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THE INCIDENCE OF *NYPA FRUTICANS* (WURMB) AND IT'S IMPACT ON FISHERIES PRODUCTION IN THE NIGER DELTA MANGROVE ECOSYSTEM.

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ABSTRACT

Nypa fruticans occurs in Bayelsa, Rivers, Akwa Ibom and Cross River State; invading an estimated area of 821 Km^2 mangrove dominated swamps. Human activities such as tree felling, urbanization, oil and gas exploration and exploitation and other activities led to the interference in the normal mangrove by the Nypapalm. Lack of utilization by the local population of the Nypa palm as in into-pacification has increased the population over the years. The effect includes the reduction in primary and secondary productivity, disruption of food chain and erosion of riverbanks. The eradication of the Nypa palm from the Niger delat mangrove ecosystem and replacement with red and white mangroves will restore the ecosystem health and enhance biological diversity.

INTRODUCTION

Nypa fruticans was first introduced into Calabar, Nigeria in 1906 from a Singapore Botanical garden. *N. Fruticans* in indo-pacific in origin, occurring as part of the mangrove vegetation. *Bypa sp.*, in its native habit is of economic use to the local population as the fronds are used as thatching materials and basket making; while sugar, sweet meat and alcoholic beverages are extracted from the sap fruit. The sap is also used in fattening livestock. In Nigerian, *Nypa sp.*, is regarded as a "nuisance palm" because it lacks economic potential for the local population. The *Nypa sp.* readily establishes itself before the natural regeneration of *Rhizophora sp.* can take place, therefore *Nypa sp.* is a threat to the economically important *Rhizophora sp.* as well as the destabilization of the foreshores. It is also menace to navigation and set fishing gears. As erosion takes place, the *Nypa sp.* breaks away and floats small island.

THE INCIDENCE OF NYPA PALM IN THE NIGER DELTA

Nypa palm is reported to occur in four coasted states of Bayelsa, Rivers, Akwa Ibom and Cross River. The estimated area of occurrence is about 821 km^2 in the four states. Nypa is a monotype genus. In Nigeria they occur when there is an interference or vacuum in the structure of the mangrove vegetation. Due to its thick horizontal stem that is underground, with much branched dichotomy, large colonies areas subjected to tidal influence; soft mud seems to facilitate vegetative. The rapid increase in the concentration of Nypa, its effect on the environment and fisheries composition led to the study on its distribution and impact in the Niger delta. So far it has been reported in several local government areas and villages. The progressive replacement of the red and white mangroves by Nypa palm is by vegetative and seedling propagation. Table 1 shows the distribution of Nypa palm in the affected areas.

Table 1: Number of States, local governments, estimated area of mangrove coverage and area invaded by *Nypa fruiticans.*

State	No of Affected Local Governments	Number of Affected Villages	Estimated Initial Area mangrove Cover (Km2)	Estimated Area of Invasion (Km2)
Akwa Ibom	10	94	136	59
Bayelsa	5	34	N/A	45
Cross River	5	140	580	58
Rivers	19	280	2000	217
Source: From affected states * N/A. Not available.				

HUMAN ACTIVITIES

There has been extensive exploitation of the Niger delta mangrove for various purposes over the years. The system has been affected most noticeably by wood abstraction for fuel wood, construction, right of way for crude or refined petroleum pipeline, sand mining, exploration and exploitation of oil and gas, channelization, fishing, hunting, transportation, urban and industrial development, industries. The oil exploitation has led to massive spills of both crude refined petroleum production and has further exacerbated deforestation.

Human activities have had profound influence on the vegetation and primary productivity of the Niger delta mangrove ecosystem. Human activities are responsible for the present floristic composition and forest structure, and the lack of well-defined donation pattern. Since there are no management strategies in place, this allows slow natural regeneration of deforested area leading to invasion by Nypa palm. Studies show that even-aged stands with open canopies. In consequence, the removal of Nypa Palm is imperative and programmes of replanting deforested areas manually at a suitable tree spacing should improve productivity of the forest. Replanting should therefore be incorporated into the management objectives for the Niger delta mangroves.

