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Seasonal availability of farmland and its contribution in wildbirds-landuse conflicts in Hadejia-Nguru wetlands, Nigeria

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ABSTRACT: This paper studied the seasonal availability of land for farming and its contributory effect on wildlife-landuse conflict in Hadejia-Nguru wetlands, Nigeria. Research was undertaken in two separate villages in the wetlands –Matara Uku and Lafiya. The villages were selected on the basis of a number of criteria including general location within the wetlands, type of natural environment as well as the proximity to river or major channel. The main aim was to choose two villages which had some differences but which would still allow some comparisons, as well as contrasts to be made. Proportional representation of household heads HHs was done using a modified "1 in k" sampling procedure, as recommended for social research in wildlife. Although, all respondents (farmers) that were sampled at the study site cultivated in both seasons, however reduced (almost halved) hectares of land were generally cultivated in the dry season at Lafiya and a little less hectares cultivated in rainy season at Matara Uku. Statistical test indicates significant difference ($p<0.05$) between total hectares cultivated between Matara Uku and Lafiya in dry season. Decline in hectares cultivated in the communities were traced to excessive flooding in rainy season at Matara Uku and shortage of water availability (drought) in dry season at Lafiya. Farmers responded to the drought (Lafiya) and flooding (Matara Uku) by occupying reserved grazing land and river shoreline. Cumulative means percentage of 73.8% farmers were cultivating either on river banks / reserved grazing land or at their boundaries in ≤1km away from their boundaries. The wetlands' wildlife that naturally occupied the shorelines is threatened by various unfavourable farmers practices and impressions. Recommendations were made based on the outcome of the study.

Keywords: Landuse conflicts; Hadejia-Nguru wetlands; Wildbirds; Farmland availability.

Introduction

The demand for water to support irrigated agriculture is an important factor that is contributing to the degradation of wetlands and their associated wildlife (Lemly et al, 2000). Human population at the Hadejia-Nguru Wetland's (HNW) communities competes with one another and with wildlife species for available rangeland and water resources. HNW falls in an area regarded as marginal land whose use is limited by physical or economical factors and which therefore makes it unproductive to extensive agriculture. The wetland thereby creates an economical and productive possibility in the midst of such an unproductive area (Adams, 1993).

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Since the land 50 km North of the wetland is a desert (Eaton, 1999), hence life is only possible around a few oasis. The wetland therefore forms a barrier to the further spread of desert. Also with the loss of thousands of hectares of arable land to desertification in the North-Eastern part of the country, the pressure on the highly fertile rangelands of the Hadejia-Nguru Wetlands increased the consequence movement of land cultivators and pastoralists towards the basin (IUCN,2002). The wetland is supplied by the Hadejia and Jama'are rivers. An area of confused drainage has been formed in the wetlands, with multiple river channels and a complex pattern of permanently and seasonally flooded land and dry land. The Hadejia-Nguru wetland (HNW) support at least 250 species of flowering plants and over 136 types of Aquatic flora and fauna. Together these support more than 103 species of fishes and 378 species of birds (Birdlife international, 2006). All these wild plants and animals depend on one another and the flood for survival and so many people depend on them for their livelihood.

Land however is the pivot of man's absolute existence. According to Adegeye and Dittoh (1985), land is obviously the most important natural resources and it is often given a wide economic definition to include all materials and forces that are supplied by nature for use in the production of goods and services. Furthermore, landuse simply means the uses to which land is put. It means the end to which land is allocated assuming a conscious decision to use it for a desired end (Marion, 1960 and Reardon, 1998). Land use is a non- static concept (Oyekale, 2004). It changes in accordance with the changes in factors such as season, population, land tenure system and the level of technology.

One of the most quoted traditional definitions of conflicts regarded it as "a struggle over value and claims to scarce status, power and resource in which the aims of the opponents are to neutralise, injure or eliminate their rivals" (Coser, 1956). According to Otite (1990), conflict arise from the pursuit of divergent interest, goals and aspirations by individuals and or groups in defined social and physical environments. However, conflicts that are properly addressed can be opportunities for problems to be identified and solved with progress achieved (Lewis, 1996). It is therefore important to emphasis that conflict is not necessarily bad, since it can represent the productive interaction of competing interests and values; which is an ever present function in a dynamic society. Otite (1990) therefore argued that conflict is a normal process of interaction particularly in complex societies in which resources are usually scarce. He further stressed that conflict challenges the rational man to think of alternative ways of meeting contesting human needs and interests. This paper studied the contributions of seasonal availability of land for farming on wildlife-landuse conflict issues in the conservation of HNW.

