# POTENTIALS FOR FISHERIES DEVELOPMENT IN THE NIGER DELTA: ANOTHER GREEN–LIGHT FOR SELF SUFFICIENCY IN REGIONAL FOOD PRODUCTION

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## INTRODUDTION

### *General*

The Niger Delta has vast potential for agricultural development and production but these potentials remain largely undeveloped because of the difficult nature of the terrain. The whole area is a maze of creeks and shallow estuaries intersparsed with swamps and sandy ridges, reminiscent of a vast netting spread out on a flat ground (Figure 1). The creeks and estuaries are the many outlets through which the vast waters of the Niger, Benin, Orashi and Sombreiro Rivers drain into the Gulf of Guinea. The fresh water output by these rivers is so enormous that in the region of the Niger Delta west of the Brass River, the fresh water comes almost to the mouths of the estuaries at the peaks of the rainy seasons (July and September). Infact, the discoloured water occasioned by the floodal flux is seen several kilometers into the Bight of Benin, especially off the Nun, Escravos; Forcados and Benin-River entrances. Inspite of these numerous outlets, the floods coming down the hinterlands are so much that until recently, they could not be effectively discharged with dispatch into the sea. The result was the flooding of the banks at the upper Niger Delta and middle reaches of most of the main rivers which resulted in prolonged inundation of arable agricultural lands and a menance of severe erosion. Economic development, especially in the areas of agriculture and infrastructure were held in check to the agony of the inhabitants of the region. South of the freshwater flood-plains are the brackish water mangrove swamps which are inundated twice daily by tidal action (figure 2). Here the floods are not annual and even the brief but colourful short season cropping possible during the receding floods in the upper reaches of the delta is not possible here.

But developments related to engineering activities throughout the region now hold a hope not only for a profitable agriculture in the region but also that the region could evolve into a veritable bread basket of the Nigerian nation. The hydrography, geology, vegetation and related studies of the Niger Delta, and surveys of the agricultural and fisheries practices and potential of the region have been elaborately covered in the works of Anderson, (1967); Scott, (1960); Hartoungh (1960); and FAO (1969). These studies outline vast potentials for agriculture and Fisheries in the region, but all of them were conducted anterior to the trends in evidence today that a thorough up-to-date study has become due as a necessary complement to these earlier efforts. This paper advocates this stance on the basis of sound scientific premise deducted from unforeseen developments resulting from several engineering activities in the region aforesaid.

Since these trends are in their infancy and still unfolding, no attempts at scientific analysis and conclusions have been made. This paper serves to draw the attention of interested scientists to the issue raised, for a more professional approach and close study of the observed phenomena.

### *Agriculture and Fisheries in the Region*

Agriculture in the Niger Delta whether animal husbandry or crop production is essentially a small-holders affair. Vast hectarages of land can not be put under crops because of the difficulty in employing farm machinery and staggering loss following the annual floods that submerge and devastate the farms. Over the years, a pattern has emerged in the fresh water flood plains of the region. A variety of short season crops including cocoyam, water yam, sweet-potato, groundnut, maize, sugar-cane and assorted vegetables are grown during the receding floods, when the land

is exposed for a brief period of five months (November – March). The brief and colourful farming has demonstrated the vast agricultural potentials of the region, in terms of variety of crops and livestock, fertility and natural soil conservation. The annual flooding and its attendant erosion also demonstrates the seriousness of the regions agricultural and other economic predicament. The cycle of annual losses to farmers has reduced the inhabitants of the region to marginal existence where the bulk of the population, until recently was largely illitrate, and the economy subsistent.

With political autonomy more relevant to the region under the state instead of the estwhile regional administrations, the construction of roads, dredging of water ways and the provision of water borne transport systems has immensely altered the economy of the Niger Delta. Farmers have evolved from subsistence to peasant operations Quite a surplus over family requirements are recorded in crops and animal production. This surplus is channelled to population centres such as Yenagoa, Ahoada, Port Harcourt, Brass, Nembe, Warri and Patani for disposa But the hydrography of the region still takes its heavy yearly tolls on agricultural production. Only this year (1985) an estimated 95.5 million naira worth of crops was destroyed by flood. This is inspite of all precautions taken, in putting vast arable land under crops. The magnitude of the loss is a suitable index in estimating the vast potentials that could be opened up for agricultural development in the Niger Delta.

