PROSPECTS AND CONSTRAINTS OF FISHERIES IN MANGROVE AND WETLANDS AREA

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Abstract
Mangrove serves as nursery ground for fish and supports the existence of the fish stocks in coastal water, it has salt tolerant trees (halophytes) adapted to live in harsh coastal conditions. They are adapted to the low oxygen (anoxic) conditions of waterlogged mud. Wetland habitats on the other hand, serve essential functions in an ecosystem, including acting as water filters, providing flood and erosion control, and furnishing food and homes for fish and wildlife. They do more than sustain plants and animals in the watershed. This paper therefore stressed on importance, prospects and constraints of fisheries in mangroves and wetlands of Nigeria. It recommended that adequate monitoring of the Niger Delta coastal wetlands, considering its importance to the Nigerian natural resources and fisheries sectors must be encouraged.

Keywords: Mangroves, Wetlands, Fisheries, coastal, ecosystem.

Introduction

Mangroves are well recognised for their high biodiversity and contribution to coastal fisheries. Yet, current approaches to their management, resource use, conservation or restoration continue to ignore the role of the freshwater component of their hydrology (BrijGopal, 2014). There is need to manage mangroves as wetlands, and the necessity to pay attention to freshwater flows, for sustaining their ecosystem services (WRA, 2015). They are important for primary products such as pastures, timber and fish and support recreational and tourist activities and Wetlands provide significant economic, social and cultural benefits. Wetlands also help reduce the impacts from storm damage and flooding, maintain good water quality in rivers, recharge groundwater, store carbon, help stabilise climatic conditions and control pests. They are also important sites for biodiversity. (Mitchin, 2015).

Mangrove forests are highly productive, with mean levels of primary productivity close to the average for tropical terrestrial forests. Their leaves and woody matter (detritus) form a key part of the marine food chains that supports fisheries. Decomposers of this detritus include micro-organisms such as bacteria and oomycetes, as well as some commercially important crab species.

Wetlands prevent flooding by holding water much like a sponge. By doing so, wetlands help keep river levels normal and filter and purify the surface water (WRA, 2015). Wetlands accept water during storms and whenever water levels are high. When water levels are low, wetlands slowly release water.

Wetlands also release vegetative matter into rivers, which helps feed fish in the rivers. Wetlands help to counter balance the human effect on rivers by rejuvenating them and surrounding ecosystems (WRA, 2015).

Nigeria has Africa's largest mangrove concentration, spanning 36,000 km^2. Oil spills and leaks have destroyed many in the last 50 years, damaging the local fishing economy and water quality (Mangrove, 2015).

The ecological values of mangroves in most tropical countries have been qualitatively well documented and recognised. However there is little quantitative scientific data to back this up. Most of the evidence is observational and anecdotal (UNEP-WCMC, 2006).

Mangroves provide nursery habitat for many wildlife species, including commercial fish and crustaceans, and thus contribute to sustaining the local abundance of fish and shellfish populations (Lal, 1990).

Wetlands represent unique environments for assessing ecological risks; they are swamps or marshes and are among the most important ecosystems in the world (BrijGopal, 2014). essential for performing many ecosystem services, such as food control, maintenance of biodiversity, fish production, carbon storage, aquifer discharge and flood control as well as providing habitat for many endangered species (Barbier *et al*., 1997). Their Habitats may vary from riverine to basin type and include such diverse media as surface waters, sediments, soils, and ground water, with both terrestrial and aquatic biota. Given the diversity of wetland habitats, a number of species may be expected to be fairly unique to a particular site. Wetland ecosystems may be impacted by chemical contamination or by nonchemical stressors such as temperature or suspended solids. A key to assessing ecological risks to chemically contaminated wetlands is determining the degree of contaminant bioavailability from multiple environmental media.

Different freshwater fish species have their own habitat requirements. Some species, like the Murray cod spend almost their entire life in the channels and pools of fast-flowing rivers, while others, including many dudgeon species, prefer slow-flowing or still habitats amongst aquatic vegetation. In some species, like golden perch and silver perch, major spawning occurs after flooding, which allows juvenile fish to access floodplain wetlands.

The Niger Delta region is very rich in aquatic resources with high diversity and abundance of over 200 species of fishes. It has more species of freshwater fishes (197) than any other coastal ecosystem in West Africa (Chidumeje et.al., 2015) .These wetlands provide a cheap and common source of animal protein for most of its inhabitants. Fish, which remains the main source of protein for over one billion people, is arguably the most important wetland product at a global level, accounting for at least 15% of animal protein for more than two billion people (CNP Okonkwo et. al., 2015). Previous studies have revealed that about 16 species of the 200 species of fishes found in the Niger Delta have been identified as endemic to the region, while another 29 are near endemic (Chidumeje *et al*., 2015)

Benefits of Fisheries in mangrove and wetland

Benefits of fisheries from mangroves come via two main mechanisms. The first is the high level of primary productivity from the mangrove trees and from other producers in the mangrove environment. This forms the basis of food chains that support a range of commercially important species. The second is the physical structure that they provide, which provides attachment points for species that need a hard substrate to grow on, as well as shelter from predation and a benign physical environment. These two mechanisms combine to make mangroves particularly effective as nursery grounds for juveniles of species that later move offshore or to adjacent habitats such as coral reefs (Chidumeje *et al*., 2015).

