainfall patterns, high temperatures, and drought, affects farming activities which is the primary source of livelihood in developing countries. As a result, the natural, social, economic and even cultural conditions of both individuals and communities are threatened, and several households are robbed of their livelihood assets (Selvaraju et al., 2006). This trend has made it necessary for farmers to adopt other alternatives to supplement their regular farming activities. As a result, attention has been shifted to cashew cultivation because of its ability to thrive in harsh climatic and environmental conditions.

Cashew (*Anacardium occidentale* L) is a forest tree crop grown widely due to its environmental-friendly nature. It is cultivated in several parts of Nigeria because of its wide array of environmental benefits. Because cashew requires annual rainfall as low as 600ml, they can be grown in the northern and semi-arid regions of the country to ameliorate desert encroachment which significantly threatens the area. It can also be cultivated in the southern regions to check the effect of gully erosion. From an ecological perspective, the cashew tree hasgreat potential to restorerigorously degraded lands (Dick, Garnett, Jones, Karim, Sundufu, Wadsworth and Okoni-Williams 2015). The conversion of land for cashew cultivation provides enormous benefits to farmers as it enables them to participate in commercial crop production that assures profit with little capital(Gilleo, Jassey, and Sallah, 2011).The cashew tree, which is tolerant to drought and also thrives on poor sandy soil, is often intercropped with other food crops like cassava, thus providing a buffer against the failure of rain-fed annual crops in a context of climatic uncertainty (Mitchell, 2004).

In Nigeria, like in other parts of the world, cashew farming is a form of plantation forestry used for forest conservation (Aweto, 1990; Oriola, 2009) which has been the case since the 15th century when cashew plantation was adopted as a strategy for afforestation and erosion control (Asogwa, Hammed and Ndubuaku, 2008). In Kogi State, cashew farming has been in practice over the years; and as a result of its high demand and economic value, several hectares of land have been planted with cashew. Cashew plantation or cultivation helps create wealth (livelihood diversification and sustainability) and ensure environmental protection. Cultivated fruit trees have long provided smallholders with food and, in recent times, income. Planting high-value tree species like cashew to produce marketable forest products is one way of strengthening this source of income, improving the nutritional value for poor rural households, and helping restore biodiversity.

In recent years, cashew has gained prominence among other cash crops in Dekina LGA; many smallholders have embraced cashew farming to support their livelihood. This is because of the high economic value of cashew nuts both in local and international markets. However, more empirical evidence is needed to ascertain the contribution of cashew farming to sustainable livelihood as well as its viability as an environmental management strategy. No literature defines the extent of cashew plantation in the study area and how it has affected environmental management efforts. Against this background, the present study is carried out to examine the contributions of cashew farming to environmental management, livelihood sustainability and local empowerment in Dekina LGA of Kogi State, Nigeria.

Research hypothesis

1. There is no significant change in cashew areal extent in Dekina LGA between 2002 and 2018
2. Cashew production has no significant impact on livelihood sustainability in Dekina LGA.

Materials and Method

Study Area

Dekina LGAof Kogi State was created in 1979, with Dekina town as the headquarter. It is located between latitude $7^{0}18^{1}0^{11}$ N to latitude $7^{0}51^{1}$ 0^{11} N of the equator and longitude $6^{0}45^{1}$ 12^{11} E to longitude $7^{0}28^{1}0^{11}$ of the Greenwich meridian (Figure 1). Dekina covers a landmass of 2,337.5 km^{2} (Ocholi, 2007). To the North-East, Dekina is flanked by

Omala, Bassa to the northwest, Ankpa to the east, and Ofu Local Government Area to the south. Indigenous Igala-speaking people with other immigrants like the Ibara, Igbos, Yorubas, Ebiras and Hausas inhabit the area.