Materials and Methods

Area Description:

The Hadejia-Nguru wetlands (HNW) lie on the Southern edge of the Sahel savanna in North- Eastern Nigeria. The area is a flood-plain complex, comprised of a mixture of seasonally flooded lands and dry uplands. Prior to the droughts of 1970s, the wetlands covered an area of about 4,125km^2, but are now reduced to 3,500km^2 (Birdlife international, 2006). The wetland is supplied by the Hadejia and Jama'are rivers. The Jama'are arises in Jos plateau and the Hadejia in the Hills around Kano; they both join to form the Yobe river which discharges into Lake Chad. An area of confused drainage has been formed in the wetlands, with multiple river channels and a complex pattern of permanently and seasonally flooded land and dry land. The wetlands are nationally and internationally important for migratory waterfowl. The wetlands support extensive wet – season rice farming, flood- recession agriculture and dry season irrigation. The flood plain also supports large numbers of fishing people, most of who also farm, and is grazed by very substantial numbers of Fulani livestock.

Survey Methods

The study was conducted at the two seasonal periods of the year i.e. dry and rainy seasons. Reconnaissance survey was first carried out in the selected project sites for familiarity and to acquire first hand information. Research was undertaken in two separate villages in the wetlands –Matara Uku and Lafiya. The villages were selected on the basis of a number of criteria including general location within the wetlands, type of natural environment as well as the proximity to river or major channel. Thus, Matara Uku is characterized with excessive flooding in rainy season while Lafiya now experiences drought in dry season. The main aim was to choose two villages which had some differences but which would still allow some comparisons, as well as contrasts, to be made.

Matara Uku is situated (south-zone) along the Marma channel with estimated population of 7,000 and 638 households, while Lafiya is situated (north-zone) downstream of the Burum Gana river with estimated population of 10,000 and 719 households. Proportional representation of household heads HHs was done using a modified "I in k" sampling procedure, as recommended for social research in wildlife (Ajayi, 1979 and Akinyemi, 2000). Where 'k' represents 10 and I = 3; three household heads out of ten were randomly selected and sampled, given a total of 30% of HHs in each community. However, a total of 192 and 216 HHs were sampled in Matara Uku and Lafiya respectively, while 86 and 53 of the randomly selected HHs were farmers in the respective villages. In depth interview using a semi-structured questionnaire were used in collecting primary information from villagers. The findings were further triangulated with the information gathered from in-depth interview with the community heads. Data were analyzed using descriptive statistics, chi-square and regression analysis.

Results and Discussion

Farmland-Seasonal Characteristics:

Tables 1 and 2 shows the hectares of farmlands cultivated by farmers at the study site in dry season and rainy season respectively. They also show the total and average farmland cultivated by the respondents of each community at the study site. Close to one fifth (16.3%) of the farmers in Matara Uku were involved in large scale farming, while none was involved in large scale farming at Lafiya in dry season (Table 1). On the contrary, 11.5% and 5.6% were large scale farmers in Matara Uku and Lafiya respectively in rainy season. Small scale farmers cultivating less than 0.1ha decreased from 53.9% in rainy season to 41.9% in dry season, with more farmers cultivating bigger hectares in dry season at Matara Uku as shown in Table 1&2.

However, percentage small scale farmers in Lafiya decreased from 56.6% in rainy season to 38.9% in dry season, with more farmers cultivating bigger hectares in rainy season unlike as it was in Matara Uku (also shown in Table 1 &2). In general, the average sizes of farmland cultivated by farmers in dry season at Matara Uku and Lafiya were 4.13ha and 2.00ha respectively, while an average of 3.50ha and 3.70 were respectively cultivated in rainy season. Statistical test indicates significant difference ($p<0.05$) between total hectares cultivated between Matara Uku and Lafiya in dry season.

