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An overview of efforts towards collaborative fisheries management in the gulf of guinea by Nigeria

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Abstract
Marine fisheries make important contribution to food security, employment and income of coastal communities in the developing countries. The Guinea Current Large Marine Ecosystem (GCLME) is ranked among the five most productive Large Marine Ecosystems (LMEs) in the world today in terms of biomass yields. The region is rich in many resources such as fisheries, oil and gas reserves and precious minerals. It also has a high potential for tourism and harbors marine biological diversity of global significance that contribute greatly to the livelihood and employment of the people of countries bordering the GCLME. However, in recent years there is more awareness about the dwindling fish catches from the region; hence better fisheries management instruments have become crucial.
To promote co-operation in the management of fisheries within and between coastal States and on the high seas, States have created a series of regional arrangements and agreements. Regional Fisheries Management Organizations (RFMOs) and Regional Fisheries Bodies (RFBs) have become progressively more important in fisheries management. This aim of this paper is to highlight the basis for regional fisheries management in Nigeria and the Gulf of Guinea Large Marine Ecosystem (GCLME) and progress made towards regional collaborative sustainable fisheries management practices in Nigeria. This article will be concluded by suggesting efforts that will enhance collaboration in the region.

Keywords: Regional Fisheries Management, Fisheries Management, GCLME, Gulf of Guinea

Introduction
The fisheries sector is of great importance in the food security of many nations through the provision of fish, employment opportunities, most especially in rural areas and in its contribution to a nation's economic growth.
The Guinea Current Large Marine Ecosystem (GCLME) is ranked among the five most productive Large Marine Ecosystems (LMEs) in the world today in terms of biomass yields (NOAA, 2012) [37]. The region is rich in many resources such as fisheries, oil and gas reserves and precious minerals. It also has a high potential for tourism and harbors marine biological diversity of global significance that contribute greatly to the livelihood and employment of the people of countries bordering the GCLME. The GCLME hosts number of threatened and endangered species and millions of migratory birds visit the coastal wetlands seasonally. In addition, the region is endowed with some of the world's significant mangrove stands.
The Guinea Current LME is known to provide distinct and diverse economic and food security source, with its coastal and offshore waters and associated near shore watersheds (Interim Guinea Current Commission, 2008) [23].
However, in recent years there is more awareness about the dwindling fish catches from the region; hence better fisheries management instruments have become crucial.
To promote co-operation in the management of fisheries within and between coastal States and on the high seas, States have created a series of regional arrangements and agreements. Regional Fisheries Management Organizations (RFMOs) and Regional Fisheries Bodies (RFBs) have become progressively more important in fisheries management; particularly due to the provisions of the FAO's Code of Conduct and Compliance Agreement (FAO, 1995) [17], and the Straddling and Highly Migratory Stocks Agreement (UNCLOS, 1992) (these agreement suggest that States should establish RFMOs and makes provisions that aid States in taking action against non-parties to the RFMOs).
Nigeria is located in West Africa in East Central Atlantic the bordering the Gulf of Guinea between Benin and Cameroon. It is a coastal State with a coastline of 853km^2 and a 200 nautical mile Exclusive Economic Zone (EEZ), in which it has exclusive rights to the fish and other

natural resources (Ibeun, 2005) [22]. The brackish and coastal waters of Nigeria support artisanal harvests, also fishing activities occur in creeks and estuaries and the inshore areas with fishermen operating in waters of less than 40 m deep, while the industrial sector operates outside of 5 nautical miles.

In addition to the marine and brackish water resources, Nigeria is also endowed with massive freshwater systems, including lakes, rivers, reservoirs, dams and floodplains which support extensive artisanal fisheries. The River Niger originates from the Guinea Highlands in southeastern Guinea and has a total length of 4,184 kilometers, flows through West Africa, enters Nigeria in the northwest and runs southwards to join the River Benue at Lokoja, before traveling the remaining 547 kilometers to the sea (Ibeun, 2005) [22]. These two major rivers and the many smaller rivers support large freshwater artisanal fisheries in the country. Of the 36 states in Nigeria, 9 (Lagos, Ogun, Ondo, Edo, Bayelsa, Rivers Akwa Ibom and Cross River) are located in the coastal region.