The nature of the annual floods and the level of the flood plains have made fish culture near impossible. Fish-ponds and pens in the true sense are virtually nonexistent in the fresh waterflood plains of the Niger Delta. The water is all too high when it is high and too low when it is low for a meaningful fish culture or fishery development programme. But the potentials for a sound fisheries development exist by way of remarkable strains of culturable fish fauna some of which include the hard clam--***Egeria spp, Alestes spp., Sarotherodon spp., Channa obscura, Heterobranchus spp., Clarias spp., Chrysichthys nigrodigitatus*** and some African carps. These species could be cultured for significant returns to the farmer, or properly managed to make the extractive fishery more worthwhile for the fishermen. But the reasources necessary for harnessing these potentials are beyond the inhabitants of these plains.

Further south, in the fresh water/Brackish water transition zone, are vast swamps suitable for intensive rice culture. Various government agencies have made efforts at establishing rice farms at Abobiri, Otuaka, Imbiakapaba, Yenagoa, Peremambiri and Igbematoru over the years (SCOTT, 1966; Hartoungh, 1966). But the difficult nature of the terrain, especially the difficulty of employing heavy agricultural machinery and implements in land preparation has held agricultural development in check. Here the effect of annual floods is considerably lesser but the soil is perpetually wet that the tubers of otherwise promissing crops like cassava, and sweet potatoes do not keep long in the soil. In this zone fish-culture has vast potentials for development - fish ponds, fish pens, race ways, fish tanks and cage culture are all possible at a considerably smaller capital outlay. But the check on the use of heavy earth moving machines imposed by the very soft and sodden soil has limited development severely.

Still farther south, are the brackish water mangrove forest. The soils are principally of three types – (Anderson, 1967):–

- Recent Aluvium (very soft and purulent)
- Chikoko (firm and fibrous)
- Saline sands (sandy-silt soils in the eastern Niger Delta).

The agricultural potentials of this zone were virtually unknown two decades ago. Some skeletal subsistent farming took place on the reminant of the coastal plain terraces of the eastern Niger Delta and the sandy-beach ridges from Opobo to Escravos. Plantain, cassava and sugar-cane were among the crops grown (Anderson, 1967; Hatoungh, 1966). Today, the hidden potentials are being unlocked but they still go unnoticed by a vast majority of the people. The zone is written down essentially as a fishery zone with artisanal fishery as its principal industry. Fin fish and shell-fishes are exploited in large quantities by migrant fishermen. The competion for the

catch is keen and often, the unscrupulous fishermen resort to unpopular and often clandestine methods such as poisoning and explosives. The catch here is supplemented with that from the inshore fisheries that the fish market is virually in glut in the immediate vicinity of the fishing ground. This makes aquaculture development not popular in the zone inspite of the vast potentials for fish pond, fish-pens and mariculture development.

It is clear then that the Niger Delta region has vast potentials for food production that could be harnessed with the aid of the right Technologies and resources. A clue to this fact is especially demonstrated in certain side occurrences resulting from oil exploitation, canalisation, reclamation and road consturction throughout the Niger Delta.

Properly studied, the trends manifesting from these activities hold a key to developing the Niger Delta region into Nigeria's bread basket as a necessary complement and a fitting finish to the laudable school-to-land programme that is gaining currency now.

