MANAGEMENT OF INLAND CAPTURE FISHERIES AND CHALLENGES TO FISH PRODUCTION IN NIGERIA

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ABSTRACT

The paper critically examines the trend in fish production in Nigeria. The problem of excessive mismanagement and lack of attention by relevant agencies are still common place in inland water bodies. The paper discusses these mismanagement practices which are non compliance with the existing rules and regulations on good fishing methods, uncontrollable, unorthodox and obnoxious fishing practices, destruction of the natural breeding grounds and the collapse of the fishery due to massive over fishing. The challenges posed by the fishing methods as well as the effect of different gears and mechanization of fishing crafts on fish production are discussed. The paper recommends ways to increase domestic fish production in inland water bodies, which include a well planned strategy of restocking the existing reservoirs after careful scientific study. enforcement of the existing laws and regulation based on community participation. Training of stakeholders on the code of practice for responsible fisheries (CPRF), extension of subsidies to fisherfolks, the traditional practices, which encourage the adherence to close season and other fish conservation and utilization strategies, are also advocated.

INTRODUCTION

Nigeria is blessed with diverse natural and man made freshwater bodies ranging from streams, rivers and lakes to reservoirs of various sizes with abundant plant and animal resources, particularly fin fish The most prominent among the net works in Nigeria is the Niger - Benue system, while Lake Chad and Kainji are the most important with regards to fish production.

Ita et al. (1985) surveyed the inland freshwater bodies in Nigeria and assessed their potential for fish production. Ita and Sado (1985) revealed that Nigeria is blessed with an estimated inland water mass of 12.5 million hectares capable of producing about 512,000 metric tones of fish annually. However, Ita (1993) indicated that Nigerian inland water bodies are currently producing less than 50% of their estimated potential fishery yields. The over exploitation of the limited resources has resulted in a sharp decline in Inland rivers and lakes fish production from 213,996 metric tones in 1998 to 181,268 and 194,226 metric tones in 2000 and 2001 respectively.

This paper is aimed at assessing the current management practices in inland capture fisheries and the challenges it poses to fish production and suggest ways in which the management of capture fisheries could be improved so that the decline in domestic fish production from this sector could be reversed.

FISH PRODUCTION

There are three main fish production systems in Nigeria, these includes Artisanal (Inland rivers, lakes, Coastal and brackish waters), Aquaculture (fish farm) and Industrial fishing (inshore

and offshore waters). The total domestic fish production in Nigeria from all sources 1993 – 2003 is presented in Table 1. In 1993 it was 255,523 tonnes while in 2002 production was 511,720 tonnes, an increase of 50.07 percent. Though there was a slight increase from year 1995 figure (371,053 tonnes) and a slight drop from year 1996 figure (355,934 tonnes), the artisanal fisheries sub-sector contributed about 86.75 percent of the country total fish production while out of these Inland Water Rivers and lakes constituted 41.33 percent. The fisheries industry is a major employer of labour accounting for more than 80% of those within the riverine/estuaries areas of the country.

Table 2 shows the Nigeria fish supply from 1992 – 2002 (metric tonnes). The current annual demand for fish in Nigeria is 1.3 million tonnes, whereas the local production stands at 0.5 million tonnes representing 42.2 percent of the total fish supply in Nigeria, leaving a huge deficit of 0.8 million tonnes. This gap has continued to be filled through frozen fish importation, and this had made Nigeria to be the largest importer of frozen fish in Africa (Tables 2 and 3). In year 2001 the fish import bills exceeded ₦30.0 billion ($241.1m). This high import bill is affecting the growth of the local fishing industry and this has negatively impacted on the country's trade balance.

In Lake Chad Basin, Ladu (2004) puts annual production estimates of 60,000 tonnes per annum using market survey in Doro-Baga fish markets. This author also report that Lake Chad fish products going through Doro-Baga market alone accounts for about 33% of the national gross production. In Lake Kainji, the total estimated yields from 1994 to 2001 are presented in Table 4. In year 1994 it was 8,204 tonnes, while in 1996 yield estimate was 38,246 tonnes, an increase of 78 55 percent. Though there was slight drop from year 2001 figure that was 13,361 tonnes, because the yields from beach seine were not taken into consideration despite the evidence that showed the re-emergence of the gear all over the Lake (Abiodun, 2002).

