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Research Paper

Biodiversity Conservation and Ethnobotany of Mangrove Species in the Niger Delta-A Review.

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ABSTRACT
The biodiversity conservation, and ethnobotany of different mangrove species commonly found in Rivers State-Niger Delta have been examined. The botanical peculiarities of these species is that they possess specialized vegetative and reproductive structures which have enhanced their adaptation to their habitat. In this review six notable mangrove species distributed into three families Rhizophoraceae, Combretaceae and Avicenniaceae and one exotic species in Arecaceae were found possessing various ethnobotanical applications from fuel wood, charcoal, thatch making, food, dyes, medicines and ecotourism centre. The implication of these information on the biodiversity of the mangrove forest to the conservation, management and utilization of the rich potentials in the forest cannot be over-emphasized. Despite these economic, social and ecological benefits from mangrove forest, the ecosystem is threatened by human over-exploitation and mismanagement of the resources, pollution and climate change. In order to sustain the mangrove forest and its rich biodiversity for future generation it is expedient to incorporate mangrove silviculture and rehabilitation practices, proper working management systems that will promote long-term economic benefit, enactment of mangrove forest policies, political and public awareness and environmental concern which will be geared towards promoting sustainable development and conservation of the forest.

KEYWORDS: *Mangrove species, biodiversity, ethnobotany, conservation, ecosystem and sustainable development.*

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I. INTRODUCTION

Ethnobotany is the study of plants and their practical utilization via traditional knowledge of a given local culture and people in a respective geographical area or region. It encompasses the interrelationship between humans and the plants with special interest in the use of indigenous knowledge to classify plants, cultivate, use as food, medicine and shelter. In recent time ethnobotanical knowledge has been applied in modern society, primarily in the form of pharmaceuticals (Soejarto*etal*., 2005). The major three ecosystem of the Niger Delta are mangrove, lowland rainforest and freshwater (Izah, 2018). The Niger Delta mangrove ecosystem is mainly fragmented deltaic formation which is held up by beach ridged island forest intermediary amidst the coastal beaches and the estuarine mangrove and island within the mangrove forests (Abere and Ekeke, 2011). These beach ridged are made up of lowland rainforest species which possess large areas of high quality of biodiversity. The mangrove found in Niger Delta comprises of several plant communities from land to sea, and it is among the richest in biodiversity in its ecosystem services. But due to insufficient data the mangrove ecosystem in the Niger Delta have not been distinctly mentioned globally. In Africa, Nigeria has the largest mangrove forest and is ranked third in the world. The Niger Delta area habours Nigeria's mangrove forest which is one of the most exploited in the world and is estimated to cover between 5000km3 and 8500km3 (Nwilo and Badejo, 2007). Rivers State which is one of the Niger Delta States is composed of mangrove well defined by regular salt-water inundation. Izah (2018) reported that there are approximately 30,000 hectares of exploitable mangroves in Rivers State, bearing a volume of nearly 5,600,00km3 of wood inside the bark. These species (mangrove) grow on various substratum (substrates), but the great bulk are found on muddy soils. In River State, the chief towns and mangrove dependent local governments are; Abua-Odual, Akulga, Asalga, Andoni, Bonny and Degema amongst others. These local governments are located on such beach ridged forest island within the mangrove ecosystem. These rich mangrove ecosystem holds the planet and the community of persons living close its shores in a particular way, from fixing breeding grounds for fish (es) to carbon storage

and flood protection. In spite of their uniqueness and significance the mangrove forest in River State especially in Degema axis is under a huge threat. Presently, in the Degema areas of River State over a third part have been destroyed. The clearance results from industrial development, infrastructure projects and petroleum exploration leading to oil spill. Besides, change in climate and some environmental condition give rise to emerging pollutants.

