

## **Overview of Management and Exploitation of the Fisheries Resources of Cameroon, Central West Africa**



Figure 1. Geographical position of Cameroon in Africa (Folack, 2007)

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	<b>ACRONYMS</b>
<b>ATLAFCO</b>	Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean
<b>BCSAP</b>	Brigade de Contrôle et de Surveillance des Activités de Pêche
<b>BRD</b>	By catch Reduction Device
<b>BIR</b>	Military Task Force .
<b>BCSAP</b>	Brigade for Monitoring and Control of fishing activities
<b>CECAF</b>	The Fishery Committee for the Eastern Central Atlantic
<b>CACP</b>	Fingerling Production and Fisheries Control Centers
<b>CDPM</b>	the Fund for Development of Marine Fisheries
<b>CEBEVIRHA</b>	The Economic Commission for Livestocks and Fisheries Resources of Central African States
<b>CA</b>	FAO Accord on High sea fishing, 1993
<b>CERECOMA</b>	Marine Ecosystem Research Centre
<b>COMHAFAT</b>	Ministerial Conference on Fisheries Cooperation amongst Coastal African States
<b>COREP</b>	Gulf of Guinea Fisheries Commission
<b>CICAM</b>	Cameroon Textile Company
<b>CDD</b>	Debt Engagement Contract with French government
<b>CCC</b>	Cameroon Soaps and Detergents Company
<b>CHOCOCAM</b>	Cameroon Chocolate Company
<b>CITES</b>	Commission for International Trade in Endangered Species
<b>DPA</b>	Directorate of Fisheries and aquaculture
<b>DREPIA</b>	Regional Delegation for Livestock Fisheries and Animal Husbandry
<b>DFID</b>	Department for International Development
<b>EU</b>	European Union
<b>EEZ</b>	Exclusive Economic Zone
<b>ENA</b>	Steel containers Company
<b>FAO</b>	United Nations Food and Agricultural Organisation
<b>GCLME</b>	Gulf of Guinea Large Marine Ecosystem Project
<b>GRT</b>	Gross Registered Tonnage
<b>HEVECAM</b>	Cameroon Rubber Cooperation
<b>HP</b>	Engine Horse Power
<b>HIPC</b>	Highly Indebted Poor Countries
<b>IOC</b>	International Oceanographic Commission
<b>IUCN</b>	World Nature Conservation Union
<b>ITU</b>	International Telecommunications Union
<b>IUU</b>	Illicit, undeclared, Unregulated (relative to fishing)
<b>IRAD</b>	Institute of Agricultural Research for Development
<b>LOS</b>	Law of the Sea Convention
<b>MIDEPECAM</b>	Marine Artisanal Fisheries Development Authority,
<b>MSY</b>	Maximum Sustainable Yield
<b>MCS</b>	Monitoring Control and Surveillance
<b>MPA</b>	Marine Protected areas
<b>MINEP</b>	Ministry of Environment and Nature Protection
<b>MINEPIA</b>	Ministry of Livestock, Fisheries and Animal Husbandry
<b>MINT</b>	Ministry of transport
<b>MINTOUR</b>	Ministry of Tourism
<b>MINDEF</b>	Ministry of Defence
<b>MINRESI</b>	Ministry of Scientific Research for Innovation

<b>MINFOF</b>	Ministry of Forestry and Fauna
<b>MINEFI</b>	Ministry of Economy and Finance
<b>MINCOMMERCE</b>	Ministry of Commerce
<b>MINESUP</b>	Ministry of Higher Education
<b>MINPLADAT</b>	Ministry of Economy, Planning and Regional development
<b>NAP-IUU</b>	National Action Plan-IUU
<b>NGO</b>	Non Governmental Organisation
<b>NAP</b>	National Action Plan
<b>PILCAM</b>	Cameroon Battery manufacturing Company
<b>SAPEMA</b>	Syndicate of Maritime Industrial fishers
<b>SONARA</b>	National Petroleum Refining Company
<b>SOWEDA</b>	Southwest Development Agency
<b>SOPARCA</b>	Cameroon Perfume Refining Company,
<b>SAPCAM</b>	Cameroon Paint and Detergent Company
<b>SLP</b>	Self Sustainable Livelihoods Programme
<b>SYNTHECAM</b>	Cameroon Synthetics manufacturing Company,
<b>SOCAFRUITS</b>	Cameroon Fruit Company
<b>SRHOL</b>	Research Station for Fisheries and Oceanography, Limbe
<b>SDA</b>	Sub-Directorate of Aquaculture
<b>SDPIA</b>	Sub Directorate of Industrial and Artisanal Fisherie,
<b>SDTPIH</b>	Sub Directorate Fish Technology and Fishing Industry
<b>SRDPIAPA</b>	Regional Development Services for Livestock, Fisheries and Aquaculture Production
<b>SDPIAPA</b>	Divisional service for the development of Livestock, fisheries, Animal Industry and Aquaculture production
<b>SOCAPALM</b>	Cameroon Oil Production Company
<b>TAC</b>	Total Allowable Catch
<b>TED</b>	Turtle Exclusion Device
<b>TDS</b>	Total dissolved Solids
<b>TJB</b>	Brute Tonnage
<b>UN</b>	United Nations
<b>UNCLOS</b>	United nations Convention on the Law of the Sea
<b>UNIDO</b>	United nations Industrial Developement Organisation
<b>UNEP</b>	United Nations Environmental Programme
<b>VMS</b>	Vessel Monitoring System
<b>WB</b>	Worldbank
<b>WWF</b>	World Wildlife Fund

## **EXECUTIVE SUMMARY**

This report discusses the present status of the Cameroon Fisheries regulation with respect to the United Nations Convention on the Law of the Sea (UNCLOS) and other International Conventions notably, the International Plan of Action-Illlicit, Undeclared, Unregulated fishing (IPOA-IUU). It presents an overview of the fisheries resources of Cameroon analyzing fish production, management, exploitation, postharvest treatment, fish transport, commercialization and consumption. Major threats to sustainable exploitation and management are also herein discussed. Results reveal that the United Nations Convention on the Law of the Sea (UNCLOS) and other International Conventions do impose significant new commitments to the Cameroon fisheries legislation and that Cameroon will need to revise its legislation to meet international standards in ensuring sustainable use of marine living resources. The fisheries sector is dominated by foreigners (about 87%) and production has declined drastically to 1/6<sup>th</sup> its value of the 1970's despite duplication of fishing effort (number of vessels). The postharvest sector is experiencing high post harvest losses (15%) mainly due to inadequate cold storage and processing facilities. There is absence of a management plan for the sector and management measures are limited to control of mesh sizes of some gears, limiting access to the coastal zone by industrial vessels to protect vulnerable coastal resources and reducing conflict. Monitoring Control and Surveillance (MCS) activities are not well established resulting to low level implementation of the legislation in force and high levels of IUU, pollution, and use of inappropriate fishing gears and methods amongst others. Statistical data collection is fragmentary and there is no system in place for such activity. Research in the sector is suffering from poor financing and inadequate man power. After an analysis of all these issues, measures for sustainable exploitation and management are proposed.



## CHAPTER I: INTRODUCTION

### 1.1. Description of the coastline

Cameroon is located in the Central Gulf of Guinea (see figure 1) and has a coastline that stretches for about 402 km, extending from the border with Equatorial Guinea, south of the Campo River estuary (2°20'N) to the Nigerian border north of Akwayafe River (4°40' N)(see figure 2). The continental shelf area (up to 200 m depth) is about 13 000 -14 000 km<sup>2</sup>, while the total Exclusive Economic Zone (EEZ) area is around 25 000 km<sup>2</sup> (Folack & Galega, 1997). The territorial sea is limited (50nm) by the presence of the Island of Malabo (Equatorial Guinea) and there is need for an outer continental territorial sea that extends beyond Equatorial Guinea<sup>1</sup>. This coastline is characterized by estuaries, mangrove forests, muddy and sandy bottoms, and a dense river network (see figure 2) (Amou'ou et al.1985). There are three distinct sections: a Western section (from the Nigerian border to the Moungo River) that is characterised by the abundance of estuaries, creeks, mangrove forest, sandy and rocky beaches, and sand pits, and has a silty or sandy sea bed, a Northern section (from the Moungo River to the Nyong River) and a southern section (between the Nyong River and the Ntem river) (see figure 2), which is high and rocky with intermittent sandy stretches, and where the seabed is rocky (Folack & Galega, 1997).