This aim of this study is to highlight the basis for regional fisheries management in Nigeria and the Gulf of Guinea Large Marine Ecosystem (GCLME) and progress made towards regional collaborative sustainable fisheries management practices in Nigeria. This article will be concluded by suggesting efforts that will enhance collaboration in the region.

Gulf of Guinea Large Marine Ecosystem

The Gulf of Guinea in West-Africa has a market size of about 300 million consumers. It's been projected that about 40% of the inhabitants of the region live in the coastal area (IGCC, 2008) [23]. The Gulf of Guinea encompasses a large number of countries from West and Central Africa. Table 1 shows these countries and coastal statistics. These countries enjoy a wide geological, geographical, and cultural diversity (Mane, 2005) [27].

The Gulf of Guinea is the part of the Eastern Tropical Atlantic Ocean off the western Africa coast. It is situated in the narrow protrusion of the Eastern Equatorial Atlantic from approximately 12º N latitude south to about 16ºS latitude, and variously from 20 º west to about 12 º East longitude. It spans a coastline length of approximately 130 nautical miles in West Africa. The Gulf of Guinea has been identified as a LME that is highly productive and is ranked among the 5 most productive LMEs in the world today in terms of biomass yields[1]. The northern subsystem of the area is thermally unstable and is characterized by intensive seasonal upwelling while the southern half, which is generally thermally stable, depends on nutrients input that flow from land through drainage, river floods and turbulent diffusion, although periodic upwelling have been reported (Ukwe *et al*., 2006) [33] Two upwelling seasons, major and minor, occur annually with differing duration and intensities off the coast of Ghana and Cote D'Ivoire in the central part of the LME. These characteristics combine to make the Gulf of Guinea one of the world's productive marine areas that is rich in fishery resources, oil and gas reserves, precious minerals, and an important global reservoir of marine biological diversity.

The GCLME has a rich fishery resources composed of important resident stocks that support the artisanal fisheries and transboundary straddling and migratory stocks that have attracted large commercial offshore foreign fishing fleets from the European Union, Eastern Europe, Korea and Japan. Since the 1960, when Nigeria gained independence to become a nation, the commercial offshore fisheries has been subjected to intense fishing pressures which invariably has placed the fisheries at risk of collapse. This situation is aggravated by the presence of local industrial fleets, which are predominantly owned by nationals or joint ventures operating in each other's water under bilateral agreements, and the existence of a large artisanal sector with strong traditional roots and powerful social and political impacts especially in Ghana. Catch per Unit Effort (CPUE) exceeds sustainable yields in most countries (Ajaji, 1994) [4], while species diversity and average body total lengths of the most important fish stocks have declined. The negative trends of over-exploitation of fish and fisheries from lack of management and adequate forecasting system have adverse economic and food security implications for the 300 million people of the region and the growing food (protein) needs of the region.

Table 1: Continental Shelf and Exclusive Economic Zones (EEZs) of GCLME Countries

Country	Continental Shelf	Inshore Fishing Area	EEZ (km^2)
Guinea Bissau	29,384	24,440	106,117
Guinea	38,228	17,761	109,456
Sierra Leone	16,600	8,994	159,744
Liberia	4,881	14,176	246,152
Cote d'Ivoire	3,115	8,332	174,545
Ghana	8,355	16,699	224,908
Togo	608	950	15,375
Benin	216	1,899	30,024
Nigeria	24,228	32,959	216,789
Cameroon	5,753	9,771	14,693
Equatorial Guinea	3,806	7,544	308,337
DR Congo	4,731	7,044	40,499
Congo	978	1,088	1,072
Gabon	18,759	27,154	193,627
Sao Tome & Principe	Not available	1,499	165,364
Angola	24,913	35,363	501,050

Source: Sea Around us project. http://www.seaaroundus.org

Source: http://gclme.org

Fig 1: The Gulf of Guinea

[1] Combating Living Resource Depletion and Coastal Area Degradation in the Guinea Current LME- Regional Issues http://gclme.org/index.php?option=com_content&view=article&id=22&Itemid=26