TABLE 1: DOMESTIC FISH PRODUCTION IN NIGERIA BY SECTORS 1993 – 2002 (METRIC TONNES)

YEAR	SECTORS											
	ARTISANAL				ACUACULTURE		INDUSTRIAL					
	Coastal and Brackish Water	Inland Rivers and Lakes	Sub-Total	%	Fish Farm	%	Fish (Inshore)	Shrimp (Inshore)	EEZ (Offshore)	Sub-Total	%	GRAND TOTAL
1993	106,276	94,900	201,176	78.73	18,703	7.32	22,464	8,956	4,224	35,644	13.95	255,532
1994	124,117	110,484	234,604	82.84	18,104	6.39	21,886	7,884	718	30,488	10.77	283,193
1995	159,201	161,754	320,955	86.50	16,619	4.48	21,191	12,252	36	33,479	9.02	371,053
1996	138,274	170,926	309,200	86.87	19,490	5.48	15,425	9,551	2,268	27,244	7.65	355,934
1997	175,126	185,094	360,220	87.18	25,265	6.11	15,326	10,807	1,570	27,703	6.70	413,188
1998	219,073	213,996	433,070	89.57	20,458	4.23	17,947	10,716	1,291	29,955	6.20	483,482
1999	239,228	187,558	426,786	88.98	21,738	4.53	14,181	15,249	1,710	31,139	6.49	479,663
2000	236,801	181,268	418,069	89.50	25,720	5.51	13,877	8,056	1,375	23,308	4.99	467,098
2001	239,311	194,226	433,537	89.15	24,098	5.02	15,792	12,380	206	28,378	5.83	486,313
2002	253,063	197,902	450,965	88.13	30,664	5.99	16,063	12,707	1,230	30,091	5.88	511,720

TABLE 2: NIGERIA FISH SUPPLY AND PROJECTED FISH DEMAND 1992 – 2002 (METRIC TONNES)

YEAR	DOMESTIC PRODUCTION	%	IMPORTS	%	TOTAL FISH SUPPLY	**PROJECTED FISH DEMAND	%	DEFICIT
1992	343,078	60.3	225,590	39.7	568,668	1,080,454	47.4	511,786
1993	255,523	49.9	256,217	50.1	511,740	1,100,755	53.5	589,015
1994	283,193	55.3	229,244	44.7	512,437	1,130,150	54.7	617,713
1995	371,053	58.2	266,448	41.8	637,501	1,150,550	44.6	513,049
1996	355,934	46.9	403,273	53.1	759,207	1,170,956	35.2	411,749
1997	413,188	51.9	382,442	48.1	795,630	1,200,459	33.7	404,829
1998	483,482	56.9	373,044	43.6	856,526	1,230,015	30.4	373,489
1999	479,663	50.7	466,840	49.3	946,503	1,250,626	24.3	304,123
2000	467,098	45.6	557,884	54.4	1,024,982	1,280,291	19.9	255,309
2001	486,313	42.9	648,197	57.1	1,134,510	1,310,014	13.4	175,504
2002	511,720	42.9	681,152	57.1	1,192,872	1,330,794	10.4	137,922

SOURCE: FDF (unpublished) (Projected values from Tobor, 1993)

TABLE 3: FISH IMPORTS AND VALUE FROM 1992 – 2002

YEAR	QUANTITY TONNES	VALUE ($)
1992	225,590	267,211,201.00
1993	256,217	267,156,521.00
1994	229,244	150,947,991.00
1995	266,448	140 308,752.00
1996	403,273	290,351,310.00
1997	382,442	158,632,744.00
1998	373 043 7	190,098,052.00
1999	466 840	209,958 638.00
2000	557,884	241,066,537.30
2001	648,196.6	368,188,841.80
2002	681,151.8	375,027,917 9

SOURCE: B. F. Dada (2004)

TABLE 4: TOTAL ESTIMATED YIELD FOR LAKE KAINJI FISHERY 1994 – 2001

YEAR	YIELD IN METRIC TONNES
1994	8,204
1995	32,474
1996	38,246
1997	28,753
1998	28,851
1999	16,351
2000	13,375
2001	13,361

SOURCE: Abiodun (2002)

OVER FISHING

Fish resources are susceptible to environmental and man induced stresses and can deteriorate rapidly, particularly when environment and man act concurrently to limit production. Multi-species fisheries react to fishing pressure. Welcomme (2001) was of the opinion that increasing effort involves progressive reduction in the size of the species caught. Reduction in size is associated with changes in mortality rates, growth rate, production and number of species comprising the catch, biomass and catch per unit effort (CPUE) both fall. The combination of falling biomass and rising productivity means that yield remains stable over a large range effort. This close association of effort and length of the fish caught implies that the fishing can be managed entirely on the basis of control of length both in terms of the assessment of the status of the fishery and through promotion of mesh or fish size limitations.

