Assessment of Flooding Effects on Arable Crops Production in Ahoada West Local Government Area, Rivers State, Nigeria.

[1]Jackson, C.M., [2]Adolphus, G., [1]Okuduwor, A. A. And [2]Chukuigwe, O.

1. Department of Agricultural and Applied Economics, Faculty of Agriculture, Rivers State University, Port Harcourt, Nigeria.
2. Department of Agricultural Extension and Rural Development, Faculty of Agriculture, Rivers State University, Port Harcourt, Nigeria.

Correspondence: gold.adolphus1@ust.edu.ng

Abstract

This study assessed effects of flood on small holder arable crop farmers in Ahoada West Local Government Area, Rivers state, Nigeria. The objectives of this study were to describe the socio-economic characteristics of the respondents, identify the causes of flood, ascertain the perceived effects of flood incidence on arable crops farmers and examine the coping mechanism for flood incidence among the arable crop farmers in the study area. Using multi-stage sampling technique, data were collected from 135 respondents drawn from the study area. A set of questionnaire and interview schedules were used for the study. Data were analyzed using mean, percentages and graphs. The findings of the study showed that 25.9% of the sampled respondents were within the age bracket of 31-40 years. The male respondents were 35.6% while 64.4% were females, which showed that women were more involved in arable crop production. About 50.4% of the respondents were married, the respondents were literate with the majority 64.4% having secondary education and the least had primary education of about 13.3%. An average level of experience was about 6-10 years. The following coping mechanism for flooding were identified, these are: change in planting season, early planting, sand filling, building runoff and collection pits, elevating building, income diversification, building small bridge/creating flood water pathways, no dumping of refuse in gutters, making ridges and afforestation. The major identified causes of flood incidence were heavy rainfall, river overflow, dam failure, unusual high tides, broken embankments, climate change and global warming and farming on flood plain. Flooding has a very negative effect on arable crop production. The study recommends that the coping mechanism should be adopted to reduce the loss of arable crops and Government should send sanitary inspectors to sensitize and educate people on the implication of indiscriminate refuse disposal.

Keywords: Assessment, Flooding, Small holder, Arable crop, Farmers.

Introduction

In recent times, flooding has become a yearly occurrence in Nigeria and is expected to increase due to climate change. Flood is a body of water which rises to overflow land which is not normally submerged. Flood results from a number of causes of which the most important are climatological in nature (Okorie, 2010). Flooding has been observed globally as one of the nature's damaging phenomena. It is one of the most serious environmental hazards. The high

volume of storm water or rain water during rainy season can result in severe damage to properties and force several people to evacuate the area thereby rendering some people homeless. Flood most times can be predicted, it often cause massive destruction of property and most times loss of life as most urban or rural communities are located near water source such as coaster, rivers and canals. (Odunuga *et al*, 2012). Flooding can be caused by heavy rainfall or when rivers and oceans overflow their bank due to high tide, thereby submerging land areas. It takes place when lakes, ponds, river beds, soil and vegetation cannot absorb all the water, making excess water runoff the land in volume that cannot be carried within stream channels or retained in lakes, natural ponds or man-made reservoir (Erekpokeme, 2015). Flooding can be exacerbated by increase amount of impervious surface or by natural hazards, wild fires or deforestation which reduces the supply of vegetation that can absorb rainfall (Ayooso, 2012).

Flood is an overflow of water that submerges or "drowns" land. The European Union (EU, 2007) floods directive defines a flood as a covering by water on the land not normally covered by water. In the sense of "flowing water "the word may also be applied to the inflow of the tide. Flooding may result from the volume of water within a body of water, such as a river or lake, which overflow or breaks levees, with the result that some of the water escapes its usual boundaries or may be due to accumulation of rain water on saturated ground in an area. (Mbah, 2015). The activities of man without adequate attention to geological structure of most cities of developed and developing nations have undoubtedly contributed to the reoccurring of disaster and consequently pose threats to environmental sustainability in most of these nations (Oludare *et al*, 2012).

Flooding is generally a condition of complete or partial inundation of normally dry areas due to overflow of tidal or inland water or from abnormal and rapid accumulation of runoff (Jeb and Aggarwal, 2018) "floods are the most recurring wide spread, disastrous and frequent natural hazards of the world" (Odufuwa, Adedeji, Oledesu and Bongwa, 2012). There has been unprecedented occurrence of floods and its associated effects in most of the rural communities and urban centers of developing countries including Nigeria (Montoya, 2018).