Basis for Regional Co-operation

Several multilateral environmental agreements (MEA) have evolved over the years to which most coastal countries are signatories. These MEAs deal with marine and coastal management issues and examples include the Barcelona Convention (1978) [9], the Nairobi Convention (1996) [28] the Jeddah Convention (1982) [25], and the Abidjan Convention (1981) [2], the International Convention for the Prevention of Pollution from Ships (MARPOL –adopted 1973 and came into force in 1983) which makes provisions as regards the control of pollution from ships, and the United Nations Convention on the Law of the Sea, (1982) [34]. These conventions and agreements lay the ground for coastal States to develop management plans and legislation relating to the use of their coastal and marine environments, whilst integrating the various sectoral policies and also taking account and making provisions as regards the river catchment that discharge to those environments.

It is also important to note that, for the success of regional partnerships, it is important to develop mechanisms to overcome confrontation and to promote an environment of genuine regional solidarity and cooperation. There is also a necessity to strengthen national, multinational/international to adapt to the realities of emerging regional cooperation.

Likewise, in response to declining fisheries resources that are of great significance, due to the transboundary nature of fish, a global debate on institutional arrangements and governance of the commons has progressed over the past few decades.

Many fish stocks and other living marine resources move freely though several countries' waters and the high seas, countries must therefore cooperate to conduct scientific study and develop fisheries rules that will ensure that these resources are conserved and managed sustainably (USDS, 2012)[38].

Other issue that makes it necessary for regional cooperation in GCLME include the menace of

Illegal, Unreported and Unregulated Fishing

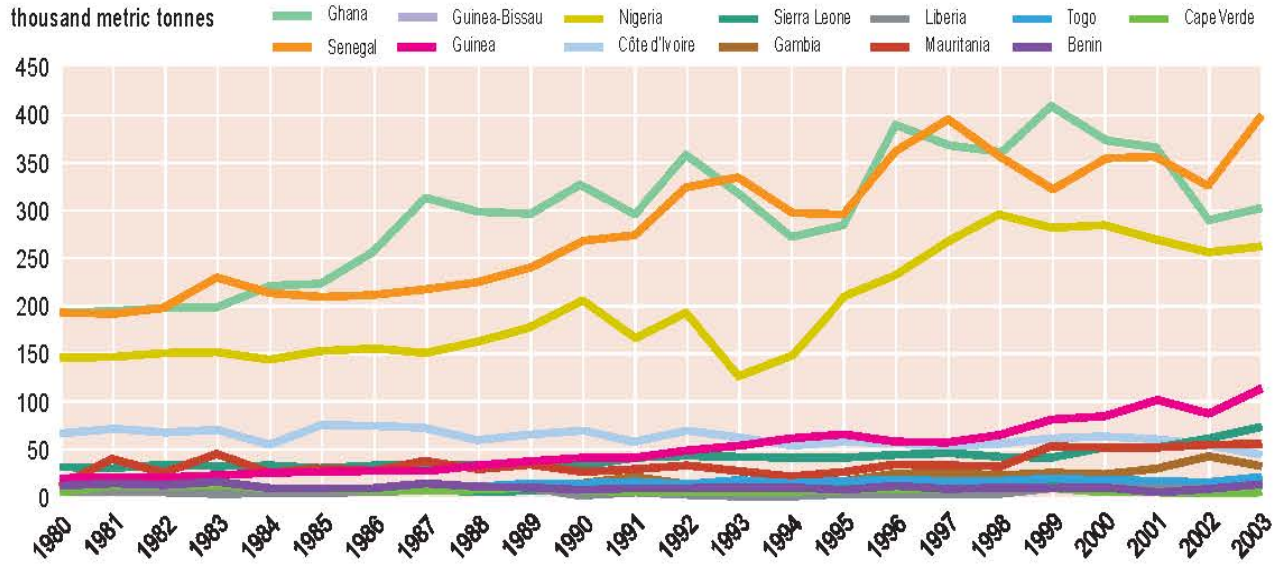
Growing concerns about IUU fishing in national waters and on the high seas prompted States to explore the option of developing and adopting international fisheries instruments to address the IUU issue and to make provisions for legal basis, which states can use for taking action against fishing vessels that are undermining international and conservation. Both the FAO Compliance Agreement (FAO, 1993) [16] and the UN Agreement on Fish Stocks, 1995, makes provisions that require the cooperation of regional States.