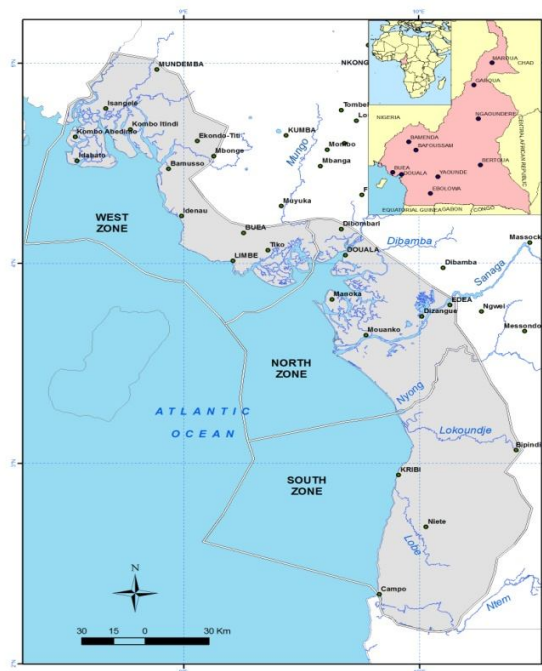


Figure 2: Cameroon coastline (after, SNH/CPSP-ENVIREP, 2007)

### 1.2. Climate, annual temperatures, annual rainfall, and wind

The coastal climate is influenced by the meteorological equator, which is the meeting point between the anticyclone of Azores (North Atlantic) and that of St. Helena (South Atlantic)(CSIR,

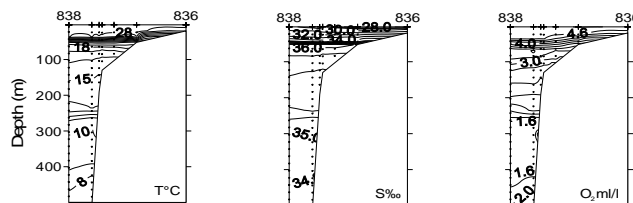
<sup>1</sup> Cameroon is claiming an outer continental shelf extending beyond the Island of Malabo and the matter is pending at the UN. However, Equatorial Guinea considers this claim not to be in line with provisions of UNCLOS.(Internet Document)

2002). There are two distinct seasons: a long rainy season of more than 8 months and a dry season which generally stretches from November to February. Rainfall intensity increases from north to south with annual average values of more than 11000mm in Debundscha and only 3000mm and 4000mm in Kribi and Douala respectively (Chiambeng, 2006). Air temperature is high throughout the year (above 25 degrees centigrade). The coastal climate is also characterised by monsoon winds of the Guinean type, predominantly south-westerly. These winds cause humidity values to be almost at saturation point. Wind speeds may attain exceptional values of 18m/s (April 1993). In general, the average wind speeds recorded over a period of 10 years (1983-1993) vary between 0.5 and 2 m/s (CSIR, 2002).

### 1.3. Water quality

The distribution of water quality parameters is given in figure 3 below, as analysed during the Dr Fridjof Nansen Survey (Krakstad et al. 2006). We observe decreasing temperatures, salinity and dissolved oxygen levels from the surface to the bottom waters in the Kribi, and Campo areas. Surface water temperatures also varied along the coastline<sup>2</sup> this period. However, the quality of the coastal waters is increasingly coming under threat (E & D, 2009; Folack, 1995). Studies have shown that marine waters close to large cities like Douala, and to a lesser extent, small towns such as Limbe, have become reservoirs for significant quantities of industrial, agricultural and domestic wastes, as well as other land based sources of pollution. Industrial set-ups like CICAM (textile printing), ENA (steel containers), CCC (soaps and detergents), Breweries, CHOCOCAM (chocolate refining), SOPARCA (perfume refining), SAPCAM (paints and bleach), PILCAM (Batteries), SYNTHECAM (synthetic fabrics), SOCAFRUITS, Oil milling (CDC), petroleum refining (SONARA, Cape Limboh) and port activities are the main sources of pollution (E & D, 2009; Angwe and Gabche, 1997).

#### Kribi



#### Campo

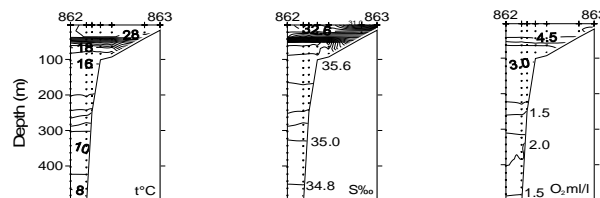


Figure 3. Vertical Distribution of Temperature, Salinity and Dissolved Oxygen in the Kribi and Campo areas (Krakstad et al. 2006).

<sup>2</sup> In 2004, Krakstad et al. registered surface Temperatures variations of 27.5°C in Limbe, 27.4°C in Wouri estuary, 27.2°C in Kribi and 27.2 °C in Campo. Salinity varied between 27.5ppt in Limbe, 23ppt in Wouri Estuary and 30ppt in Campo this period.

#### 1.4. Description of inflowing rivers

The Cameroon coastal area has a dense network of rivers in 3 major river systems (Folack & Galega, 1997), all of them draining into the Atlantic Ocean. These are:

- The West system with main rivers as: the Cross River (length: 160km, catchment: 800km<sup>2</sup>, flow range: 171-7,570m<sup>3</sup>/s and TDS: 38.75ug/l); the Ndian (flow range: 246m<sup>3</sup>/s); the Meme (flow range: 300 m<sup>3</sup>/s), the Mungo (length:150m, drainage area: 2,420km<sup>2</sup>, sediment yield: 1.0 x 10<sup>9</sup>kg/yr, flow range: 27-236 m<sup>3</sup>/s and TDS: 78.1ug/l); the Wouri (length: 250km, drainage area: 82000km<sup>2</sup>, flow range:49-1.425m<sup>3</sup>/s and TDS: 43.54ug/l) and the Dibamba (length:150m, catchment:2400km<sup>2</sup>, flow range: 480m<sup>3</sup>/s and TDS: 28.4ug/l).
- The Sanaga system (length: 890km, catchment 135,000km<sup>2</sup>, sediment yield: 2.8 x 10<sup>9</sup>kg/yr, flow range: 500-5,700m<sup>3</sup>/s and TDS: 96.26ug/l).
- The South system with main rivers: the Nyong (length: 800km, drainage area: 14,000km<sup>2</sup>, flow range: 25.7-376m<sup>3</sup>/s and TDS: 19.1ug/l); Lokoundje (length: 185km), Kienke (length: 100km), Lobe (length: 80km), and the Ntem (length: 460km, drainage area: 31,000km<sup>2</sup>, flow range: 50-764m<sup>3</sup>/s ).

These rivers transport nutrients into the marine environment that promote growth and development of plankton which serves as food for young and adult fish (Djama, 1995).

#### 1.5. Physical Oceanography

##### 1.5.1. Waves

The waves reaching the West African coast (Gulf of Guinea) are of two distinct origins namely, the sea generated waves by the weak local monsoon, and swells generated by storms in the southern Atlantic (Allerman and Tilmans, 1993). Storms occur all year round but are most intense in the rainy season: (June to August). The frequency of the swells reaching the region and generated by these storms vary between 8 and 20s, with an average frequency of 12-13s. Their average height is approximately 1.0-1.5m, although wave heights of 2 to 3m or more can also occur (CSIR, 2002). These swells generally arrive from the South and Southwest. Long swells undergo considerable shoaling near the coast where they form breakers. Measurements in the south of the Cameroon coast indicate swells with higher wave heights during the rainy season. Maximum wave heights have been recorded between 2.65 and 3m (5 year storm) and between 2.8 to 3.25m. The locally generated waves are small, short frequency waves from the SW that rarely exceed heights of 1.25m and have a minimum frequency of between 3 and 4 s (LCHF, in CSIR, 2002).

##### 1.5.2. Tides

Tides are semi-diurnal; mean tidal ranges being 1.8 and 2.8m, with spring tide attaining 2 to 4m on the open coast (Bird and Schwartz, cited in CSIR, 2002). These currents caused by tides are weak over the continental shelf; however, strong tidal streams occur in the various inlets and estuaries along the coast, especially those of the Cameroun Estuary. The following height differences have been recorded for tidal statistics along the Cameroon: MLWS (0.2m), MLWN

(0.5m), MSL (+1.0m), MHWN (1.6m), MHWS (1.8m), and time differences: MHW (+5min) and MLW (no data)<sup>3</sup>. (CSIR, 2002).

### 1.5.3. Currents

The currents in the Gulf of Biafra offshore of Cameroon are generally fairly weak and constitute a zone of convergence between the eastward flowing Guinea Current and northwards surface flows from the south (GCLME, 2006). Measurements of surface currents offshore Cameroon indicate a convergence of surface flows offshore the Cameroon Estuary area and a resultant flow of surface waters in a south-westerly direction into the Bay of Biafra. The surface waters are permanently warm (Bight of Biafra, Wouri estuary etc). They have a coastal fauna that is inter-tropical in nature and are characterized by slight seasonal variations in hydro-climate, a moderate productivity (except in estuaries) and the presence of a large number of species (multispecies nature) (FAO, 1990).

## 1.6. Plankton

Plankton constitutes the basis of the food chain in the aquatic environment that ends with man. They serve as food for young and some adult fish. Data on plankton organisms is not well established especially for the marine environment. However, E & D, 2011 in recent studies registered a total of 32 genera and 47 species for the phytoplankton. Diatoms were the most dominant group of phytoplankton and within the species registered occurred 6 potentially harmful algal species: *Pseudo-nitzschia delicatissima*, *Noctiluca scintillans*, *Gonyaulax sp.*, *Peridinium sp.*, *Gymnodinium sp.*, *Microcystis aeruginosa*, *Anabaena sphaerica*. For the zooplankton a total of 18 genera and 20 species were registered with Cyclopoids dominating. Additional data is given in the Guinea Current Large Marine Ecosystem (GCLME) survey reports (Dr Fridjof Nansen surveys 2004 to 2006).

Inland, plankton is well documented. Some outstanding works include, that of Durand and Leveque (1980) and of Chiambeng (2004). Durand and Leveque carried out detail studies on the systematics of phytoplankton and some zooplankton in the Sahelo-Soudanian region of Cameroon. They registered close 100 species of phytoplankton with the Chlorophytes dominating. In another development, Chiambeng (2004) studied freshwater zooplankton in rainforest waterbodies and identified above 60 species with the genus *Alona spp.* dominating.