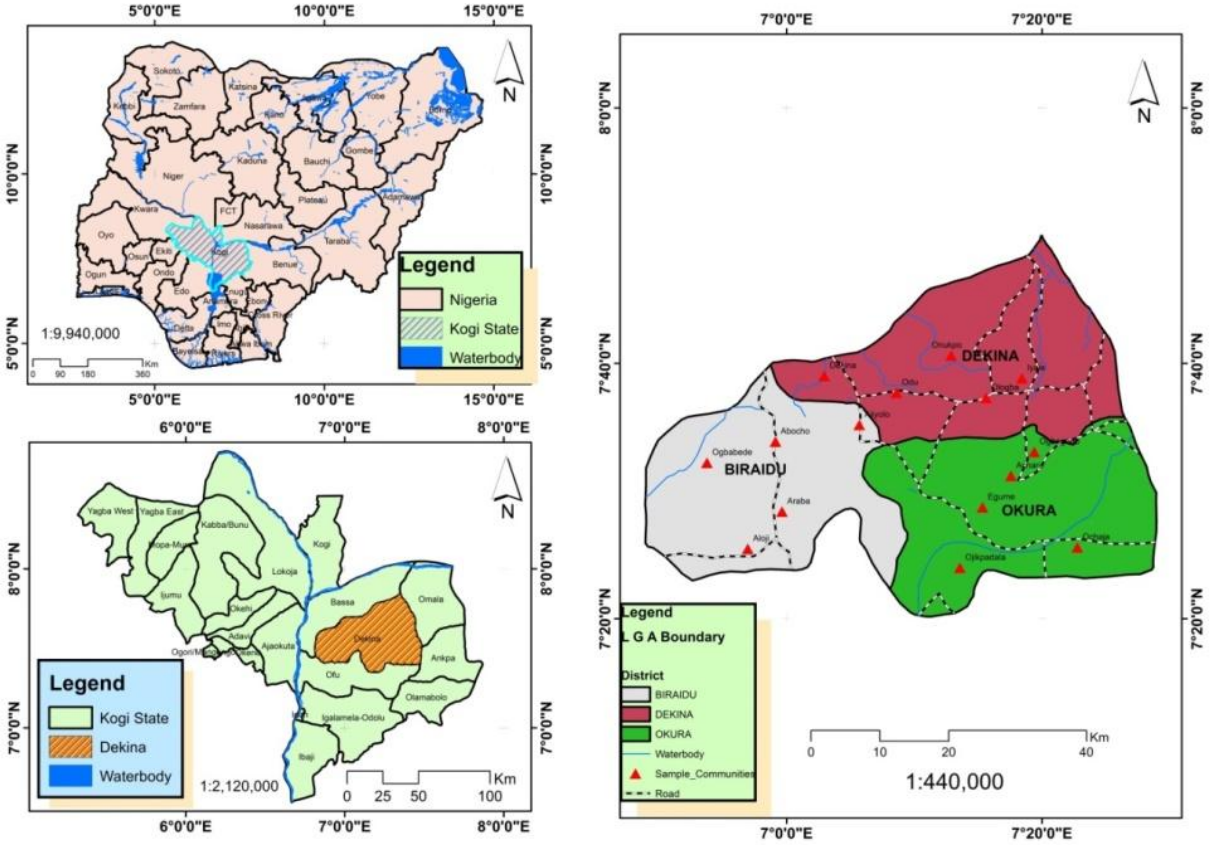

Figure 1: Nigeria showing Kogi State, showing Dekina LGA and the sampled communities
Source:*GIS Lab, Department of Geography & Environmental Studies, KSU (2019)*

Data required and source.
Data were gathered from both primary and secondary data sources. Primary data were gathered by administering a well-structured questionnaire to cashew farmers across selected communities in Dekina LGA of Kogi state.

Satellite Imageries of Dekina LGA were also acquired for two studyyears; 2002 and 2018. The Landsat imageries were downloaded from the official website of the United States Geological Survey (USGS);the coordinates of sampled cashew farms were also collected to ascertain the spectral signature of those sampled locations in order to differentiate cashew plantation from other vegetation on the satellite imageries.

Sampling and Method of Data Analysis
Multistage sampling was used to carry out the study. Stratified, random and purposive sampling techniques were employed in data collection. First, a stratified sampling technique was employed to sample cashew farmers into the three already existing districts in Dekina local government area, namely: Dekina, Okura and Biraidu districts. Then, a random sampling technique was employed to select five cashew-producing communities from each of these districts using a Table of Random numbers. In all, a total of 15 cashew-producing communities across the three existing Districts that make up Dekina LGA were used for data collection and a total of 6478 cashew farmers were identified in the fifteen (15) selected communities(Dekina cashew farmer's association. 2019). A total of 712 cashew farmers were sampled using Taro Yamane's formula of 1969, and questionnaires were administered using purposive sampling.