The September, 2012 flood affected several states in Nigeria which includes Rivers, Bayelsa, Delta, and Lagos state and millions of people were displaced in that process. The flood rendered

millions of people homeless and their means of livelihood destroyed. The social and economic impact of the flood incident most especially on agricultural production and social infrastructures, cannot be over emphasized yet the long term impacts of the recent flood in Nigeria could be more severe (Dabara, 2016).

Floods are major disaster affecting many countries of the world annually especially in most plain areas. Flood do not only damage properties and endanger the lives of human and animals but also produce other secondary effects like outbreak of diseases such as cholera and malaria as well (Akanbi 2015). Flooding occurs most commonly from heavy rainfall when the natural water course do not have the capacity to convey excess water. However, floods are always caused by heavy rainfall and can result from other phenomena, particularly in coastal areas.

Flood is one of the most common hazard faced in Rivers state, because of the position of the state in the map (coastal region). Flood destroys the farm produce and makes farmers uproot undue farm produce which could affect the economic status of the State badly if it solely depends on those farm produce as source of its revenue, vacating from buildings because of the devastating effect of flood on structures and objects within the place. This implies to the loss of farm produce and properties of some occupants of an affected is known to be vulnerable to climate change impacts especially changes in rainfall as a result of extreme weather events, several local government has experienced flooding most especially Ahoada West, Ahoada East, Ogba/Egbema/Ndoni and Abua/Odua local government areas which are all in Rivers State.

Historically, Ahoada West local government area has had several cases of flood, of which several communities where badly affected, e.g Joinkarama. This forced many of them to join the growing population of internally displaced person (IDP) due to the flooding. The specific objectives were to: describe the socio-economic characteristic of the respondents in the study area, identify the causes of flood incidence, ascertain the perceived effects of flood incidence on arable crops production and finally examine the coping mechanism for flood incidence among the rural arable crop farmers.

Methodology

Study area: This research was conducted in Ahoada West Local Government Area of Rivers State, Nigeria. It has a latitude: 4° 59' 0" N longitude: 6° 25' 43" E Lat/Long (dec): 4.98334, 6.42877. The area has a population of 249,232 (NPC, 2006). The local government area is bounded by Ogba/Egbema/Ndoni Local Government Area, Abua/Odua Local Government Area.

Multi-stage sampling procedure was used: The study area was divided into three clans namely; Ekpeye, Engenni and Ogbogolo. First, two villages were purposively selected from each clan that had experienced flooding then secondly, random sampling was used to select one hundred and thirty five (135) respondent from the 6 villages of the 3 clans.

Data collection: This research study made use of primary data through interview schedule. The instrument was alphabetically segmented respectively to get valid response linked with various research objectives which form the basis of the study. The data obtained from the questionnaire were presented on a table and analyzed individually using simple percentage.

Results And Discussion

Socio-economic Characteristics of the Respondents

The analytical results of socio-economic characteristics of the respondents in the study area are presented in Table 1.

Table 1: Socio-economic characteristics of the respondents

Variables	Categories	Frequency (n=135)	Percentage	Mean

Sex	Male	48	35.6	
	Female	87	64.4	
Age	21 – 30	26	19.3	
	31 - 40	33	24.4	27yrs
	41 – 50	20	14.8	
	51 – 60	35	25.9	
	>60	21	15.8	
Marital Status	Single	39	28.4	
	Married	68	50.4	
	Widow/Widower	28	20.7	
Education level	No Formal education	12	8.9	
	Primary	18	13.3	
	Secondary	84	64.4	
	Tertiary	18	13.3	
Household size	1 – 5	34	25.2	
	6 – 10	73	54.1	6 persons
	10 – 15	28	20.7	
Farm size (plots)	1 – 1 1/2 plots	41	30.4	
	2 – 2 1/2 plots	52	38.5	4.8 plots
	3 – 3 1/2 plots	35	25.9	
	4 – 4 1/2 plots	7	5.2	
Farming experience (years)	1 – 5	60	44.4	
	6 – 10	48	35.6	
	11 – 15	6	4.4	6 – 10 years
	>15	21	15.6	
Occupation	Farming	55	40.7	
	Civil Servant	40	29.6	
	Artisan	13	9.6	
	Trader	27	20.0	
Monthly income(₦)	20000 – 30000	61	45.2	₦ 45.2
	31000 – 40000	40	29.6	
	41000 – 50000	14	10.4	
	>51000	20	14.8	
Total Household monthly expenditure	10000- 20000	87	64.4	
	21000 – 30000	48	35.6	
Social organization	1 – 2	47	34.8	
	3 – 4	46	34.0	34.8
	5 – 6	35	25.9	
	7 – 8	7	5.2	