Illegal and unauthorized fishing by foreign fishermen in GCLME has been frequently reported in the last two decades. Some vessels belonging to countries such as Italy, Greece, Russia, Japan, Korea fish in GCLME waters undeterred. The vessels are larger than the size recommended for fishing in Nigerian waters. They use unapproved sophisticated fishing gears. The major factor that is responsible for IUU fishing in the GCLME especially in Nigeria's territorial waters is the inadequacies of the relevant agencies to monitor the activity due to insufficient necessary platforms such as patrol boats, aircrafts and vessel monitoring systems (VMS).

Armed Robbery and Piracy

An issue that is becoming more rampant in the coastal waters of Nigeria is piracy, theft and armed robbery. In past years significant but low level armed robberies to hijackings and vessel thefts occurred. But in recent times the issues has been escalating and urgent and concerted efforts is being aimed at tackling the problem before it becomes uncontrollable. Fishing vessels are robbed of their catches and equipment and people have been killed occasionally. In 2007 fishing trawlers suffered more than 100 pirate attacks and a spike of 50 attacks in the January 2008 that culminated in five crew deaths in one day (CS monitor 2008) [13].

Major target species in the Gulf of Guinea



Source: UNEP, 2006

Fig 2: Reported marine fish catches in Western African countries since 1980

The target fish species off the Coast, Ghana and Togo are *Sardinella aurita, Sardinella maderensis, Scomber japonicus* and *Engraulis encrasicolus*. In Ghana, for example it was reported that small pelagics contributed 125,000t and 247,000t to the total marine production of 234,000t and 371,000t in 1985 and 1992 representing 54 and 66 percent of the fisheries yield respectively, indicating their importance to food security of the region[2].

The biological resources of Nigeria's offshore waters between the continental shelf area and the 200-mile EEZ limit have not been effectively utilized. The potential yield of tuna and mesopelagics in this area has been estimated to be 10,000 to 15,000 t/yr. The highly migratory tuna move from one subregion to another in the Eastern Central Atlantic region.

The target species from Benin to the Democratic Republic of the Congo are *Ethmalosa fimbriata*, *Sardinella maderensis, lisha africana*. Demersal fisheries are of higher economic value than pelagics, and the major targets are croakers, *Pseudotolithus elongatus, Psendotholitus senegalensis, Pseudotholitus typus, Galeoides decadactylus, polymenids, polydactylus quadrifilis*, grunters, big eye tuna, *Brachydeuterus auritus*, catfish, Arius sp. *Pomadasys* sp soles and *Cynoglossus* sp.

The pink shrimp *Peanus notialis* is dominant target species in the lucrative coastal demersal shrimp fishery, other target species include the *Parapenaeopsis atlantical* and *Penacus kerathurus*. Shimpring grounds cover 2,500 mi² off Nigeria, 190 mi² off Cameroon and 180 mi² off Benin. The white shrimp, *Nematopalaemon hastatus* a major fishery off Nigeria – Cameroon, and it is exclusively exploited by small scale operators with passive cane or netting gear in the estuaries, and with miniature trawls in the surf zone (Amire, 2003) [6]. The Potential of this fishery is about 150,000t/Year off Nigeria. The shrimp resources of the ecosystem are an important export species.

Regional Fisheries Management Cooperation

If fish stocks were entirely distributed within areas of national jurisdiction, there will be no need to maintain or create international structures for their management, but because two or more coastal States share the same stocks, where stocks extend over EEZs and the high seas and for highly migratory species, the need of regional cooperation for management becomes necessary. Participation in the management of shared, straddling, and high seas stocks depends on the property management of the resources. For shared stocks totally circumscribed within a set of EEZs, resource property management responsibility coincides; participation in management is closed and determined by ownership (exclusion). This is not the case for straddling and high seas stocks, property is common, exclusion in harvesting is not acceptable, only reduction in catches. Responsibility for management falls primarily on fishing nations and coastal countries in the areas of jurisdiction of which such stocks occur. This led to the development of Regional Fisheries Management Organizations.