Although, all respondents (farmers) that were sampled at the study site cultivated in both seasons, however more (almost doubled) hectares of land were generally cultivated in the rainy season at Lafiya and a little more hectares cultivated in dry season at Matara Uku. Information gathered from respondents revealed that excessive flooding in rainy season at Matara Uku and shortage of water availability (drought) in dry season at Lafiya is responsible for decline in hectarages cultivated in the communities. Excessive flooding at Matara Uku claimed several hectares of land used in cultivation by farmers. Lots of farmers responded to this disaster by occupying hectares of community grassland that were reserved for cattle rearers, which also serves as feeding and playing ground for wild birds and many other biological species. This corroborates the conclusions of Lemly *et* al (2006), which states that the demand for water to support irrigated agriculture is an important factor that is contributing to the degradation of wetlands and their associated wildlife. Farmers in Lafiya however responded to shortage of water upstream River Hadejia in dry season by creating artificial dams, irrigation practice as well as moving closer to rivers and water channels, occupying shorelines (mostly rangelands) that serve as feeding, breeding and playing ground for many water birds and many other animal species.

Wildlife-Landuse Conflict:

Table 3 reveals the estimated distances of respondents' farmland to grazing reserves or river shoreline in rainy season at Matara Uku and dry season at Lafiya. The study shows that 14% of farmers (at Matara Uku) and 22.1% (at Lafiya) were either cultivating on reserved grazing land or on-river banks in rainy and dry season respectively. A cumulative means percentage of 73.8% farmers were cultivating either on river banks / reserved grazing land or at their boundaries or in ≤1km away from their boundaries. That is, about three-quarter of these river banks and grazing land which traditionally serve as feeding, breeding or playing ground for several wild birds such as *Circonia circonia, Dendrocygna viduata,Quelea quelea, Egretta ardesiaca and Pelecanus rufescens* and other wild plant and animal species (Birdlife International, 2006 and Oduntan, 2007) were occupied by farmers at the study area.

Although scholars such as Jacobson *et al* (2006) believe farms can provide good habitat for birds. They also argued that farm management could help increase wild animal numbers and diversity, especially for birds (Jacobson

*et a*l, 2006). They further stressed that not only might farms benefit birds, but also birds might benefit farmers. However, some practices used by farmers in the Hadejia-Nguru wetlands negate their claims. Table 4 shows the methods of controlling wild birds regarded as pest by farmers in the study area. Only few (28.5%) of the farmers employed wildlife-conservation friendly methods such as the use of human statue (22.1%), guards/netting (4.8%) and charms (1.6%) in controlling wild animals on their farmland. Other techniques used by farmers in controlling wild animals on farmland include fire arms (22.7%), chemicals (30.4%), dogs (9.1%) and traps (9.3%).

These methods indiscriminately either kill the animal or render them wounded, with no exception for non-targeted species. This however threatened the abundance and continuous existence of diversity of water bird species and other wildlife that the wetland's environment habour. When the farmers were asked of their impression about the presence of wild birds in the area (Figure 1), 61.1% and 86.8% of farmers considered the wild birds as nuisance in Matara Uku and Lafiya respectively. Only a few (12.8%) and (9.4%) had positive impression about the wild birds' presence in the respective communities, while (25.6%) and (3.8%) were indifferent. This however is contrary to earlier finding of Akinyemi, (2000), where the attitude of 61.0% of farmers favoured wild animal species at communities bordering the Yankari National Park. This unfavourable impression of farmers to wild animal species in Hadejia-Nguru wetland can be traced to the information gathered on the estimated number of farmers that lost crops to wild animal species and the rate of occurrence (Table 5).

The information shows that there is none of the farmers who has never lost crop to wild animal species at one time or the other, while as much as an average of over 60% of the farmers have lost crops to wild animal species at not less than twenty-one times. The result is not in line with that of Jacobson *et al*, (2006) on the attitude of farmers to wild birds in North Florida farms, where 44.0% and 65% of Conventional farmers and Organic farmers respectively disagreed that birds cause damage to their crops. In addition, the presence of some farmers on reserved grazing land could explain destruction of farm crops by migrating cattle which has led loss of many lives and properties at several occasion in Nigeria. Table 6 shows accessibility of Pastoralist to grazing reserves in the study areas. In nature however, wild birds such as the *Egretta spp* are known to be of great mutual relationship with cattle. Hence, displacement of the cattle herd from the wetland will tamper with the natural ecology of such birds in the area.

Table 1: Hectares of Farmland Cultivated in the study sites (Dry Season).