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<sup>3</sup> Where: MLWS (Mean low water Spring), MLWN (Mean low water Neap), MSL (Mean sea level), MHWN (Mean high water Neap), MHWS (Mean high water spring)

## **CHAPTER 2: Fishery Development and Policy**

### **2.1. Brief historical overview of Fishery Development and Policy in Cameroon**

In Cameroon, industrial fishing started more than 50 years ago and historical catch and effort data on the industrial fleet are given in Sessengo & Njock (1987). There has been a gradual increase in number of vessels, Gross Registered Tonnage (GRT) and Engine Horsepower (HP). It is reported that in 1951 one trawler operated in Cameroonian waters and landed 60 t of demersal fish. In 1961, nine trawlers were available and they landed a total of about 3 800 t of fish. The industrial fleet expanded rapidly during the sixties and by 1973 there were 29 trawlers and 13 shrimpers that landed a total of about 17, 616 t of fish and shrimp (Njock, 1990). The catch of the industrial fleet peaked at about 20 400 t in 1976 and since then, catches have generally declined to about 6000 tons in 2010 (Source: MINEPIA reports). The artisanal sector too has undergone significant evolution over the years. In the seventies, a total of about 18,615 fishermen were identified, operating 6011 canoes for a production of around 55000 tons (Njock, 1985). This number has increased over the years as a result of fishers seeking refuge in Cameroon territory from the Bakassi war that escalated in the 1990's and today we have about 24, 000 fishermen for a production of above 62.876 tonnes (MINEPIA Frame survey, 2009).

The potentials of the fisheries resources, has been evaluated over the years through scientific surveys. It is thus that we have had surveys with the Research vessel Ombango (1962-1963); the Guinean Trawling Survey (GTS) (1963-1964); Research vessel Fiolent (1976); Dr Fridtjof Nansen 1981; and most recently Dr Fridtjof Nansen (2004; 2005; 2006) (Djama, 1992; GCLME, 2006). Results from these assessment surveys reveal progressive deterioration of the resources for many reasons including irresponsible fishing practices. For this reason, Cameroon established cooperation with international organizations like the World bank (WB), United Nations Food and Agricultural Organization (FAO), sub regional bodies like COREP (Gulf of Guinea Fisheries Commission) etc. to seek opportunities for concerted action for the execution of projects geared towards improving on the resources. Recent projects include: the SLP (Sustainable Livelihood Programme), Revision of the Fisheries Legislation, Elaboration of action plan to fight IUU (Illicit, undeclared, Unregulated fishing), Elaboration of action plan for COREP, Elaboration of Plan for Development of Aquaculture etc (FAO, 2007).

In Cameroon there has been all along, no policy document for the fishery sector<sup>4</sup>. Instead we find many documents geared towards improvement of the sector (Chiambeng & Ngoande, 2011). Cameroon attained independence in 1960 and between that date and 1969 the fisheries sector was administered by services of both the Ministry of Livestock with respect to captured fisheries and the Ministry of Rural Development with respect to inland fisheries and aquaculture. A Department of Marine Fisheries was created in the Ministry of Livestock in 1969 while inland fisheries and aquaculture remained attached to the Ministry of Agriculture. Under the impulsion of the Department of Fisheries, Law N0/74/12 relative to the Maritime Fishing code was voted

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<sup>4</sup> The first policy document was formulated recently, January 2011 for Fisheries and Aquaculture with the assistance of the ACPFISH-II project. All stakeholders in the fisheries sector participated in the preparation and validation of this document (MINRESI, MINDEF, MINEPAT, Fishermen, MINEP etc)(ACPFISH-II, 2011)

and promulgated in 1974 (ACPFISH-II, 2011). This same year, the Marine Fisheries Development Fund (CDPM) was established to provide material and technical assistance to the sector then fisheries research stations/centers became affiliated to the the General Directorate for Scientific and Technical Research (DGRST). Three years later Decree No. 77/363 of 9 September 1977 created the Maritime Small Scale Fisheries Development Authority (MIDEPECAM) to assist in improving the fisheries sector as one of the priorities of the 5<sup>th</sup> Five year Social and Economic Development Plan.

Two years later, both marine, inland fisheries and aquaculture, were put under the Ministry of Livestock, Fisheries and Animal Husbandry (MINEPIA) as a result of restructuring of the government. Before, inland fisheries and aquaculture were under the Ministry of Agriculture. The promulgation of the Fisheries and Aquaculture legislation followed in 1981 as part of a multisector legislation on Forestry, Wildlife and Fisheries (law N0. 81/013 of 27<sup>th</sup> November 1981). In 1985 the Structural Adjustment Programme (SAP) was introduced as a mechanism for economic recovery then in 1991 the master Plan for the Development of the Fisheries sector came into force. The legislation was revised to produce the Forestry, Wildlife and Fisheries law No. 94/01/of 20th January 1994 on the regime for Forestry, Wildlife and Fisheries which is in force till date.

This present legislation has many gaps and the level of implementation is very low. For this reason, its review was recommended under the FAO/TCM/2907(A) Project on "Assistance in the Revision of the Fisheries and Aquaculture Legislation in Cameroon" a "Proposed Legislation for Fisheries and Aquaculture was developed (FAO, 2005). The new text proposed is designed to provide some solutions to these crucial problems and is presently awaiting promulgation.

A policy of Poverty and Decentralisation and a Programme of Good Governance was adopted between 1996 and 2000 with the elaboration of the Strategic Framework for Sustainable Development of Aquaculture. The framework for aquaculture became operational from 2003 to 2009. A strategy for the Development of the Rural Sector, together with a Policy of Great Achievemnets and Growth and Employment Strategy followed in 2005, 2006 and 2010 respectively.

To enhance and fully establish economic recovery, the governemnet has produced a document entitled "Cameroon: *An emerging Democratic and United Country, Despite its diversity*" which is a longterm development vision of the country with overall goals to be attained by 2035. These goals comprise:

- Reducing poverty to socially accepted levels;
- Becoming a medium income country;
- Acquiring the state of a newly industrialized country and;
- Reinforcing national unity and consolidating the democratic process.

Cameroon hopes to reduce poverty by 1/10<sup>th</sup> with this vision by 2035. The reduction of poverty would lead to improved access to healthcare, education, training, and basic infrastructure, including water supply, roads and electricity. We note here that all the items just listed constitute major constraint in the development of the fisheries sector especially artisanal fisheries both

marine and inland (MINEPIA, Frame Survey, 2009, Chiambeng & Holvoet, 2008, Total E & P, 2007, Njifonjou, 1998, Djama, 1992, Njock, 1990 etc).

In conclusion, we find that since independence the country has used different planning approaches and mechanisms to define fisheries policy (ACPFISH-II, 2011) including:

- Five year Social and Economic Development Plan Approach,
- The adoption of Structural Adoption Program (SAP);
- Master Plan for Fisheries Development (1991);
- Policy on Decentralization and National Program on Governance;
- Poverty Reduction Strategy paper 2, 2003;
- Strategy for the Development of the Rural Sector, 2005;
- Policy on Greater Achievements;
- Aquaculture Development Strategy, 2009;
- Growth and Employment Strategy paper (DSCE) 2010.

In fact, the general development objective of the sector is to optimize the contribution of fisheries to the development of the country.

The specific objectives are:

- 1) Assure food security to the Cameroon population by providing local markets with good quality and quantity of fisheries products,
- 2) Increase the contribution of fisheries to national budget by recovering taxes etc and,
- 3) Assure sustainable management of the fisheries resources.

These objectives need to be translated into projects and programmes, and budgeted before concrete actions can be taken.

## **CHAPTER 3: Institutional and Legal Framework governing the fishery sector**

The exploitation and management of fisheries in Cameroon is governed by an institutional framework and Fisheries legislation.

### **3.1. Institutional framework**

The Ministry of Livestock Fisheries and Animal Husbandry (MINEPIA) is the responsible institution for management of the fisheries sector in Cameroon. MINEPIA is assisted in its functions by other institutions notable Ministry of Scientific Research and Innovation (MINRESI), Ministry of Transport (MINTRANS), Ministry of Environment and Nature Protection (MINEP) and Ministry of Defence (MINDEF).

#### **3.1.1. Ministry of Livestock Fisheries and Animal Husbandry (MINEPIA)**

The Ministry of Livestock, Fisheries and Animal Industry was reorganised by Presidential decree n° 2420/152/ of 08 December, 2004. MINEPIA is responsible for the elaboration, execution and follow-up of government policies with respect to fishing, fisheries management and sustainable development of the sector. It provides fishing authorizations, follows-up activities of licensed vessels, ensures respect of the fisheries legislation, and promotes fisheries production.

To better carry out these functions, MINEPIA has a Directorate of Fisheries and Aquaculture (DPA) at Central Level. The Directorate of Fisheries and Aquaculture (DPA) is subdivided into 04 sub-departments and 9 services, which cover the main management domains of the sector. These include: the Sub-Directorate of Aquaculture (SDA), Sub-Directorate of Industrial and Artisanal Fisheries (SDPIA), Sub-Directorate of Fish Technology and Fishing Industry (SDTPIH) and that for Monitoring and Control of fishing activities (BCSAP). DPA is headed by a Director, answerable to the Minister and executes its functions through decentralized services of MINEPIA in the different regions and divisions.

At regional level there is a Regional Delegation for Livestock Fisheries and Animal Husbandry (DREPIA), which is headed by a Regional Delegate. As is the case with the Director of fisheries, the Regional Delegate is answerable directly to the minister and represents the minister at regional level. In principle there is no direct relationship with the the DPA. DREPIA is assisted by Regional Development Services for Livestock, Fisheries and Aquaculture production (SRDPIAPA) headed by a Chief of service, assisted by 2 controllers.

At divisional level, Divisional Delegates are assisted by a Divisional service for the Development of Livestock, Fisheries, Animal Industry and Aquaculture production (SDPIAPA) which acts as a link between the subdivisions and the regions. All the subdivisions in principle have fingerling production and Fisheries Control Centers (CACP) headed by a Chief of Center (CCACP).