In order to fulfill commitment to Agenda 21's call for states to address challenges of environmental degradation and development, by instituting regional partnerships. The FAO's Code of Conduct and Compliance Agreement, and the Straddling and Highly Migratory Stocks Agreement (these two agreement call on states to establish RFMOs and provide states with the possibility of taking action against activities of non-parties to RFMOs). These regional fisheries management organizations (RFMOs) were established through agreement between States with a common interest in fishing an area of the high seas or a species therein. RFMOs are defined as 'intergovernmental fisheries organizations or arrangements, as appropriate that have the competence to establish fisheries conservation and management measures' (Lodge *et al*., 2007) [26] RFMOs adopt management and conservation measures that are binding on parties.

On an institutional level, RFMOs provide the basis for international cooperation in the global effort to conserve high seas fish stocks. RFMOs first began to appear in proper in the 1950s in response to the need for States to cooperate in balancing competing interests in a fishery (Clark, online).

To promote co-operation in the management of fisheries within and between coastal states and on the high seas, states have created a series of regional arrangements and agreements. In particular, regional fisheries management organizations (RFMOs) have become progressively more important in fisheries management; particularly due to the some governments have also created specific intergovernmental organizations to co-ordinate and represent their fishing interests. RFMOs could operate in a specified area of the high seas, or have a more specific mandate to regulate certain species of fish stocks.

RFMOs have the unique mandate to develop several measures that set them apart from another group of organizations that also function to promote high seas fisheries regulation namely, regional fisheries bodies (RFBs).

RFB have also been identified as critical vehicles for promoting long term sustainable fisheries where international cooperation is required in conservation and management. Since 1992 United Nations Conference on Environment and Development (UNCED or "Earth Summit"), legal instruments assigned RFB a key role in the facilitation of international cooperation. Regional Fishery Bodies (RFBs) are a mechanism through which States or organizations that are parties to an international fishery agreement or arrangements work together towards the conservation, management and/or development of fisheries. RFBs have an advisory mandate, and provide advice, decisions or coordinating mechanisms that are not binding on their members. Their activities also include the collection, analysis and dissemination of information and data, coordinating fisheries management through joint schemes and mechanisms, serving as a technical and policy forum, and also take decisions relating to the conservation, management, development and responsible use of the resources (FAO, 2011) [18].

The role and priorities of RFB's varies according to their mandate and other factors such as the political will of the member states (FAO, 2011) [19].

The major issues addressed by RFB's include the following

- Management: this includes issues surrounding responsible fisheries management, ecosystem approach to fisheries, by catch concerns and illegal, unreported and unregulated fishing (IUU).
- Science and research: concerned with producing scientific advice that meets decision-makers' needs (such as integrating fisheries and environmental information), the need for continuing, accurate and comprehensive stock assessments, and assessments of associated species and ecosystems at national and regional levels.
- Institutional: mostly involves issues relating to finance

[2] The convention secretariat: http://www.unep.org/abidjanconvention/

and strengthened external cooperation followed by capacity building, information exchange and human resource development.

- Development: cooperation in diversified areas such as aquaculture and artisanal fisheries development impacts, tuna industry developments and assisting member States with the change in balance between subsistence and commercial fisheries.

There are several regional fisheries management bodies or organizations aimed toward fisheries management that are of interest to Nigeria. They include:

