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The Promise of Wetlands Farming: Evidence from Nigeria

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Abstract: In this study, the extent of wetlands in Nigeria, wetlands farming systems and the contribution of wetlands farming to food security were investigated using a combination of secondary and primary/micro level data. Results show that wetlands a substantial proportion of Nigeria's land area, the farming systems slightly differ in dry and wet season farming. Wetland was found to contribute as much as 56.3% of wetlands communities' food supply.

Key words: Wetlands, farming, food security, promise, contribution, Nigeria

INTRODUCTION

Wetlands are areas of marsh fern, peatlands or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or flowing, maritime water, the depth of which at low tide does not exceed 6 meters (Ramser Convention on the Conservation of Wetlands of International Importance, 1971). The International Institute for Tropical Agriculture (IITA, 1990) classifies wetlands into three broad groups-inland valleys, river floodplains and mangrove swamps. Inland valleys occur in the upper reaches of major and minor watersheds where the low lying areas collect surface and sub-surface water from adjacent heavily farmed lands. They usually remain wet for limited periods in each year.

Floodplains or fresh water swamps are lowland areas of major and minor rivers which are usually flooded during the wet season (Ibanga and Armon, 1992). Mangrove or salt water swamps are areas affected by tidal waters and are usually salted soils. Two zones of salt water can be identified. These are: Brackish Water Zones-transition zones between the fresh water and salt water zones. Salt water zone: The soils here are continually flooded by salt water at high tide and exposed at low tide. The salt water zone is vegetated by mangrove. Mangrove, also called estuarine or tidal swamps, are found at the mouth of major rivers in West Africa (Moorman and Juo, 1986). These swamps are flat and poorly drained, with the depth of flooding being influenced by tidal water. The soils are mainly acid sulfate soils, which when saturated and reduced during the rainy season generally have a pH between 5 and 6. During the dry season, they become very acidic (pH<3) because the presence of sulfuric acid.

Wetlands, particularly, tropical wetlands are of great importance to many people who live along the coastlands. Extant literature reveals that early civilizations of Egypt, Mesopotamia, India and China centred around the valley of the Nile, Tigris, Indus, Yangtse and Nwangtto, respectively. In terms of agriculture, the cultivation of swamps and seasonally flooded plains has been the tradition of communities living along the river banks, Grove (1985) reports that wetlands such as the delta of Senegal river, the Niger Inland delta in Mali or Lake Chad do not only provide for rain-fed crop cultivation but extensive grasslands for relatively nutritious grazing for livestock. It is only in these areas that agriculture can continue into the dry season.

In Nigeria, a lot of rice, sugarcane and vegetables and recently, wheat are cultivated in the floodplains of northern Nigeria. An estimated 15000 ha of floodplain rice is cultivated in and around Nguru Gashua floodplains (Aminu-Kano, 1994). The Abakiliki area of Eastern Nigeria is reputed to have the most developed hydromorphic cropping system in Nigeria (Agboola, 1987). Udofia and Inyang (1984) identify swamp (wetlands) as the fourth farming system in Akwa Ibom State.

In spite of the age long practice of cropping the wetlands by many regions and cultures in Nigeria, it was not until recently (1992) that the Federal and some State governments attempted to exploit its rich agricultural potentials. Although there was trial cultivation of rice in the Niger Delta region in 1933, wetlands farming was given more fillip in a countrywide National Fadama Development Project in 1992. Akwa Ibom State and indeed most southern Nigerian states are known to have very high population density but limited land mass. There is generally declining productivity from available upland

agriculture (Eshiett, 1994). Thus, there is a compelling need to expand arable crop production into the vast and hitherto little exploited wetland resources.

The objectives of this study, are to present and discuss: The extent of wetlands in Nigeria, the wetlands farming systems and the contributions of wetlands to household food supply (and ultimately, food security). It is hoped that empirical information from the study would provide additional information for better utilization of wetlands for agricultural purposes.