In the new organigram of MINEPIA, we find that there is no synergy between the services, DPA and DREPIA, not even between those of DREPIA and CACP. Each administrative unit functions more or less independently which creates a serious problems in the execution of fisheries management tasks.



Attached to MINEPIA are:

- the Marine Artisanal Development Authority (MIDEPECAM), created in 1977 to increase fish production through support to small scale fishermen. Specifically MIDEPECAM is in charge of training, construction and supply of fishing equipment to fishermen and,
- the Fund for Development of Marine Fisheries (CDPM), created in 1974, for funding of activities of the Ministry of Livestock that cannot be achieved under regular government budget. These include infrastructures, equipment, trainings and workshops.

### **3.1.2. Other Institutions**

#### **3.1.2.1. Ministry of Scientific Research and Innovation (MINRESI)**

It was also reorganized in 2005, and defines the countries policy in terms of scientific research. It includes the Institute of Agricultural Research for Development (IRAD), with a Fisheries Research Station (SHROL) in Limbé, an Inland Fisheries Research Station in Fouban and recently a Specialised Research Centre for Marine Ecosystems (CERECOMA) in Kribi. These Research Stations and Centres are charged with carrying out research on stock assessment, marine ecology, fisheries biology, fish post harvest technology, marine pollution and aquaculture mainly.

#### **3.1.2.2. Ministry of Defense (MINDEF)**

This ministry is charged with the supervision of the maritime waters and protection of coastal the population, investments in the coastal zone and the marine resources. It assists MINEPIA also in the Monitoring and Control<sup>5</sup> of fishing activities (implementation of the legislation by fishers). They intervene through the navy (Rapid Intervention Brigade (BIR), national Gendarmerie and sub regional maritime forces.

#### **3.1.2.3. Ministry of Transport (MINTRANS)**

It is responsible for coordination of activities linked with terrestrial, air and maritime transport. Through the merchant marine, it controls movement of fishing vessels and other vessels within Cameroon territorial waters together with ports. Through the Direction of Maritime Affairs it is also concerned with licensing of vessels and security conditions onboard industrial fishing vessels, which is a prerequisite for the issuing of licenses by MINEPIA. These actions contribute to assuring security for industrial fishing in Cameroon waters.

#### **3.1.2.4. Ministry of Environment and Nature Protection (MINEP)**

It is charged with formulating and executing national environmental policies, elaborating strategies for sustainable management of natural resources (including fisheries) and pollution control of the marine and terrestrial ecosystems. MINEP is also responsible for evaluating EIA's (Environmental Impact assessment studies) for any activity to be carried out in these in diverse ecosystems (marine, riverine, terrestrial, air etc).

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<sup>5</sup> Decree 2002/036 of 04 february (MINDEF) in its article 2 encourages collaboration of the navy with other administration in marine activities.

3.1.2.5. Ministry of Economy, Planning and Regional Development (MINEPAT)

This institution is assigned with the task of carrying out regional planning and elaboration economic policies geared towards sustainable development, management of public investments and cooperation. In this respect it assures studies and management of the ocean through financing of projects in the fisheries sector.

3.1.2.6. Ministry of Tourism (MINTOUR)

It is in charge of putting in place national policies related to tourism. In this capacity it monitors and orientates tourist activities in marine and coastal zone and finances the development of touristic sites in the coastal zone and monitors pollution activities in tourist beaches.

Other ministries that equally intervene indirectly include: Ministry of Economy and Finance (MINEFI) (financing, budget management, customs transactions), Ministry of Commerce (MINCOMMERCE) (commercialization of fisheries products), Ministry of Higher Education (MINESUP), (scientific research), Ministry of Labor (improvement of working conditions in the maritime sector, follow-up of international conventions in that direction)..

In addition to these institutions there exist local and International NGOs and regional bodies and programs that also contribute to development in the sector. Some of these are cited below:

i. The Food and Agricultural Organization (FAO) through the Fishery Committee for the Eastern Central Atlantic (CECAF) promotes the optimum utilisation of the living resources in its area of competence through collection and analysis of statistical, biological and socio-economic data and their dissemination, and the formulation of management recommendations for implementation by its members. It also improves related processing and marketing activities in conformity with the objectives of its members. In 1977, priority was given to training, resources evaluation, and management of shared stocks and the development of artisanal fisheries. The area covered by this Committee now extends from Cape Spartel to Angola.

ii. The United Nations Industrial Organization (UNIDO) which through the he Guinea Current Large Ecosystem (GCLME), with regional Coordination Unit based in Accra (Ghana) sponsors research in the marine environment and training in marine sciences in 16 African countries of the region from Guinea to Angola.

iii. The Regional Fisheries Committee for the Gulf of Guinea (COREP) established in 1984 to co-ordinate, harmonise and develop the sustainable exploitation of fisheries resources with regard to shared stocks found within the Exclusive Economic Zones of its Member States (Cameroon, Gabon, Congo, Congo DR, Sao Tome and Equatorial Guinea) within the waters of the Gulf of Guinea situated between Cameroon and Angola.

iv. The Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean (ATLAFCO) was created by convention in July 1991. The coastal States along the Atlantic coast of Africa, between Morocco and Namibia, declared a common wish to strengthen fisheries cooperation in the evaluation and conservation of fisheries resources.

Etc.

### 3.2. The Fisheries Legislation

The first Fisheries and Aquaculture legislation was promulgated in 1981 as part of a multisector legislation on Forestry, Wildlife and Fisheries (law N0. 81/013 of 27<sup>th</sup> November 1981) The legislation was revised to produce the Forestry, Wildlife and Fisheries law No. 94/01/of 20th January 1994 on the regime for Forestry, Wildlife and Fisheries which is in force till date with its different texts of application (Douffisa, 2007). This law and its texts of application define conditions of access to industrial and artisanal fishing and is a guide to anyone who intends to invest in the fisheries sector in Cameroon. Equally, Law n° 96/12 of 1996 on the management of the environment provides the global framework for management of the environment. This law provides guiding principles for the protection of the coastal marine environment, resource management and sustainable development.

Generally the fisheries legislation in place suffers two major setbacks:

3.2.1. Poor Implementation, and

3.2.2. Non respect of International instruments.

#### 3.2.1. Poor Implementation

Insufficient implementation of the legislation by actors of the competent institutions and respect of its provisions is relatively low for many reasons including:

- a. Absence of a centralized crime register, complicating Monitoring, Control and Surveillance (MCS) activities on the field;
- b. Insufficient dissemination and vulgarisation of provisions to the target population (MINEPIA staff) and other administrations implicated, and actor of fisheries sector;
- c. Poorly structured and functional MCS;
- d. Absence of trained fisheries Inspectors who are well equipped and dedicated to the task;
- e. Poor sanctioning: Very few offences have been sanctioned to guarantee respect of legislation;
- f. Poor coordination between the different institutions implicated notably MINEPIA, MINTRANS and MINDEF;
- g. Penalties too low to discourage defaulters;
- h. Predominance of foreign actors who are ignorant<sup>6</sup> of the laws and not even prepared to respect it.

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<sup>6</sup> Majority of actors in the fisheries sector declare being ignorant of the provisions of the fishery legislation which can be very dangerous to management. However, majority recognize the fact that some gears and illegal fishing practices are banned (Frame Survey, 2009)

### **3.2.2. Non respect of international instruments**

Generally, the fisheries law is not in conformity with international regulations for the management of marine living resources (UNCLOS), fight against IUU, high sea fishing, management of shared stocks etc. On the other hand, it presents some weaknesses at the level of MCS and requires immediate revision (Giles, 2008). These setbacks are well known and have been highlighted in diverse studies in the sector (Djama,, 1992, Chiamheng, 2011). In an attempt to incorporate these setbacks, the fisheries administration initiated a process for revision of fisheries law in 2005. This effort received support from FAO and a draft proposal was produced for a new fishery legislation which needs to be finalized before promulgation. In addition, Cameroon produced with assistance from FAO, an Action Plan destined to Combat IUU fishing (FAO, 2007). This plan has taken into consideration together with issues discussed herein for the final revision of the new proposed legislation.

#### **3.2.2.1. United Nation Law of the Sea Convention (UNCLOS)**

Cameroon ratified UNLOSC on 19/11/1985 (NOAA, 2009). In this section, we analyze the different Articles and provisions of UNCLOS and other international instruments concerning management of marine living resources of coastal nations, together with the Cameroon Fisheries legislation and highlight aspects in the legislation that require attention for it to meet international standards.

##### **3.2.2.1.1. The Fisheries legislation and UNCLOS**

###### **a. Conservation and Utilization of living resources**

Provisions for the Conservation and Utilization of living marine resources are given in articles 61 and 62 respectively of UNCLOS<sup>7</sup>. Herein, coastal states are obliged to determine the Total Allowable Catch (TAC), and ensure conservation and management measures that their marine living resources are exploited within Maximum Sustainable Yield levels (MSY). This provision goes further and encourages cooperation amongst states at sub-regional, regional or international levels. Article 61(3) makes it mandatory that threatened species are restored to MSY levels while Articles 61(5) and 61(4) call for contribution and exchange on a regular basis of available scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks through competent international organizations, giving consideration to by catches to guarantee their reproduction. Article 62, provides regulation for nationals of states fishing in the Exclusive Economic Zone of other coastal states to comply with the laws and regulations of the coastal State. It goes further and recommends licensing, species to be caught, catch quotas, data collection and reporting, specific research programs, closed seasons and areas of fishing, the types, sizes and amount of gear, and the types, sizes and number of fishing vessels that may be used; fixing the age and size of fish and other species that may be caught and bans illegal exportation and transshipment.