Collapse of fisheries due to overfishing has been well documented in lakes such as lake Victoria before the advent of the Nile Perch (Fryer, 1972). However, many cases are documented where fishing and environmental pressures have together produced such a collapse. In Lake Kainji, Seisay and du Feu (1997) observed a reduction in mean sizes (that is, mean length and weight) in fish species and changes in species composition due to both recruitment and ecosystem overfishing. Eyo (2004) reported a massive poaching of juvenile fishes on Lake Kainji by foreign fishermen who utilize gill net and beach seines (Dala) less than 3 inches as stipulated by the Inland waters decree. He called for a new act, which would regulate the fishing culture on Nigerian freshwaters, which suffered massive overfishing in recent times. According to the author, those reckless fishermen have reduced the population of fish in the lake from about 35,000 metric tones to less than 10,000 metric tones at present. In Lake Chad Basin overfishing was observed by Stauch (1978) that the fishermen resorted to using smaller mesh nets, which cropped the juveniles.

INLAND FISHERIES DECREE 1992

In Nigeria, the management of Inland water is regarded as the exclusive responsibility of the state to which such water bodies belong (Ita, 1993). However, as a result of pressure from the Federal Department of Fisheries (F.D.F.) and the National Institute for Freshwater Fisheries Research (NIFFR), based on the need for the existence of a National Inland Fisheries Legislation to harmonize the administration, management, protection and improvement of fisheries resources in Inland waters, it has been observed that although Inland waters are within the state boundaries and therefore should be subject to legislation, some of the waters usually traverse more than one state, therefore action or lack of action by one state could have profound effect on the fishery resources, fishing and fish skill in another state.

Inland Fisheries in Nigeria have recently been conferred with Federal Legislation (National Decree No. 108, 1992). The Decree provides in Section 5 sub-section 1 that no person shall fish with a gear constructed with net webbing of less than 76mm except where the gear consists of the following:

(a) Pelagic trawl nets used for freshwater sardines that is clupeids, which are used with Outboard engines of not more than 25HP capable of operating trawlnet with 3mm codend or

(b) Liftnets used for freshwater sardines constructed with 3 – 5mm stretched mesh size webbing.

Sub-section 2 stated that no single fishing unit should operate with a single net or a combination of nets exceeding 500m of 3mm mesh size and above.

The decree also provides in section 6 sub-section 1 prohibition of Unorthodox except for electro-fishing and the use of chemical for the purpose of research. No person shall take or

destroy or attempt to take or destroy any fish within the Inland water of Nigeria by any of the following methods; that is:-

(a) Explosive substance
(b) Noxious or poisonous matters; or
(c) Electricity

STATE FISHERIES EDICTS

Majority of the Inland States have promulgated their Fisheries Edicts for instance Benue, Jigawa, Kano, Kogi, Kwara, Kebbi, Niger, Nassarawa, Oyo, Plateau, Sokoto, Taraba, Adamawa and Zamfara States. The Kainji Lake Fisheries Promotion Project (KLFPP) recommended to the Fisheries Divisions of Niger and Kebbi States to amend their Fisheries Edicts as well as the Fisheries Rules and Regulations. The recommendation was accepted and implemented by the relevant authorities. For successful fisheries management, the Kainji Lake Fisheries Management and Conservation Unit (KLFMC) was established in 1997 with the mandate to implement fisheries management plan developed by the Nigerian/German (GTZ) Kainji Lake Fisheries Promotion Project. The Niger and Kebbi States Fisheries Edicts and Fishing Regulations of 1997 provides for regulation of fishing within specified water in the States. Section 4 sub-sections 1 provides that,

(a) Gill nets of not less than 76.2mm (3 inches) mesh size
(b) Clap net and cast nets of not less than 50.8mm (2 inches) mesh sizes
(c) Drift nets of not less than 63.5mm (2 ½ inches) mesh sizes
(d) Webbing traps of not less 50.8mm (2 inches) mesh sizes
(e) Long line with hooks, and
(f) Rod and line.

No person shall fish within the territorial waters of the States unless he obtains a License so to do.

The edicts further highlights on the licensing procedures, fees and on penalties for committing any offences stipulated. However, there are some lapses and contradictions in the edict, which could cause problems during enforcement. Fish size stipulation and mesh size limitation: Fifth schedule Section 11 of the Edict lists thirteen species with stipulated sizes for capture as thus:

S/NO.	Species	Standard Length (cm)
1	*Lates niloticus*	30 and above
2	*Gymnarchus niloticus*	50 and above
3	*Heterobranchus spp*	30 and above
4.	*Hydrocynus spp*	20 and above
5.	*Mormyrus/rop*	20 and above
6.	*Citharinus spp*	20 and above
7.	*Distichodus spp*	22 and above
8.	*Tilapia niloticus/galilae*	12 and above
9.	*Heterotis spp*	30 and above
10.	*Bagrus spp*	25 and above
11.	*Clarias spp*	20 and above
12.	*Labeo spp*	20 and above
13.	*Synodontis membranacecus*	20 and above