There are also local threats such as; over harvesting of woods for fuel, construction and over harvesting of fish (over fishing) leading to disruption of food chain and fish communities. Before now causes of oil pollution which is a major hazard for the marine and coastal environment has been; damage to oil tanker ship through collision with other ships, explosion or wrecking, seepage from offshore installation and flushing of tanker holds but recently the major destruction faced by the coastal ecosystem (mangrove forest) in Degema-River State is locally made petroleum called ″kpoo fire″ which has drastically cleared off most of the mangrove forest in the area making it an open sea or in mini-ocean. This menace has caused deforestation which is global issue of a great concern alongside with many of the mangrove ecosystem species now becoming rare and their long term survival now in doubt. This if not checked will lead to biodiversity loss of the mangrove forest and affect in the inhabitants who are sustained by this forest negatively and also pose a threat to the biosphere in general. In addition, rural communities in Degema depend on the mangrove forest (because they are fishermen) for commercial values and exploit for their livelihood. Also over-exploitation of these mangrove forest (and its resources) can endanger certain species existence or even lead them into extinction. The mangrove ecosystem inhabits various biological species including fish (es), aquatic animals, reptiles, shrimps, water hyacinth, algae, cat fish, crab, macrophyte, planktons, zooplanktons tec. (Idu, 2015; Izah and Srivastav, 2017). Despite the importance of the mangrove forest and its unique resources that help to sustain life and livelihood, and the huge wealth in its biodiversity, no conservative measure has been taken to protect the mangrove forest that is threatened and endangered. Conservation of the biodiversity would protect the coastal swamps from hazards of marine erosion, pollution, local threats and retain the mangrove in their natural state as a wealth treasure for the local inhabitants. The Federal government of Nigeria have devised measure to protect biodiversity of various areas which includes 8 national parks, 12 strict nature reserves, 28 game reserves and 445 forest resources excluding the mangrove forest (FRN Report 2010). Therefore the study aims to give an insight on biodiversity conservation and ethnobotanical uses of mangrove species in Niger Delta.

MANGROVES SPECIES IN THE NIGER DELTA

Mangal is a plant community and habitat where mangrove thrives. Mangroves are found in tropical and sub-tropical tidal areas with high degree of salinity. The Niger Delta mangrove ecosystem is encompassed with brackish water referred to as estuarine (salt and fresh water interface) (Izah and Srivastav, 2017). The salinity level in estuarine is lower than that of marine but higher than that of fresh water (Izah, 2018), which is influenced by mangrove species with narrow strip of beach ridges. Many authors have reported the presence of five mangrove species in Niger Delta which includes *Rhizophoraracemose*(red mangrove),*Rhizophora mangle* and*Rhizophoraharrisonii*(short red manrove),*Aviecenniagerminans*(white mangrove) and*Lagunculariaracemose*(black mangrove) and an exotic introduced species such *as Nypafrutican*making a total of six mangrove species (Jamabo and Chinda, 2010; Oyamba*etal*., 2016; Ohimain*etal*., 2014). In addition the species *Conocarpuserectus*(button mangrove) is found in Degema axis of River State making it a total of seven mangrove species in Niger Delta. The three *Rhizophora* species commonly called red mangrove has a characteristic feature on their own. Although mangrove belong to various unrelated families they share in certain physiological and structural traits, which enhance their growth and productivity in the highly stressful, fragile and difficult ecosystem where they are found. In the Niger Delta region, the genus *Rhizophora*and *Avicennia*records for a substantial amount found. Also *Rhizophoraracemose*is the most abundant, expanding about 90% of the mangrove forest, occurring at the exterior part of the water body (Abere and Ekeke, 2011). Apart from the mangrove species found in the areas, other grasses, sedges and most importantly the mangrove fern *Acrostichumaureum*isseen predominantly in the ecosystem. The taxon *Rhizophoraracemose* is the first and the largest among the three species of the *Rhizophoraceae*family and it grows in soft muddy banks of brackish water accompanied by *Rhizophoraharrisonii*and *Rhizophora mangle*. *Rhizophoraharrisonii* is considered a mutative hybrid of *Rhizophora mangle* and *Rhizophoraracemose*. The mangrove forest houses fish (es), planktons, (phytoplanktons and zooplanktons), macro-benthic organism, shelled fish (es), periwinkles, birds, insects, monkeys, oysters, crabs and other invertebrates (Ayanlade, 2014).

ETHNOBOTANY OF MANGROVE SPECIES

Ethnobotany is the study of how people of a particular culture and region make use of indigenous plants or plant resource. The mangrove species have been exploited by aborigens of Degema in Rivers State for timber, fuel wood, charcoal, fishing tools and also seen as fishing grounds since the coast was colonized. Hence the local knowledge about different mangrove species and their different utilization and characteristics turn around this knowledge and the economic importance of the mangroves. Although the people (Degema) have

interacted with their mangrove plants for ages but no inventory and documentation of this relationship have been carried out. The study will attempt to provide a proper inventory and document ethnobotanical uses of these mangrove species found in Degema, Niger Delta- Nigeria. It is believed that this unique potential drawn from these mangrove species will help in improvement, development, management on sustained-yield and conservation of the rich mangrove resource of the area. In addition, to provide alternative sources of income and energy for the aborigens of Degema whose mangrove ecosystem is destroyed by oil pollution, emerging pollutants from pharmaceuticals, pesticides, environmental degradation and other local threats (over harvesting etc.). Table 1 gives a summary of the ethnobotanical uses of mangrove species.