Source: Field survey, 2021

From Table 4.1, the results indicated that 35.6% of the respondents were men, while 64.4% respondents were female. This result implies that most of the respondents involved in arable farming are mostly females. The study disagrees with Okwuduwor, Okidim and Agbagwa (2021) in their study on economic effects of flooding on agribusiness: A case study of fishery value chain in Bayelsa State Nigeria that there are more male with 52.5% than female 47.5%. This result also indicated that mean ages is 27years. This implies that the age of the respondents plays a critical role in coping with the incidence of flood. Hence, the more energetic an individual, the higher the possibility of him or her to perform better compared to the much younger or the much older producers.

Most of the respondents of 50.4% are married. This implies that married persons have more responsibility to cater, meaning that men and women who are into farming are responsible and have to cater for their families. Therefore, they require extra innovations to handle or cope with the incident of flood. This is a good development because the family members of the married farmers will always join and assist in farm work. Their availability reduces labour constrains faced during the peak of the farming season (Teklewold *et.al*. 2006).

The finding shows that most of the respondents had one form of educational qualification with secondary education having the highest with 64.4% and the least no formal education with 8.9%. The implication is that, a reasonable number of farmers in the study area should be able to read and understand how to use necessary information to strategies on how to combat the flooding situation and salvage their arable crops.

Household size, the results further indicated that the mean household size was 6 persons. Since agricultural production activities are labour intensive, large household can provide farming labour at little or no cost (Kalu 2003). For the farm size of the respondents, the results indicated that 30.4% of the respondents had ranges of 1 and half plots as their farm sized followed by 38.5% of the respondents who had 2-2 and half plots as their farm size, while 25.9% had a farm size of 3-3 and half plots and 5.2% had 4-4 and half plots.

Experience refers to the act of gaining knowledge through practices of skill which brings about specialization. Respondents in the study area have enough experience on the incident of flood in

the study area and its effects on crop production. From the distribution of the respondents according to their years of experience in farming, the results further indicated the following results; 1-5 years 44.4%, followed by the ranges of 6-10 years 35.6%, while 11 - 15 years has percentage of 4.4%, and >15 years has 15.6%. This implies that with longer farming experience arable crop farmers can have better ideas on how to cope with flooding in the study area.

The respondent's occupation 40.7% are mainly engaged in farming, 29.6% of the respondents are civil servant, 4.6% are artisan and 20.0% are into trading. This result indicated that majority of the respondents are farmers. From the respondent's total monthly income, 5.2% had a total monthly income range of 21000-30000, 29.6% of the respondents had total monthly income between 31000-40000, 10.4% had total monthly income range of 41000-50000, and 4.8%, their total monthly income was >50 and are into trading, 22.0% are civil servants and 14.7% are artisans.

The result shows the respondent's total household monthly expenditure where 64.4% had a total household monthly expenditure ranges of 10000-20000 and 35.6% of the respondents had a total household monthly expenditure of 21000-30000. The result shows the number of social organizations the respondents belong. Less than half 34.8% belong to social organization ranges 1-2, followed by 34.0% that belong to social organization ranges 3-4, 25.9% belong to social organization ranges 5-7 and 5.2% belong to social organization ranges 8-10.

Table 2: Causes of flooding in the study area

S/N	Causes of flooding	Mean	Ranking	Remark

1	Heavy Rainfall	3.62	1st	Agree	Source: Field Survey Data, 2021. Criterion Mean ≥ 2.50
2	River overflow	3.33	3rd	Agree	
3	Dam Failure	2.98	4th	Agree	
4	Torrential Rain	2.12	11th	Disagree	
5	Severe/Over Wind	2.04	12th	Disagree	
6	Unusual High Tide	2.56	8th	Agree	
7	Retention Ponds/Lake	2.25	10th	Disagree	
8	Broken Embankments	2.68	6th	Agree	
9	Climate change/Global warming	2.61	7th	Agree	
10	Lake of Gutters/Drainage	3.52	2nd	Agree	
11	Farming on Flood Plain	2.70	5th	Agree	
12	Flat Terrain	2.30	9th	Disagree	
13	Impervious Surface	1.76	13th	Disagree	
	Grand mean	3.28			

