

**THE ROLE OF FLOODPLAINS IN RURAL DEVELOPMENT:  
A CASE OF AYA RIVER FLOODPALINS IN EKAJUK,  
OGOJA LOCAL GOVERNMENT AREA OF CROSS RIVER STATE, NIGERIA.**

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**Abstract**

Floodplains are very important in the development of a society where they are located; this is because of the socio-economic implications they have. This study was aimed at evaluating the role of Aya River Floodplain in the development of rural area in Ekajuk clan of Ogoja Local Government Area of Cross River State. The study is anchored firstly on identifying the various land uses along the Aya River Floodplain. Secondly, to examine the socio-economic importance of the Aya River Floodplain to the Ekajuk people and thirdly, to identify the problems associated with the use of floodplains in the area. Data for the study was collected using both simple random sampling and participatory rural appraisal techniques. The PRA techniques involved the interactions with focal discussion groups in each of the selected villages. The data collected was analyzed using pearson product moment correlation. The results of the study showed that the major land use along the Aya floodplain is agriculture as a result of year to year alluvial deposits that enriches the soil. Other land uses such as logging along the gallery forest, fishing were also identified. However, the study showed a weak positive correlation coefficient of 0.26 between farm sizes and estimated annual income generated. The study also showed that indiscriminate use of floodplains lead to negative implication. Conclusions were made based on the achievement of the study and recommendations provided to ensure sustainable use of this fragile ecosystem.

**Keywords:** *Floodplains, Aya River, Biodiversity, Socio-economic.*

**Background to the Study**

Floodplains have accounted for the development of many societies through agricultural due to the silt deposit that characterized them. Hence, they are often regarded as the most biologically productive and diverse ecosystem on earth (Tockner and Standford 2002). These prolific lands in terms of agriculture are highly and intensively cultivated giving rise to what is known as floodplains or Fadama agriculture.

Floodplain agriculture accounts for the wealth and livelihood of some desert countries like Egypt, North Sudan and Uganda where the controlled flooding of the Nile River provides large expands of fertile land for agricultural activities along the Nile Valley making them self-sufficient in the growing and exporting of cotton in particular ahead of other African countries. On a similar case, Thailand, china and other countries along the Ganges River Plain are reckoned with as the World's largest exported of rice due to floodplain cultivation (Utang, et al 2008).

In Nigeria, the importance of floodplains to the development of rural areas cannot be over emphasized. Dabi (2008) has observed that Fadama agriculture is critical to the survival and economic development of the rural areas of semi-arid Northern Nigeria where rainfall is scarce and highly variable.

However, floodplains are not without problem when used indiscriminately as is with the case of Ogunpa flood disaster of 1972 in the then Oyo State. In a similar case, floodplains in Ekajuk are widely used for several economic activities that have brought development in the area, this therefore is critical to this study.

### Objectives of Study

This study is made of three key objectives:

1. To identify the various lands uses along the Aya floodplains.
2. To examine the socio-economic importance of the Aya River floodplain to the Ekajuk people.
3. To determine the problems associated with the unsustainable use of floodplains.
4. To make policy decisions on the use of floodplains in the development of rural areas.

### Study Hypothesis

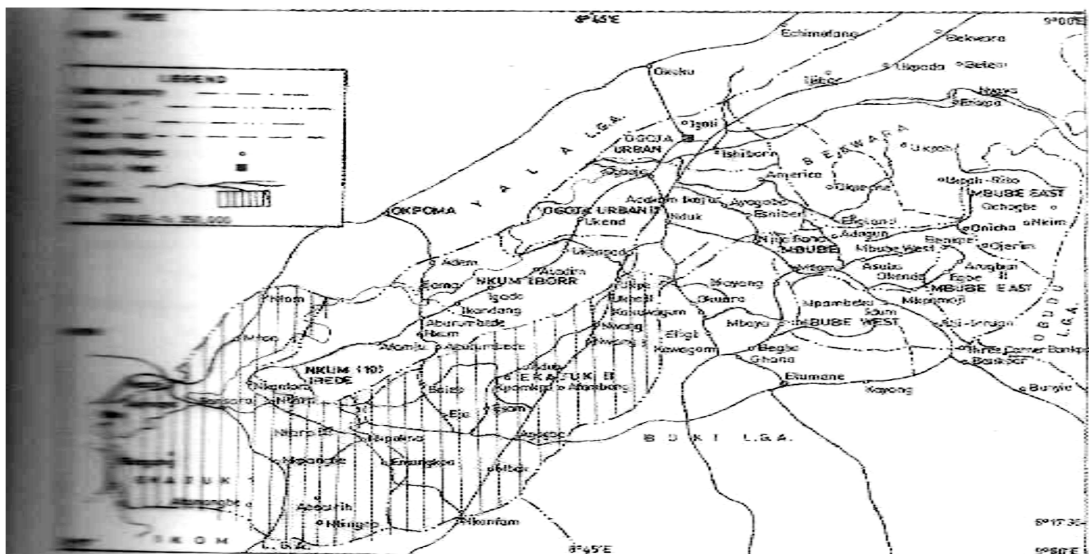
Ho: Annual incomes generated by floodplain farmers do not relate significantly with the extent of farm sizes in the Ekajuk floodplains.