From the above fact it is clear that the edict permits the use of different fishing gears with varied mesh sizes ranging from 2 inches (50.8mm) to 3 inches (76.2mm) the listing of the unit sizes of the different species for capture could cause problems during implementation. A fisherman with under sized fish captured with either cast net or clap net of 2 inch mesh could be rightly fined by the law enforcement agents who possibly do not know much about the selectivity of these fishing gears. The clap net, gill net and drift nets of similar mesh sizes are likely to catch fairly uniform sizes of fish. Clap nets have limitations in use and should either be exempted from the minimum mesh size stipulation or fixed along with gill nets to avoid complications with fish size stipulation.

The Beach seine net (Dala), although controversial among riverine communities, and even among Lake Kainji fishing communities, was identified as a new technology for catching clupeids in the open water of Lake Kainji where the Atalla 'liftnet' fishermen cannot operate on account of wave action. Its operation was recommended for Lake Kainji where there were over 90% clupeids (Ita, 1999). It is therefore important, for all the gears used in any particular state to be identified and indicated in the edict to avoid subsequent controversy after the promulgation of the edict.

The fishing gear frame survey conducted in Lake Kainji from 1994 to 2001 showed that about 43% of the gill nets used, 73% drift nets, 20% for cast nets and 100% beach seine were illegal in accordance with Niger and Kebbi States Fisheries Edicts (Abiodun, 2002).

UNORTHODOX AND OBNOXIOUS FISHING PRACTICES

This is a very bad fishing method, which is not good for the conservation of the aquatic resources. It is also a very old method used in harvesting fish in Nigeria. The use of poisons and dynamite for fishing has been prohibited in Nigeria since 1992. But the artisanal fishermen still use explosives and poison from time to time in Nigerian Inland waters either to kill, daze or shock fish.

Fishing poison – These involves the use of synthetic chemical and Ichthyotoxic plants, in Nigeria Inland waters. The synthetic chemicals include Gamalin 20, Aldrex 40 as well as Didimacs 25, Atranex, Fenthion etc. These chemicals, which are usually in liquid forms, are simply poured on the water surface ponds, rivers and lakes to narcotize and kill fish.

Ichthyotoxic plants commonly used and their active ingredients in Nigerian Inland waters are well described by Udolisa et al. (1994) and in Lake Kainji basin by Reed et al. (1967). The appropriate plants parts (bark, leaves or roots) are collected from surrounding bushes, prepared, and poured into water. The neurotoxic or suffocating effects eventually result in the fish floating belly up on the surface, where they are collected with scoop nets or clap nets. Most poisons affect gills of the fish and the flesh is generally safe to eat (Welcomme, 2001), although where synthetic chemicals are used residues may accumulated in the fish flesh to toxic levels. Because poisons are indiscriminate, many other benthic organisms may be severely damaged. Often these organism and small fish, which are not desired, are much more vulnerable to the effect of poisons than the target fish. Fish poisons take place mainly in the dry season, between November and April in waters less than two metres deep (Udolisa and Lebo, 1983).

Explosives – This involves the use of locally made dynamites and hand grenades along riverbanks and mining paddocks. Fishing with explosives is extremely dangerous and destructive, indiscriminately killing all species within the radius of action of the explosion. The dead and dazed fish are then picked up with hands and scoop net. Human victims of self-made explosives can take months or even years to recover.

Electro fishing – Fish otherwise unobtainable can be narcotized using electricity so that they cannot escape and can thus be easily taken. Fishing with electricity is extremely dangerous and its use as a research tool is governed by strict codes of conduct to ensure safety of

practitioners. Electric fishing is generally illegal or banned by laws of both States and National Inland Fisheries.

EFFECT OF DIFFERENT GEARS AND MECHANIZATION OF FISHING CRAFTS

Exploitation of fish resources in Nigeria is still done at small-scale level. Virtually, all the fishermen in Inland waters are artisanal and could be subsistence at times except a few trawlers operators on the offshore of the country's coastline. The total number of artisanal fishermen in Nigeria in 1994 was 457,775. Out of this number 57.8 percent was full time fishermen (Table 5). Of the 511,720 tonnes of fish production in 2002 the artisanal fisheries sub-sector accounted for 88.13% of the production.

The implications of fishing and fishing gear on the exploitation of the fisheries resources tend to have considerable effects on the fishing ground and stocks of the water body. These effects can be viewed positively or negatively depending on the type of gear used, the rigging process as well as the operation procedures (Knaap, 1994). There are different types of methods useful for capturing the fisheries resources of any water body, but the suitability of a particular gear/method varies from one water body to another. Udolisa et al (1994) identified about twenty - seven different types of small scale fishing gear in Nigeria and methods belonging to eight separate International Statistical Classification of Fishing Gear (ISSCFG) classes, and another three other fishing methods that can be classified under miscellaneous.

