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# MULTIPLE UTILIZATIONS OF WETLANDS FOR SUSTAINABLE FOOD AND WATERRECYLING PRODUCTION IN NIGERIA

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## Abstract

In Nigeria, wetland comprises inland swamp, mangrove and fresh water swamp and shallow to deep water fadama which are scattered in packets, covering over 24,009km. Previous finding showed that all Nigerian saline wetlands occupy 759,000 acres. Moreover, The Fresh wetlands are Niger delta, Niger River, Benue river, Cross river and Imo River, Ogun-Osun River, and Lake Chad occupying 117,700, 8,150, 242,000, 250,000 and 26,000, 380,000, 55,000 acres respectively. The freshwater swamp portion of the wetland is estimated to be 2,130,000 hectares while the mangrove swamp is reported to be 858,000 hectares. The study investigated the multiple use of wetland as partial waste water recycling methods and food production. The wetland treatment was done via (collection system, wastewater treatment plant, natural waterways, constructed wetland, effluent reservoir and water consumption) and processed through Wastewater - Discharge - Purification – Deposit - Supply. The Results shows an increased in water supply through the alternate method of waste water reuse from wetland production making it useful for agricultural practice with resultant effect in food supply increased. The required food supply shortages are met basically through wetland production. The result also that wetland contributed to over 56% of the food supply while Upland and other domestic production contributed 33.4 and 10.3% respectively. The wetlands of Nigeria make important contribution to the livelihood of urban and rural communities. Environmentally, they provide a range of hydrological and ecological benefits including the recharge and discharge of aquifer. However decision-makers should highlight and applied the economic value as well as evaluating the various goods and service that wetland provide to the nation's sustainable development.

**Keywords:** Aquifer, Ecological Benefits, Fadama, Hydrological, Sustainable Development, Wetland



## 1.0 INTRODUCTION

The total wetland area in Africa amounts to about 5.6 million km$^2$ (i.e. about 16% of the total area of the continent). The major wetland soils, however, represent a total area of 3.4 million km$^2$ (i.e. 9-10% of the continent). The wetland soils of Africa consist of: histosols (205,333 km$^2$), gleysols (1,783,948 km$^2$), fluvisols (1,376,534 km$^2$) and temporarily flooded soils (2,280,847 km$^2$). The fluvisols of the arid and the semi arid zones pertaining to the valleys and deltas of the Nile and Niger Rivers make an important contribution to the food production required to feed the Sahelian population (Antoine Jacques, personal communication).

The wetlands in tropical sub-Saharan Africa cover a total area of 2.4 million km2 (24 Mha) and are divided into four categories (Table 1a

and 1b): coastal wetlands (1,165,000 km2); inland basins (1,070,000 km2); river floodplains (300,000 km2); and inland valleys (850,000 km2) (Andriesse, 1985). Africa, which represents one-fifth of the world's land, is about one-third desert; its total irrigated land accounts for a mere 0.1%. While the area occupied by wetland soils is larger than the irrigated land area, it is nevertheless quite small compared to the total. There are several large areas, principally in Central Africa, where wetland soils are common and are dominated by Tropaquepts and Tropoquents with limited suitability for conversion to productive use.

In Nigeria, wetland comprises inland swamp, mangrove and fresh water swamp and shallow to deep water fadama. (Ayotade and Fagade, 1980) Assessing the spatial distribution of Nigerian wetland, Kio and Ola-adams (1986) reported that the wetlands are scattered and in packets, covering over 24,009km. The important wetlands available in Nigeria, are Hydejia and kirikasama, Lake Chad, Komduge, Yobe, Kanji Lake, Baturiya, Adiami-Nguru floodplains, Matgadru-Kabok floodplains, the Niger-delta flood plains and the coaster lagoons near Lagos and D`elta of Cross river. The Coaster saline wetlands (mangrove) of Nigeria are Niger River which is 249,885. hectares, claiming 71.9% of Nigerian wetlands, Cross river estuary, Imo River and Qua Iboec river estuary occupies 38,475.0and 14,580.0 hectares, occupying 11.09% and 4.2% of Nigerian wetland respectively. In addition to these wetlands, other un-prominent ones occupy 44,500.0 hectares. It was also reported that all Nigerian saline wetlands occupy 307,395.0 hectares . Moreover, The Fresh wetlands are Niger delta, Niger River, Benue River, Cross River and Imo River, Ogun-Osun River, and Lake Chad occupying 47,668.5, 3,300.88, 98,010.0, 101,250.0 and 10,530.0, 153,900.0, 22,275.0 hectares respectively (NEST,1991) A total of 2,988,000 hectares of Nigerian lands are wetland. The freshwater swamp and mangrove portion of the wetland is estimated to be 2,130,000 and 858,000 hectares respectively put together they are yet enough

