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# FUNCTIONAL ROLES OF MANGROVES OF THE NIGER DELTA TO THE COASTAL COMMUNITIES AND NATIONAL ECONOMY

**[1]ZABBEY, N., [2]A. I. HART and [1]E. S. ERONDU**

1 Department of Animal Science and Fisheries, Faculty of Agriculture, University of Port Harcourt, Rivers State.
2 Department of Animal and Environmental Biology, Faculty of Science, University of Port Harcourt



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## *ABSTRACT*

*Mangrove swamps supply various goods and provide invaluable ecological services, especially as critical habitats for fish breeding. These functions are discussed in the context of rural livelihoods of coastal dwellers in the Niger Delta in particular, and the contribution to national economies in general. The decline in capture fisheries production in Nigeria is partly linked to massive mangrove loss in the Niger Delta. This provides basis for urgent evolution of effective mangrove conservation schemes in the Niger Delta and for focused research on the interaction between the delta mangroves and inland/coastal fish recruitment and production dynamics.*

## INTRODUCTION

Oftentimes, our familiarity with mangroves makes us not to reflect on their importance, in terms of rural livelihood support, food supply and coastal protection. No doubts, the undervaluation, or simply non recognition of the goods and services that mangroves provide are the reasons why mangrove habitats are considered wasteland or are sites of choice for conversion to one form of development or the other.

Mangroves, in terms of contribution to rural development, are to coastal communities what taxes are to national governments. Mangroves provide various ecological goods and services directly for humankind, and indirectly through the supporting roles mangrove forests play in maintaining other productive systems in the seascape. The estimated economic value of mangrove forests to local community is in the range of $27,264 - $35,921 per hectare (Sathirathai and Barbiar, 2001). This estimate includes the value of direct use of wood and other resources collected from mangroves as well as additional external benefits in terms of off-shore fishery linkages and coastline protection.

Recently, Federal Department of Fisheries (FDF, 2007) gave reasons for decrease in fish production in Nigeria but mangrove degradation in the Niger Delta was conspicuously omitted. This paper highlights some of the ecosystem goods and ecological services that mangroves provide for the delta littoral and hinterland communities in Nigeria. It identifies consistent and unprecedented shrinkage of Nigeria's mangroves as an insidious factor accountable for decline in fish catch rates in the country, and by extension, in the entire Gulf of Guinea.

### Nigeria's Mangrove belt

Nigeria's mangrove, in terms of area covered, is the largest in Africa and the fourth largest in the world; the largest being Indonesia>Brazil>Australia>Nigeria (Nandy and Mitra, 2004). According to Spalding *et al.* (1997), the mangrove area of Nigeria is estimated at 10,515km$^2$; the estimate is based on earlier surveys and

does not reflect current status (Zabbey, 2008).

The deforestation rate of tropical rainforest forest (not wetlands forest) in Nigeria is approximately 3.5% annually, translating to a loss of 350,000 – 400,000 ha of forest land per year (Ladipo, 2010). Similar estimate does not exist for mangrove loss in Nigeria. However, in our opinion, areal loss of mangrove is much higher than the above estimate due to the frequent and extensive losses caused by oil spillages and unhindered spread of nypa palm in the Niger Delta. Other causes of mangrove loss in Nigeria include overexploitation for fuel wood, conversion to other forms of development, dredging and industrial discharges.

**Mangrove Resources**

Mangroves provide local communities with several goods free of charge. These include fish, shrimp, crabs, firewood, poles, honey, boat building material, furniture, traditional medicine, etc. Mangrove bark is used for colouring of cloth and nets, net preservation and glue production. Mangrove stem and branches are used as handles for traditional fan, net mending stick, handles for axes and spades, drum sticks and carving of drums (gongs). At least, 24 mangrove goods have been identified (Ronnback *et al.,* 2007).