In Inland capture fisheries there is a tendency for the pelagic and demersal fishes to move haphazardly on the surface and bottom of shallow waters. Often few pelagics notably the clulpeids (*Pellonula afzeliusi* and *Serrathrissa lenonensis*), *Alestes species* and *Physailla* species. Spend most of their lives on the surface of deep water. Fishing gears commonly used in Inland waters are clap nets, cast nets, beach seine nets, longline, gill nets, fishing traps, Atalla lift net and possibly trawl nets.

(i) Clap nets and cast nets with small mesh sizes of less than 25.4mm stretched: Clap nets and cast nets with stretched mesh sizes less than 25.4mm catch large quantities of juvenile fish e.g. *Alestes, Citharinus, Labeo* and *Tilapia species*. The use of clap nets and cast nets inflict severe toll on the juvenile population of commercially high value species such as those mentioned above.

(ii) Beach seine nets – Beach seines commonly used in Inland water rivers and lakes have mesh sizes of 2.79 – 25.4mm. These nets with small mesh sizes are highly destructive to juvenile fish. The continued use of Dala (Beach seine) of small mesh size can deplete or reduce populations of an aquatic eco system. This gear has been outlawed by the Niger and Kebbi States fisheries edicts of 1997, but still fishermen are using it illegally in Lake Kainji.

(iii) Fishing Traps – There are various types of fishing traps used in Inland waters, they are provided with non-return valves which retain all sizes of fish that passes through the entrance including juveniles of high market value fishes such as *Synodontis, Bagrus spp* etc. Traps destroy breeders and juveniles of fish and have great capacity for depleting fish resources.

(iv) Gill nets are highly selective both for upper and lower size ranges of fish. In Kainji Lake, unscrupulous fishermen are using mesh sizes between 12.7 – 63.5mm less than the statutory 76.2mm for catching fish. These stretched mesh sizes catches large quantities of juvenile of commercially valuable fish species.

Mechanization of fishing crafts – For a fisherman to be able to operate on water, he need fishing crafts. Such vessel must be stable and safe. In inland fishery canoes are propelled by paddling or polling. This manual propelling limits the scope of fishing operations, since the fishermen must return to base the same day to prevent the fish from spoilage after capture.

One of the technologies that has revolutionalised the fishing industry is the invention of engines which could be installed in fishing crafts either as outboard or inboard motors. This development is one of the major causes for increased fish landing worldwide. For instance in Pakistan, when mechanization was introduced, fish catch rose from 83,000 tonnes in 1957 to 94,000 tonnes in 1959 and in Uganda in 1954 when only 13 outboard engine cases were fishing, the estimated fish production was 24,820 tonnes and in 1957 when 731 out of total of 4.500 canoes used engines, production was 50,531 tonnes (Cole and Greenwood – Barton, 1962).

In Nigeria, similar increase in fish production with introduction of mechanized fishing crafts was observed (Table 5). Table 6 shows the domestic fish production by sectors (1985 – 1994). For instance in 1985 there were 129,688 canoes operating in the artisanal sector out of which 15.28 percent (19,812) were motorized and the artisanal production was 201,383 tonnes while the total domestic fish production was 242,525 tonnes. In 1989 when the percentage of mechanized canoes motors operating in this sector had increased to 20.76 percent canoes, the artisanal production was 303,500 tonnes and the domestic production was 362,752 metric tonnes.

In recent times, the prices of fishing crafts have continued to escalate and there are fears that modern fishing crafts may be phased out in the nearby future in artisanal fisheries as the local fishermen may not be able to afford them. For example, 7.3m LOA (24 footer) individual fishermen canoe constructed with marine plywood fibre glass sheathed which was ₦3,000 in 1988 now costs ₦135,000. 'V' bottom 5.5m LOA (18 footer) open speed/trawl boat (fibre glass sheathed) which was ₦4,500 now goes for ₦370,000 and 'V' bottom 6.4m LOA (21 footer) fishing/work boat priced at ₦7,000 in 1988 now costs ₦750,000. The outboard engines are not left out in the price hike. The Yamaha 8HP has risen in price from ₦5,432 in 1988 to ₦150,000 in 1998. The 15 HP which was ₦7,963 and goes for ₦200,000 in 1998. These prices are beyond the reach of the artisanal fisherman. The contribution of fishing craft in fisheries development will be affected in future when the fishermen can no longer purchase fishing boats and engines due to high cost. Fishermen will have no option than to revert to the canoe and paddle methods of the past with its obvious hazards. This will adversely affect the level of domestic fish production.