1) Fishery Committee for the Eastern Central Atlantic (CECAF): The purpose of the Committee is to promote the sustainable utilization of the living marine resources within its area of competence by the proper management and development of the fisheries and fishing operations. The area of competence is in The Eastern Central Atlantic between Cape Spartel and the Congo River
   Current membership: Angola, Benin, Cameroon, Cape Verde, Dem. Rep. of the Congo, Republic of Congo, Côte d'Ivoire, Cuba, Equatorial Guinea, European Union, France, Gabon, Gambia, Ghana, Greece, Guinea, Guinea-Bissau, Italy, Japan, Republic of Korea, Liberia, Mauritania, Morocco, Netherlands, Nigeria, Norway, Poland, Romania, Sao Tome and Principe, Senegal, Sierra Leone, Spain, Togo, United States of America.
2) La Conférence Ministérielle sur la Coopération Halieutique entre les Etats Africains Riverains de l'Océan Atlantique (COMHAFAT): also Known as The Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean (ATLAFCO) is an inter-governmental organization created in 1989 and composed of 22 States; from south of Namibia to north of Morocco. The Convention establishing COMHAFAT, "The Atlantic Regional Convention for Fisheries Cooperation," adopted in 1991, sets the fields and modalities of regional fisheries cooperation among the member States. The main objectives of ATLAFCO are as follows:

- The promotion and strengthening of regional cooperation on fisheries development; and
- The coordination and harmonization of efforts and capacities of stakeholders for the conservation and exploitation of fisheries resources.

COMHAFAT has reinforced its institutional framework for amendment of its statutes. It has also created a fund for Fisheries Promotion in Africa, with the support of the Japanese Foundation for International Cooperation (OFCF). This Fund is to finance development projects in the field of capacity building of the member States in fishing and aquaculture as well as that of assistance in the implementation of international regulations.

3) Fishery Committee of the West Central Gulf of Guinea (FCWC): The member countries are; Benin, Côte d'Ivoire, Ghana, Liberia, Nigeria, Togo. The area of competence comprises all marine waters under national jurisdiction of the contracting parties. The objective of the Fishery Committee for the West Central Gulf of Guinea (FCWC) is to promote cooperation among the contracting parties with a view to ensuring, through appropriate management, the conservation and optimum utilization of the living marine resources covered by the Convention and encouraging sustainable development of fisheries based on such resources.
4) International Commission for the Conservation of Atlantic Tunas (ICCAT): The Commission may be joined by any government that is a member of the United Nations (UN), any specialized UN agency, or any intergovernmental economic integration organization constituted by States that have transferred to it competence over the matters governed by the ICCAT Convention. Instruments of ratification, approval, or adherence may be deposited with the Director-General of the Food and Agriculture Organization of the United Nations (FAO), and membership is effective on the date of such deposit. Currently, there are 48 contracting parties namely: Albania, Algeria, Angola, Barbados, Belize, Brazil, Canada, Cape Verde, China, Sierra Leone, Côte d'Ivoire, Croatia, Egypt, Equatorial Guinea, European Union, France, Gabon, Ghana, Guatemala, Guinea, Honduras, Iceland, Japan, Libyan Arab Jamahiriya, Morocco, Mauritania, Mexico, Namibia, Nicaragua, Nigeria, Norway, Panama, Philippines, Republic of Korea, Russian Federation, Saint Vincent/Grenadines, Sao Tome and Principe, Senegal, South Africa, Syrian Arab Republic, Trinidad and Tobago, Tunisia, Turkey, United Kingdom, United States of America, Uruguay, Vanuatu, Bolivia, Rep of Venezuela. The International Commission for the Conservation of Atlantic Tunas (ICCAT) is responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and adjacent seas. In order to carry out the objectives of the Convention, the Commission is responsible for; compiling fishery statistics from its members and from all entities fishing for these species in the Atlantic Ocean; coordinating research, including stock assessment, on behalf of its members; developing scientific-based management advice; providing a mechanism for contracting parties to agree on management measures; and producing relevant publications.

Other examples of organizations that have been established by treaty to enable cooperation at the regional level in Africa, (they are centered directly and indirectly towards sustainable fisheries management), include; The New Partnership for African Development (NEPAD) adopted in 2001 and the Abidjan 1981 Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region[3].

NEPAD is an economic development program of the African Union that was adopted at the 37th session of the Assembly of Heads of State and Government of The Organization of African Unity (OAU) in July, 2001 at a meeting in Lusaka, Zambia. NEPAD had four primary objectives;

- to eradicate poverty,
- promote sustainable growth and development,
- integrate Africa in the world economy, and
- accelerate the empowerment of women.