MATERIALS AND METHODS

The study area: The study was conducted in Akwa Ibom State, a major wetland farming State in Nigeria. Located within latitudes 4° 32' North and longitudes 7° 25' and 8° 25' East, the State occupies a distinct and contiguous area of 8142 km^2. The state has three ecological zones. These are the marshy land of the river washed areas of Eket, Ibeno, Ikot Abasi, Oron and Itu Local Government Areas, the flat areas of Etinan, Abak, Uyo and Ikot Ekpene Local Government Areas. The third zone is the elevated areas of Ikono and parts of Itu Local Government Areas. The State is endowed with abundant wetlands. The entire periphery of the state would have been swamps were it not for part of the western boundary between Imo River and Enyong Creek which is dryland in most parts. The swamp form a continuum but have however been broken down into discrete units and named after important settlements. The State is basically rural and agrarian with majority of the people engaging in agriculture or related activities. A wide range of crops are cultivated including food, cash crops and vegetables. The State can roughly be classified into two ecological zones, namely upland and wetlands. The difference between the two environments being in the nature of the soil: the upland is dry most year round while wetlands are transition zone between upland and water bodies. The cultivation of wetlands is common practice in the state, particularly in coastal communities.

The data, sources and methods of analysis: The study relied on both primary and secondary sources of data. The secondary data and their sources include:

- The distribution and extent of Nigerian wetlands (NEST, 1991).
- The distribution and extent of wetlands in Akwa Ibom State.

Table 1: Distribution and extent of Nigerian wetlands

Coastal saline wetlands (Mangrove)			Fresh water wetlands (Floodplains)		
Name	Extent (ha)	(%)	Name	Extent (ha)	(%)
Niger river	617,000	71.91	Niger delta	1,177,00	55.26
Cross river Estuary	95,000	11.07	Niger river	8150	0.38
Imo River and Qua Iboe River Estuary	36,000	4.2	Benue river	242,000	11.38
Others	110,000	12.8	Cross river	250,000	11.44
			Imo river	26,000	1.22
			Lake Chad	55,000	2.50
			Ogun/Osun	380,000	17.84
Total	759000	100.00		2,130,000	100.00

Total wetlands area (mangrove and fresh water) = 2,889,000 ha, Source: NEST (1991)

- The distribution and extent of wetlands in Northern and Middle Belt States (Gwarry, 1995).
- Crop enterprises in the swamps of Akwa Ibom State.
- Economic returns of vegetable production from selected fadama farmers (Gwarry, 1995).

The primary data were obtained from wetlands farmers in Akwa Ibom State. Multistage sampling was used in the data collection. First, inland valleys locations/ communities were selected. This was followed by selection of villages from the locations. Finally, 200 wetlands farming households were selected for the study using random sampling method. Structured questionnaire was administered on each of the households. However, 150 of the 200 questionnaires were completed with useful information and were thus used for analysis (Table 1). Information sought from the respondents include their social and economic characteristics, farm labour profile, input quantities and cost profile as well as output quantity and prices.

Descriptive statistics of simple percentages and proportion were used to analyze the data to provide stylized facts on the social and economic characteristics of the farmers as well as describe the wetlands farming system.

RESULTS AND DISCUSSION

Extent of wetlands in Nigeria: Several authorities have provided statistics on the extent of wetlands in Nigeria. Ayotade and Fagade (1980) report that the Nigerian wetlands comprise inland swamps, mangrove and fresh water swamps and shallow to deepwater fadamas. According to Kio and Ola-Adams (1986) the wetlands in Nigeria, though scattered and in pockets, would cover over 24,009 km. They highlighted this to include about 21 man-made lakes and important wetlands sites namely

Hdejia/Kirikasama, Lake Chad, Komdugu Yobe, Kainji Lake, Baturiya, Adiami-Nguru floodplain, Matgadu-Kabok floodplain, Niger Delta, coastal lagoons near Lagos as well as coastal lagoons and delta of Cross River.

Many water bodies in Nigeria have watersheds or wetlands. For instance, the Jos Plataeu is the major watershed for nearly all the streams flowing from the northern part of Nigeria towards Lake Chad and to the Niger and Benue Rivers. The Highlands in the south western part of the country form the watersheds of the rivers flowing northwards to the Niger and southwards towards Atlantic Ocean. The Niger River and its tributaries at Sokoto, Kaduna and Anambra Rivers also form important wetlands. The Benue River and its tributaries at Katsina Ala and Gongola Rivers produce extensive wetlands site. Mangrove areas exist on the coast and cover an estimated area of 10,000 km^2 along the Atlantic coast of the country (Okigbo, 1984). The Nigerian Environmental Study/Action Team (NEST, 1991) provides a comprehensive list of wetlands in Nigeria (Table 1). A total of 2,988,000 hectares of Nigerian land is reported to be wetland. This comprises 858,000 hectares of mangrove swamp and 2,130,000 hectares of fresh water swamps. Within the mangrove swamps, the Niger coastal saline wetlands make up 71.91% (617,000 ha). The Niger Delta wetlands make up 55.26% of fresh water swamps. It has been rated as the third largest wetland in the world. Comparatively, the bulk of the Nigerian wetlands are fresh water swamp. It makes up about 71% of the nation's wetland endowment. Within the Northern and Middle Belt region of Nigeria, the *fadama* (wetland) of Adama and Taraba States make up 31.6% of the wetlands in the region (Table 2). This is followed by those in Borno and Yobe States In the study area-Akwa Ibom State, wetlands make up 31.6% of the total land area of the State (Table 3). The entire periphery of the State is wetlands except in the upper fringes close to Enyong Creek.