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<sup>7</sup> Reference for UNCLOS could be downloaded from the internet site below:

[http://www.un.org/Depts/los/convention\\_agreements/convention\\_overview\\_convention.htm](http://www.un.org/Depts/los/convention_agreements/convention_overview_convention.htm)

The regulation in force in Cameroon is the Law on Forestry and Fisheries 1994/01 of 20/01/1994 which is accompanied by various decrees and decisions of application (Douffissa, 2007). The three main provisions dealing with exploitation and conservation of marine living resources in the Cameroon fisheries regime are: Decree n° 95/413/PM of 20 June 1995, providing the conditions for access to fishing, Decree N0.2001/546/PM of 30/07/2001 amending and completing certain provisions of decree No. 95/413/PM of 20/06/1995 that defines the different types of fishing and vessels authorized, conditions for deliverance of fishing licenses and making obligatory log books aboard vessels and Decision N0. 0002/MINEPIA of August 2001, dealing with protection of fisheries resources. These provisions generally do not reflect current international policies with respect to UNCLOS. There is no provision for Total Allowable Catches (TAC), MSY to promote optimum resource use and regulation of fishing seasons (Article 62/61 of LOS Convention). However, in a bid to assure regeneration of the resource, the legislation makes provision for closed seasons (Order N0. 0002/MINEPIA of August 2001) but does not spell out the species involved and periods for different species groups. Also, provisions to regulate areas of fishing and sizes of fish to be caught are limited. Decree N0. 95/413/PM of 20/06/1995 bans fishing in 5 zones along the coastline comprising only estuaries while Decree No. 95/413/PM of 20/06/1995 bans fishing in sensitive sites and of juveniles but does not spell out the sites to be considered as sensitive. In addition, Order N0. 0002/MINEPIA of 1/08/2001 provides sizes of fish species to be caught only for a limited number of target species (*Sardinella maderensis*, *Pseudolithus senegalensis*, *P. elongates* and *Cynoglossus canariensis*) but does not for shrimps.

Furthermore, associated or depended species (incidental catches) are not given any consideration in the present Cameroon fisheries legislation (Article 62 of LOS Convention) whereas these constitutes above 70% in shrimp trawl fisheries in Cameroon (Chiambeng and Ngoande, 2011). There is no mention of any mechanism (e.g. use of BRD: By-catch reduction Device and TED: Turtle Exclusion Device) for the reduction of incidental catches (Article 61(4) LOS Convention). However, Order No. 0002/MINEPIA of August 2001 that lays down provisions for the protection of fishery resource, bans fishing of juveniles amongst others while Decree No. 95/413/PM of 20/06/1995 in its Article 24 bans capture of protected species (e.g. sea turtles which often occur in by-catches of industrial trawlers).

Cooperation with competent international organizations at the sub regional, regional, global level towards avoiding over-exploitation and exchange of scientific data for better management of living resources as provided in Article 61 (2) and 61(5) of LOS Convention is also not considered within the context of the present fisheries regime. Specific fisheries research programmes and reporting of associated scientific data as spelled by out in Article 62 of LOS Convention are still to be considered.

#### **b. Straddling, trans-boundary stocks**

LOS Convention makes it mandatory for stocks of species occurring within the Exclusive Economic Zones of two or more coastal States (trans-boundary stocks) and those occurring both in the EEZ and international waters close to the EEZ to be managed through sub-regional, regional and international agreements in its article 63. The Cameroon fisheries regime is still to act in concert with these provisions. However, in an attempt to manage these stocks, Cameroon signed a Fishing

Protocol with Equatorial Guinea on the 26<sup>th</sup> May 1981 (Decree N0. 82/406 of 06 September, 1982 of the present legislation) and is a member of a handful of regional, sub-regional and international fisheries agreements (see section 3.1.2).

### **C. Highly migratory species**

Regional cooperation of coastal states either directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of highly migratory species, both within and beyond the Exclusive Economic Zone is called for in Article 64. This article further encourages coastal states to make an effort to establish one for states that do not yet belong to any. There is no provision in the Cameroon fisheries regime either for exploitation and management of highly migratory species (whales, Dolphins, Sharks, Sphrynidae (barracudas), *Thunnus sp.*) or for any cooperation with other states in this respect. However, an attempt to manage these species is given in Decree No. 95/413/PM of 20/06/1995 (Article 24) that bans the capture of protected species including cetaceans (dolphins, whales) which are highly migratory species. In addition, Cameroon is signatory of sub-regional, regional and international bodies (e.g. IWC: International Whaling Commission) geared towards management of fisheries resources including highly migratory species (see section 8).

### **d. High sea Fishing**

Article 117 of the LOS convention requests states to respect, national measures for the conservation of the living resources of the high seas and obliges cooperation with other states at all levels, (sub-regional, regional, etc) in executing measures geared towards conserving and managing high sea resources. The Cameroon fisheries legislation in its Article 119 of Law No. 94/01 of 20<sup>th</sup> january 1994 gives provision to 3 types of fishing licenses including license for high sea fishing (tuna) though these licenses don't yet exist in Cameroon (FAO, 2007). Also, Decree No 95/413/PM of 20<sup>th</sup> june 1995 defines conditions for industrial, semi-industrial, artisanal, sports and scientific fishing but does not make mention of high sea fishing contradicting Article 119. Last but not least, fishing in high sea is limited here to tunas within the Cameroon fisheries legislation contrary to Article 177 of LOS Convention which provides access to a diversity of species in the high sea.

### **e. Marine mammals**

LOS Convention gives rights to coastal states and competent international organization, as appropriate, to prohibit, limit or regulate the exploitation of marine mammals more strictly than provided in the LOS Convention (Article 65). Special attention is given to Cetaceans (Whales, Dolphins) and appropriate international organizations mandated for their conservation, management and study (e.g. IWC: International Whaling Commission). Efforts by Cameroon to protect marine mammals are seen in its signatory of the IWC and adherence to the International Trade in Endangered Species of wildlife and flora (CITES) in 1981. Additional effort to protect marine mammals is given in Article 127 of Law N0. 94/01 of 20/01/1994 of the Cameroon fisheries regime with respect to conservation of living resources, that bans the capture and sales of threatened species but does not specify exactly the species to be considered as threatened (Douffissa, 2007).

There is no provision for their studies, management and restoration as spelled out in Article 65 of LOS Convention.

#### **f. Sea turtles**

There is no direct provision for sea turtles within the framework of the LOS Convention. However, turtles can be considered indirectly under Article 61(4) and 61(2) that provides some protection for threatened and endangered species as well as species associated bycatch. Protection is also seen, in Article 194(5) that encourages habitat protection beneficial to threatened or endangered species since they are associated with bycatch and in the form of trade restrictions, like with whales since they are also included in the list of Endangered Species of wildlife (CITES). In an attempt to protect sea turtles, Law No. 94/01 of 20th January 1994 in its article 127m bans the capture and sales of protected species. Also, Decree No 95/413/PM of 20<sup>th</sup> June 1995 in its article 24 provides also provides protection for endangered/threatened species but both does not spell out the list of species. Additional protection is seen through turtle monitoring projects (Kudu Project in Kribi) along the maritime beaches<sup>8</sup>. Lastly, the absence of provisions for a mechanism to fight against incidental catch in trawl fishery (Article 62 of LOS Convention) in the fisheries legislation makes Sea turtles more vulnerable.

#### **g. Anadromous and catadromous species**

Responsibility to coastal states with rivers having anadromous stocks (live in ocean but spawn in rivers) to ensure their conservation through appropriate regulatory fishing measures including establishment of total allowable catches for these stocks is given in Article 66 of LOS Convention. It goes further to ban fishing of these stocks in the high sea except through agreement with states where the stocks originate. Article 67 accords the responsibility for the management of catadromous stocks (lives in freshwater but enter ocean to spawn) to coastal states in whose waters these species spend the greater part of their life cycle. It permits harvesting of these stocks only within the EEZ and subject to provisions concerning fishing in the EEZ and calls for cooperation amongst states in harvesting and management measures out of the EEZ. Both anadromous and catadromous stocks still need to be given consideration within the context of the Cameroon fisheries regime considering the high density coastal hydrographic network and mangrove estuaries along the Cameroon coastline. Research is needed for listing of such species prior to making provisions in the legislation.

#### **h. Marine habitat protection**

Coastal states have the obligation to protect and preserve the marine environment (Article 192). The LOS Convention goes further in its Article 193 to oblige states to carry out exploitation of natural

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<sup>8</sup> *In an attempt to preserve marine turtles, there is ongoing monitoring of turtles in the beaches of the South (Ebodjé, Mbendji, Likodo, Ipenyendje and Bekolobe). Total, 149 marine turtles have been observed of which 90% are *Lepidochelys olivacea* and the other 10%, *Dermochelys coriacea*. Among the five species recorded *Chelonia mydas* is in class B and their exploitation is regulated, whereas *Dermochelys coriacea* is in class C and is partially protected (Fretey et al., 2006; Fretey, 1998a)*

resources in due respect of environmental policies and in Article 194 makes provisions for measures to prevent, reduce and control pollution in the marine environment. Article 61(4), on the management of living marine resources encourages reduction of by-catch while Article 206 makes provision for Environmental Impact Assessment for projects in the marine environment. Efforts to abide to international regulations with respect to habitat protection are seen in Cameroon's ratification of the United Nations Convention on Biological Diversity of 1992, on 29/8/1994 and its signatory to the Basle Convention on the Trans-boundary Movements of Dangerous Waste and their Disposal (NOAA, 2009). Additional efforts are given, in Article 18 of Law No. 94/01 of 20/01/1994 that bans the discharge of toxic wastes into the environment by industries and recommends obligatory treatment before and in articles 23 and 37 of Decree No. 95/413/PM of 20/06/1995 that ban fishing in sensitive sites and of juveniles. Also, Order No. 0002/MINEPIA of August 2001 that lays down provision for protection of fisheries resources in its article 127 bans introduction of living alien species contrary to international regulations where the ban is mainly for harmful alien or exotic species (Article 196, UNCLOS). There also, no provision for EIA's<sup>9</sup>.