CODE OF CONDUCT (PRACTICE) FOR RESPONSIBLE FISHERIES (CPRF)

The FAO conference, on 31st October 1995 adopted a code of conduct for responsible fisheries, calling on all FAO member states those involved in fisheries to implement the code. The Federal College of Freshwater Fisheries Technology, New Bussa recently organized training of stakeholder on the code of practice for responsible fisheries (CPRF). The code sets out principles to conserve, manage and sustainably use living aquatic resources. The code works to protect the World's inland, marine and coastal waters with due respect for biodiversity and the ecosystem (FAO, 1997). These include provisions with binding effects, for instance on conservation and management measures for vessels on the high seas and beyond.

NUMBER OF FISHING CRAFTS AND ARTISANAL FISHERMEN BETWEEN 1985 - 1994
TABLE 5: ESTIMATED

YEAR				ARTISANAL CANOES				ARTISANAL FISHERMEN		
	INSHORE FISHING	TRAWLERS SHRIMPING	EEZ	POWERED	%	NON-POWERED	TOTAL	FULL TIME	PART TIME	TOTAL
1985	109	40	27	19,812	15.28	109,876	129,688	174,619	127,615	302,234
1986	137	54	21	16,008	20.75	61,126	77,134	237,455	171,517	408,972
1987	161	82	18	16,128	21.04	60,516	76,644	252,711	184,754	437,465
1988	161	132	4	16,016	20.76	61,128	77,144	259,083	188,767	447,850
1989	134	158	29	16,024	20.77	61,131	77,155	272,062	198,186	470,250
1990	123	195	8	16,056	20.86	60,925	76,981	261,287	190,900	452,187
1991	102	195	26	16,032	20.80	61,061	77,093	264,144	192,958	457,102
1992	75	203	13	16,037	20.81	61,039	77,076	265,831	194,016	459,847
1993	83	223	10	16,042	20.82	61,008	77,050	263,757	192,624	456,381
1994	74	230	16	16,037	20.81	61,036	77,073	264,577	193,198	457,775

SOURCE: FEDERAL DEPARTMENT OF FISHERIES, 1995

TABLE 6: DOMESTIC FISH PRODUCTION BY SECTORS 1985 – 1994 (TONNES)

SECTORS	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
ARTISANAL										
Coastal and Brackish water	140,873	160,169	145 756	185,181	171,332	170 459	168 211	184,407	106,276	124 117
Inland Rivers and Lakes	60 510	106,967	103 232	112 443	132 168	113,075	123,075	89,536	94 900	110,484
SUB TOTAL	201,383	267 136	248 987	297 624	303 500	283 534	291,286	283 943	201,176	234 601
AQUACULTURE (Fish Farm)	15 000	14 681	15 221	15 764	25 607	7 [illegible]	15 840	19,770	18,703	18 104
	23 766	22 419	21 383	32 740	28 411	21,120	28 768	25 502	22 464	21 886
INDUSTRIAL	2,375	2 623	3 517	2,868	5 234	3 606	6 200	9 373	8 956	7 684
(TRAWLERS)	-	-	-	941		743	1 258	4 400	4,224	718
Fish (Inshore)	26 142	25 642	24 960	36 549	33 645	25 529	36 226	39 365	35 644	30 488
Shrimps (inshore)	242 525	307 059	289 108	349,037	362 752	316 365	343,352	343 078	255 523	283 193
EEZ (Offshore)										
SUB TOTAL										
GRAND TOTAL										

SOURCE: FEDERAL DEPARTMENT OF FISHERIES, 1995

TRADITIONAL MANAGEMENT STRATEGIES IN NIGERIA

Scudder and Connolly (1985) identified two major categories (system) of management and traditional riverine fisheries in the Amazon basin, and also in the middle Zambesi River and Kafue flood plains. These include inadvertent or unintentional management strategies, such as water tenure, ritual prohibitions, taboos and magic; and intentional strategies, which include gear restrictions, closed seasons and flood plain intensification.

In some Nigerian inland waters, states flood ponds and stagnant pools seasonal belong to all the communities and permission to engage in fishing is usually announced by the Head of Fisherman (Sarkin Ruwa) who has the power to authorize and to stop fishing in different ponds, and at the appropriate times. Though this approach is related to closed seasons and water area, are directed more at protecting the interests of part time fishermen who engage in full-time farming during the rainy season and return to fishing at the end of the season (Ita, 1993). This

therefore, is not directed at protecting the fishery, but in making sure that every member of the community has an equal chance of benefiting from the resources.