The proportion of wetlands to dryland and to the total land area in the county and individual State or region determines, to some extent, its importance in the economy. Where they occur in the rural area, they play significant role in the livelihood activities of the people, particularly agriculture. In Akwa Ibom State, it constitutes the fourth farming system (Udofia and Inyang, 1987) and has remained a major source of supply of such food stuff like rice, cocoyam and dry season vegetables, particularly fluted pumpkin.

Wetlands farming system: The wetlands farming system is slightly different from that of the upland. This is largely dictated by the nature of the wetlands farming environment.

Table 2: Wetlands in northern and middle Belt States of Nigeria

States	Total available wetlands (ha)	(%) of total
Adamawa and Taraba	995,000	31.6
Bauchi	235,000	7.5
Benue	298,000	9.5
Borno and Yobe	550,000	17.6
Kaduna	81,000	2.6
Kano	163,000	5.2
Katsina	46,000	1.2
Kwara	100,000	3.5
Niger	110,000	3.5
Plateau	166,000	5.3
Sokoto	400,000	12.7
Total	3,144,000	100.0

Source: Gwarry (1995)

Table 3: Approximate wetlands locations and areas in Akwa Ibom State

Wetland location	Area (km^2)	(%) of total land area in the State
Mbiabet	62.5	0.9
Use	81.3	1.3
Ayadeghe	125.0	1.8
Nwaniba	312.0	4.4
Ebughe	193.8	2.9
Etebi	331.3	4.7
Okore Ete	350.0	5.0
Ukam	75.0	1.0
Floodplains of all rivers and streams in the State (except Ubuim Creek)	468.0	6.7
Nkana	87.5	1.2
Nung Obong	68.8	0.9
Ebam Ekot/Ekoi	63.0	0.8

Total source: Akwa Ibom Agricultural Development Programme (1992)

Cropping pattern, sequence and combination: There are two cropping seasons in the wetlands the dry season and the wet season farming. The dry season farming lasts from December to May while the wet season farming commences about June and ends in November. The dry season farming starts in the wetlands immediately after the rains, when the water regime has considerably reduced. The following describes the various cultural operations and the sequence of cropping and crop combination.

Land preparation: The first cropping activity is land preparation. This takes place between November and December. Land preparation consists of bush clearing, packing and burning of the trash and mounding in some communities.

Sowing: Seeding follows land preparation in the cropping activity. This depends on how safe, judged by the level of water in the field the farmer considers it is to plant. Crops are planted in mixtures. In addition to rice, which is usually planted as sole crop, fluted pumpkin is planted as sole crop in certain locations. Plots with sole fluted pumpkin are in almost all cases, for commercial purposes while such a farmer has other plots with mixed crops basically to satisfy family food needs. The predominant

crop enterprises are sole fluted pumpkin, a combination of fluted pumpkin, pepper and okra. Others are cassava, fluted pumpkin and okra, cassava, cocoyam, maize and fluted pumpkin and cassava, cocoyam and fluted pumpkin.

Weeding: Weed is a very important pest in wetlands farming. The moist environment of the wetlands seems to favour the growth of weeds, thus making them compete with crops for space and nutrients. Weeding is done once or twice depending on weed intensity.

Harvesting: Harvesting of crops in the wetlands takes place between March and May, before the rains sets in and the field becomes flooded. However, sometimes the farmers' prediction of the coming of the rains is not accurate enough such that they are caught by sudden heavy and consistent down pour. The sudden flooding of the farm land arising from the situation often leads to panic harvesting. Panic is a situation where the farmer is forced by unforeseen and sudden environmental risk (e.g., flooding are drought) to harvest the crops before they are mature. During the field study this situation was commonly observed in Ayadeghe. Heaps of tiny cassava tubers were found displayed along roads for sale around the months of April and May. Crops harvested are either sold at the farm gate, village markets or conveyed to town where the farmers hope to obtain higher price and profit.