H1: They relate

### Area of Study

Ekajuk lies between longitude 8028' and 8047'E and latitude 6018' and 6034N; in Ogoja Local Government Area of Cross River State, about twenty kilometers south of Ogoja urban. The area has an average rainfall of 1750mm to 2000mm per annum with two distinctive seasons (wet and dry). The wet season begins from April and end in October to give way to the dry season (Ofomata, et al, 1975; Majuk 1984).

The area is drained by two important rivers; the Aya and the Onwa Rivers. The Aya and its tributaries such as Monaya, Edline drain almost every part of the study area. The Aya and its tributaries constitutes what Utang, et al (2008) calls the "Aya system" which is a sub-river basin of Cross River basin. Among its course, the river is confluence by five 4th and three 3rd orders tributaries including the Monaya in Ekajuk. The flow regime naturally follows the run-off and climatic controls characterized by a single minimum flow and a short water period under three to four months. The Ekajuk people are engaged in basically agriculture with the cultivation of annual and cash crops such as Yams, cassava, cocoyam, maize, rice etc on the fertile floodplains, many of them also engaged in fishing and hunting along the gallery forest.



## **Literature Review**

In importance and diversity of floodplain ecosystem have aroused many scholars opinion as many societies holds their civilizations and livelihoods to it. Goudie (2004) defines a floodplain as an area of land adjacent to a stream or river that stretches from the bank of its channel to the base of the enclosing valley walls and experiences flooding during periods of high discharge. The author added that floodplains can support particularly rich ecosystems; both in quantity and diversity. In this view of Gregory and Walling (1973), the relatively smooth strip of land bordering the river channel, embracing the river pattern and inundated at times of high stage is described as a floodplain.

In their view, Enger and Smith (2001) opine that some floodplains may flood annually while others may flood less regularly. Floodplains and their minor morphological subdivisions are primarily deposition of landforms whose forms are genetically related to specific depositional processes (Bloom, 1998). These depositional landforms according to Tockner and Standford (2002) globally cover  $>2 \times 10^6 \text{ km}^2$ . Hence Gerard (1992) indicates that floodplains occupy a significant portion of the earth's South America, and a greater proportion of tropical Asia giving rise to many socio-economic activities such as farming, fishing and even recreation. According to FAO (2007) article on West Africa Sahelian floodplain Recession Agriculture (Mali), the floodplain of River Senegal, Niger, Sokoto, Kafu, Phongolo and Tema in Semi-arid-zones of South and East Africa, the organization observes that such productive land have helped indigenous communities to develop sequential use in relation to inundation and recession of flood waters-promotion, forestry, crop cultivation, fisheries and livestock with annual inundation patterns.

Apart from agriculture and fishery, floodplains are known to be attributed to biodiversity, uniqueness, naturalness and cultural heritage. The physical hydrological functions include nutrient retention and recycling, ground water recharge, flood control, sediment retention, erosion control, water treatment, climate stabilization, ecosystem stability and stabilization of other systems (Seyan, et al, 2001). Despite the importance of floodplains, the over-use and indiscriminate utilization of that pristine ecosystem can lead to untold devastation as was the case of Ogunpa flood disaster that occurred in Ibadan in 1981 due to the destruction of forest along banks of river Ogunpa. The disaster was also partly attributed to the blockage of the river channel by human activities. (Oguntala and Oguntoyinbo; 1982 quoted in Fawupe (2003)).