CHARCOAL PRODUCTION

Rhizophora species yields the best wood for charcoal production. Harvested woods are transported home and burnt down in kiln to generate charcoal. The charcoal is bagged and sold in the market. The charcoal obtained from the red mangroves are the heaviest charcoal, which is also used in some industries like metal production industries. It is also used by food vendors to roast food because the wood produce a high calorific value. Also charcoal is used to remove sour taste from soup by dropping about 3-5 piece in a boiling pot of soured soup.

CONSTRUCTION MATERIAL (BUILDING, POLE, WOOD)

Mangrove lumbers are used for construction of building but *Rhizophora* species are the most effective ones. Axe and machete are used to cut down these mangrove stems but in recent time, sawing machine is now applied for cutting mangrove stems. The wood is sawed into different sizes on the basis of its diameter and used as plywood for building, poles for wall filling, scaffold, bridges, boats, roof frames, and fencing for tourist. A bit larger poles from mangrove stems are used to build main frame of house walls which are alter replenished with mud in local communities.

FISH RACKS (TRAYS)

Seedlings or matured prop (breathing) roots from mangrove species precisely from *Rhizophora* are used in making racks. The seedling or prop roots are harvested fresh and sliced into the desired diameter (sizes) then woven into fish racks that are used as trays for drying fish (es), prawn, shrimps, crabs, groundnuts etc.

BAFFLES

Mangroves plants are used in making baffles. A belt of mangrove species is built to help dissipate the energy of the surging waves, thereby protecting coastal dwelling. Sometimes these baffles are used in tourism.

THATCH MAKING

The fronds of *Nypa* palm is harvested using machete and the leaflets are sliced out and used in making thatches for roofing houses. In waving of shingles, leaf stake are cut into different lengths and sliced into five or six divisions framed as a rib. Two to three leaflets are then folded approximately midway over the rid and stitched into place, using a strip of peel removed from the leaf stalk.

DYE/TANNIN

The bark of *Rhizophora* species are harvested using axe or machete and soaked in a bucket of cold or warm water and allowed to stand for 24-48 hours depending on individual need. After which the slices are sieved out from the supernatant and then clothes or nets are soaked in the dye (red, black-red) and sun dried. It could also be boiled in hot water to bring out the dye (red-brown).

MEDICINE

Two forms of medicinal purpose were observed. Firstly, a combination of Black mangroves and leaves and *Rhizophora* leaves are harvested and boiled together until a perfect supernatant is formed. This is then administered to the patient in the recommended dosage (1 cup twice daily) as it relates to the nature of the illness. This preparation is used in the treatment of malaria. Secondly, it is used in the treatment of haemorrhage. The young breathing root of red mangrove (i.e. the succulent part: the tip) is harvested and chewed or beaten to bring out the exudate which is squeezed out and applied onto the affected area of the injury and then two to three leaflets of red mangrove are used to cover and tied with a rope. This is the best and fastest method known in treatment of haemorrhage.

ASHES

The ashes generated from *Rhizophora* is very important. First, it is used in cooking. The ashes are collected, soaked in a bucket or pot of water and allowed to sediment and then sieved (decanted) to remove impurities (dirt etc.). The concentrated water (water with ashes) is now used in cooking plantain, which helps in

reducing the cooking time and retaining the colour of the plantain. Secondly, the ashes are a perfect soap for washing of pots and pose no irritating effect on the skin unlike detergent. Also a mixture of grounded charcoal and ashes is a perfect paste for tooth brushing that helps to remove plague and stains on the teeth.

FUEL WOOD

The wood from mangrove forest are widely used by dwellers as fuel wood. *Rhizophora* species and *Avicennia* species are the preferred sources of fuel wood which are sold in designated areas in the town.

ECOTOURISM AND RECREATION

The mangrove forest is used by dwellers for relaxation points or tourist centres. Because often times dwellers use this environment for activities lime sporting, festivals celebration, chieftaincy canoe regatta etc.

Table 1.List of mangrove species identified and their ethnobotanical uses.