**Ecological Services**

Ronnback *et al.* (2007) listed nine services, grouped under three broad functions namely: regulatory, reproductive and cultural functions. Mangroves are the first lines of defence of littoral communities, protecting them against coastal storms, erosion and floods. A case in point, and indeed more dramatic scenario, whereby mangroves protect coastal dwellers is that of the Indian Ocean tsunami of December 2004. The tsunami storms travelled at more than 600 km/h and struck coastlines as a wave of more than 15m. It is actually difficult to quantify the protective effects of mangroves, because coasts vary in topography and in most areas little precise information was recorded of the magnitude of the tsunami. However, studies in India concluded that mangroves saved lives and mitigated damage (Hogarth, 2007). According to Danielsen *et al*. (2005), villages on the coast were completely destroyed, whereas those behind the mangrove suffered no destruction even though the waves damaged areas unshielded by vegetation north and south of these villages. Other reports have shown how mangroves counteract tropical storms and their capacity to stabilize shoreline substrate thereby protecting it from erosion (Mazda *et al*., 2006)

Translating the protective value of mangroves into monetary value will deepen our appreciation. Some areas in the Upper Gulf of Thailand coastlines have been eroding at 28m/year between 1969 and 1987 (Akornkoae *et al*., 1993), owing to a large extent to massive mangrove losses. There are no similar estimates of mangrove loss due to riparian erosion in Nigeria. The replacement cost of building hard protective structures to replace the coastal protection service once generated by mangroves can be significant. In Peninsular Malaysia, Chan *et al*. (1993) estimated this cost at US$ 3 million/km coastline. Erecting these single-service artificial seawalls with limited lifetime is one thing, maintaining them is another issue.

Many riverbank communities in the Niger Delta are facing the threat of being washed away by shoreline erosion. Hundreds of millions of naira are purportedly invested in the construction of protective shoreline embankment to save some of the worst affected communities from becoming extinct. Without going into the performance evaluation of the shore protection projects in the Niger Delta, the instructive point of note is the huge sums of money assigned to these projects and the fact that mangroves hitherto protected those communities and are protecting other littoral communities free of charge!

Mangroves maintain good water quality, that is, by preventing fluctuations in

salinity and turbidity, reduces concentrations of pollutants, and control nutrient levels in coastal waters (Kuhlmann, 1988; Kitheka, 1997).

Mangroves are important breeding and nursery sites for many commercially important shrimp, crab and fish. While some of these species are permanent residents (such as oysters, dog whelk, etc), some are temporary residents –associated with mangroves during at least one stage in their life history. Juvenile fish and shrimp have been found to move substantial distances into mangrove forest habitat at high tide, where they gain protection from predation by larger fish, which remain in or near mangrove water ways. By this, recruits are sufficiently available to replenish individuals removed from the stocks, either through fishing or due to natural mortalities (Hogarth, 2007).

Beside fishes that utilize mangrove forests as transitory habitats, several species of molluscs that are largely sessile in nature constitute an important *in-situ* fishery. This is the case of our highly relished oysters, periwinkle and dog whelk (that feature prominently in native soup).

There is dearth or absence of research data on the contribution of mangroves to specific commercial fish stocks in Nigeria. However, it has been estimated that 60% of commercial fishes in the Gulf of Guinea breed in the mangroves of the Niger Delta (Bassey, 1999). The above percent are conservative if Nigerian fish stocks are considered separately from other maritime states in the Gulf of Guinea.

**Is mangrove loss indicted for declining capture fisheries production in Nigeria?**

Though debate around the role of mangrove forest as nursery habitat continues (Sheridan and Hays, 2003; Manson *et al.*, 2005), increasing number of studies have coupled wild fish and invertebrates production to mangrove habitat nursery and protective functions (Lewis *et al*, 1985; Wolansky and Boto, 1990; Thomas and Connolly, 2001; Crona and Ronnback, 2007). It is estimated that each square kilometre of mangroves can support a fishery production of 90 – 280 tonnes annually (Ronnback, 1999). Thus, mangroves are nature's own aquaculture system, having multi-functional advantages over single-service artificial culture systems (Moberg and Ronnback, 2003). In Nigeria, field based data pertaining to the contribution of mangroves to specific fisheries production are lacking. But based on surrogate findings around the globe, we presume that the unprecedented rates of mangrove degradation and loss in the Niger Delta is one of the major, but neglected contributors to declining wild fisheries in Nigeria. Mangrove fish preference and maintenance function should, therefore, form a significant research focus of statutory institutes and Fisheries Society of Nigeria (FISON) members. This will enable us to understand and quantify the role Niger Delta mangrove plays in coastal fish recruitment, and provide scientific basis for the evolution of informed mangrove conservation strategy. Mangrove restoration and establishment of mangrove protected areas are recommended. This will ultimately protect rural and national fish-based economies.

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