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Review

A review of the marine fisheries policy and management in Nigeria

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We reviewed the marine fisheries laws as contained in the Sea Fisheries Decrees of Nigeria promulgated in 1971, 1972 and revised in 1992. We found out that these decrees were lacking in scientific data needed to effectively enforce the laws, both for industrial and artisanal fisheries. The major habitats of the different species, their breeding and nursery grounds; the migratory movements and seasons for different species; size selection of the fishing gears for different species caught simultaneously by relevant gears; sizes at first maturity of the different species; feeding/trophic relationships of the various species; maximum and optimum sustainable yields of the resource, and the corresponding effort, are some of the missing scientific information. This paper stresses the importance of these scientific data requirements for effective policy options and sustainable fisheries management.

Keywords: Fisheries management; Marine fisheries; Sea fisheries; Fisheries policy; Nigeria

INTRODUCTION

Nigeria has an extensive coastline of approximately 900km and an Exclusive Economic Zone (EEZ) of about 217,313 km² (SeaAroundUs, 2007). Within the nation's EEZ, there is abundance of *SARDINELLA* and bonga and extensive breeding and feeding grounds for prawns. Because of the high export value of these prawns, many trawlers engage in shrimping with small mesh codend trawl nets less than the stipulated 44mm, which expectedly exploit not only shrimps but juveniles of important commercial fish species stipulated for exploitation with 76mm trawl codend. In addition to fishing with illegal mesh sizes, the shrimp trawls also shrimp in shallow areas (less than 20m depth or 5nm strip) reserved for the artisanal fisheries by law. The by-catch from shrimping made up of small sized fishes were initially dumped in the sea, but because of the waste of biomass they were later permitted to be landed and sold to fish traders. This has created the danger of over-fishing of the important commercial fish species by shrimp trawlers. It is thus imperative that the existing Sea Fisheries Laws and Regulations should be updated with necessary scientific data previously not available, in light of the non-sustainable exploitation of fisheries resources in the coastal waters. It is in this regard that the fisheries sector of the national economy can be rescued from imminent collapse. Moreover, government's poverty alleviation measures in the rural coastal communities would suffer a great set back because of the fisheries resources-dependent livelihood of the population. In addition, health problems related to deficiency of protein, which is most cheaply derived from fish diet, would attain significant dimension with increasing fish scarcity and non-affordability. This paper is targeted at highlighting the crucial scientific data needed for an effective monitoring and control of the operation of the fishing industry to enhance sustainability of the resources.

Problem Statement

In order to control marine fisheries exploitation, a number of Decrees were promulgated by government, starting form 1971, and additional regulations added as they became necessary all through to the latest Decree of 1992. In spite of these laws and regulations, fisheries exploitation is showing clear signs of severe overexploitation. This is largely because the existing laws and regulations lack fundamental scientific data on which sustainable exploitation

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depends. In particular, fin-fish selectivity by trawl nets is largely unknown. It is well known that only about 5% of the total landings are attributed to industrial marine fisheries using trawlers, the remaining 95% being landed by local or artisanal fishers (Ita 1993). Yet there is no provision in the Fisheries Decrees for operation of coastal canoe fishers (beside restriction to near-shore waters not beyond 5 nautical miles), even though this class of fisher folks operate in the most productive coastal waters where the probability for exploiting undersized fishes are highest (Ita, 1985a,b; Holzloehner et al., 2004). Information for stipulating gear types to be used within different coastal waters is also lacking. Consequently, the artisanal fishers exploit the choice commercial species like bonga, croakers, grunters, barracudas, mullets, sharks, rays, skates, snappers, soles, threadfins, cat fishes, shrimps, etc. without restriction. It is very clear that without proper scientific data the existing fisheries regulations will never halt the increasing trend of over exploitation of these living resources of our marine waters.