**TABLE 1a: DISTRIBUTION AND EXTENT OF NIGERIAN WETLAND**

| ***COASTER SALINE WETLANDS (MANGROVE)*** | ***EXTENTS IN(ACRE)*** | ***PERCENT(%)*** |
|---|---|---|
| NIGER RIVER | 617,000 | 71.91 |
| CROSS RIVER ESTUARY | 95,000 | 11.09 |
| IMO RIVER AND QUA IBOEC RIVER ESTUARY | 36,000 | 4.2 |
| OTHERS | 110,000 | 12.8 |
| TOTAL | 759,000 | 100.0 |

SOURCE: Adapted from NEST (1991) Journal .Volume 3 (2) Medwel Journal .Pg.110.

**TABLE 1b: DISTRIBUTION AND EXTENT OF NIGERIAN WETLAND (CONT'D)**

| ***FRESH WETLANDS (FLOODPLAINS)*** | ***EXTENTS IN(ACRE)*** | ***PERCENTAGE (%)*** |
|---|---|---|
| **NIGER DELTA** | 117,700 | 55.26 |
| **NIGER RIVER** | 8,150 | 0.38 |
| **BENUE RIVER** | 242,000 | 11.38 |
| **CROSS RIVER** | 250,000 | 11.44 |
| **IMO RIVER** | 26,000 | 1.22 |
| **OGUN/OSUN RIVER** | 380,000 | 17.84 |
| **LAKE CHAD** | 55,000 | 2.50 |
| **TOTAL** | 2,130,000 | 100 |

SOURCE:, Adapted from NEST (1991)

## 2.0 MATERIALS AND METHOD

The objectives of the studies are to review:

- The ecology of Nigerian wetlands.
- Factors influencing the utilization of wetlands in sustainable food production.
- The contribution of wetlands in sustainable food production.
- Design alternative wetland for food and water reuse production
- Make recommendations towards achieving a sustainable food production based on the findings.

### 2.1 Factor Influencing the Sustainable Use of Wetland for Food Security

African wetlands are a very important source of natural resources upon which many rural economies depend. Despite their importance, wetlands throughout Africa are being modified and reclaimed for other non agricultural use. Food is the most important need of all biotic. Food supply indicates the quantity of food made available to consumers at a given period. Given this definition, Nigerian's food supply has for many years fallen short of demand, creating a deficit which has not been met by importation or starvation. In the period between 1994 and 2001 Nigeria's domestic food production moved from 89.25 million metric tons to 103.86 million metric tons in 2001. Food demands in these years ran from 87.23million metric tons in 1994 to 110.37 million metric tons in 2001 (Table 2), while the food deficit was 6.51 million metric tons (Okolo, 2006). The high demand for food may have been triggered by the gradual increase in population pressure, increased income levels, rapid urbanization and associated changes in family occupational structures. (Fu.et.al., 2009), though the annual domestic food productions made up a very large share of the food supplies, they were consistently inadequate to fully take care of the country's food demands. Until recently with the improvement of wetland, food deficit is decreasing to sustainable minimum as show on table 2 below

**Table 2: FOOD SUPPLY AND DEMAND IN NIGERIA (1996-2008) (MILLION MT)**

| DESCRIPTION/YEAR | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|
| PRODUCTION | *93.35* | *95.64* | *98.74* | *100.41* | *102.12* | *103.86* | 107.20 |
| FOOD DEMAND | *96.26* | *99.03* | *101.87* | *101.87* | *107.46* | *110.37* | 110.42 |
| DEFICIT/ SURPLUS | *(2.91)* | *(3.43)* | *(3.13)* | *(1.46)* | *(5.46)* | *(6.51)* | (3.22) |

Source: Adapted from Okolo (2006) and Author's Data 2010

**Table 2: FOOD SUPPLY AND DEMAND IN NIGERIA (1996-2008) (MILLION MT) (CONT'D)**

| DESCRIPTION/ YEAR | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| PRODUCTION | *109.65* | *110.12* | *114.00* | *115.82* | *118.42* | ***124.32*** |
| FOOD DEMAND | *113.33* | *115.48* | *119.12* | *116.21* | *118.61* | ***124.47*** |
| DEFICIT/ SURPLUS | *(3.68)* | *(5.36)* | *(5.12)* | *(0.39)* | *(0.19)* | ***(0.15)*** |

Source: Adapted from Okolo (2006) and Author's Data 2010

Thus, leaving the country with substantial sustainable food production meant that the country can make provision to produce enough food for the future populace, since adequate provisions have to been made through wetland for massive production of food that will meet the demand of the present masses.