### **3.2.2.2. The Fisheries Legislation, IPOA-IUU (International Action Plan-Ilicit, Undeclared, Unregulated fishing) and other instruments**

In 2001, a non binding International Plan of Action on IUU fishing (IPOA-IUU) was developed within the framework of FAO Code of Conduct for Responsible Fisheries of 1995 and other international instruments (FAO, 2007). The FAO adopted the Code of Conduct for Responsible fisheries in 1995. It covers only fisheries management in the EEZ and high seas but also matters such as aquaculture, postharvest practices and trade. A non binding instrument, the Code is expected to set out principles and international standards of behavior for responsible practices with view to ensuring the effective conservation, management and development of aquatic living resources with due respect for the ecosystem and biodiversity. Existing International Conventions and Accords such as United Nations Convention on the Law of the Sea (UNCLOS, 1982) previously discussed, FAO Accord dealing with conservation and management of living resources (CA, 1993) by fishing vessels in the high sea, United Nations Accord relative to straddling fish stocks (UNFSA, 1995) also contributed to the development of IPOA-IUU which was confirmed by the Fisheries Committee of the FAO (COFI) in 2001.

IPOA-IUU provides a toolbox of measures to address the problem and covers all sectors of the fishing industry, from flagging of vessels to fishing authorizations to landings and market-based controls on fish trade. IUU fishing is generally perceived to be the product of overcapacity in the fishing industry, inadequate fisheries management, and problems associated with either ineffective flag state control or the use of flags of convenience (High Sea task Force, 2006). In general the institutional control of IUU will require some legislative measures: controlling access to fisheries,

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<sup>9</sup> EIA's are taken care of in the environmental law Decree n° 2005/0577/PM of 23 February 2005 which lays down the methods of carrying out environmental impact assessments and Order n° 0069 / MINEP of 8 March 2005 that sets the various categories of operations whose realization is subject to an environmental impact assessment.



regulating port access, designing inspection regimes and catch certificate schemes, and a system of penalties.

In this section, we present different aspects of the Cameroon fisheries legislation that need to be considered in order to meet international standards for conservation and management of marine living resources with respect to IUU fishing.

### **a.Sanctions**

IPOA-IUU in its article 21, encourages coastal states to put in place very severe sanctions to discourage IUU fishing. The 1994 fisheries regulation, presently in force presents six types of sanctions<sup>10</sup>. The new proposed legislation has seven. In both documents, the last category of sanction though very severe, is generic and too heavy, and applies to vessels with foreign flags (400 000 000 and 900 000 000 FCFA in article 130 of proposed law (FAO, 2005). This approach is discriminatory as it provides sanctions according to nationality without considering the nature, gravity and estimated value of the crime which is against Article 21 of IPOA.

### **b. Licensing of vessels**

Articles 34 to 41, IPOA-IUU encourage coastal states to control their vessels in order to minimise illicit activities. They are also encouraged to avoid according flagging to vessels with history of established IUU fishing, and discourage change of flagging for convenience. Finally, it encourages states to link vessel immatriculation, to issuing of fishing authorization. In Cameroon licensing of vessels is governed by laws that are in conflict with IPOA-IUU obligations. In its Article 4(2) and 5(2) of decree N° 95/413/PM of 20 June, 1995, IUU history of vessels and presentation of an IRCS (International Radio Call Sign) are not pre-requisites to obtaining a fishing agreement which is not in line with provisions of article 24 of IAP-IUU and the ITU (International Telecommunications Union) of Geneva. This has led to a situation where majority of vessels registered in Cameroon have double immatriculation. Also, Article 119 of the 1994 fishery legislation makes provision for high sea fishing licenses, but there is no laid down condition for this type of fishing, and for access to other coastal waters which is in disagreement with CA, (1993) and UNFSA, (1995). UNCLOS article 92.2: States : « *A ship which sails under the flags of two or more States, using them according to convenience, may not claim any of the nationalities in question with respect to any other State, and may be assimilated to a ship without nationality.*

### **c. Incentives**

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<sup>10</sup> Charges comprise (i) 5000 to 50 000 FCFA and 10 days imprisonment for violation of articles 121 (non renewal of licences), and 122 (non presentation of fishing licence to controllers), (ii). 1-3000 000 and 1 year imprisonment for violation of article 127a (use of trawl gear within 3 nautical mile limit), j (use of inappropriate mesh sizes by industrial vessels) and m (capture and detention of protected species); (iii). 50-200 000 for violation of articles 116 (non possession of fishing agreement), 117 (fishing licence), 125 (non declaration of catches), 127.g (discharge of toxic substances into environment), 129 (use of vessels >250 GRT); (iv.) 3-10 000 000 and 1-3 yrs jail for fraud on fishing documents, (v). 3-10 000 000 for holders of A, B and C permits and (vi) 50 000 000 to 100 000 000 for any offence committed by a foreign fishing vessel (Douffissa, 2007).

In its Article 23, IPOA-IUU, encourages coastal states to ensure that no economic support is given to companies, persons or enterprises carrying out IUU fishing. The Cameroon fisheries legislation in its Order n° 017/MINEPIA of 29 september, 1987, on the organisation and modalities for operation of Fisheries Centers, mentions « *fuel for fishing* » as incentive to be given to fishers by the MINEPIA Fisheries Centers (art. 6). Article 18 of the proposed legislation states: incentives, as required, could be considered to encourage fishing and aquaculture actors. Both articles don't discriminate IUU fishers benefiting from this incentive as speculated in Article 23 of IUU.

#### **d. MCS**

IPOA-IUU recommends states to put in place an efficient monitoring, Control and Surveillance system (MCS) for fishing, notably by taking into consideration amongst others, regulated access to resources (Article 24 and its sub-articles). In an attempt to abide to this, an MCS system is in place (Order N0. 0021/MINEPIA of 11 april 2002) in Cameroon, though poorly functional due to lack of trained staff and appropriate equipment (FAO, 2007) but there is no mechanism to regulate access. For instance, there is no effort limitation in the delivery of licenses for the different fisheries exploited (Douffissa, 2007) which is very dangerous in the management of fisheries (Open Access) and in disagreement with Article 24 of IPOA-IUU. Consideration needs to be given to this and others for the Cameroon legislation to match international requirements.

#### **e. Cooperation with other coastal states**

Cooperation with other coastal states in the exploitation, management and protection of marine living resources is an important provision in articles 78 to 84 of IPOA-IUU. This aspect is not given any consideration in the present fisheries regime. However, Cameroon is a member of some regional fisheries organizations e.g. COREP (Gulf of Guinea Fisheries Commission), CECAF (The Fishery Committee for the Eastern Central Atlantic) and COMHAFAT (Ministerial Conference on Fisheries Cooperation amongst Coastal African States). The roles of these organizations and others are given in section 3.1.2. In an attempt to abide to COMHAFAT, which encouraged states to implement the VMS (ARGOS system) to combat IUU, transceivers have been made obligatory and presently installed on vessels and an MCS brigade is in place though poorly functional. Cameroon is also, a signatory to the Abidjan Convention<sup>11</sup> relating to co-operation in the area of protection and development of the coastal zone of West and Central Africa, and its protocols. Efforts in implementing decisions of this convention can be seen with the creation of five marine and coastal protected areas/parks/reserves (see section 4.8; Article 11 Abidjan Convention), and mandatory EIA's (Decree n° 2005/0577/PM of 23 February 2005 of MINEP) before petroleum exploration and exploitation (Articles 8 & 13 Abidjan Convention) amongst others. However, the degree of implementation is slow.

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<sup>11</sup> *The Convention for co-operation in the protection and development of the marine and coastal environment of the West and Central African region and protocol (1981) Entry into force: 5 August 1984. In its general provisions Article 4. Member states are called upon to: i) prevent, reduce, combat and control pollution of the Convention area ii) establish and harmonize national policies; iii) cooperate with competent regional, sub-regional and international bodies*

## CHAPTER 4: Fisheries Management in Cameroon Maritime Waters

Fisheries in Cameroon can be divided into 2 sectors: Marine fisheries and Continental fisheries

### 4.1. Marine Fisheries

This could be further sub-divided into artisanal, semi-industrial and industrial (which is exclusively marine).