Descriptive and inferential statistical tools were employed. Data from the administered questionnaires were analysed using simple percentages, frequencytables, and Principal Component Analysis (PCA). The first hypothesis, *which states that no significant change occurred in cashew areal extent between 2002 and 2018,* was tested using the Chi-square test. The second hypothesis that *cashew farming has no significant impact on livelihood sustainability in Dekina LGA* was tested using Logistic Regression Analysis.

Image Classification

Firstly, all the data werepre-processed to be of good quality – this processing includes atmosphericcorrection of TM data.Next, the features of cashew plantations are analysed andkey distinguishing features are defined, and new composites are generated. Finally, supervised classification and accuracy assessment are carried out to analyse the improvement in classificationaccuracy obtained. Bare surface/farmland, Built-up Area, Cashew plantation, Light vegetation, Thick Vegetation and Water body were identified as the final six class types in this study. Training samples for Bare land/farmland, Built-up area, and Water bodies were selected according to Landsat TM images using visual interpretation.

Results and Discussions

Temporal Variation in Cashew Areal Extent in Dekina LGA between 2002 and 2018

In order to understand the changes that occur in cashew areal extent over the study period of 2002 to 2018, it is imperative first to understand the land use/land cover distribution of each study year (i.e. land use/land cover distribution of 2002 and 2018). To this effect, the land use/land cover distribution of Dekina LGA for 2002 and 2018 is displayed in Figure 2. Images "A" and "B" indicate land use/land cover classification for 2002 and 2018 respectively.