Critical review of the sea fisheries decrees

The 1971 and 1972 Sea Fisheries Decrees

As interim measures pending the collection and collation of scientific information, the Federal Government through the Supreme Military Council and using advice from Federal Department of Fisheries, promulgated the Sea Fisheries Decrees of 1971, 1972 and 1992. These decrees were limited in scope and were directed at the following parameters:

i) Registration and licensing of fishing trawlers operating in the coastal waters of Nigeria. The number of trawlers to be registered required biological information on the Maximum Sustainable Yield (MSY) of the exploited stock and the yearly quota for each trawler. The catch quota for each boat was not included in the decree.

ii) The 1971 decree prohibited the use of explosives and poisons in catching fish. The damages caused by explosives and poisons to the fish stock was known and did not require additional information prior to its promulgation.

iii) The 1972 Sea Fisheries Decree restricted fishing trawlers from operating within the first two nautical miles of the continental shelf. This was intended to prevent industrial vessels from competing with small-scale artisanal canoe fishers. This restriction was later extended to 5 nautical miles in 1992. This decree was based on complaints, by local fishers, of damages done to their fishing nets by industrial fishing trawlers.

iv) The 1972 decree also placed restriction on the codend of trawl nets used by industrial trawlers. The minimum codend mesh size of trawl nets was put at 3.5 inches (or 76mm) for finfish and 1.75 inches (or 44mm) for shrimping. This restriction was based on experience of trawling along the West African coast. It was lacking in details of the sizes of fish to be caught. Many undersized fishes were caught by shrimp trawlers initially and dumped in the sea for fear of being arrested. This resulted in the extension of the decree to include restriction on dumping of fish by-catch by shrimp trawlers.

v) The 1972 decree also restricted shrimp trawlers from operating within the inshore waters of the Lagos-West fishing grounds. This was intended to protect the juveniles of croakers common in the area. It was the only restricted fishing area for trawlers. There are many such areas along the Nigerian coast, particularly along the estuaries of major rivers, which constitute breeding and nursery grounds for different marine fish species.

These have to be identified and included in the revised law. As Neiland et al. (2002) pointed out, weak scientific data lead to incomplete information and knowledge, and policies based on such data will remain incomplete.

Another crucial gap in Nigeria's fisheries policy is the complete absence of stakeholders' input during the policy formulation process. Experience shows that top-bottom approach to fisheries management does not yield the best of results. Local communities whose livelihoods derive from fisheries resources either directly or indirectly (e.g. artisanal fishers, women trading in fisheries products), local authorities where these resources domicile, commercial fishers, fishing equipment manufacturers and suppliers, should be given the chance to contribute to the policy formulation. Nigeria is now a democracy, so it is imperative to address these issues when the proposed revision of the laws takes effect.

The Exclusive Economic Zone (EEZ) Decree of 1978

By this law, Nigeria claimed 200 nautical miles as its EEZ, where it has sovereign rights over all natural resources, in concert with the provisions of the UN Convention on the Law of the Sea. The EEZ decree did not explicitly state the role that local research would play in the management and exploitation of the living resources, although that was a requirement under the Law of the Sea. The decree however provided for the policing of the EEZ by law enforcement agents.

The 1992 Sea Fisheries Decree

The 1992 Sea Fisheries Decree consists of two segments namely:

The Sea Fisheries Licensing Regulation of 1992 which stipulates the conditions for granting fishing license for shrimping and fishing. This requires application for pre purchase assurance and submission of feasibility studies.

The 1992 decree also re-emphasized the provision of regulations dealing with restriction of trawling within the first 5 nautical miles of the continental shelf. Trawl codend mesh size restriction was re-emphasized together with:

(i) Dumping of edible and marketable sea products and export thereof. Accordingly, fish landed by shrimp trawlers must not be less than 75% by weight of the total landing including the head on weight of the shrimp landed. This decree opens itself to wrong interpretation and has possibly resulted in the landing of more by-catch than shrimps. The rendering: “Fish landed by shrimp trawlers should not be less than 75% by weight...” This implies that the by-catch (fish) should not be more than 25% of the total catch.

(ii) Restriction on minimum sizes of fish to be caught was not available at the time. The decree did not supply any information on fish sizes but made provision for the Nigerian Institute for Oceanography and Marine Research (NIOMR), Lagos, to publish the sizes of different species (minimum total length of different species) to be caught during each year.

The provision of such information required special commissioned surveys by the Development Agency (Federal Department of Fisheries) on account of the cost-intensive nature of such surveys. In the absence of such commissioned study, the gap in knowledge exists up to the present, despite the fact that the decree has stipulated for such information.

The fixing of 3.5 inch codend was based only on the selectivity of croakers, the most dominant species at the time and lacked scientific information on the sizes of other species likely to be caught by the 3.5 inch codend of trawls.

Because of this deficiency in the decree and the lucrative trade in the by-catch of cheap small fish, some shrimp trawlers became more interested in the by-catches than shrimps meant for export. Such action was dangerous to the survival and continuous recruitment of the fish stocks.