In Nigeria, the major staple crops produced are mainly cassava, maize, rice, beans, groundnuts, plantain, yam, cocoyams, millet and sorghum. In spite of the increases in the annual production of some of these crops, their aggregates produce were inadequately met (see table 3). Food importation, even for staples like rice that can be easily produced in Nigeria within one or two seasons, will continue to be the only alternative source of food deficit supply if quick measures are not immediately taken. The nutritional needs of Nigerians may therefore continue to be inadequate as such short falls may gradually become unaffordable in terms of the rising foreign exchange.

**Table 3: OUTPUT OF MAJOR AGRICULTURAL CROPS (MILLION MT) 1994-2004**

| ***CROP*** | ***1994*** | ***1995*** | ***1996*** | ***1997*** | ***1998*** | ***1999*** | ***2000*** | ***2001*** | ***2002*** | ***2003*** | ***2004*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CASSAVA** | 31.00 | 3.40 | 32.95 | 33.51 | 34.09 | 35.98 | 36.75 | 37.43 | 38.02 | 39.44 | 40.43 |
| **YAM** | 23.15 | 22.81 | 23.92 | 24.71 | 25.10 | 26.00 | 26.42 | 26.54 | 26.87 | 27.12 | 27.98 |
| **MAIZE** | 6.90 | 6.93 | 6.21 | 6.28 | 6.43 | 6.51 | 6.49 | 6.46 | 7.01 | 7.45 | 7.57 |
| **MILLET** | 4.75 | 5.56 | 5.58 | 5.99 | 6.32 | 6.42 | 9.74 | 9.87 | 10.04 | 11.15 | 12.78 |
| **RICE** | 2.42 | 3.20 | 3.12 | 3.23 | 3.48 | 3.52 | 3.84 | 4.21 | 4.65 | 4.90 | 5.67 |
| **BEANS** | 1.54 | 1.75 | 1.84 | 1.95 | 2.05 | 2.10 | 2.26 | 2.34 | 2.45 | 2.65 | 2.96 |
| **GROUNDNUT** | 1.45 | 1.57 | 2.07 | 2.10 | 2.22 | 2.30 | 2.39 | 2.78 | 2.88 | 3.33 | 3.56 |
| **PLANTAIN** | 1.66 | 1.63 | 1.68 | 1.75 | 1.80 | 1.84 | 1.99 | 2.03 | 2.44 | 2.59 | 2.68 |
| **COCOYAM** | 1.12 | 1.18 | 1.29 | 1.38 | 1.45 | 1.49 | 1.59 | 1.65 | 1.76 | 1.89 | 1.92 |
| **SORGHUM** | 6.19 | 6.99 | 7.51 | 7.95 | 8.40 | 8.50 | 8.82 | 9.34 | 9.56 | 10.45 | 11.02 |
| **PALM OIL** | 0.83 | 068 | 0.77 | 0.78 | 0.79 | 0.82 | 0.86 | 0.94 | 1.25 | 1.78 | 1.89 |
| **COCOA** | 0.32 | 0.20 | 0.32 | 0.32 | 0.34 | 0.16 | 0.17 | 0.16 | 0.18 | 0.21 | 0.23 |
| **RUBBER** | 0.23 | 0.25 | 0.24 | 0.25 | 0.25 | 0.26 | 0.27 | 0.27 | 0.29 | 0.30 | 0.29 |

Adapted from NEST 1991 and Author's data 2010

Over the years, the nutritional needs of many Nigerians (the poor, children, lactating mothers, elderly) are not been adequately met. The diet of many Nigerians fall short of the minimum per capital daily calorie and protein in-take for maintaining the human body (2,500kg cal/day and 65gms/day) recommended, by the Food and Agricultural Organisation (FAO, 1999). Oluleye and Osunfuyi (1991) opined that an average

Nigerian receives about 9gms of protein per day causing protein energy malnutrition deficit, a major health problem in Nigeria causing growth failure in children and loss of weight in adults.