Hectarages (Ha)	Mat.Uku		Lafiya	
	Number of Farmers	Total Ha Cultivated	Number of Farmers	Total Ha Cultivated
* <0.1	36(41.9%)	1.8	30(56.6%)	1.5
** 0.1 ≥ 5.99	21(24.4%)	63.945	16(30.2%)	48.72
*** 6 ≥ 9.99	15(17.4%)	119.925	7(13.2%)	55.965
**** ≥ 10	14(16.3%)	169.4	-	-
Total	86	355.1 ($\overline{X}$ =4.13ha)#	53	106.2 ($\overline{X}$ =2.00ha)#

* represents subsistence farming,
** represents small scale farming,
***represents medium scale farming,
****represents Large scale farming.
# indicates significant difference ($p<0.05$) between total hectares cultivated between Matara Uku and Lafiya (from statistical tests).

Table 2: Hectares of Farmland Cultivated in the study sites (Rainy Season).

Hectarages (Ha)	Mat.Uku		Lafiya	
	Number of Farmers	Total Ha Cultivated	Number of Farmers	Total Ha Cultivated
* <0.1	42(53.9%)	21	21(38.9%)	1.05
** 0.1 ≥ 5.99	16(20.5%)	48.72	17(31.5%)	51.765
*** 6 ≥ 9.99	11(14.1%)	87.945	13(24.1%)	103.935
**** ≥ 10	9(11.5%)	115.5	3(5.6%)	43.35
Total	78	273.2 ($\overline{X}$ =3.5ha)	54	200.1 ($\overline{X}$ =3.7ha)

Table 3: Estimated distance of farmland to grazing reserve /water bodies in the study sites.

Distance	**Study sites**				
	Mat.Uku	**Lafiya**	**∑X**	**∑%**	**Mean distant %**
On-shore or grazing land	12(14.0)	3(5.7)	15	19.7	9.8
At the boundary	19(22.1)	15(28.3)	34	50.4	25.2
≤1km away	31(36.1)	22(41.5)	53	77.6	38.8
>1km away	24(27.9)	13(24.4)	37	52.3	26.2
Total	86	53	139	200	100

Figures in parenthesis are percentages.

Table 4: Distribution of Methods of controlling wild animal pests by Farmers in the study sites.

	Study sites				
Method	**Mat.Uku**	**Lafiya**	**∑X**	**∑%**	**Mean method %**
Use Gun	28(18.4)	31(26.9)	59	45.3	22.7
Chemicals	37(24.3)	42(36.5)	79	60.8	30.4
Use Dogs	21(13.8)	5(4.4)	26	18.2	9.1
Trapping	19(12.5)	7(6.1)	26	18.6	9.3
Use Charms	5(3.3)	-	5	3.3	1.6
Guards	12(7.9)	2(1.7)	14	9.6	4.8
Human statue	30(19.7)	28(24.4)	58	44.2	22.1
Total	152	115	267	200	100