Provision for Future Regulations by the Minister in 1992 Sea Fisheries Decree

Both the 1972 and 1992 decrees made provision for future regulations on:

(i) Areas to be prohibited for fishing, besides the Lagos-West fishing grounds.

(ii) Sizes of nets or mesh sizes to be employed in fishing and sizes of fish to be captured.

ii) Any other regulation relating to the conservation and protection of the fish stocks in the sea.

In spite of the obvious deficiencies in the sea Fisheries Decrees so far promulgated, no attempt has been made by the Development Agency to commission studies with the aim of updating the decrees with the relevant scientific information. There is obvious decline in fish landings by trawlers as a result of over exploitation of juvenile fish both by industrial fishers and coastal artisanal canoe fishers. Shrimping is being sustained because of the lucrative trade in the by- catch from shrimp trawlers. There is the need therefore to commission specific investigations to supply information for updating the 1992 decree and for additional regulations to control indiscriminate exploitation by coastal artisanal fishers.

Fisheries Regulation for Coastal Artisanal Fishers

The coastal artisanal fishers exploit the bulk of the fish from the coastal waters of Nigeria. Only about 5% of the total landings are attributed to industrial marine fisheries using trawlers. The canoe fishers exploit both marine and brackish water species common along the estuaries and lagoons. The limit of 5 nautical miles made exclusive to canoe fishers by virtue of the Sea Fisheries Decree, constitute the most lucrative fishing ground, being the shallowest portion of the continental shelf. The canoe fishers penetrate all the breeding and nursery grounds and capture immature juveniles and breeding populations. The fishing gears used by canoe fishers are dangerous and include both active and passive gears such as cast nets, beach seine nets, purse seine nets, boat seines, gill-nets, traps, hooks etc.

The law made provision for additional scientific information on the total lengths of fish to be landed by both the industrial trawlers and coastal artisanal fishing gears. From all indications no such information has been collected and supplied to the Development Agency (the Federal Department of Fisheries) for updating the existing decrees.

Fisheries scientists from different higher institutions and research institutes have carried out biological studies of some marine fishes and published their findings but these studies were not directed towards the needs of the Development Agency for updating the existing laws and regulations. Such studies require special commission.

It is necessary to re-emphasize the need for such studies with the aim of filling the gap in existing knowledge for updating the Sea Fisheries Decrees so far promulgated.

The missing scientific information

The present low level of the resources calls for urgent commissioning of studies aimed at collation of existing

information on the resource and conducting new studies aimed at updating and collection of additional information. Such information will include:

(i) The major habitats of the different species and their breeding and nursery grounds. This information is needed for regulation on closed area and season to protect the breeding population and the juveniles.

(ii) The migratory movements and seasons for the different species also require investigation.

(iii) Catch composition of the various fishing gears used by both industrial and artisanal canoe fishers and the size selection of the gears for different species caught simultaneously by different fishing gears.

(iv) Minimum sizes of the different species at first maturity. This will be used in identifying the appropriate mesh size to be permitted for fishing to ensure that each fish reproduces at least once before they are captured.

(v) Feeding habits of the various species need be studied for comprehensive trophic level classification. The choice of minimum mesh size will depend on the species selected for protection. Usually, herbivorous species or primary consumers are the most popular species because of their abundance in the population followed by secondary consumers. The carnivores or tertiary consumers are often the largest in size and feed on the herbivores. Whereas the rich citizens prefer the bigger carnivorous species though expensive, the poor masses prefer the cheap smaller herbivores. Often, the minimum size of gear for catching some mature herbivores and secondary feeders may end up catching the majority of immature carnivores.

The ultimate goal is to utilize the information collected to draft a comprehensive Marine Fisheries Laws and Regulations covering both industrial and canoe fisheries. This will include methods of implementation to make the laws effective.

The current state of knowledge

Estimates of Potential Yield

Estimates of potential yield for Nigerian inshore and brackish water resources have been documented from the early sixties and updated by different workers up to the early nineties. Among these are Longhurst (1961) who estimated the potential yields of Nigerian marine resources to be about 40,000 metric tons. Ajayi (1982) estimated the potential yield for the Nigerian inshore waters (0 - 50 meters) to be 15, 000 m.t. Also Ajayi and Talabi (1984) re-estimated the yield potential in relation to trawl codend mesh size. They concluded that if 52mm (2 inch) codend is used the potential would range between 9,048 and 16,965 m.t. However if the legal codend mesh size of 76mm (3.5 inch) was used, a potential of about 20,000 m.t. is possible plus about 7500 m.t. of by-catch from shrimpers. This would bring the total potential yield to about 27,500 m.t. Enin (1997) estimated the maximum sustainable yield of the industrial shrimp fishery at 3447 m.t (Schaefer model) and 2706 m.t. (Fox model); and 20,000 m.t. for the industrial fin-fish fishery.