TROPHIC RELATIONSHIP IN MANGROVE ESOSYSTEM

The successful integration of mangrove resources depends on the ecological and silvicultural parameters for primary production; and the biological role that the primary production from the forest plays in the mangrove food web of secondary production aquatic resources.

Food Web

The chain begins with the products of carbohydrates and carbon by plants through photosynthesis. Leaf litter is fragmented by the grazing action of amphipods and crabs, Heald. (1971); Sasekumar, (1984).

Decomposition continues through microbial and fungal decay of leaf detritus. The food chain ends with higher carnivores such as large fish, birds of prey, wild animal or man.

Litter Fall.

Litter Fall is measured as a component of net primary production. Estimate of litter fall range from 0.2 t 1.6kg/m2/y dry matters Sasekumar and laid, (1983) during tidal fluctuation the leaves are fished out to channels and water bodies in the mangrove estuaries. Odum et al (1972) estimated that about 50% of mangrove litter was exported out of the esturary. Crabs play an important role in the food web as they are voracious feeders, and they bury or consume huge amount of leaf litter before they are washed away by tides. It has been estimated that about 10% and 70% of daily leaf litter are removed or consumed by crabs before it is flushed away by tide.

Hence leaf litter is biologically and economically important because of it's role in the food web. Compared to Nypa palm that are without litter and had no daily production of litter. Therefore mangrove forest should be ideally managed to sustain an active ground microfauna (microbial) and microfauna. Environmentally, well-managed mangrove forests should promote growth with high biomass increments capable of producing high levels of litter fall. Food-energy resources are available in the mangrove ecosystem for secondary production. These include that primary productivity of phytoplankton, the benthic macrophyte productive mangroves. Mangrove forest primary productivity is a source of food for in guts penned species that consume about 10-40% of plant litter of mangrove origin, Leh and Seasekumar. (1984); also as detritus food in guts of other aquatic crustaceans. This crustacean is the link with adult shrimps of Penaeus sp. Which feed heavily on the other crustaceans. Mainly

species of omnivorous fish in turn feed on these other crustaceans as well as mangrove detritus.

Riverine vegetation should therefore never be felled indiscriminately, as N. Fruticans is an opportunistic plant as the fibrous roots do not all for sedimentation, thus bank erosion will increase water turbidity and affect the fauna adversely. Those that will be mostly affected are the shrimp larvae, mollusc and the breeding of important estuarine species. Protected areas should be created in the pristine mangrove area for biological diversity conservation. Should there be a demand for land, for agriculture or aquaculture, the sites must be properly evaluated prior to the conversion in order to prevent or reduce the damage to the whole mangrove ecosystem. Collection of molluscs attached to roots of mangrove, wood for firewood or charcoal should not be carried at the banks of the river as these lead to drastic changes in the structure and zonation in the mangrove ecosystem. The interference by man creates a vacuum that is easily and readily occupied by *Nypa sp.* Environmental, biological and social consideration requires that harvesting operations must not impair the ecosystem.

CAPTURE FISHERY

From the economic view point, mangroves are far more important for the aquatic production they support than for the wood production potential. It has been estimated that the average yield of fish and shell fish in the mangrove areas is about 90kg/ha, with maximum yield being up to 225kg/ha, kapetsky (1985). In the coastal and brackish waters of Nigeria an average of 250,000 tonnes of fish and more than 35,000 tones shrimp are caught annually (Fisheries statistics of Nigeria, (1999). Other unrecorded catches of decapods, gastropods and bivalves. Whereas many species of fish and shellfish are caught in the mangrove area, the main composition consists of shrimp (Penaeidae family) and the Clupeid family. Invasion of *Nypa sp* in some river systems in Akwa Ibom, Bayelsa, Cross River and Rivers State varies in concentration and as such the effects on the fisheries vary depending on the density of *Nypa sp. Nypa fruticans* does not provide the necessary primary and secondary productivity to occur, coupled with the tendency of the mass of Nypa palm to be eroded, become detached from the soft mud and floats away from the system. This incidence of Nypa has pinnate leaf system does not drop off easily or on daily basis for the necessary primary production activities. The absence of stilt roots (or pneumatophores) of the red and white mangroves further deprives the habitat of the necessary sedimentation process.