Figures in parenthesis are percentages

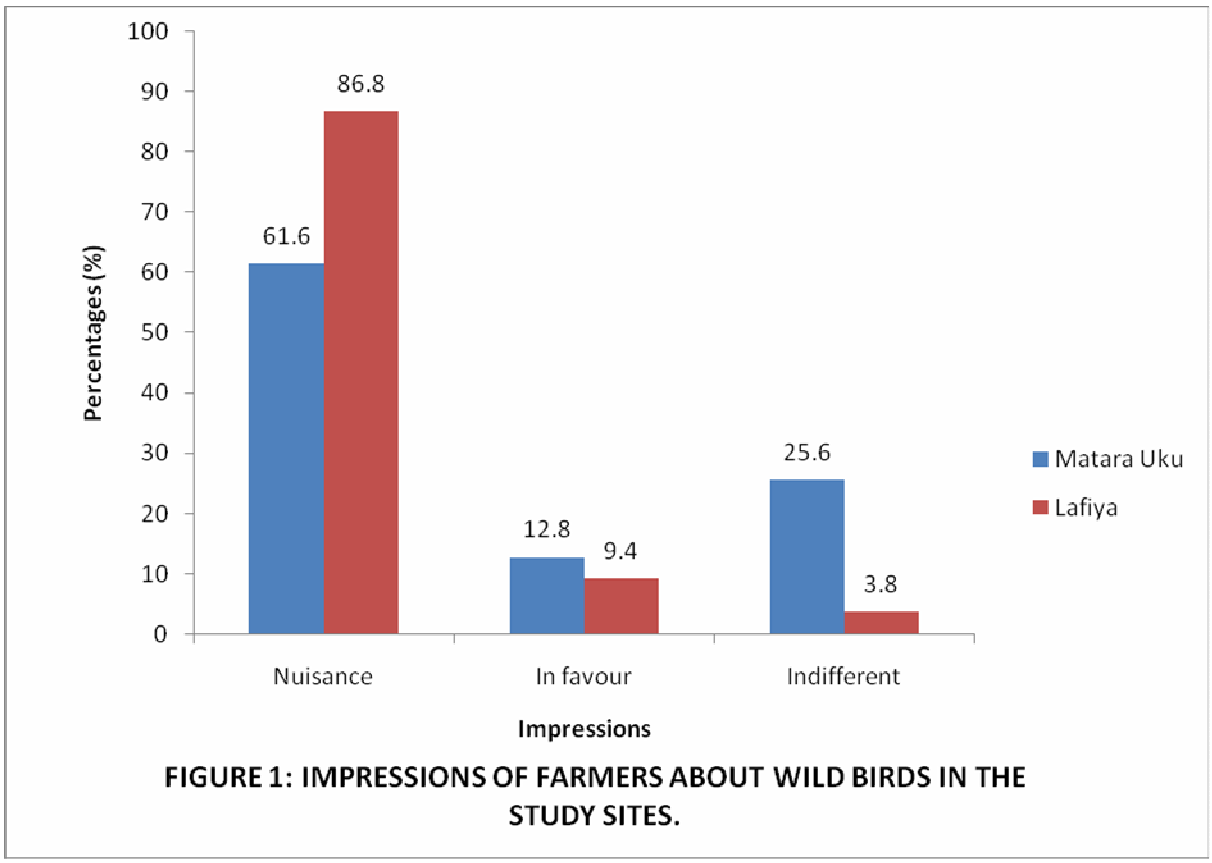

FIGURE 1: IMPRESSIONS OF FARMERS ABOUT WILD BIRDS IN THE STUDY SITES.

Table 5: Estimated Number of Farmers who lost Crops to Wild Animal Species and the Rate of Occurrence at the Study Areas.

Rate	**Study sites**				
	Mat.Uku	**Lafiya**	**ΣX**	**Σ%**	**Mean rate %**
None	-	-	-	-	-
1-10	3(3.5)	5(9.4)	8	12.9	6.4
11-20	25(29.1)	13(24.5)	38	53.6	26.8
20 and above	56(65.1)	31(58.5)	87	123.6	61.8
Not certain	2(2.3)	4(7.6)	6	9.9	5.0
Total	86	53	139	200	100

Figures in parenthesis are percentages

Conclusions and Recommendations

Hadejia-Nguru wetlands is characterised by seasonal flooding in communities downstream of the river Hadejia and drought in communities upstream the river. Intensification and expansion of agricultural activities as well as the struggle to ensure all year round cultivation by farmers has led farmers to occupying reserved grazing lands and river shoreline. However, all these undesirable activities of farmers should be checked, so as to reduce conflict as well as preserve the homes of numerous biodiversity.

Government should reclaim and redefine the use of grazing reserves which serves as feeding and breeding ground for many wild and domesticated plant and animal species.

Expulsion of all farmers cultivating on grazing reserves as well as improving the reserves' fodder quality and quantity should be ensured. Law enforcement agents also need to enforce that such reserves are used solely for its purpose in order to reduce illegal grazing occurrence on protected rangeland.

Moreover, farmers cultivating on shoreline and at grazing reserves boundaries should be discouraged. In addition, buffer zone should be put on these boundaries to avoid conflict between farmers and herdsmen, as well as reducing the ecological disturbance and threat on the river's biodiversity. Farmers cultivating around the wetlands should be enforced to maintain clean farm environment as a form of controlling wild animal pests' invasion, rather than the use of chemicals and other methods that threaten wild species abundance.

Continuous clearances of river channels down streams should be maintained in order to ensure continuous availability of water resources in abundance upstream as well as reduced excessive flooding in communities downstream.

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