#### 4.1.1. Marine Artisanal fisheries

The artisanal fishery operates within the 3 nautical mile limit banned to industrial vessels. This fishery comprise: Small scale artisanal, semi-industrial and artisanal shrimp fisheries. The sector is dominated (85%) by immigrant fishermen mainly from Nigeria, Ghana and Benin (Frame survey, 2009, Djama, 1992). This can be a major constraint in the development and rational management of this sector. The distribution of actors according to nationality is given below in table 1. Fishing is the main activity in these fishing communities even though other income activities<sup>12</sup> do exist

Table1: Distribution of fishermen and women actors by nationality along the Cameroon coast (MINEPIA Frame Survey, 2009)

Actors/nationality	BO	%	AF	%	FM	%	FS	%	MEC	%	BC	%	Total acteur	%.
Camerounians	2158	26,50	2484	14,71	1398	73,85	1178	18,41	18	2,17	63	31,19	7299	21,25
Nigerian	5844	71,77	13158	77,92	482	25,46	4839	75,62	130	15,64	139	68,81	24592	71,58
Ghanaian	36	0,44	813	4,81	2	0,11	177	2,77	0	0,00	0	0,00	1028	2,99
Beninois	101	1,24	423	2,50	0	0,00	204	3,19	683	82,19	0	0,00	1411	4,11
Togolese	4	0,05	9	0,05	11	0,58	1	0,02	0	0,0	0	0,00	25	0,07
<b>Total</b>	<b>8143</b>	<b>100</b>	<b>16887</b>	<b>100</b>	<b>1893</b>	<b>100</b>	<b>6399</b>	<b>100</b>	<b>831</b>	<b>100</b>	<b>202</b>	<b>100</b>	<b>34355</b>	<b>100</b>

**BO:** Boat Owner Fisherman **AF:** Assistant fisherman; **FM:** Fish Monger; **FS:** Fish Smoker;  
**MEC:** Mecanic; **BC:** Bota Constructor

<sup>12</sup> Aside fishing members of fishing communities do carry out farming (76% fishers, 81% fish mongers, 58% fish smokers); livestock rearing (70% fishers) and small trade (95% Nigerians) to generate some income especially during low seasons (MINEPIA Frame survey, 2009).

#### 4.1.1a. Fishing grounds

##### - Small scale artisanal fishing

This fishing is done exclusively within the 3 nautical mile limits and within estuaries. The vessels are small size and dug out of a tree trunk. They are mostly hand pulled or sail driven. It is practiced in almost all fishing camps (Njifonjou & Mounchipou, 2003).

##### - Semi-industrial fishing

This fishing is practiced mostly by foreigners (Ghanaians) and extends a bit further into the sea. The fishing vessels are large size canoes of Ghanaian type called the "Awasha". driven by 40HP engines. Main fishing camps are Idenau, Yoyo, Bekumu, Cap Cameroon, Limbe. The fishers are migratory (Chiambeng, 2011).

##### - Artisanal shrimp fishery

Artisanal shrimp fishing is also practiced in estuaries and creek zones mostly in the artisanal fishing camps of Mabeta and Mboko in Fako Division (see plate 1), as well as Mokala and Bamusso in the Ndian Division. Only one type of net is used for this purpose - the "ngoto". The species exploited is mainly *Nematopalaemon hastatus*. In recent developments, there is a small-scale exploitation of the alien shrimp *Penaeus monodon* in the Bakassi area (Chiambeng, 2011, 2009). The artisanal fishing camps are in a very poor state socio-economically<sup>13</sup> and require immediate attention by government for improvement of livelihood standards (see plate 1).



Plate 1: A view of mabeta fishing port (Photo Folack, 2007)

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<sup>13</sup> The social atmosphere is deplorable in majority fishing camps especially those enclaved in the Bakassi area. Institutional and social infrastructure are poorly developed. There are no hospitals and limited health care centers (19.7%) which are poorly staffed; there are limited schools (35.4%) and teachers; potable water is absent (11.52%) and majority drink rain and well water; they lack electricity (11.9%), access roads (20%), processing and storage facilities (11.5%) and toilets (defaecate on beaches or mangrove forest) amongst others (Minepia Frame Survey, 2009).

#### 4.1.1b. Target Species exploited

The artisanal fisheries in general use a combination of gears to catch a mixture of pelagic and demersal fish. This fishery is dominated mainly by pelagic species in catch quantities. (Njifonjou, 1998). Major pelagics are *Ethmalosa fimbriata* (see plate 1) and *Sardinella maderensis* (see plate 2). Other major species include: *Scomberomorus tritor*, *Caranx spp.*; *Ethmalosa fimbriata*; *Sardinella maderensis*; *Ilisha africana*; *Caranx*; *Arius sp.*; *Pseudotolithus elongatus*; *Pseudotolithus senegalensis*; *Pseudotolithus typus*; *Galoides decadactylus*; *Pentanemus quinquarius*; *Polydactylus quadrifilis*, *Cynoglossus spp.*; *Chloroscumbus chrysurus*, *Nematopalaemon hastatus* (estuarine white shrimp or njanga); *Penaeus monodon* (tiger shrimp).



Plate 2: *Sardinella maderensis* (Photo Yongbi, 2008)



Plate 3: *Ethmalosa fimbriata* (photo Yongbi, 2008)

#### 4.1.2. Industrial fisheries

The industrial fisheries uses shrimp and fish trawlers to exploit demersal stocks (GRT <250). The traditional fishing grounds for finfish trawlers are ideally supposed to be at least 3.2 km off the estuaries in the coastal sector and possibly outside the 20 m depth used by the artisanal fishermen (Djama, 1992; Njock 1990). Unfortunately, available data indicates that finfish trawlers concentrate their fishing activities in the coastal sector between 6 and 25 m and enter into conflict with artisanal fishers (net destruction).

##### 4.1.2.1. Industrial fishing grounds and species targeted

Fishing of both finfish and shrimps is mostly done between 10m and 60m along the whole coastline from the river Ntem in the south to Akwayafe in the North. The main areas include: the

Ntem estuary, the coastline between Campo and Kribi, the Sanaga estuary, the Wouri estuary to Ambas bay Limbe and the Bakassi peninsula (Njock, 1990). (figure 4 ). Fishing ground for shrimp and fish species targeted is conditioned by the ecology of the species. Njock (1990) described the fishing grounds of shrimps within Cameroon maritime waters. According to this author:

*Penaeus notialis* (the pink shrimp) is the most dominant species found in lagoons, estuaries, creeks and open sea and is targeted by shrimp trawlers, mainly at depths between 30 and 60 m. The ocean floor here is muddy but this shrimp migrates upwards at night. Maximum length sizes can reach 22 cm and life span of about 18 months. The coastal zone between the Cameroon estuary and Rio del Rey rivers are the main fishing grounds.

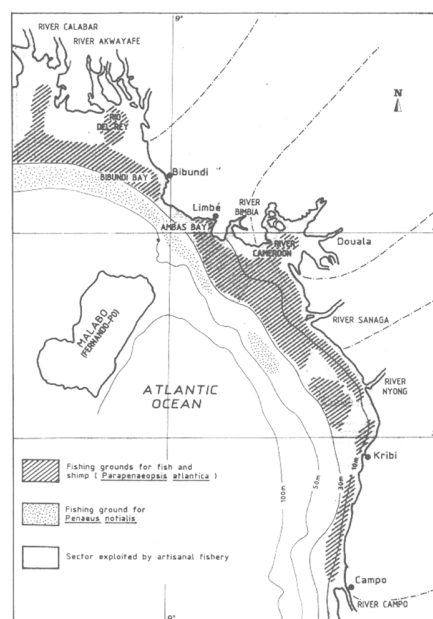


Figure 4: Major fishing grounds for industrial fleets off Cameroon coast (After Njock, 1990)

Fishing of *Parapenaeopsis atlantica* (Guinea shrimp) is mainly in the open sea at depths between 10 and 30 m and maximum length sizes can reach 16 cm while *Penaeus kerathurus* (the Caramote prawn) is in coastal waters and the Guinea shrimp (*Parapenaeopsis atlantica*) and the Caramote prawn (*Penaeus kerathurus*) in the shallower coastal sector at 10 to 30 m depth and mostly between the Sanaga River and the Ambas Bay. *P monodon*, although caught with industrial trawls, is mostly exploited by artisanal fishers in Bamusso fishing camp (Bakassi area). The estuarine shrimp *Nematopalaemon hastatus* is exploited by the artisanal fishery around the Bimbia and in the Bakassi mangrove area.

A list of important crustacea, Moluscs, their ecology and nature of exploitation is given below in table 2. We find a total of 15 species of which only four are commercialized and the rest used for subsistence. Majority gastropods dwell on mangrove roots. Periwinkles are harvested too and often exported illegally to Nigeria by the artisanal fishers of the Bakassi and Douala areas (Chiambeng, 2011).

Table 2: Important Crustacea, Crabs, Molluscs and other species exploited by artisanal and industrial fisheries (modified after Njock, 1990, Djama, 1992, FAO, 1990).

Species	Habitat	Exploitation
<i>Parapaeneus atlantica</i> (Guinea shrimp)	Coastal marine waters, estuaries, up to 40m depth -benthic	Commercial
<i>Parapaeneus longirostris</i> ( rose shrimp)	Sandy and muddy bottoms, upto 600m	Commercial
<i>Nematopalaemon hastatus</i> (Estuarine prawn)	Sandy and muddy bottoms in estuaries and coastal marine waters, upto 50m depth	Commercial
<i>Penaeus notialis</i> (Pink shrimp)	Coastal marine waters, estuaries Muddy and muddy sand 15-100m	Commercial
<i>Macrobrachium spp.</i> (Giant river prawn)	Riverine and brackish water	subsistence
<b>Crabs</b>		
<i>Callinectes marginatus</i> (Marbled swim crab)	Brackish waters of estuaries and lagoons	subsistence
<i>Ocypoda ippeus</i> (African ghost crab)	Sandy beaches	subsistence
<b>Molluscs</b>		
<i>Sphoerium mourei</i> (Snails)		
<i>Purpura spp.</i>		
<i>Sepia officinalis</i> (Common cuttle fish)	Demersal on sandy and muddy bottoms, from surface to 200m	subsistence
<i>Mytilus tenuistriatus</i> (Sea Snails)	Rhizophora roots, rocky beaches	subsistence
<i>Crassostrea gasar</i> (Oyster, bivalve)	Rhizophora roots,	subsistence
<i>Crassostrea rufa</i> (Oyster, bivalve)	Rhizophora roots,	subsistence
<b>Others</b>		
<i>Periopthalmus hoelferi</i> (mudskipper)		subsistence
<i>Tympanotonus fuscatus</i> (Periwinkle)		subsistence

A list of fish species, exploited by the industrial fisheries and their ecology is given below in table 3. We find 21 families and 52 species dominated by the Scianidae and Carangidae. Also, most of the species targeted by industrial fishing are benthic and at different depths with majority used for commercial purposes.