SPECIES	PLANT PARTS	PRODUCTS	USES
Conocarpuserectus L.	Stem	Poles	Fence, home tools, fuel wood, building etc.
Avicenniagerminans L.	Leaves, bark, stem	Wood, fodder, medicine	Cooking, animal feed, ulcer,throat pain, construction, building etc.
Rhizophoraracemose G. F. W Meyer	Leaves, bark, stem	Charcoal, fuel wood, canoe, paddles, racks (trays), dyes (tannins), poles, wood, ashes	Baking, roasting, transportation, dying, drying fish, (es), shrimps etc., clothes, railway slippers, cooking, washing pots, toothpaste, agriculture (in crop propagation).
*Nypafrutican*Wurmb	Leaves, fruits	Leaves, fruits	Thatch making, human feed.
*Laguncula*riaracemose L., Gaertn F.	Bark, stem, leaves	Medicine, wood	Antidysenteric properties, malaria, construction, astringent
Rhizophoramangle L.	Root, leaves	Charcoal, medicine, wood, timber	Cooking, building, fishing, construction, haemorrhage.
*Rhizophoraharrisonni*Leechman	Stem, leaves, bark	Wood, charcoal, dye (tannins)	Cooking, construction, axe handle, roasting, baking, clothes, fishing.

POTENTIAL THREATS OF THE MANGROVE FOREST IN THE NIGER DELTA

In the Niger Delta, the loss of the mangrove forest and its rich biodiversity and the relevant alternation in the environment are now constant than ever before in history and there is no palliative measure taken to slow the process down. The potential threats to the mangrove ecosystem of the area are oil and gas exploration which is the bedrock of the scourge because all the oil companies in the Niger Delta are located in the mangrove forest. The activities of these oil and gas companies have succeeded into degradation, deforestation and fragmentation of the mangrove ecosystem. Also dredging, urbanization and the exotic invasive *Nypa* palm species have all led to environmental degradation of the mangrove forest. The oil spillages have portrayed a constant negative impact (pollution) on the mangrove forest leading to death of the mangrove plants and other aquatic lives (Ohimain*etal*., 2008). Presently the locally made petroleum called ″kpoo fire″ by the youths of the Niger Delta has contributed to the detrimental effect of great loss of biodiversity of the mangrove ecosystem. This if not checked will lead to loss of the biodiversity of the area. Also the loss of the mangrove resources through excessive exploitation, illegal poaching, deforestation, use of chemical for fishing etc. have contributed a great impact on the diversity composition and abundance of the mangrove forest in Niger Delta. This effect has predisposed many species into being threatened, endangered and extinct. Enaruvbe and Atafo (2016) have reported that the high rate of deforestation and pollution in the water ways of the Niger Delta is leading to environmental degradation thereby improving loss of biodiversity and important goods and services from the ecosystem. Also Adekola and Mitchell (2001) have opined that this loss of biodiversity in Niger Delta especially in the mangrove forest is as a result of population growth and weak governance which has led to water pollution/ contamination, human activities such as dredging, oil and gas exploration, fish (es) migration, invasive plant infestation, wetland reclamation and shrinkage of the wetland. The rate of degradation has increased continuously without plans for conservation or replacement which has introduced a major threat to humans and the environment at large. This anthropogenic and other activities if not checked can lead to extinction of the mangroves and other aquatic lives found in the Niger Delta.

BIODIVERSITY CONSERVATION

The idea of custodianship which challenges us to pass onto future generations all the diversity of life and quality of the environment that we inherited is the main point in biodiversity conservation. The mangrove

biodiversity is a life support system and its depletion has risen a serious environmental and economic concern. It is evident that over-exploitation of the mangrove resources and oil exploration has impacted negatively on the biological, ecological and economic importance of the forest. Therefore a balance between the environment, development and society is consequential to sustainable development which confirms biodiversity conservation. The indiscriminate over-exploitation of the mangrove forest on food security and healthcare should be monitored. The mangrove dependent communities should be educated on conservative and sustainable methods. Also integrated research and training institute on wetland ecosystem, NGO's including the oil companies impacting the spills should support and contribute towards development of the mangrove-dependent communities and also secure positive measures in cleaning up the environment. Government should enact laws, policies and enforce it on exploitation of the resources of the mangrove forest. There should be promotion *in situ* and *ex-situ* conservation and also community based conservation participation in the process. Ethnobotany offers an effective approach to plant biodiversity and conservation because, it provides a wealth of information which can be exploited scientifically.