## ENGINEERING ACTIVITIES AND FOOD PRODUCTION POTENTIALS

### *The Freshwater Zone and the Immediate Hinterland*

The relevant major engincering activities in this zone are the construction of new roads and oil exploration and exploitation. In the hinterland from Ogoni to Ahoada and parts of Omoku are new roads with a significant feature - they are lined all along with burrow pits from which the earth for building the roads was removed. Often these pits became receptacles for water (ground water or surface run-off). In the freshwater flood plains, the roads are raised several meters high to keep above the highest flood when they occur, and the first picture this engineering feat conjures up is that of a gigantic dam. The road (dam) effectively keeps the water under check allowing it passage only at predetermined points. Side-by-side with the roads, are the water ways which are deepened by canalisation or dredging to make for easy evacuation of flood water or for easy navigation. All along, one thing is clear - to a certain degree the water is controlled. The increase in these developments has made it possible in recent years to farm most of the flood plains with losses due to flooding, significantly reduced except during unusually wet years such as that of 1985.

### *The Brackish–Water Mangrove Swamps*

The principal engineering activities in this zone are oil exploration and exploitation, canalisation and land reclamation. The drilling of oil wells and construction of canals to facilitate oil exploitation and navigation results in dredging-up a lot of organic materials deep down to the surface. In most cases, the materials moved forms a vast land mass a few meters above the surrounding creeks or canal. Three major soil types are identifiable from such formations.

- Sand
- Chikoko
- Sna Recent Aluvium.

Some times, it is a mixture of two or all three types combined in different proportions. With time, vegetation of various types develop on these new land formations. Various grasses and ferns are common to sandy formations. Pure Chikolo formation are either entirely barren or covered with a poor vegetation of grass. The most interesting is where the formation is entirely recent alluvium or has this materials mixed in large quantities with others. In such places, the vegetation grows very fast. A succession of plants that give way to a lush, evergreen rain forest with a large array of plants soon emerges. Where these artificial land formations occur near suitable fishing grounds or other human habitation, the fishermen or other natives have been quick to appropriate them for agricultural use. Particularly suitable for these soils and very important in this new area of agricultural awareness are coconuts, pineapples, oil palms, and plantain Some of the farms are in the region of mini estates and the crop performance is excellent Inquiry showed that no fertilizers were used.

In the same zone, canalisation gives rise to vast mud flats being smoothered with sharp sand. Where such sand is subject to tidal action, the area soon gets colonized by shell fishes including the Razo Clams, *Cultellus tenuis and Targelus andansonii.* These grow to about 7 cm in less-than six months and constitute a lucrative fishery for the gatherers. The Clams yield excellent meat and are used in soups.

*The Estuaries*

At the estuaries, engineering activities take another form. Man dredges the river mouths to facilitate navigation such as are the cases of the Bonny and Brass Rivers. On the other hand, nature transports sand, creating banks and bars that obstruct the free flow of water. This is most noticeable in non-navigable estuaries* such as the Sombreioro, Santa Barbara, San Bartholomeo, and St. Nicholas Rivers. These engineering activities run counter to each other producing two significant effects. Here a comparison of the Bonny and Sombreiro should surfice. It is based on observations made on an on-going aquacultural study on spatfall in the two rivers. Five pairs of stations were set up equidistant from the river mouth in north-south transects. It was assumed that the hydrographic condition should be same for corresponding station, being in the same natural region and latitude. But the assumption proved unreliable from evidence obtain from transparency, and salinity cheks (Table 1). Of the five stations established up the Sombriero, in no station was transparency, above 0.50 m and salinity was 15% at the mouth and oto just 1 kilometer upstream. On the Bonny River, transparency ranged between 0.85 m to 2 m and salinity from 25% to 12% in the 4th station and 0%o in the 5th station (about 50 and 60 km) upstream. Whereas spatfall of the mangrove oyster *(Crassostrea gasar)* was recorded in all but the 5th station upstream on the Bonny River, spatfall occurred only at station 1 at the mouth of the Sombreiro River. Under such differences in salinity and transparency regimes between corresponding stations of what should be two similar rivers, the basis for comparison of the animal population processes (spatfall and growth) was lost. On average the Sombreiro River is more turbid than the Bonny River, a situation that is likely to result in reduced phytoplankton abundance and hence reduced food for the oyster population on the Sombreiro River as compared to the somewhat healthier population on the Bonny River. Implicated is the difference in hydrography and topography of the river beds. The Bonny River has a central deep channel right up to station 5 (Iwofe). The depth averaging 15–20 m is maintained by constant dredging to facilitate navigation to and from the many ports spanning the river.