A typical example of an Intentional management strategy involving gear restriction operates in the Argungu Emirate Council of Kebbi State. Where the use of gill nets and cast- net is prohibited in order to protect the fishery from over- exploitation and conserve the resource for the popular Argungu International Fishing and Cultural Festival. Fishermen are only allowed to use clap nets and hooks in fishing. There is however, no mesh size regulation for the clap nets. Ita (1993, 1998) recommended these management techniques for the Kainji Lake fishery resources such as management of fishermen population; mesh size regulation, closed season and area and control measures.

PRINCIPLES AND CONCEPTS OF INLAND FISHERIES MANAGEMENT

Management has been defined as the integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure continued productivity of the resources and accomplishment of other fisheries objectives (FAO, 1997). The term is applied to decisions and actions affecting the magnitude and composition of fishery resources and the distribution of benefits from its products (Welcomme, 2001). There are two main approaches to management, that based on the resources, mainly advocated by natural scientists, and that based on society, mainly advocated by socio-economists. Modern fisheries management seeks to reconcile these two views using them as tools for reaching balanced decisions on the resource with the participation of all stake-holders in fishery.

Fishes are renewable natural resources, which should be exploited rationally on sustainable basis. Olatunde (1999) is of the opinion that to derive maximum benefits from them it is necessary to evolve effective integrated management strategies. This author further stated the management options should be to make the resources available; now and in future, at the time we need them, in very good condition at affordable prices, should enhance economic well being of the fisherfolk and should be environmental friendly. To ensure sustainability, the author noted the need to adopt closed seasons/areas, mesh size regulation, control number of fishermen entering the water, stocking of existing water bodies that are depleted; establish fish sanctuary and promulgate fisheries edicts/decrees.

CONCLUSION AND RECOMMENDATIONS

The following recommendations are important requisite for successful management of the fisheries in inland waters of Nigeria for sustainable production.

1. Implementation and enforcement of the existing national inland fisheries decree and states edict throughout inland waters of the country.
2. Promotion of community participation and intensify information campaigns at the local level through seminar, symposia, radio programme, brochures, posters and holding of festivals to avoid total collapse of inland capture fisheries.
3. Effort should be directed towards the implementation of a uniform set of principles and guidelines for a sound management of inland waters.
4. Environment – friendly activities, including alternative livelihood projects that do not destroy the inland environment, should be encourage by the government.
5. Ban importation, possession and use of nets with less than 65mm stretched mesh sizes
6. Concerted efforts should be made by government to influence the prices of fishing materials e.g. Outboard engines, fishing gears etc either through subsidy or reduced import taxes on fishing inputs.

7. Production of materials such as brass screw, marine paints etc. should be done locally. This will help to reactivate some boat yards, which have been forced to close down as a result of high prices and scarcity of boat building.
8. Interest of fisheries should be considered in the planning and construction of subsequent reservoirs, and the various uses of waters should be harmonized.
9. Strengthening of data collection system on all aspects of the fisheries to provide quantitative information to back up management measures.
10. Outlaw the fishing of juveniles of commercially important freshwater fishes. The nursery ground of those fishes should be declared non-fishing zone during breeding seasons.
11. Establishment of fish sanctuaries in the National Parks.
12. Restocking of existing reservoirs that have been depleted.
13. Penalties for violations should be prohibitive enough to render gains derived from violations not worth effort.
14. Stakeholders including officials/Extensionists in State and Federal Fisheries Departments should be sent for training on Code of Practice for Responsible Fisheries (CPRF) at the Federal Freshwater Fisheries Colleges of New Bussa and Baga, which offer short courses on CPRF annually. The knowledge so gained would then be passed to the fisherfolk who are the target group for implementation.

In conclusion, the challenges facing the management of Inland capture fisheries should be viewed from the perspective of employing stable fishing crafts and required gear in a way that the fishery remain at the maximum sustainable yield (MSY) to ensure promulgation, implementation and enforcement of the fisheries laws and regulations, reduce/subsidize the prevailing high cost of fishing gears and equipment, improve the livelihood of the fisherfolk by providing them with alternative sources of income during off season and stable ecosystem for sustainable fish oduction

REFERENCES

Abiodun, J. A. (2002). Fisheries StatisticalBulletin Kainji Lake, Nigeria, 2001. *Nigerian – German Kainji Lake Fisheries Promotion Project Technical Report Series 22:* 25p.

Cole, R. C. and L. H. Greenwood – Barton (1962). Problems associated with the development of Fisheries inTropical countries: 1. The Mechanization of fishing boats. *Tropical Science:* 127 – 146.

Dada, B. F. (2004). Contribution of fisheries to employment, national economy and food security in Nigeria. Paper presented at the 2003 FISON public lecture, Lagos, 22nd December, 2003. *Fish Network (1):* 1 – 6.