II. CONCLUSION

Human activity has contributed a great loss in biodiversity of the mangrove forest endangering aquatic species founds in the environment. The clearing of mangrove species or forest leads to loss of valuable habitats, thereby threatening the survival of other species. Apart from the discovered potentials in the mangrove forest there are undiscovered biological materials that could benefit man and the environment. The ethnobotanicaluses of mangrove species by the Degema people in Niger Delta has been emphasised. It is therefore expedient to incorporate mangrove silviculture and rehabilitation, and management systems that will promote and complement long term economic benefits to the dwellers. In addition, political and public awareness on the mangrove forest and environmental concerns and the need to promote sustainable development and conservation will help to foster cooperation among government and dwellers while achieving good standard of living. Finally, enforcement laws on mangrove land use act, mangrove forest policy and adoption of rules and regulations should be practised to save the forest from total loss.

REFERENCE

[1]. Abere, S. A. and Ekere, B. A. (2011).The Nigerian Mangrove and Wildlife Development.Proceedings of the 1st International Technology, Education and Environment Conference.*African Society for Scientific Research* (ASSR).pp 824-834.

[2]. Adekola, O. and Mitchell, G. (2011). The Niger Delta Wetlands: threats to ecosystem services, their importance to dependent communities and possible management measures. *International Journal of Biodiversity Science, Ecosystem Services and Management.* 7(1): 50-68.

[3]. Andrew, O. (2008). Ethnobotanical uses of Mangroves species by the Usokun-Degema People. Unpublished B.Sc Project submitted to the Department of Plant Science and Biotechnology, Faculty of Science, University of Port Harcourt, Nigeria.

[4]. Ayanlade, A. (2014) Remote sensing of Environmental change in the Niger Delta, Nigeria. PhD Thesis submitted to the Department of Geography, School of Social Sciences and Public Policy, King's College London, University of London.

[5]. Enaruvbe, G. O. and Atafo, O. P. (2016).Analysis of deforestation pattern in the Niger Delta region of Nigeria.*Journal of Land Use Science*, 11(1): 113-130.

[6]. Federal Republic of Nigeria (FRN).(2010). Fourth National Biodiversity Report. Abuja.

[7]. Idu, A. J. (2015). Threats to Water Resources Development in Nigeria.*Journal of Geology and Geophysics.*4: 205.

[8]. Izah, S. C. (2018). Ecosystem of the Niger Delta region of Nigeria: Potentials and threats. *Biodiversity International Journal.* (4): 333-345.

[9]. Izah, S. C., Srivastav, C. N. and Aigberua, A. O. (2015). Uncontrolled bush burning in the Niger Delta region of Nigeria: Potential Causes and Impacts on Biodiversity. *International Journal of Molecular Ecology and Conservation*. 7(1): 1-15.

[10]. Nwilo, P. C. and Badejo, O. T. (2007).Impacts and Management of Oil Spill pollution along Nigeria Coastal Areas. Retrieved from http://www.fig.net/pub/figpub/pub36/chapters/chap-ter_r.pdf

[11]. Ogamba, E. N., Izah, S. C. and Omonibo, E. (2016).Bioaccumulation of hydrocarbon, heavy metals and minerals in *Tympanotonusfuscatus* from coastal region of Bayelsa State, Nigeria, *International Journal of Hydrology Research.* 1:1-7.

[12]. Ohimain, E. I., Gbolagade, J. and Abah, S. O. (2008). Variations in Heavy metal concentrations following the dredging of an oil well access canal in the Niger Delta. *Advances in Biological Research,* 2(5-6): 97-103.

[13]. Ohimain, E. I., Otobtekere, D. and Biriduba, W. (2014).Unsustainable Exploitation of Freshwater Wetland Turtles and Tortoises in Central Niger Delta.*International Journal of Environmental Monitoring and Analysis,* 2(2): 57-67.

[14]. Soejarto, D.D., Fong, H. H. S., Tan, G. T., Zang, H. T., Ma, C. Y., Franzblau, S. G., Gyllenhaal, C., Riley, M. C., Kadushin, M. R., Pezzulo, J. M., Xuan, L. T., Hiep, N. T., Hung, N. V., Vu, B. M., Loc, P. K., Dac, L. X., Binh, L. T., Chien, N. M., Southavong, B., Sydara, K., Bouamanivong, S., Ly, H. M., Thuy, T. V., Rose, W. C. and Dietzman, G. R. (2005). ″Ethnobotany / Ethnopharmacology and Mass bioprospecting: Issues on Intellectual Property and benefit-sharing″ (PDF). *Journal of Ethnopharmacology.* 100(1-2): 15-12.