## **Materials and Methods**

### **Theoretical Framework**

#### **Ecological Perspective Theory**

The ecological perspective theory is the theory that takes into consideration the influence of environmental factors at multiple levels that shape individual. A key concept of the theory is embeddedness in which earth system functions within the operation of another system (Campbell, 2012). A floodplain as a component of a river system and land-use system of agriculture, fishing is brought together in this study to enhance rural development. Hence, the use of this theoretical framework. The use of this framework is to help in understanding how floodplains environment influences individuals in terms of activities and behaviours as well as reactions to flood hazards when they occur.

#### **Data Collection and Analysis**

Data for this work was collected from the field using data sources unless were other related works were consulted. The data was collected on biophysical and socio-economic characteristics of the study and respondents respectively. Data collected covered the various and use patterns along the Aya River, socio-economic activities along the Aya floodplain and the problems associated with the over-use of floodplains.

Stratified and random sampling techniques were used in collecting the data; the essence was to avoid bias selection of sampled villages within the study area. The procedure for collecting data was Participatory Rural appraise (PRA) in which the views of the people were appraised based on their activities in the area.

Data collected were analyzed using tables and percentages as well as the prudent moment correlation given as:

$$r = \frac{1}{n} \sum (x-x)(y-y) / (S.Dx)(S.Dy)$$

Where:

- r = the correlation coefficient
- x = the independent value
- y = the dependent value
- S.Dx = standard deviation of x
- S.Dy = standard deviation of y
- n = number of variables
- Σ = summation sign

### Results and Discussion

Land uses along Aya River plain uses along the Aya River plain and presented them in table 1 below.

**Table 1: Various Land uses along the Aya Floodplain**

NAME OF VILLAGE	LAND USE
Mfon 2	Farming, Fishing and Logging
Bansara	Farming and Fishing
Ntara Aya	Farming and Fishing
Ekagong	Farming and Fishing
Ntingna	Farming, Fishing and Logging
Esam	Farming and Fishing
Nwang	Farming, Fishing and Logging
Nkpakna	Farming and Fishing
Emangkpa	Farming and Fishing

#### Authors' Field work, October 2012.

From the table, it was observed that agricultural land use is the most dominant along the floodplain while logging is also practiced in a small scale. Hydromorphic crops like rice and cane-sugar are well cultivated along the floodplains during flood periods while cassava, yam, okra and pepper are cultivated at low flood periods. The implication of this is that farming is carried on throughout the year.

The authors' also observed that the agricultural land use vary from village to village in respect of major farm produce (rice and yam farms) as shown in table 2 below. The table shows that Esam has the least rice and yam farm sizes while Nkpakna and Bansara have the largest rice farms in term of acreage, meaning that they are intensely involved in floodplain utilization.

**Table 2: Estimated Acreage of Cultivable Floodplain for the Major Crops**

S/N	VILLAGE	RICE FARM	%	YAM FARM	%	TOTAL	%
1	Mfon 2	35	11.7	29	10.5	64	11.1
2	Bansara	40	13.4	20	7.2	60	110.4
3	Ntara Aya	35	11.7	24	8.7	59	10.3
4	Ekagong	32	10.7	27	9.7	59	10.3
5	Ntingna	26	8.7	38	13.7	64	11.1
6	Esam	35	11.7	42	15.1	77	13.4
7	Nwang	22	7.4	22	7.9	44	7.6
8	Nkpakna	33	11	37	13.4	70	12.2
9	Emangkpa	40	13.4	38	13.7	78	13.6
	Total	289	100	277	100	575	100
	Mean	33	11	30.8	11	63.9	11

Source: Authors' Fields work, October, 2012.

### Socio-economic Importance of Floodplains to Ekajuk People

In evaluating the socio-economic importance of floodplains to the rural development of Ekajuk people, the authors discovered that the major socio-economic activity as well as importance of floodplains to the Ekajuk people is all year agriculture as a result of the rich deposition of aluvium along the Aya River which enriches the soil. This ecosystem, it was observed had boosted the agricultural output of the people as well as providing a good gallon forest for lumbering activity. The study showed that between 12800kg (12.8 metric tons) and 49000kg (49 metric tons) of agricultural produce were produced along the Aya floodplains for the last ten years (2003-2012) with yam, rice and maize being the major ones.