**Table 1 – Transparency and salinity at 5 stations on (a) the Bonny and (b) the Sombreiro River (July – September 1985)**

*(a) Bonny River*

| *Station* | *Transparency (m)* | *Salinity (‰)* |
|---|---|---|
| 1 | – | – |
| 2 | 1.35 | 18 |
| 3 | 1.30 | 14 |
| 4 | 1.04 | 12 |
| 5 | 0.35 | 0 |

*(b) Sombreiro River*

| *Station* | *Transparency (m)* | *Salinity (‰)* |
|---|---|---|
| 1 | 0.23 | 15 |
| 2 | 0.24 | 10 |
| 3 | 0.22 | 0 |
| 4 | 0.50 | 0 |
| 5 | 0.47 | 0 |

Besides, the Bonny River has no principal freshwater body draining into it.

The Sombreiro River on the other hand is comparatively very shallow especially at its mouth where it is virtually obstructed by a sand bar that is exposed at ebb tides. This bar, in effect, keeps off the influx of saline water at flow tide and thereby, enhances the sea-ward distribution of the ample freshwater through-put from the upper reaches of the river and the hinterland. Thus, the translational power of the flowing river is very effective for a considerable distance down-stream, resulting in the uncharacteristics turbidity and fresh water so near the estuary.

This basic difference resulting from the bottom structure of the estuaries of the two rivers is not likely to change so long as it is not found necessary to dredge the Sombreiro River as is done with the Bonny River. And so long will the oyster resources of the former remain stunted and their exploitation unimaginable, except something drastic is done.

## DISCUSSION

From an overview of the current trends in the environment of the Niger Delta resulting from various engineering activities, both natural and artificial, a pattern emerges for the meaningful harnessing of the enormous but latent food production potentials. The answer is in hydraulic engineering, the manipulation of environmental conditions through varying fresh-water and sea-water inputs so as to increase aquactic and weland productity. Dams reminiscent of the roads traversing the flood plains from Port Harcourt with inlets, outlets, by-passes, and controls to subjugate the vast arable farmland made unusable by floods. Similarly, wider and deeper canals would make for easier evacuation of excessive freshwater and curtail flooding to manageable magnitudes. The same arrangement would while establishing suitable grounds for the farming of clams and oysters also extend the area of salt-water influence and restore natural oyster populations in rivers such as the Sombreiro and St. Nicholas. Carefully planned and executed, the deposition of dredged up materials would be effected through a careful soil management technique to create vast opportunities for crop farming as is being discovered in the mangrove swamp belt.

Finally, the experiences of Mexico, Venezuela, Egypt, Romania, Tunisia, Morocco, India, and Sri-Lanka are invaluable to the Niger Delta region in the adoption of hydraulic engineering for the development of the numerous estuaries, creeks and wet lands into vast pens, ponds and well managed lagoons for increased food production (Kapetski, 1981). One advantage of this approach to agricultural development in the region, is the multi-use of same and adjacent facilities in altrernate and integrated practices in food production. Properly engineering reservoirs could be drained for crops in one season and filled up for aquaculture in another. With adequate control and planning, the same facility could be developed for irrigating crop land, watering live-stock and fish-culture in a scale yet unknown in this country. In the same vein, broad dams and ancilliary structures developed through interdisciplinary approach that involves the skills and competence of transportation/civil engineers, farmers and fisheries scientists and technologists is the key to realising the goal envisaged.