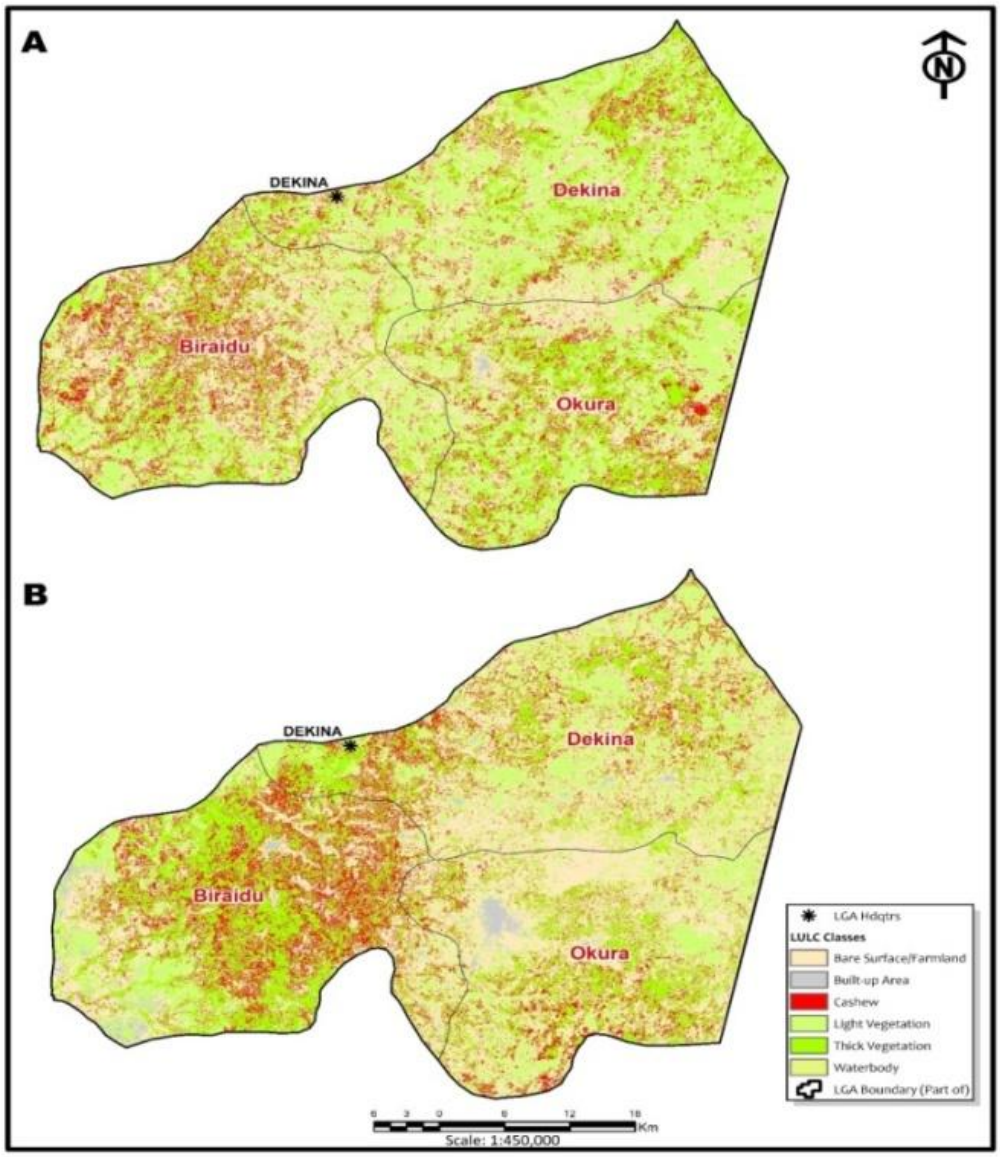

Fig. 2: Land use/land cover map of Dekina LGA for 2002 and 2018
Source:*GIS Lab, Department of Geography & Environmental Studies, KSU (2019)*

Table 1: Land use/land cover classification of Dekina LGA for 2002 and 2018

	2002		2018	
Features	**Area (sq/km)**	**Percentage**	**Area (sq/km)**	**Percentage (%)**
Bare surface/Minor Settlement/Farmland	2298.5568	59.4839	2524.608	65.3338
Built Up	7.1334	0.1846	39.8655	1.0317
Cashew	261.9261	6.7783	301.7943	7.8101
Light Vegetation	6.3045	0.1632	422.5905	10.9361
Thick Vegetation	901.5309	23.3305	40.7934	1.0557
Water body	388.7163	10.0595	534.5163	13.8326
Total	**3864.168**	**100**	**3864.168**	**100**

Source:*GIS Lab, Department of Geography & Environmental Studies, KSU (2019)*

Details of the analysis displayed in Table 1 indicate that there has been an increase in cashew areal extent over the period of study. The result shows that in 2002, 6.78% (261.9261 sq/km) of the total land mass of Dekina LGA was occupied by purely uninterrupted cashew plantations as little patches of Cashew farms mixed with other vegetation are most likely to be overshadowed by other vegetation. This value increased in 2018 to about 301.7943 sq/km (7.81%), indicating an increase of Cashew plantation in the study area by 39.8682 sq/km in 2018 and an annual increase of 2.5 sq/km between 2002 and 2018. By visual observation of the classified image displayed in Figure 2, it is evident that cashew plantations increased significantly in Biraidu district of Dekina LGA. A slight increase can also be observed in Dekina district of the Local government. However, this is not the case in Okura district of Dekina LGA, as cashew plantation appears to have declined between 2002 and 2018. This decline can be attributed to the increase in the rate of urbanisation in Okura district, as Anyigba, the seat of Kogi State University, is located in Okura district of Dekina LGA. The university's presence has resulted in high demand for land for residential, educational, and commercial purposes. The university's presence has also increased minor settlements, farmland and built-up area between 2002 and 2018, as displayed in Figure 2 and Table 1. The category of Baresurface/Minor settlement/Farmland occupied the majority of the land mass occupying about 59.48% (2298.5568 sq/km) and increased by 65.33% (2524.608 sq/km) in 2018. This increase can also be attributed to the population growth due to the immigration of people because of the establishment of Kogi State University Anyigba in 1999, especially as a significant increase in the built-up area can be noticed in Anyigba part of the Local Government (Figure 2). Table 1 also showed that during 2002, Light Vegetation occupied the least amount of land, covering just 0.16% (6.3045 sq/km), as most parts of the study area were heavily vegetated. However, in 2018, there was a hike in Light vegetation up to 422.5905 sq/km, representing 10.94% of the study area. This is due to the deforestation of heavily forested areas for agricultural purposes and cashew cultivation as young cashew plantations are captured under the category of light vegetation, thus contributing to the sharp rise in Light vegetation between 2002 and 2018. The increase in cashew plantations is due to the fact that cashew has gained prominence among other tree crops over the last five years in Dekina LGA of Kogi State.

Similarly, heavy forest vegetation was also deforested to cater for the residential needs of the populace as a result of urbanisation activities in the study area. Water bodies also increased over the study period between 2002 and 2018. This can be attributed to the fact that during 2002, most water bodies were overshadowed by vegetation, making them less visible in land use/land cover classification. However, due to deforestation, hidden water bodies are exposed well enough to be captured by satellite imagery.