Values of mangrove-associated fisheries

Some 210 million people live in low elevation areas within 10km of mangroves and many of these benefits from mangrove-associated fisheries (Wetlands International, 2014). The economic values of mangrove-associated fisheries vary widely, reflecting the wide range of different fisheries, economic markets, and levels of utilisation. Besides economic values, mangrove-associated fisheries provide jobs and food supplies for millions of people. In turn this may provide multiple benefits such as political or social stability.

Mangroves provide important nursery and habitat for important commercial fish and prawns (Mangrove Watch, 2013). In general, a fishery is an entity engaged in raising or harvesting fish which is determined by some authority to be a fishery. Fishery is typically defined in terms of the “people involved, species or type of fish, area of water or seabed, method of fishing, class of boats, purpose of the activities or a combination of the foregoing features” (FAO, 2015). The definition often includes a combination of fish and fishers in a region, the latter fishing for similar species with similar gear types (Madden, 2004). A fishery may involve the capture of wild fish or raising fish through fish farming or aquaculture. (Madden, 2004 and NOAA fishery glossary, 2015) Directly or indirectly,

the livelihood of over 500 million people in developing countries depends on fisheries and aquaculture (FOA, 2009).

Limitations of management

Inadequate knowledge of mangrove ecosystems, their extent, status and linkages to other ecosystems hampers efforts to conserve and manage mangroves, leading to the unsustainable exploitation of these productive coastal resources. According to Macintosh and Ashton, 2002, a comprehensive information database of mangrove biodiversity in each country is necessary to monitor the status of mangrove biological diversity, realise its economic potentials and areas of application. This is critical in planning an effective management of mangroves.

Economic arguments carry the greatest weight in conservation and management of mangroves (Macintosh and Ashton, 2002) However, the true economic value of mangrove diversity and natural resources is difficult to measure and important ecological processes and functions undervalued. All development plans and policies should include economic valuations that fully reflect the sociological, ecological and environmental costs of resource use, physical developments and pollution.

At the International Level, the common approach to major environmental policy issues has been to formulate conventions, treaties and agreements, which all concerned countries become signatories to. Mangroves are today a global issue because more than 100 countries worldwide have mangrove resources (Spalding, 1997). Of the approximately 100 countries that have mangrove vegetation, about 20 have undertaken rehabilitation initiatives (Field, 1998) establishing nurseries and attempting afforestation and re-planting in degraded areas (Erftemeijer, 2000) More than half a dozen international agreements and various regional agreements are directly relevant to the conservation of mangrove biodiversity.

Historically the responsibility of mangrove management at the national level in many mangrove countries have been assigned on a sectoral basis to executing agencies of the government, institutions for example Forestry, Fishery or Agriculture Departments. The agencies responsible for administering mangroves differ between each country and even between states and districts within countries.

Sectoral management has inevitably resulted in prejudices regarding their objectives, leading to conflicts of interest, to unsustainable resource use, and to poor and less powerful groups becoming more disadvantaged and disenfranchised (Brown, 1997). These limitations are now recognised as a major constraint to achieving sustainable development of mangrove resources.

Importance of mangroves and wetlands in fisheries

There are different species of fish in local wetlands depending on the type of wetland in the neighbourhood. Wetlands provide a plentiful food supply chain because of their rapid plant production. Some fish eat other fish while other fish eat small insects and crustaceans that eat or live on plants.

Shallow waters in wetland ecosystem provide shelter for young fish and protect them from adult predators because many adult fish cannot live in shallow water. Fish needs wetland to escape changes in environmental conditions such as changes in water level, velocity or bad weather (Rajendranalk. et al., 2015).

Mangrove also recharge underground water supplies by collecting rainwater and slowly releasing it, (Rajendranalk. et.al.,2015), they trapped debris and silt stabilizing the near shore environment and clarifying adjacent open water, which facilitates photosynthesis in marine plants and Wetlands provide clean water to fish by helping to filter out potentially harmful pollutants. Some pollutants can become trapped by wetland vegetation and then stored within layers of sediments. Other pollutants are transformed into less harmful forms by wetlands plants and small organisms called microbes (Rajendranalk et al., 2015).

Mangrove serve as nesting ground for mammals, juvenile fish and invertebrates (Rajendranalk. et al., 2015) so also do Wetlands serve as source of refuge for adult and juvenile fish to hide from predators. Thick plant growth can visually confuse predators and camouflage small fish.

Constraint of management of fisheries in mangroves and wetlands

Fishermen in most of the estuaries and lagoons complain less fish catches for their efforts, recent statistics shows a decrease in coastal fish production which includes lagoon and estuarine fisheries. These facts indicate that fish stocks in coastal areas including lagoons and estuaries are depleting and sustainability of the fisheries industry is threatened (Kamal Bamasooriya, 2014).