Eyo, A. A. (2004). Provost alerts Federal Government over foreign fishermen in Lake Kainji. In The Guardian Newspaper Thursday, October 7, 2004 Vol. 21, No. 9,451 pg. 50.

FAO (1997). Fisheries Management . *FAO Technical Guideline for Responsible Fisheries No. 4, Rome FAO* 82p.

FDF (1995). *Fisheries Statistics of Nigeria* (1985 – 1994) 3rd edition published by Federal Department of Fisheries Abuja. 51p.

Fryer, G (1972). The conservation of the Great Lakes of East Africa a lesson and a warning. *Biological Conservation* 4. 256 – 262.

Ita, E. O. (1993). Inland Fisheries Resources of Nigeria. *CIFA Occasional Paper No. 20 FAO Rome.* 120p.

Ita, E. O. (1998). The Current Status of Fish Stock and Fisheries in *Kainji Lake, 1996. Nigerian – Germany (GTZ) Kainji Lake Fisheries Promotion Project.* 45p.

Ita, E. O. (1999). Fisheries Resources of the Arid Zone of Nigeria In: A.N. Okaeme et al. (eds.) *Proceedings of a Workshop on Sustainable Management and Conservation of Fisheries*

and other Aquatic Resources of Lake Chad and the Arid Zone of Nigeria, (Maiduguri, 16th – 17th January, 1995) pp 35-63.

Ita, E. O. and E. K. Sado (1985). A summary of the Inventory Survey of Nigeria Inland Waters and Preliminary estimates of their fish yield potentials. In: Ita et al. (eds.) *Proceedings of the 4th Annual Conference of the Fisheries Society of Nigeria*, 26th – 29th November, 1985 Port-Harcourt, Nigeria. Pp. 22-33.

Ita, E.O., E.K. Sado; J.K. Balogun, A. Pandogari and B. Ibitoye (1985). Inventory Survey of Nigeria Inland waters and their reference to ponds, lakes, reservoirs and major rivers. *Kainji Lake Research Institute Technical Report Series, 14*, 51p.

Knaap, M. van der (1994). Status of fish stock and fisheries of thirteen medium sized African reservoirs. *CIFA Occasional Paper No. 26 FAO Rome.*

Ladu, B.M.B. (2004). The Chad Basin Fisheries and the Doro – Baga International Fish Market: Areas of Intervention to improve livelihood. *National Agriculture Digest, July 12. 2004. Vol. 3 No. 9 pp15 – 16.*

Olatunde, A. A (1999) Keynote address on small-scale fisheries resources management options: an overview. In: A. A. Eyo (ed.) *Proceedings of the 13th Annual Conference of the Fisheries Society of Nigeria*, New Bussa, 3rd – 8th November, 1996 pp. 1 – 6.

Reed, W., J. Burchard; A.J. Hopson, J. Jennes and I. Yaro (1967). Fish and Fisheries of Northern Nigeria. Ministry of Agriculture Northern Nigeria Gaskiya Corporation, Zaria. 226p.

Scudder, T. and T. Connelly (1985) Management system for riverine fisheries. *FAO Fisheries Technical Paper No. 263.* 8pp.

Seisay, M. D. B. and T. A. du Feu (1997). The effect of long term exploitation by gill net fishery on the multi-species fish stocks in Kainji Lake. *Nigerian – Germany Kainji Lake Fisheries Promotion Project Technical Report Series 11.* 58p.

Stauch, A (1978). The future of the fisheries in the Lake Chad Basin. In: R.L. Welcomine (ed.) *Symposium on rivers and flood plain fisheries in Africa. CIFA Technical Paper 5;* 66-73.

Tobor, J.G. (1993). Fin and Shellfish of Conservation Interest in Nigeria. In: A.B.M. Egborge et al. (eds.) *Proceedings of the National Conference on Conservation of Aquat. Resources Organised by National Advisory Committee on Conservation of Renewable Resources*, Pp 104 – 129.

Udolisa, R.E.K. and P. Lebo (1983). Chemical narcosing of fish in Northern Cross River. In: E. O. Ita (ed.) *Proceedings of the 3rd Annual Conference of the Fisheries Society of Nigeria.* Maiduguri, 22nd – 25th February 1983 pp. 105 – 107.

Udolisa, R.E.K, B.B. Solarin, P. Lebo and E.E. Ambrose (1994). A catalogue of small scale fishing gear in Nigeria. RAFR Publication *RAFR.014/FI/94/02:* 142p.

Welcomme, R.L. (2001) Inland Fisheries: Ecology and Management. FAO Blackwell Science. 358p.