The wet season farming in the wetlands lasts from the month of June to November. The major crop cultivated during this period is swamp rice. The choice of rice for this season may be due to its flood tolerant nature. The cultural operations involved in rice cultivation slightly differ from that of other crops. It commences with pre-planting activities other basic practices which are known but where not found to be common in dry season crop farming. The cultural practices in rice cultivation are discussed below:

Pre planting activities: The pre planting activities in swamp rice cultivation consist of nursery preparation. The nursery is prepared in the month of April and May irrespective of the rice variety. The seedlings are left in the nursery for 1-2 months, on the average, before transplanting. Nursery preparation is followed by land preparation. Land preparation is done in slightly different ways by different farmers. All farmers cut standing vegetation and pack the trash, but not all farmers till the soil and even fewer farmers carryout puddling.

Sowing/transplanting: When the land has been prepared, rice seeds are planted with the aid of a stick. Where the land is hoed, rice seeds or seedlings are planted between rough edges. Farmers do not follow any particular planting or transplanting pattern or spacing. Transplanting is a combined operation of lifting and washing the seedlings followed by transplanting.

Fertilizer application and weed control: Farmers use fertilizer in the nursery. Not many use fertilizers in the field. Reasons given by farmers for not applying fertilizer include high cost and lack during planting season. Many of the farmers interviewed also believe that their land is sufficiently fertile and the use of fertilizer was not necessary. Weed control is entirely by hand by carefully picking weeds from the rice crop. Weeding is usually carried out once only and the timing of weeding varies widely from 20-30 days after planting.

Bird scaring: Birds are major pest of rice. Bird scaring is done mainly by hired labour. The bird scarers are employed for about 35-40 days during the rainy season farming. Depending on the variety, this is the period when rice start to milking up to when they are mature enough and no more susceptible to damage by birds.

Harvesting: Most varieties of rice planted in the study area mature in 120 to 150 days after planting. The common varieties of rice grown are MAS 2401, TOS 2578, IR 5 and such local varieties named in Ibibio as *Nsim enang*, *Abakiliki*, *Ntuad Ntuad* and *Mbio nkwa*. Harvesting is done mainly by hired labour and mostly female. Rice is harvested using a small sickle to cut the individual panicles. The rice straws are packed as heap to form bunds in the field. Some farmers utilize such bunds by planting such as cocoyam, cassava or plantain on them. Generally, most rice fields are left fallow until they are cleared again for cultivation. The fallow period may last between 2 to 5 years depending on if the individual farmer has abundant land to turn to in the subsequent planting seasons.

Contribution of wetlands to food security and income: Farmers cultivate the wetlands for two main reasons namely to satisfy household food need and to sale produce to make income. Table 4 and 5 contain information on the contribution of wetlands farming to household food supply (and by extension, food security) and income. Three sources of food supply to the households. These were purchases from market, production from uplands as well as wetlands. Food supply from the tree sources were converted to a common unit of measurement of grains equivalent using grains equivalent table. Findings reveal that wetlands contribute a total 2426 kg of food (in grains

Table 4: Contribution of wetlands to household food supply (monthly)

Source of food	Quantity (in grains equivalent)	(%)
Purchase	443.80	10.30
Upland Farms	1438.60	33.40
Wetlands	2426.00	56.30
Total	4308.40	100.00

Source: Field data, 2002

Table 5: Contribution of wetlands crops to household income

Crop	Economic values notes	Value	Value (N ha^{-1})
Rice	Based on returns of 12,961 rice farmers(assuming 2 plots at 0.1 ha)	241,366,668	18622.53/farmer
Raffia/palm wine	Calculated from 200 ha identified	199,500,000	997,500
Oil palm	Calculated from 1000 ha identified	42,450,000	42,450
Maize and Okra	Calculated from estimated 15 ha per village	19,123,500	1,274,900
Chiles and pumpkin	Calculated from an estimated 15ha per village	11,737,500	2,347,500
Cocoyam	Calculated from an estimated 30 ha per village	37,612,500	1,253,750
Okra	Calculated from an estimated 10 ha per village	26,112,500	2,611,250
Cassava	Calculated from an estimated 20 ha per village	19,400,000	970,000
Fluted pumpkin	Calculated from an estimated of 15 ha per village	49,500,000	3,3000,000
Total		428,802,668	

Source: Northern Akwa Ibom Swamp resources study report (1997)

equivalent) per month to the household. This constitutes more than 56% of the total food supply to the household. It is followed by upland farms which contribute bout 33% of food consumed by wetlands farming households.