Reasons for depleting fish stocks in mangrove ecosystems:

- Over exploitation of fish stocks: Number of fishers in lagoons and estuaries are increasing each year.
- Number of fishing boats as well as the number of fishing nets/boat increased after Tsunami in almost all the lagoons.
- Destruction of mangrove habitats: habitats are being destroyed through disappearance of mangrove plants and reclamation of lagoons for village

expansions as well as cleaning of mangrove forests for shrimp farming and other developmental projects.

- Excavation of mangrove habitats for aquaculture and other purposes such as flood mitigation, Mangrove habitats contain Potential Acid Sulfate Soil (PASS) which contains Iron Pyrite: Iron pyrite is oxidized when exposed to air and yields large amount of sulfuric acid. This sulfuric acid can decrease the pH of the water to alarming levels when it leaches to water and destroy fish nursery grounds (Kamal Bamasooriya, 2001).
- Separation of lagoons from the sea due to: Formation of permanent sand bars. Many shallow lagoons in the southern part of Nigeria. Man-made constructions, e.g. Improper construction of culverts at Choba lagoon (Port-Harcourt, Rivers State) (Ekeke et al., 2008). Natural migration of fish juveniles to lagoon from the sea is prevented due to these barriers.
- Change of lagoon ecology due to human activities: Severe silting problems were observed in some lagoons mainly due to soil erosion in catchments area. Water salinity in some lagoons was changed due to flushing of freshwater from irrigation schemes. Onne river became a freshwater body because of the flushing of large amount fresh water from Udawalawa irrigation scheme (Ekeke et al., 2008).
- Pollution: Oil spills pose one of the greatest environmental challenges globally, constituting harmful effects on both human health and aquatic organisms. Fishing resources can be damaged through physical contamination, bio-accumulation, and damaging of spawning grounds, as well as habitat destruction, depending on the circumstances of the spill and time of response. Many coastal communities are affected (Ekeke et al., 2008). Some of the lagoons especially in the southern part of Nigeria are highly polluted because of the release of industrial wastes to lagoon, which causes surface tension and thereby reducing the oxygen level of water, making it difficult for the water to sustain living thing and this is badly affecting the fish stocks.

Insufficient fund to procure Land and Poor management of the available fund:

- Water supply to farmers in heavily contaminated wetland;
- Unstable prices of fingerlings

thereby making fish not readily available, numbers of fish taken are not controlled and no choice of fish is grown. No specific age group is involved in fishing in the mangrove thereby making the stream dirty. All these make, fish farming have so many constraints in Mangroves and wetlands.

Prospects of Fisheries to Mangrove and wetland

- **Protecting mangroves and wetlands**

The need to protect wetlands cannot be overemphasized, because it enhances farmer's livelihood and it's based on these following important reasons as documented by Chidumeje (2015):

(i) Wetlands are among the most fertile, productive ecosystems in the world, rivalling the likes of tropical rainforests and coral reefs.

(ii) Two thirds of all fish consumed worldwide are dependent on coastal wetlands at some stage in their life cycle.

(iii) Annual fish and seafood production in swamps and marshes worldwide has been estimated at an average of nine tons per km^2, 259 ha or 640 acres.

- **Restoring natural mangroves**

Where mangroves have been degraded or lost, they can still be restored, enabling the return of ecosystem services relatively quick. Critical to successful restoration is to understand the causes of loss in order to ensure these can be prevented in the future, and ensuring that the communities or owners of mangroves are supportive of restoration. Where these conditions are met, the main focus of restoration should be restoring growing conditions – tidal flows, freshwater inflow and sediments. These alone may be enough to allow natural mangrove recovery, but in some cases mangroves may need to be planted to commence or enhance recovery.

- Enhance fish stocks in lagoons through regular stocking of fish/shrimp juveniles.
- Reduce fishing pressure in lagoons and estuaries by introducing alternative livelihood activities for fishermen. e.g. "Aquaculture" will be a promising alternative livelihood activity that can be introduced to fisher folk in lagoons and estuaries in Subsahara Africa, Suitable aquaculture activities for lagoons and estuaries are: Shrimp culture in ponds, Fin fish culture in floating cages, Crab fattening in cages, Oyster and muscle culture, Artemia culture, Seaweed culture.

Conclusion

Mangroves and wetlands serve as critical nursery for young marine life and therefore play an important role in the health of fisheries and economic well-being of fishermen. This paper has reviewed the importance of fisheries in mangroves and wetlands, the constraints and recommended possible solution to the problems facing fisheries in the ecosystem.

Recommendations

Acts and legislations should be put in place by appropriate national environmental bodies. Villagers should report as early as possible any case of oil spill. Quality control of pesticides and chemicals used for agricultural purposes should be carried out. Preventing

oil pollution through adequate monitoring of oil pipelines and oil wells, as well as illegal discharge of toxic wastes and crude oil into water bodies can be effectively achieved by employing GIS and remote sensing techniques. Also, oil companies as well as the federal government should put in place strict policies to mitigate wetland pollution and degradation. More so, the adoption of the use of appropriate tools, such as GIS and remote sensing, to ensure adequate monitoring of the Niger Delta coastal wetlands, considering its importance to the Nigerian natural resources and fisheries sectors must be encouraged.

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