Fish

In the Niger delta, the main commercial fish caught in the mangrove areas include mullets *(Liza spp,. Mugil spp.,) Grunter (Pomadasys spp.), Snappers (Lutjanus spp.), catfishes (Arius spp., chrysichthys spp.), Tilapia (Tilapia spp., Oreochromis spp.), threadfins (Galeoides sp., Pentaemus sp. and Polydactylus sp.), Croakers (Pseudotolithus spp.)*. The most important fish in the inshore artisanal fishery is Bonga *(Ethmalosa fimbriata, Sawa (Sardinella maderensis* and *S. Aurita)*, shad *(Lisha African)* and *Pellonula spp*.

Shellfish

Most of the shellfish include crustaceans (crabs and shrimps) and molluscs (bivalved and gastropods). The main edible crabs Callinects amnicola constitute highly valued mangrove products that are caught by using local traps. Other edible crabs include Ocypoda spp. and Cardamoms sp.

Shrimps are usually caught with push net, stow net and traps along shallow creeks within the mangroves. In Nigeria five commercial species of shrimps are landed, with the bulk consisting of Penaeus notialis, Nemato paleomon hastatus, Macrobrachium vollenhovenii and m. macrobrachion.

The commercially important gastropods include Typanotonusfuscata, Tympanotonus radula, Pachymelenia aurita, P. Fusca vary. quadriseriata, P. bryonensis, This callifera var. Coronata. Bivalves include Crassostrea gasar, Egeria radiata (Galatea paradoxa). C. Gasar are not readily common in some river systems where Nypa has established, and does not allow for dense colonization of oyster spat. It is most important source of protein and an economic renewable resource for coastal dwellers. This makes it the single most important exploited species in the mangrove ecosystem.

Effect on Recreation and ecotourism

Ecotourism potential can be achieved if the resources on which it is based are well protected. This can in turn empower local communities, giving them sense of ownership in their communities' development. Ecotourism, has the potential to motivate rural population, maxmize economic benefits and minimize environmental costs. The invasion of Nypa palm forecloses many of the biological and financial advantages that a natural ecosystem can offer. In this case the changes become irreversible due to biophysical factors or simply because the restoration costs are too costly.

Impact of Nypa invasion on the Environment

Due to invasion of Nypa palm and heavy exploitation of the mangrove wood and on the species, only small sizes are common. Many mangrove areas are destroyed due to the construction of protective structures. These are frequently located at or seaward of the estuarine low water mark. Large areas of productive wetlands and tidal flats become cut off from the marine influence and, the seaward areas of the estuaries are deprived of fresh water inputs, this highly productive tidal swamps are lost. Firewood may by felled behind the line of annual flooding which marks the landward limits of coastal wetland.

Where Nypa palm is the dominant vegetation, the area shows low incidence of encrusting tree fauna, little or no evidence of burrowing crabs due to the close stand of Nypa palm and its rhizome stem. Floating mass of Nypa palm destroys nets, cages set by fishermen.

CONCLUSION

For management, it is very important to take a holistic approach to secure the survival of the entire ecosystem. Conservation of biodiversity through the selection of mangroves to be felled and regenerated and the protection of habitats for various marine and terrestrial animals is of utmost importance as in maintenance of the protective role the mangroves play along river banks and coastline. Nigeria has ratified the Ramsar Convention (2nd October, 2001) and committee set up to prepare the National wetland policies. The issues of Nypa palm invasion in parts of the Niger Delta requires urgent actions and should be tackled before the fishery becomes irreversibly damaged.

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