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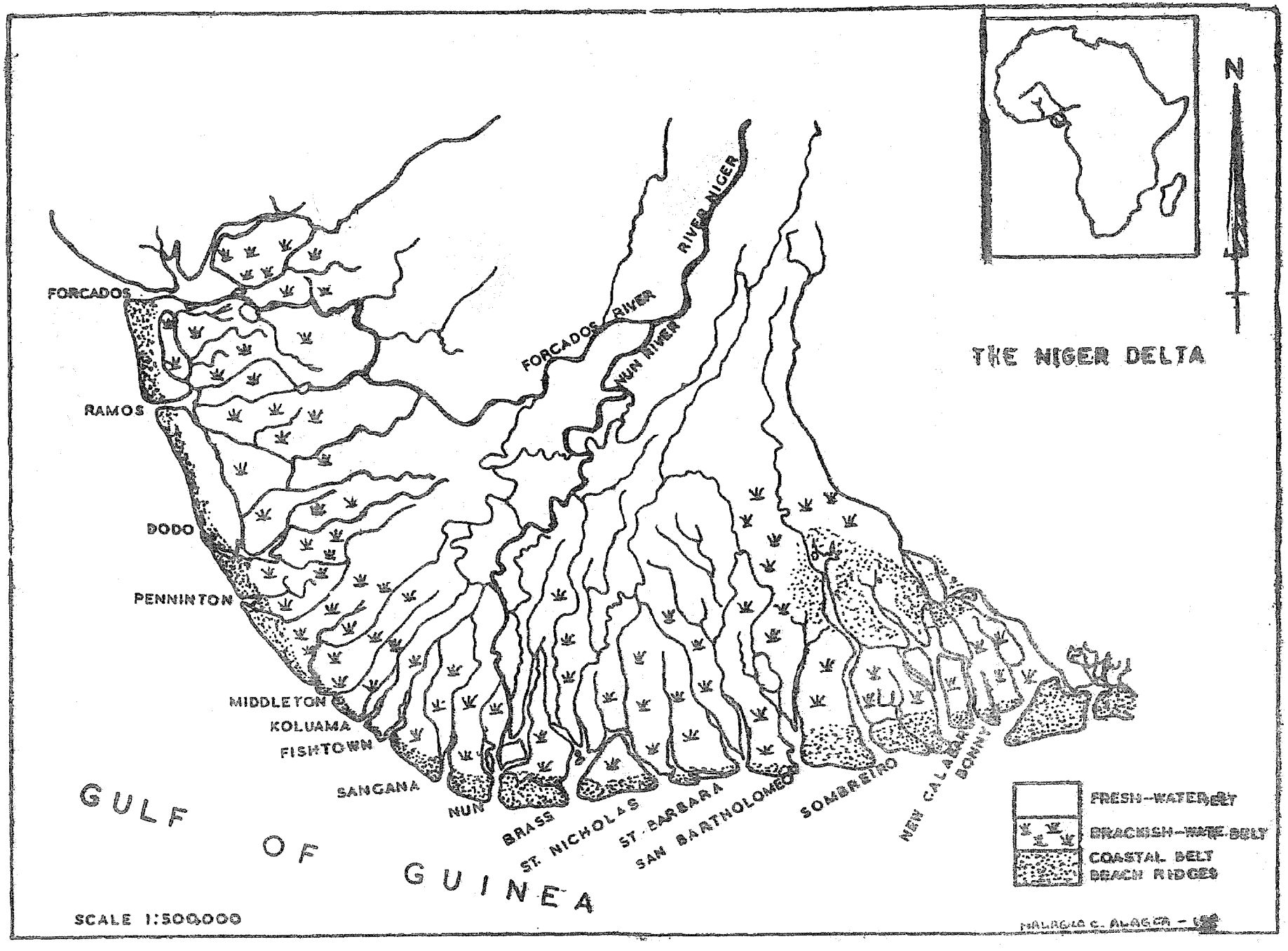
THE NIGER DELTA
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FORCADOS
RAMOS
DODO
PENNINTON
MIDDLETON
KOLUAMA
FISHTOWN
SANGANA
NUN
BRASS
ST. NICHOLAS
ST. BARBARA
SAN BARTHOLOMEO
SOMBRERO
NEW CALABAR
BONNY
FORCADOS RIVER
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