Assessment of the change in cashew areal extent between 2002 and 2018

The first hypothesis that *there is no significant change in cashew areal extent between 2002 and 2018* is statistically tested using Chi-square analysis, and the result obtained is shown in Table 3. The result showed a significant difference in the areal extent of cashew plantations between 2002 and 2018 at $p<0.05$. Therefore, predictor variable(s) with a p-value less than 0.05 is significant. As such, the change in cashew areal extent between 2002 and 2018 in Dekina LGA of Kogi State is significant, so we fail to accept the null hypothesis is rejected.

Table 2: Summary of Chi-square result showing change in cashew areal extent between 2002 and 2018

	Chi-square	DF	Sig.
Pearson	562.000	1	0.000
Likelihood ratio	776.248	1	0.000

*Significant at a 5% confidence level

Cashew Marketing Channel and Source of Income

Cashew farming and business is a lucrative profession that has attracted several people and has sustained the livelihood of households for decades. Marketing of cashew products is an essential part of the cashew business. The result in Table 4 showed that cashew products- primarily nuts- are marketed through different marketing chains available to cashew farmers. From the result, a good number of cashew farmers (50.4%) do the marketing on their own. This means that they personally make arrangements on how their cashew products are transported to the market or customers. Cashew farmers who have been in the business for years have customers or buyers who come around to buy the nuts directly from them. This supports Salau,Popoola and Nofiu's (2017) work when they reported that most cashew farmers sell

their nuts directly to processors and exporters. Another prominent marketing channel in the study area is the use of middlemen. 34.7% of the cashew farmers indicate thatthey market their cashew nuts through middlemen who take the nuts directly to the buyers, and any complaint is transmitted to the farmers. Therefore, the result shows that cashew farmers in the area use different marketing chains or channels to sell nuts. In a related study, Onyenobi, Ewuziem and Wazza (2011) and Salau et al. (2017) stated that the marketing of cashew nuts involves several players and channels. The study shows that for cashew farmers, the sales of cashew nuts are alleged by 99.7% of the respondents as their primary source of income. This is expected, considering the nuts are used as raw materials for producing cashew nutshell liquid (CNSL) oil. Taiwo (2017) stated that both the CNSL and CNS (cashew nutshell) are biomass fuels for clean power generation. CNSL is in high demand due to its multiple other uses for producing paints, laminating resins and intermediates for chemical industries.

The information in Table 4 further shows that the sales of cashew nuts are made in bags. The result showed that a good number of cashew farmers (85.5%) sell their nuts at the rate of ₦21,000-₦30,000 per bag. This was closely followed by those who sell theirs at ₦10,000-₦20,000 (13.8%); an inconsequential number sell theirs for more than ₦30,000. The information further shows that the average selling price per bag of cashew nuts in the study area is ₦24,100. Indeed, the price of cashew nuts per bag depends on the harvest time, as affected by the demand and supply variables of the harvest period. Information on the bags of cashew harvested revealed that a good number of the cashew farmers (33.8%) harvested 21 – 30 bags, another 33% harvested over 30 bags, with only 2.9% harvesting less than 10 bags bringing the average harvested cashew nuts to 25 bags per season. The bags of cashew harvested are affected by several factors, including farm size and pests and disease. A further step was taken to estimate individuals' annual income from cashew farming. Results in Table 4 indicated that the average income a cashew farmer earns per season is put at ₦602,500.

Table 3: Cashew marketing channel and source of income

Variables	Category	Freq	%
Marketing channel	Via cashew cooperative	60	8.4
	Via cashew association	45	6.3
	Personally	359	50.4
	Via cashew research institute of Nigeria	1	0.1
	Middlemen	247	34.7
		712	**100**
Source of income	Sales of Nuts	710	99.7
	Others	2	0.3
		712	**100**
Cashew selling price per bag	₦10,000-₦20,000	98	13.8
	₦21,000-₦30,000	609	85.5
	>₦30,000	5	0.7
		712	**100**
Average selling bag/bag	₦24100	712	100
Harvested bags of cashew	<10	21	2.9
	10-20	215	30.2
	21-30	241	33.8
	>30	235	33.0
		712	**100**
Average harvested bags/season	25	712	100
Average income/season	₦602,500	**712**	**100**