The program founded on fundamental principles of a commitment to good governance, democracy, human rights and conflict resolution, and the recognition that maintenance of these standards are essential for the creation of an environment that is conducive to investment and long-term

[3] Draft Sea Fisheries Act of the Federal Republic of Nigeria 2011. Not yet passed into law at the time of this writing.

economic growth (Fayissa and Nsiah, 2010) [20]. NEPAD seeks to attract increased investment, capital flows and funding, providing an African-owned framework for development as the foundation for partnership at regional and international levels. In August 2005, NEPAD held the "Fish for all Summit" in Abuja, Nigeria. In order to take the lead in developing regional priorities for future investments in fisheries and aquaculture as part of its wider agriculture program.

The objectives of the Summit were:

- To establish a shared understanding among key stakeholders of the current status and likely future trends of African fisheries and aquaculture,
- To identify priorities for the development of fisheries and aquaculture in Africa within the context of the NEPAD programme,
- To agree future directions for research and capacity building in support of these development priorities (NEPAD, 2005) [39].

Some target Areas for Attention

Regional fisheries management effort in the GCLME has become very crucial; therefore all the countries in the region need to be encouraged to make concerted arrangement to develop their domestic governance measures. In concluding this article I will like to highlight areas that need to be addressed in Nigeria to enhance her participation in regional cooperation among countries in the GCLME.

1) Development of instruments for:

a) Participatory management: In recent years the need for co-management in fisheries administration has been more widely recognized. Acknowledgement and the desirability for fisheries stakeholder groups to take part in the fisheries management process are evident in Nigeria for example part II section 6[4] in the draft of the new fisheries act outlines the provision for a National Fisheries Advisory Council, but the fisheries resource-management process has been based on a centralized approach. The governments have formulated fisheries-development policy goals to maximize fish production at sustainable levels. These policies have always neglected existent traditional fishing methods, probably because they are regarded as primitive and not able to meet demand for fish. The current situation is that there is no framework or structure for the co-management process in the country's fisheries management plan. No doubt, success in fisheries development and management would depend on the degree to which stakeholders have contributed in the design and implementation of policies. Equity in participation is very weak in the Nigerian fisheries as many stakeholders are left out from the various management and development processes. It is in the interest of the resource and of all parties that there is establishment of clear, strong effort to develop co-management protocols that will give local stakeholders and their communities a genuine sense of proprietary interest and participation in setting management objectives, fishing plans and regulatory measures. For example in the Niger-delta area of Nigeria in particular the proactive energies of the youth could be turned to good use. Effective stewardship efforts by local communities in respect of fishing will have considerable impact on fisheries conservation.

b) Conflict Management: There is need to develop an instrument that will address conflict resolution in Nigeria and in the GCLME at large. Resolution of conflict within the artisanal fisheries in Nigeria have been reported to be largely informal, most times issues were resolved through negotiation, mediation and arbitration. The parties to the dispute are guided by rules and operate within a sociocultural framework that enjoins them find solutions that guarantees their commitment to the resolution outcomes. Conflicts also arise between artisanal and industrial demersal fleets when fishing on the same grounds. The inshore trawlers are not allowed to trawl within first five nautical miles of the coastline, a place statutorily reserved for artisanal fishermen. It was noted that the regulations are not always respected and that artisanal fishing gear is occasionally damaged by industrial trawlers operating too close inshore. Conflicts do occur occasionally between the federal department of fisheries officials and industrial vessel operators in the areas of licenses and data collection, as the department relies on catch data recorded by the fishing vessels as source of information on the total fish catch and fishing zone in the coastal area of Nigeria. Fishing firms may underestimate their data which makes it invariably unreliable.