Ajayi and Talabi (1984) concluded that judging from than current estimates of landings of inshore industrial trawlers estimated at 16,342 m.t., the fishery was at the time of the estimate being exploited at about 60% of its potential. Elliot (1993) summarized the Nigerian coastal fisheries resources between 1980 and 1989 and observed a consistent increase in the number of trawlers registered and the estimated total landings based on statistics collected by the Federal Department of Fisheries (Table 1).

From the table above, the potential yield of 27,500 m.t. of Ajayi and Talabi (1984) was almost reached in 1985 with increase in the number of trawlers from 133 in 1984 to 163 in 1985 and with total landings of 26,142 m.t. That notwithstanding, the registration of more trawlers increased consistently to about 440 in 1989 with total landings for that year estimated at 33,645 m.t. but with the lowest average landing per trawler of 76.5 m.t. compared with 192.9 m.t. in 1984 when only 133 trawlers were registered.

Law Enforcement

Amiengheme (1993) outlined some of the constraints to the enforcement of fisheries laws and regulations and indicated lack of strong political commitment on the part of government as one of the major constraints. This implies that pressure was being put on the licensing agents to continue licensing even above the estimated sustainable yield of the fishery. There is need for coordination between the licensing authority of The Federal Department of Fisheries and the Nigerian Institute for Oceanography and Marine Research (NIOMR) in aspects of enforcement of number of boats to be registered.

Tobor (1991) states that the primary objective of licensing vessels was to generate revenue while the control of effort was secondary and ineffective. The licensing fee of N4,000 (Four thousand naira) was too low at the time to discourage investors. Even a hundred fold increase in licensing fee could not have discouraged interested investors.

Mesh Size Regulation

The stipulation of “two different mesh sizes: fin fish (76 mm or 3.5 inch) and shrimp (44 mm or 1.75 inch)” is another controversial issue. The two vessels are all

Table 1. Fish catch (metric tons) from inshore fishing and shrimping between 1980 — 1989

Year	Total Landings	No. of Trawler	Average Landing
1980	13,631	80	170.4
1981	9,611	81	118.7
1982	18,861	86	219.3
1983	19,245	120	160.4
1984	25,650	133	192.9
1985	26,142	163	160.4
1986	25,042	250	100.2
1987	24,900	252	98.8
1988	35,608	372	95.7
1989	33,645	440	76.5

Source. Elliot (1993)

allowed to fish beyond 5 nautical miles from the coast line. Any fish that escapes from the 76mm codend trawl net is retained by the 44mm codend trawl net of shrimpers and designated as by-catch. Initially, the by-catch was discarded at sea but was later prohibited on account of wastage of biomass. Overfishing cannot be controlled with two different codend mesh sizes fishing along the inshore waters of Nigeria.

Ansa-Emmin (1980) in a discussion of the fisheries resources of Eastern Central Atlantic, states that the sixth session of the Committee for East Central Atlantic Fisheries (CECAF) recommended the adoption of a mesh with 60mm for the exploitation of all demersal species (shrimps, fin-fish and cephalopods). The research conducted in Nigeria and the Congo by CECAF showed that the existing mesh size of shrimp trawlers can be increased up to 60 or 70mm without significant reduction in shrimp landings while at the same time reducing juvenile mortality among other species of fish captured and discarded. Ghana adopted this recommendation and reduced the codend mesh size from 77mm to 60mm (Dowuona 1984). Nigeria is yet to adopt the CECAF recommendation.

By-Catch from Shrimping

Okpanefe (1982) sampled the by-catch from shrimp trawlers in 1981 and concluded that only 8.27% of fish by-catch was small fishes of 0-20cm while 91.25% were medium sized fishes of 21.0cm to 41.0cm. However in 1986 with increase in the number of shrimpers from less than 40 to over 100, Kusemiju (1993) reported that a large proportion of fish landed by shrimp trawlers were small-sized fishes. He recommended the setting up of a commission for the conservation and control of the fishery as is usually done in developed countries. This recommendation was very timely and should be implemented.