Source: Researcher's fieldwork, 2019

Benefits of Cashew farming to Sustainable Livelihood

Ten sustainable livelihoodindicators are used to understand the impact of cashew farming on sustainable livelihood (Table 5). Results of principal components analysis (PCA) revealed that out of the 10 variables used, only two (2) components accounting for 79.4% of the variation in the data set were extracted. Using component loadings of ±≥0.9 as criteria for selecting variables, PC_1 had strong and positive loadings on three variables. The variables were: cashew farming has helped in the supply of raw materials (0.914), cashew farming helps families to be self-dependent (0.910), and cashew farming has increased food supply (0.901). PC_1 was responsible for 50.8% of the total variance in the data set. The positive loadings indicated an increase in raw materials, self-dependence and food supply with the increase in cashew farming. Based on the variables loaded on PC_1, it represents increased access to raw materials and self-dependence. In addition, PC_2 was responsible for 28.6% of the total variance in the variable set and had two variables with positive loadings; the variables were: cashew farming helps generate government revenue (0.914), and cashew farming increases foreign exchange (0.904). The positive loadings suggest an increase in government revenue with the increase in cashew farming. The result presented in Table 5, based on the extracted components, identifies an increase in raw materials/ self-dependence and an increase in government revenue as the principal contribution of cashew farming to sustainable livelihood in the study area. These two factors represent the apparent gains of cashew farming for sustainable livelihood. The first extracted component depicts an increase in raw materials/ self-dependence. The availability of raw materials from cashew farming in the form of cashew nuts increases farmers' source of income, giving farmers the confidence and courage to continue in the line of business. Ultimately, this increases the availability of raw materials for industries while the incomes earned from cashew farming give farmers a sense of self-independence. Also, the result shows that increased cashew farming results in household self-dependence. The increase in cashew farming will increase revenue that accrues to the household; the availability of money enables the household to make food available and also meet other needs without external help. Being self-dependent enables cashew farmers to acquire farm inputs and other things to enhance cashew productivity. Also, the second identified principal component shows that an increase in cashew farming increases government revenue. This is because the taxes obtained from the sales of cashew nuts in our local markets and from those to be exported help to increase government internally generated revenue. Such revenue enables the government to carry out capital projects for the communities and for the general functionality of the state. This shows that the government needs to support cashew farming in the state to encourage more households into cashew farming. This will help to increase its source of revenue as well as enable households to become self-reliant. The result in Table 5, therefore, recognises an increase in raw materials/self-dependence and an increase in government revenue as the principal gains of cashew farming to sustainable livelihood in the study area.

Table 4: Level of Cashew farming to sustainable livelihood

Variables	Principal components	
	PC_1	**PC_2**
Cashew farming has helped in the supply of Raw Materials	0.914	0.255
Cashew farming has helped families to be Self-dependent	0.910	0.283
Cashew farming has helped in Food Supply	0.901	0.249
Cashew farming helps in Environmental Sustainability	0.898	0.248
Cashew farming has increased Employment Opportunities	0.865	0.177
Cashew farming Increases household income	0.749	0.003
Cashew faming helps generate Govt Revenue	0.142	0.914
Cashew farming has helped in Foreign Exchange Savings	-0.052	0.904
Cashew farming has led to Infrastructural Development	0.347	0.814
Cashew farming has helped improve Social Interaction	0.588	0.591
Eigenvalues	**5.08**	**2.86**
% variance	**50.8**	**28.56**
Cumulative exp.	**50.8**	**79.36**