Thus, there is a great need to avoid absolute reliance on the cultivation of upland field or rain fed agriculture for food production. Alternative means such as utilization of wetlands in achieving a sustainable food production should be fully utilized along with the cultivation of upland fields. The cultivations of wetlands will serve multiple purposes, the pressures exerted on forested regions are reduced, and water supplies as well as dry season's food security are improved.

## 3.0 RESULT AND DISCUSSION

It is very evidence that food supply in Nigeria is heavily reliance on Wetland, creation of natural wetland can be done with cost effectiveness and more efficiently as describe in the following diagram as was previously experimented by this same author in China, (from Waste Water to adequate Water Supply via Constructed Wetland Production), since small factors can encourage it production and full utilization in Nigeria (Ojekunle et. al., 2009)

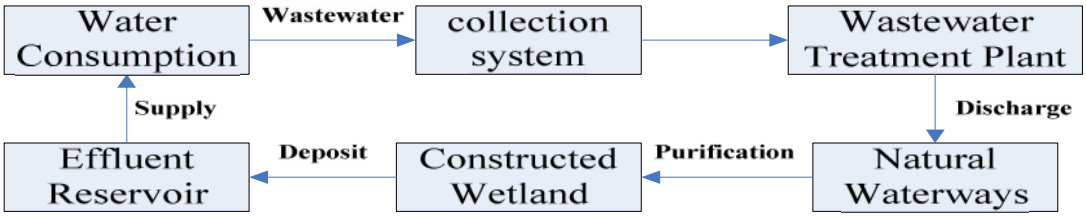


Figure 1 The scheme of constructed wetland through wastewater recycling in Abeokuta, Nigeria

### Principal components of the system

The basic scheme of the wastewater recycling and constructed wetland could be generalized in Fig. 1. Central to the system is the wastewater treatment plant and the constructed wetland. The design of the system incorporated the geohydrological features (Taking into consideration the catchment area aquifer, rock formation – basement complex and the other available source of water within the catchment), current sewerage facilities (Previous and Proposed Wastewater Treatment Plant), financial conditions and public concerns (Designed of Environmental Impact Assessment), making it cost-effective (Preparing Cost Benefit Assessment) and feasible (looking critically at the Risk Assessment and measures of control).

### Wastewater Treatment Plant (WWTP).

The Proposed Abeokuta Sewage Treatment Plant, to be located in the urban area will be completed with an estimated maximum capacity of 100,000 tons in 2011. According to the Proposed Design Guidance of Abeokuta Sewage Treatment Plant, the secondary effluent parameters of the sewage treatment plant are illustrated in Table 4.

**Table 4** Proposed Design parameters of the Abeokuta Sewage Treatment Plant

| *Pollutants* | *COD(mg/L)* | *BOD(mg/L)* | *SS(mg/L)* | *TN(mg/L)* | *TP(mg/L)* | *PH* |
|---|---|---|---|---|---|---|
| **Influent Concentration** | 500 | 200 | 250 | 30 | 2.0 | 6~9 |
| **Effluent Concentration** | ≤60 | ≤15 | ≤25 | ≤10 | ≤1.0 | 6~9 |
| **Reduction Rate** | ≥80.5% | ≥91.4% | ≥89.0% | ≥57% | ≥45% | — |

**Table 5.** A summary of the recommended minimum pre-treatment level for a natural wetland treatment

| *Constituents* | *Suggested Pre-treatment Level* |
|---|---|
| **Biological Oxygen Demand** | Minimum of secondary 20-30mg/L |
| **Total Suspended Solids** | Minimum of secondary 30-50mg/L |
| **$NH_4$-N** | (highly desirable) Maximum 5mg/L |
| **Total Nitrogen** | Less than 20mg/L |
| **Total Phosphorus** | Less than 1.0mg/L |
| **Total Dissolved Solids** | Site Specific |
| **Metals & Other Toxins** | Below Chronic Toxicity Level |

Adapted from (Kadlec and Knight 1996)

The strip-like lowland between Abeokuta basins is the proposed wetland-treatment site for tertiary treatment. As an area of unoccupied and marsh-landscape land, this site would cost much less in the land occupation and would facilitate the growth of the vegetation, thus the quick installation of the constructed wetland. The aquatic macrophytes (such as reeds and cattails) planted in the artificial wetland is selected from the natural locality for the greatest adaptability and in case of unexpected exotic species invasion (Greenway and Simpson 1996). The application of wetland treatment would be especially beneficial to the sustainable water resources management, providing wildlife habitat, landscape enhancement, macrophyte harvest, riverbank ecotourism, land replenishment and food production.