Coastal Artisanal Fishery

The potential yield from this sector which is estimated to land over 90% of total fish yield from the coastal industrial and artisanal fisheries has also been estimated. Using the estimated total number of coastal artisanal fishers in Tobor et al (1977) and Ajayi and Talabi (1984) estimated the yield from coastal and brackish water artisanal fisheries at between 128,000 and 170,000 tons. Estimates for this sector vary according to different authors. Ssentongo et al. (1983) estimated 100,000 tons as the ceiling for inshore artisanal and industrial fisheries. If 95% of the catch is landed by the artisanal sector, then about 95,000 tons is attributed to this sector by the authors.

Judging from the Federal Department of Fisheries statistics (1971 to 1983), landings from coastal and brackish water fisheries varied from 199, 639 tons in 1971 to 376, 943 tons in 1983. This shows that this sector more than tripled Ssentongo et al. (1983) estimate of 95,000 tons. If the figure then was more than triple the potential, the current state of the fishery of this sector can be predicted. The yield is bound to decline as evidence of overfishing and the catch is expected to be dominated by small fishes. This sector exploits all the species captured by industrial vessels and in addition land substantial quantities of some pelagic species such as the bonga (Ethmalosa fimbriata) and Sardinella sp.

Holzlohner et al. (2004) lists the fishing gears used by this group of fishers as driftnets with meshes ranging from 1½ to 4½ inches (34 — 115mm); set-nets with meshes of 54 — 113mm; cast nets with meshes of 10 — 50mm. In addition, there are purse seines for exploitation of the bonga with meshes of 50mm and below. Ama-Abasi and Holzloehner (2002) observed that in the outer estuary, the post-larval stages measuring 2-9cm are the target of boat seine fishery while the adult stages (18-25cm) are exploited by purse seine fishery. It is important to ensure that the coastal artisanal fishers are taken care

of in the Sea Fisheries Decree since they exploit the most productive sector of coastal waters.

Management measures

The coastal waters of Nigeria can rightly be classified as an ecological disaster zone in view of the numerous problems affecting the zone, including pollution from industrial activities and oil exploration and overfishing by both industrial and artisanal fishers. It is relevant to set up a Commission within the cover of Natural Resources Conservation Council (NARESCON) to proffer solution for the conservation and control of the fishery resources to obviate a total collapse of the fishery.

The commission would be empowered to review the existing conservation measures of the coastal zone with special reference to fisheries and commission studies to update the existing policies. The major problem of policy formulation and implementation is availability of financial resources to meet specific needs such as:

a) Research to update the laws with relevant information as earlier listed.

b) Vessels for policing the coastal zone to enforce existing laws including the EEZ.

c) Updating of the national Fishery Statistics for estimation of total landings including types of gears and sizes of fish landed, and number of boats and fishers exploiting the fishery.

Experience in the past has shown that budgetary allocations to Fishery Departments and Research Institutes are too meager to meet the requirements of the above needs. Policy options and policy formation have political implications and should therefore be handled and financed through a Commission as recommended. Similarly, policy implementation also has some political implications which require enforcement by laws. Stipulation of number of trawlers to be registered each year cannot be enforced by an individual without a supporting law on account of political pressure as earlier noted.

CONCLUSION

The Sea Fisheries Decrees so far promulgated from 1971 to date require additional scientific information for effective enforcement. The need for commissioning of studies to fill the missing gaps in the decrees has been emphasized. The 1992 decree in particular noted the deficiencies in the degrees and therefore made provision for future regulations on.

(i) Areas to be prohibited for fishing along the coast.

(ii) Sizes of nets or mesh sizes to be employed in fishing and sizes of fish to be captured and

(iii) Any other regulation relating to the conservation and protection of the fish stocks in the sea.

The above provision took cognizance of the need to include coastal artisanal fisheries in future laws and regulations considering the fact that these fishers account for about 95% of total fish landed along the coast.

The poor state of the resource has been highlighted based on available information. Management measures recommended to remedy the deplorable state of the resource include:

- The setting up of a Commission under Natural Resources Conservation Council with adequate financial resources to commission studies needed to update the laws and render them enforceable.

- The Commission is also expected to finance the provision of materials and equipment needed for policing the coastal zone and for updating the national fishery statistics which has been long outdated.

It is noted that policy options and policy formation mechanisms have political undertone and should be supported by an established Corn mission.

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