The causes of flood incident in the study area were ranked as shown on Table 2, 13 items on the questionnaire were used to address the factors. Items number 1, 2, 3, 6, 8, 9, 10 and 11 were agreed by the respondents (as they all had criterion mean scores greater than 2.50). They indicated: heavy rainfall, river overflow, dam failure, unusual high tides, broken embankments, climate change and global warming, lack of gutters and drainage, and farming on flood plain. However, items numbered 4, 5, 7, 12 and 13 which had a mean score of 2.12, 2.04, 2.25, 2.30 and 1.76 (lower than the criterion mean) respectively; indicated torrential rain, severe wind/over wind, retention ponds/takes, flat terrain and impervious surface.

Table 3: Perceived effects of flood incidences on arable crop production

Effects of flood	Mean (n=135)	Ranking	Remark

Decreased arable crops output	4.62	1st	Agree
Causes decay of root crops	4.36	3rd	Agree
Destruction of rice paddy	4.61	2nd	Agree
Loss of choice planting materials	4.13	6th	Agree
Sudden decrease in farm income derived from crop loss	3.84	8th	Agree
Disruption of local cropping systems and patterns	3.05	11th	Agree
Increase in labour demand	2.77	12th	Agree
Increase in food item prices	4.10	7th	Agree
Increase in soil fertility through alluvium deposits	2.72	13th	Agree
Increase in cost of planting materials	3.66	9th	Agree
Improves the fertility of the soil along flood plains	1.56	14th	Disagree
Destroys farm roads	3.36	10th	Agree
Destroy food/farm strong facilities	4.19	5th	Agree
Pollution of farm environment with non-decomposable materials	4.33	4th	Agree
Grand mean	3.66		

Source: Field Survey Data, 2021. Criterion Mean ≥ 2.50

Table 3 showed the perceived effects of flood incidences on arable crop production in the study area which were ranked as shown on table 4.3 above. Fourteen (14) items on the questionnaire were used to address the factors. Items number 1, 2, 3, 4,5, 6, 7, 8, 9, 10, 12, 13 and 14 were agreed by respondents (as they all had criterion mean scores greater than 2.50) indicated decrease in arable crop output, causes decay of root crops, destruction of rice paddy, loss of planting materials, sudden increases in farm income derived from arable crop sales, disruption of

local cropping systems and patterns, increase in labour demand, increase in food item prices, increase soil fertility through alluvium deposits, increase in cost of planting materials, destroy farm roads, destroy food/farm strong facilities and pollution of farm environment with non-decomposable materials. However, item 11 which had a mean score of 1.56 (lower than the criterion mean) indicated improve in the fertility of the soil along flood plains were disagreed by the respondents.

Table 4: Coping mechanism for flood incidence

Coping mechanism	**Mean (n=135)**	**Ranking**	**Remark**
Change in farming system	4.20	1st	Agree
Early Harvest	3.36	4th	Agree
Sand filling	3.27	6th	Agree
Building runoff collection pits	3.51	2nd	Agree
Income Diversification	2.91	7th	Agree
Building small bridges/creating flood water pathways	2.52	8th	Agree
Not dumping refuse in gutters	3.44	3rd	Agree
Making of ridges	3.36	4th	Agree
Afforestation	2.50	9th	Agree
Grand Mean	3.23		

Source: Field Survey, 2021. Criterion Mean ≥ 2.50

The above results in table 4 which shows the coping mechanism for flood incidence in the study area. Nine (9) items on the questionnaire were used to address the factors. Items number 1, 2, 3, 4, 5, 6, 7, 8, and 9 were agreed by the respondents (as they all had criterion mean scores greater

than 2.50) which indicated change in planting season, early harvest, sand filling, building runoff collection pits, income diversification, building small bridges/creating flood water pathways, not dumping refuse in gutters, farm land elevation and afforestation.

Conclusion

Flood incidence in the study area affects small holders' arable crop farmer. It has some perceived effects on arable crop production in the study area and it could discourage the people from going into arable crop production. Some coping mechanism has been adopted by the respondents in the study area which help them to cope during the flood incidence.

Recommendations

Based on the findings, the following recommendations were made: The general public both male and female should adopt the coping mechanism to minimize the effect of flooding in the study area. Sanitary inspector should visit the study area regularly to avoid dumping of refuse in the gutter as its one of the causes of flooding in the area.

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