## The Reclaimed Water Reservoir.

The polished effluents after the wetland treatment would be temporarily stored in the channel of the basin. Satisfying the requirement of water quality shown in Table 5, this water would be drawn and transported to public water use or through a pipeline for use. As a highly seasonal river area, this river channel has broad riverbed but little upstream water to feed into in most time of a year. So this river channel could be used as a temporal reservoir simply by closing floodgates on basin areas to hold the tertiary effluents from the wetland. In the flood seasons, the water gates would open to discharge the storm runoff.

The reclaimed water will also be use for agricultural production and hence food security, since, in Nigeria, agriculture holds a lot of potential for future economic development having played very dominant role in the nations past history. In the past, a system of agricultural production had been developed to support a visible social, cultural, economic and political institution in various ecological zones of the nation. From these, the nation's food needs and export were met. Unfortunately, agricultural production was therefore relegated in national issues as can be seen by the budgetary allocated to it between 1990 and 2002 (Table 6 and 7)

**TABLE 6: BUDGETARY ALLOCATIONS TO AGRICULTURE (1990-2002)**

| *Year* | *Total budget (N billion)* | *Allocation to agric (N billion)* | *% of agric to total* |
|---|---|---|---|
| **1990** | 39.76 | 1.96 | 4.95 |
| **1991** | 38.66 | .67 | 1.74 |
| **1992** | 52.03 | .92 | 1.78 |
| **1993** | 112.10 | 2.83 | 2.53 |
| **1994** | 110.20 | 3.71 | 3.37 |
| **1995** | 153.49 | 6.92 | 4.51 |
| **1996** | 337.21 | 5.71 | 1.69 |
| **1997** | 428.21 | 8.66 | 2.02 |
| **1998** | 487.11 | 9.04 | 1.86 |
| **1999** | 747.69 | 12.15 | 1.28 |
| **2000** | 701.05 | 13.60 | 1.94 |
| **2001** | 1018.15 | 64.94 | 6.38 |
| **2002** | 1018.15 | 44.84 | 4.40 |

Source: Okolo (2006)

In 2008, there was improvement; however, the past picture indicates that the annual budget had not given enough support to agriculture to encourage food production. Table 7 compares budgetary allocation in agriculture within the same period to other sectors like education and health. This shows that agriculture has not received any concession in terms of national budget approvals except for 1993-1997 where agriculture had better budgetary allocation than health but never compared to educational sector.

| *Year* | *Total budget* | *Allocation to agric % in bracket* | *Allocation to education % in bracket* | *Allocation to health % in Bracket* |
|---|---|---|---|---|
| **1990** | 39.76 | 1.96(4.95) | 2.29(5.77) | 0.65(1.66) |
| **1991** | 38.66 | 0.67(1.74) | 1.55(4.02) | 0.75(1.96) |
| **1992** | 25.03 | 0.92(1.78) | 2.06(3.96) | 1.02(1.97) |
| **1993** | 112.10 | 2.83(2.53) | 7.99(7.14) | 2.68(2.39) |
| **1994** | 110.20 | 3.71(3.37) | 10.28(9.33) | 3.02(2.75) |
| **1995** | 153.49 | 6.92(4.51) | 12.72(8.29) | 5.06(3.30) |
| **1996** | 337.21 | 5.71(1.69) | 14.88(4.41) | 4.85(1.44) |
| **1997** | 428.21 | 8.66(2.02) | 16.79(3.925) | 5.80(1.36) |
| **1998** | 487.11 | 9.04(1.86) | 24.61(5.05) | 13.64(2.80) |
| **1999** | 947.69 | 12.15(1.28) | 31.56(3.33) | 16.80(1.71) |
| **2000** | 701.69 | 13.60(1.94) | 49.56(7.07) | 20.44(2.92) |
| **2001** | 1018.02 | 64.94(6.38) | 59.74(5.87) | 44.65(4.39) |
| **2002** | 1018.15 | 44.80(4.40) | 109.45(10.75) | 63.17(6.20) |

*Source: Federal Ministry of Finance 2004*

If the nation's food needs and water must be improved, the government must give attention to agriculture in budgetary matters. Inputs for farmers have to be made available; interested farmers must have access to both uplands and wetlands (Natural and Constructed) so that farmer will not have to wait for rainy season.