The results in Table 5 clearly show the importance of wetlands faming to household income. One hectare of wetlands cultivated with rice alone can provide N18622.53 per farmer. However, the highest income is derived from fluted pumpkin, followed by okra, fluted pumpkin combined with chiles. The high returns to fluted pumpkin and other vegetable may have informed the cultivation of these as sole crops particularly during the dry season.

CONCLUSION

The issues revealed in this study, are very important for the efforts in achieving household and indeed national food security. In the first instance, the study has demonstrated that Nigeria and Akwa Ibom State particularly are endowed with abundant wetlands that can be utilized for agricultural production. Second, wetlands could contribute substantially to household food supply and invariably food security. The fact that there is abundance of wetlands yet farmers are not getting the optimum from it quickly suggests the need for actions that would lead to optimum use of the wetlands for agricultural purposes. Such actions should be those that will increase the productivity of the wetlands. Productivity enhancing technologies should be introduced to and be adopted by farmers as a way of increasing productivity. Training on efficient use of resources and risk management should also be extended to the wetlands farmers. The training is expected to build the capacity of the farmers to progress from their present production practice and level to the optimal farm level. Obviously, the wetlands have a lot of promise both for agriculture and other uses. But a delicate balance must be struck between using the rich wetlands resources for agriculture and it conservation. This is essential as the future cannot be conserved if the present is not satisfied. Therefore, the farmers should continue to utilize the wetland for his purpose while the environmental concerns are also addressed. This is a question of sustainable management of the wetlands. Sustainable management of wetlands would require a multidisciplinary approach involving all stakeholders-farmers, environmentalists, the public sector and researchers.

REFERENCES

Agboola, A.A., 1987. Farming Systems in Nigeria. A Paper presented at the Second Regional Seminar on Land Development and Management of Acid Soils in Africa, Lasaka-Misarapi, Zambia.

Aminu-Kano, M., 1994. Sustainable Water Resources Development in the Komdugu-Yobe Basin. A Paper presented at the National Symposium on Water Resources and Rural Development, Kano.

Ayotade, K.A. and S.O. Fagade, 1980. Nigeria's Program for Wetland Rice Production and Rice Research. In: The Wetlands and Rice in sub Saharan Africa, Juo, A.S.R. and J.A. Lowe (Eds.). IITA, Ibadan.

Eshiett, E.T., 1994. The Wetlands of Nigeria: Distribution, Characterization and Traditional Land Use Practices. Twenty firstst Annual Conference of Soil Science Society of Nigeria, Uyo.

Gwarry, D.M., 1995. Sustainable Food Production Through Fadama farming in the Semi-Arid zone of North-Eastern Nigeria. A Paper Presented at the 11th Annual Conference of Farm Management Association of Nigeria, Uyo.

Grove, A.T., 1985. The Niger and its Neighbours: Environment, History, Hydrobiology, Human Use and Health hazards of the Major West African Rivers. Belkema, Rotherdam.

Ibanga, I.J. and M.N. Armon, 1992. Report on Wetlands Soils of Cross River State, Nigeria, Cross River State Agricultural Development Project, Calabar.

IITA, 1990. 1989/90 Annual Report, International Institute of Tropical Agriculture IITA, Ibadan.

Kio, P.R.O. and B.A. Ola-Adams, 1986. Utilization and Development of Wetlands. In: Nigerian Wetlands. Akpata, V.I. and D.U.U. Okali (Eds.). Man and Biosphere.

Moormann, F.R. and A.S.R. Juo, 1986. Present Land Use and Cropping Systems in Africa. In: The Wetlands and Rice in sub-Saharan Africa, Juo, A.S.R. and J.A. Lowe (Eds.). IITA, Ibadan, pp: 187-194.

NEST, 1991. Nigeria's Threatened Environment: A National Profile. NEST, Nigeria Environmental Study/Action Team Ibadan, pp: 154-160.

Okigbo, L.C., 1984. Potentials for Mangrove Utilization in Nigeria. Invited study presented at the Annual Conference of Forestry Association of Nigeria.

Udofia, W.E. and I.B. Inyang, 1984. Land and People of Cross River In: Akwa Ibom and Cross River States: The Land, the People and their Culture. Abasiattai, M. B. (Ed.). Wusen Press Ltd., Calabar, pp: 1-25.