### Problems of Floodplains Utilization in Ekajuk

Despite the positive impacts floodplains play in the development of Ekajuk clan, the authors observed that from the ten sampled villages, floodplains have brought some negative and devastating effects on the people. To this effect, table 3 below was obtained. The table shows that destruction of farmlands and siltation of Monaya River are the greatest problem of floodplains utilization in the area. The table also shows that decline no fish catch as a result of human disturbance along the floodplains.

**Table 3: Problems of Floodplain Utilization**

Village	Major River	Effects	Frequency	Period of flooding
Mfon 2	Aya/Onwu	Destruction of farm land	3	July-Aug, Aug - Sept., Sept -Oct.
Bansara	Aya/Onwu	Loss of drinking water/destruction of crops	3	July-Aug, Aug - Sept., Sept -Oct.
Ntara Aya	Aya	Reduction in fish catch	2	July-Aug., Sept. - Oct.
Ekagong	Aya	Loss of farm siltation	2	July-Aug., Sept. - Oct.
Emangkpa	Monaya	Loss of farm siltation	3	July-Aug., Aug. - Sept, Sept. -Oct.
Ntingna	Aya	Reduction in fish catch	2	July-Aug., Sept. - Oct.
Esam	Monaya	Loss of drinking water/siltation	3	July-Aug., Aug. - Sept, Sept. -Oct.
Nwang	Monaya	Siltation, loss of farmlands and reduction in fish catch	3	July-Aug., Aug. - Sept, Sept. -Oct.
Nkpakna	Monaya	Siltation/loss of crops and drinking water	3	July-Aug., Aug. - Sept, Sept. -Oct.

**Source:** Authors' Field work, October, 2012

The above table also showed that most of floods occur at the time of the year when most of the farming activities are place. Hence, the greatest impact is felt by crops and farm lands. To further buttress the objectives of the study, the hypothesis of study as tasted and a correlation co-efficient of  $\theta (r)$  0.26 was obtained. This coefficient means that there is a weak positive relationship between the estimated farm and sizes measured in area for major crops and the estimated annual income measured in Naira of floodplain farmers in the study area. This means that part of the annual income may have been given red from the sales of other floodplain produce such as fish and timber.

**Table 4: A Correlation between Estimated Farm Sizes and Estimated Annual Income**

VILLAGE	X	Y-N = (000)	(X-X)	(X-X) <sup>2</sup>	(Y-Y)	(Y-Y) <sup>2</sup>	$\frac{(X-X)(Y-Y)}{n}$
Mfon 2	64	8200	0.1	0.01	-311	96721	-31
Bansara	60	2890	-3.9	15.2	-621	385641	2422
Ntara Aya	59	3480	-4.9	24.0	-31	961	152
Ekagong	59	3350	-1.1	24.0	-161	25921	789
Emangkpa	64	4340	0.1	0.0	829	687241	83
Ntingna	77	4430	13.1	171.6	912	844561	12039
Esam	44	1970	-19.9	7022.4	-1541	2374681	30666
Nwang	70	4450	6.1	37.21	939	881721	5728
Nkpakna	78	3490	14.1	198.8	-21	441	-30
Total	575	31600		7493.3		5297889	51818
Mean	63.9	3511					

Using the Pearson's product moment correlation given thus

$$r = \frac{\sum (x-x)(y-y)}{n (S.Dx) (S.Dy)}$$

X = Estimated Farm sizes in Acres

Y = Estimated Annual Income in N (million)

X = 63.9

Y = 3511

S.Dx = 28.2

S.Dy = 767.2

r = 0.26

### Conclusion and Policy Recommendations

This study has been able to elucidate the role of floodplains in the development of rural areas as it had shown floodplains encourage all-year agriculture in the study area which makes many farmers reasonable self-reliant through the sale of their produce.

The authors also took pains to find out the problems associated with floodplains utilization. Based on the findings of the study, the following policy recommendations are put forward:

1. Farmers in the study area should be encouraged to cultivate fast-yielding crops to enhance food security at a very short time.
2. They should also be encouraged to make use of new improved varieties providing them to the farmers.
3. The gallery forest along the river banks and floodplains should be protected to enhance tourism and serve as buffer zones to avoid flooding.
4. Floodplains utilization should not be expanded to the river coast to avoid siltation of rivers.
5. Sequential cultivation of crops in core with the flood recession pattern should be adopted as practiced in Mali along the floodplains Senegal.

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