[a]the underlined with coefficients ±≥0.9 are considered significant

Source: Researcher's fieldwork, 2019

Assessment of Cashew farming and livelihood sustainability

In this section, the research hypothesis that *cashew farming has no significant influence on livelihood sustainability* is statistically tested using binomial logistic regression analysis. Livelihood sustainability was measured using the item that says *cashew farming helps in the food supply*; this item was used because it had the highest mean value. The result displayed in Table 6 revealed that the binomial logistic regression was significant (X^2 = 23.458, p<0.05). This implies that cashew farmingin the study area can predict livelihood sustainability. The strength of regression result represented by Nagelkerke R Square result revealed that 7.1% (0.071) of the variability in livelihood sustainability was explained by cashew farming. The result in the model summary showed that the predictor used in the model could predict livelihood sustainability. Wald statistics has a chi-square distribution which is significant at *p<0.05*. Therefore, predictor variable(s) with a p-value less than 0.05 is significant; thus, we fail to accept the null hypothesis. From the result in Table 6, cashew farming significantly predicted livelihood sustainability (p<0.05). It further shows that cashew farming with OR (Odd ratio) of 5.38, which is greater than 1 suggests that it is more than 5 times likely to predict livelihood sustainability. Therefore, the result shows that livelihood sustainability is significantly predicted by cashew farming. The continuous productivity of cashew trees cum yield enables farmers to make money out of the produce, and from the money earned, improved seedlings of cashew can be purchased to replace dead ones as well as make use of the money realised to meet up with household demands.

Table 5: Summary of binomial logistic regression result showing the influence of cashew farming on livelihood sustainability

Variables	B	S.E.	Wald	Df	Sig.	Odd ratio
Knowledge	1.68	0.32	27.83*	1	0.000	5.38
Constant	0.87	0.28	9.62	1	0.002	2.39
Overall model estimation						
	Chi-square			**Df**	**Sig.**	
Step	23.458*			1	0.000	
Block	23.458*			1	0.000	
Model	23.458*			1	0.000	

Nagelkerke R Square = 0.071; Overall model classification = 90.9%

*Significant at a 5% confidence level

Cashew farming and Ecosystem services

The population mean and Chi-Square test of independence were used to determine the impact of cashew farming on ecosystem services. This was achieved using farmers' responses measured using the Likert Scale, with responses ranging from strongly agree to strongly disagree on 3 items. The results obtained are shown in Table 7. The first ranked item showed that 79.1% of the cashew farmers stated that cashew farming has helped in forest conservation. They believe that cashew farming or plantation is a forest crop that serves as an artificial forest and that cashew farming helps in forest regeneration over time. In a related study, Sousa et al. (2015) stated that cashew plantation has the potential for forest recovery. This means that forest regeneration is enhanced by planting a forest crop or trees like cashew. This is also consistent with the report of USGS 2016, which states that the expansion of cashew plantations has helped to mitigate the loss of woody cover and biomass, somewhat offsetting the loss of trees from deforestation.The second-ranked item showed that 82.4% of the cashew farmers stated that cashew farming has helped in environmentalconservation. This is such as it helps to conservethe environmental condition by improving air quality as cashew trees help to mitigate the effect of the anthropogenic emission of carbon dioxide (CO_2). When soil is adequately conserved through adopting best management practices that do not expose soil under the canopy to soil erosion, soil fertility is maintained, favouring cashew yield. In addition, the third-ranked item revealed that 84.5% of the cashew farmers believed that cashew farming has helped in soil conservation. This is expected as cashew farming helps to protect the soil from the erosive force of rainwater. The presence of herbaceous species found under the canopy of

cashew trees also helps add nutrients to the soil through litter dropping, which decays to increase the organic matter content and serves as a physical barrier to soil erosion. The presence of vegetation helps to dissolve the erosive force of stormwater, thereby reducing the rate of nutrient loss from the topsoil. This is consistent with Iwara's (2018) findings, which found soil under tree canopy to have higher nutrients than outside tree canopy. In a related study, Tola and Mazengia (2019) stated that cashew (*Anacardium occidentale L.*) is a forest tree used for afforestation and soil conservation.

Table 6: Impact of Cashew farming on the ecosystem

Items	Total % response		Chi square	Mean	Rank
	A	D			
Cashew farming has helped in forest conservation.	79.1	20.9	694.05*	3.16	1
Cashew farming has helped in environmentalconservation.	82.4	17.6	579.79*	3.06	2
Cashew farming has helped in soil conservation.	84.5	84.5	527.99*	3.02	3

*Significant at a 5% alpha level; p-Value is 0.000; df = 3; 8.4% for those who are not aware of CBNRM

Conclusion and Recommendations

The significant increase in cashew areal over the study period indicates the reversal of deforestation and its attendant environmental effects. This indicates an approach towards environmental stability where ecosystem services and their functions are enhanced annually. The rising economic proceeds from cashew farming are also an indication of the sustainability of the livelihood of the farmers. Therefore, there is a need for the government and other supporting bodies to provide a mechanism that will encourage the improvement of the crop's value chain, as it has proven to be a strategy for achieving both environmental and livelihood sustainability in Dekina LGA.

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