c) Climate change: The vulnerability of tropical developing countries (including Nigeria), likely to be much greater due to inadequate adaptive capacity than that of developed countries of the North (IPCC 2001)[40]. Nigeria is one of the countries expected to be most affected by the impacts of climate change, through sea level rise along our 853 km^2 long coast line, intensified desertification, erosion and flooding disasters and general land degradation. One prediction is that 'Nigeria will lose close to $9 billion as a result of the catastrophe while, at least, 80 per cent of the inhabitants of the Niger Delta will be displaced due to the low level of the oil-rich region.[5] Changing wind patterns and sea temperatures have an impact on various oceanographic processes, including upwelling. In the past reasons for fish decline had been focused on overfishing. Recently more attention is now being focused on climate change. Rising ocean temperatures and ocean acidification are radically altering aquatic ecosystems. Climate change is modifying fish distribution and the productivity of marine and freshwater species. This has impacts on the sustainability of fisheries and aquaculture, on the livelihoods of the communities that depend on fisheries, and on the ability of the oceans to capture and store carbon (biological pump). The effect of sea level rise means that coastal fishing communities are in the front line of climate change, while changing rainfall patterns and water use impact on inland (freshwater) fisheries and aquaculture. In Nigeria, climate change is considered to affect every aspect and sector of socio-economic development and is cross-sectoral in nature. It transcends the traditional focus on environmental issues because it affects the country's overall well-being and economic growth. Nigeria's response to the impacts of climate change therefore addresses such topics as natural resource management, agriculture, economic development, infrastructure, health, energy and transportation. Consideration of climate change includes impacts on

[4] Guardian Newspaper, Nigeria, Monday September 17, 2001, p.80 in http://www.nestinteractive.org/climate_change.php 25/11/11.

[5] This Day Newspaper Nigeria, October 8, 2011.

gender relations and youth, livelihoods, migration, security, and the management of environmental disasters. Specifically expected impacts on freshwater, coastal water and fisheries resources are as in the section above. Nigeria's First National Communication (FNC, 2003)[41], submitted to the United Nations Framework Convention on Climate Change, and reported that the nation's freshwater and coastal resources are highly susceptible to the effects of climate change. According to the FNC and other relevant reports, the marine ecosystem and coastal zone of Nigeria is vulnerable to; sea level rise such as coastal inundation and erosion, Salt water intrusion into fresh water resources, Invasion and destruction of mangrove ecosystems, coastal wetlands, coastal reefs and beaches, Population displacement, Disruption of sources of livelihoods e.g. fishing and agriculture, Possible submergence of oil wells and related infrastructure, Prohibitive cost of protecting coastal infrastructure.

As at time of this writing there no governance structure for climate change in Nigeria, but efforts is being made to put one in place. Such efforts include;

- The country has submitted its First National Communication to the UNFCCC, and the Second National Communication is in preparation.
- Nigeria adopted the ECOWAS sub-regional Action Plan to reduce vulnerability to climate change in March 2010.
- Special Climate Change Unit (SCCU) was established within the Federal Ministry of Environment.
- In 2010, the National Assembly passed a bill to create a national Climate Change Commission, which, once established, will likely facilitate coordination and support for the multi-level and cross-sectoral adaptation responses.
- Ongoing development of a National Climate Change Response Strategy and Policy.
- Public awareness/enlightenment campaigns.

2) Development of Regional Fisheries Policy: although talks about a regional fisheries policy has begun in the GCLME through the Interim Commission as the commission is planning its transmission into a permanent commission with the development of a Strategic Action Plan (SAP), a negotiated document that describes policy, legal and institutional actions and investments to attend to regional priority problems on the marine environment of the GCLME.
3) Joint Sea Patrol: Due to the uprising of piracy and armed robbery attacks on the GCLME, there is an urgent need to start joint patrol of the region. Recently Nigeria and Benin launched the joint patrol in the Seme and Cotonou territorial waters of Benin Republic to curb the activities of pirates and other sea criminals[6]. This bilateral cooperation is the first of its kind in the West African sub region and is in line with the Maritime Organization of West and Central Africa (MOWCA) Coastguard Function Network Initiative. Other countries in the region joining will be much more effective.
4) Vessel Registration: In the GCLME it is suggested that there should be a system for standardizing and sharing or consolidating vessel registered within the region, to enhance information from vessel monitoring systems.

[6] This Day Newspaper Nigeria, October 8, 2011.

Conclusions

The role of RFMOs and RFBs cannot be overemphasized. Countries in the GCLME need to direct more efficient effort towards the management of their resources especially fisheries as many livelihoods in the local communities are completely dependent on the fish resources being harvested from this region.

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