Access to micro credit at subsidized cost including a revamping of the Agriculture and Rural Development Bank. The government must support adequate processing and storage to limit wastages and provide market facilities including access to market for farmers. Food importation must be discouraged especially those with local substitutes. A scheme for production suggested by Okolo (2006) includes the selection of crops with potentials for expanded output and planting them nationwide. This has the capacity of helping the nation to attain food security in a short while as well as raise farmers' income. If this wetland system is given prior attention without the usual propaganda, political noise, and with enough inputs to the farmers through the farmer's union/cooperatives and if it is consistently done, the nation may be heading towards food sufficiency and water abundance in less than half a decade. This scheme must be private sector driven. The credit loan to farmer must be subsidized and enabling environment provided for private developer to thrift.

## CONTRIBUTION OF WETLANDS TO HOUSEHOLD FOOD SUPPLY

There are two main contributions of wetland utilization to food security;, to satisfy household food need and to acquire income through the sale of agricultural produce. The summary table below gives precise results of the importance of wetland in food production. In the table below summarized, the contribution of three sources of food supplies, namely; purchase from market, food produce from upland and wetlands were presented in percentage.

**TABLE 8. SHOWING THE MONTHLY CONTRIBUTION OF HOUSEHOLD FOOD SUPPLY**

| *SOURCE OF FOOD* | *QUANTITY (IN GRAINS EQUIVALENT)* | *PERCENT* |
|---|---|---|
| Purchase | 443.80 | 10.30 |
| Upland farming | 1438.60 | 33.40 |
| Wetland farming | 2426.0 | 56.30 |
| **Total** | **4308.4** | **100.00** |

SOURCE : Field Data 2002.

The Results shows recently that though Nigerians depend heavily on imported foods which are not meeting the huge desire of the teeming population of the remaining supplies of food to meet these short falls are basically from wetland production. It shows that Wetland contributed to over 56% while Upland and other domestic production contributed 33.4 and 10.3% respectively. It is recommended that Nigeria and Sub Sahara Africa can develop this cost and quick effective technique in food production since it will it no small measure relieve food shortage and production

Food supply from the three sources was converted to a common unit of measurement of grains equivalent using grain table equivalent. Sources of food supplies through wetland utilization have the highest contribution.
From the result obtained wetlands contribute 2426kg of food (in grain equivalent) per month to the household. This constitutes more than 56% of the total food supply available to each household while 33% of foods consumed are contribution through upland cultivation.

## 4.0 CONCLUSION

In many places Wetland are inextricably linked to cropping and livestock management systems. At the same time, increasing population in conjunction with efforts to increase food security is escalating pressure to expand agriculture within wetlands.
In Nigeria, the usual pattern of rainfall reveals that for much of the year, water is scarce. This makes constructed wetlands the final resort for most farmers because the capacity of wetlands to retain moisture for long periods, and sometimes throughout the year, makes them a valuable agricultural resource and domestic water uses. This correlate with the Zambia experiences where the poorest households obtained 90% of their cash income from the sale of produce grown in the wetland.

A view of wetlands as unproductive wastelands is being overturned (Maltby, 1986). The undoubted importance of wetlands as waterfowl habitat is now seen in the wider perspective of the sustainable utilization of wetland resources by people (IUCN, 1988a). Adamus and Stockwell (1983) identified and documented the functions that wetlands perform for people; ground water recharge; ground water discharge; flood storage and desynchronization; shoreline anchoring and dissipation of erosive forces; sediment trapping; nutrient retention and removal; food chain support; habitat for fisheries; for wildlife; active recreation; and passive recreation and heritage value. Their study, and the associated procedure for identifying wetland functions, was not a major scientific discovery but the integrated approach was novel and important.

## 5.0 RECOMMENDATION

This constructed wetland scheme must be private sector driven. The credit loan to farmer must be subsidized and enabling environment provided for private developer to thrift.
Communities identify a wide range of biophysical and socio-economic constraints to the use of wetlands for agriculture, but generally negative environmental impacts are not amongst them.
The study not only discovery the integrated approach of waste water reuse for agriculture production but an empirical analysis on future constructed wetland and sustainable food production. It is also important to note that more need be done on the hygienic and environmental aspect of this study so as synchronized the expected benefit accrued to the scheme.

**Plate 1:**wetland farming : vegetable production and rice production in wetland area.

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