Table 3: List of common fish species exploited Cameroon waters coastal area (modified after Djama, 1992, Njock, 1990, FAO, 1990).

Family/Fish Species	Habitat	Exploitation
<b>Scianidae (Croakers, Mussobo)</b>	Marine up to 350m depth, also in estuaries - benthic	commercial
<i>Pseudotolithus typus</i>	Muddy and sandy bottoms to about 150m depth	
<i>Pseudotolithus senegalensis</i>	In shallow waters on muddy, sandy and rocky bottoms	
<i>Pseudotolithus elongatus</i>	Brackish waters and estuaries	
<i>Umbrina sp</i>	Sandy muddy bottoms up to 75m deth	
<i>Pteroscion peli</i>	Coastal waters to about 200m depth, more common between 30-60m	
<b>Polynemidae (Capitain)</b>	Marine coastal waters, up to 30m depth (benthic)	
<i>Galeodes decadactylus</i>	Sandy and muddy bottoms in shallow coastal waters, also estuaries	
<i>Pentanemius quinquarius</i>	Sandy and muddy bottoms to 50m depth	

<i>Polydactylus quadrifilis</i> (shine nose)	Sandy bottoms to 50m, also estuaries	Commercial
<b>Pomadasyidae (Grunts)</b>	Mostly marine, up to 200m depth (benthic)	Commercial
<i>Brachydeuterus auritus</i>	Coastal waters from 10-100m depth, common 40-50m	
<i>Pomadasy jubelini</i>	Sandy and muddy bottoms in coastal waters and estuaries, common between 20-50m depth	
<b>Clupeidae (Sardines)</b>	Coastal marine waters, estuaries (pelagic)	Commercial
<i>Sardinella maderensis</i> (Strong Kanda)	Warm coastal waters, from surface to 50m, sometimes in estuaries	
<i>Ethmalosa fimbriata</i> (Bonga)	Coastal marine waters, estuaries	
<i>Illisha africana</i> (Menyanya)	Coastal marine waters, estuaries	
<b>Ariidae (Sea catfish)</b>	Coastal marine waters, estuaries (benthic)	Commercial
<i>Arius heudeloti</i>	Rivers, estuaries and adjoining coastal waters	
<i>Arius latiscutatus</i>	Coastal marine and brackish waters	
<b>Drepanidae (Sicklefishes)</b>	Marine, from about 20-50m depth	Subsistence
<i>Drepana africana</i>		
<b>Spariidae (Seabreams)</b>	Marine upto about 150m (benthic)	Commercial
<i>Dentex angolensis</i>	On different types of bottoms on the continental shelf	
<i>Dentex congoensis</i>	idem	
<i>Dentex canariensis</i>	idem	
<i>Pagellus bellotti</i>	On hard and sandy bottoms to 100m	
<i>Pagrus caeruleostictus</i>		
<b>Serranidae (Groupers)</b>	Marine, upto 300m, also estuaries (benthic)	subsistence
<i>Epinephelus aeneus</i>	Sandy and muddy bottoms from coastline upto 100m	
<i>Epinephelus spp.</i>		
<b>Lutjanidae (Snappers)</b>	Mostly marine, up to 450m depth, also estuaries (benthic)	Commercial
<i>Lutjanus atlantica</i>		
<i>Lutjanus dentatus</i>	Rocky bottoms, also estuaries	
<i>Lutjanus goreensis</i>	Rocky and other hard bottoms, juveniles in estuaries	
<b>Cynoglossidae (tonguesoles)</b>	Marine, up to 300m (benthic)	Commercial
<i>Cynoglossus canariensis</i>	On sandy and muddy bottoms from 15-300m depth	
<b>Carangidae (Jacks, etc)</b>	Marine upto 200m depth, few in brackish waters (benthic)	subsistence
<i>Alectis alexandrinus</i>	Adults near bottom to about 60m, young pelagic	
<i>Caranx crysos</i>	Usually close inshore, but also in deeper waters, 100m	
<i>Caranx spp.</i>		
<i>Chlorosocumbeus chrysurus</i>	Coastal waters, also in estuaries and mangrove-lined lagoons	
<i>Decapterus punctatus</i>	Demersal in coastal waters to about 100m, also pelagic	
<i>Selar crumenophthalmus</i>	Shallow coastal waters, more regularly found in dry season	
<i>Seriola sp.</i>		
<i>Selene dorsalis</i>	Coastal waters up to 60m, regularly found in May-October	
<i>Trachinotus sp</i>	Coastal waters and estuaries	
<b>Trichuriidae (Cutlass fish)</b>	Marine, up to 1500m (pelagic (night) and benthic)	Commercial
<i>Trichurus lepturus</i>		



<b>Sphyraenidae (Barracudas)</b>	Marine, up to about 100m depth (pelagic)	subsistence
<i>Sphyraena guachancho</i>	Estuaries and muddy bottoms	
<i>Sphyraena piscatorium</i>	idem	
<b>Scombridae (Tunas)</b>	Marine up to 100m depth (pelagic)	subsistence
<i>Scomberomorus tritor</i>	Warm water species, sometimes enters estuaries	
<i>Thunnus obesus</i>	Mainly offshore species, but also occurs near shore	
<b>Dasyatidae (Stingrays,)</b>	Coastal waters, up to 300m depth (demersal)	subsistence
<i>Dasyatis spp.</i>		
<b>Rajidae (Rays, Coverpot)</b>	Marine, up to 400m depth (benthic)	
<i>Raja miraletus</i>		subsistence
<b>Mugilidae (Mullet)</b>	Estuaries, freshwaters, up to 20m (pelagic)	
<i>Mugil cephalus</i>		
<b>Carcharinidae (Requiem Sharks)</b>	Coastal oceanic waters, up to 800m depth - benthic or pelagic	
<i>Carcharhinus limbatus</i>	Pelagic in coastal and offshore waters	
<i>Carcharias taurus</i>		
<i>Carcharias sp.</i>		
<i>Carcharodon sp.</i>		
<i>Carcharhinus plumbeus</i>	Coastal waters on sandy and muddy bottoms, often near estuaries	
<b>Family Pristidae (Sawfishes)</b>	Marine and brackish waters, up to 10m depth, -benthic	
<i>Pristis pectinata</i>	Coastal waters up to 100m, also estuaries	
<i>Pristis pristis</i>	Demersal in littoral	
<i>Pristis microdon</i>	Demersal in inshore coastal waters to about 45m depth, also in estuaries	

#### 4.1.3. Other marine fauna

There exist other marine fauna that are accidental catches in trawl fishing and sometimes in artisanal fishing. These include turtles: the green turtles (*Chelonia mydas*), the hawksbill turtles (*Eretmochelys imbricate*) and the Olive ridley turtles (*Lepidochelys olivacea*) all belonging to the family Cheloniidae; then the Leatherback turtle (*Dermochelys coriacea*) of the family Dermochelidae (WWF, 2005).

#### 4.2. Inland fisheries

##### 4.2.1. Fishing grounds, gears and target species

The inland fishing sector is mainly artisanal with use of small and medium size canoes and rudimentary fishing gears. Fishers here are mostly Cameroonians (80%) and few foreigners mostly Nigerians, Malians and Tchadians (Tiotso, 2003, Potsma et al., 1993). Fishing is carried out in dams (Lagdo, Mbakaou, Mape and Bamendjin, Maga dams), natural lakes (Lake Chad basin, Barombi, Ossa, etc) and in Rivers (Sanaga, Wouri, Mungo, Nyong, Doume, Logone, Ntem etc).

Fishing vessels here are mainly plank, plywood and dug out canoes which are mostly not motorized and with 2 to 3 persons and 4 to 7m long with majority handpulled. Fishing gears include: gillnets (various mesh sizes), longlines (baited and unbaited), traps and castnet. Some fishermen use large floating gourds (calebas) as boxes for longlines or even as rafts (Van der

Knaap et al., 1991b, Njifonjou, 2000) in fishing. Target fish species include: *Tilapia sp.*, *Lates niloticus*, *Clarias spp.*, *Heterobranchus*, *Auchenoglanis spp.*, *Labeo spp.*, *Mormyrus spp.*, *Hemichromis sp.*, *Mormyrops spp.*, *Alestes marolepidodus*, *Hydrocynus sp.*, *Synodontis*, *Hemichromis fasciatus*, *Heterotis niloticus*, *Citharinus spp.*, *Synodontis spp.* (Nguenga, 2002; Gordon, 1989, Ngwa, 1990).

Data on fishing activities inland is very scanty compared with the marine sector especially for river fishing due to many factors discussed in section (4.4.1). MINEPIA (2005), carried out a frame survey on inland fisheries in Southwest Cameroon. This survey identified 436 canoes, 255 Bottom Gill nets, 147 Surface Gill Nets, 622 Cast nets, 430 barrage nets, 15 beach seines, 1.058 hooks and lines, 1.220 basket traps and 223 other types of gears in the region. In the Mbakao dam, MINEPIA in its 2003 survey identified 39 fishing villages and camps with almost 1970 fishermen of which 1946 were Cameroonians and using 1628 canoes. Women involved in processing were 385 and fish mongers 305 in numbers. Fishing gears included gill nets (7000); lines and hooks, nets and cast nets (2020). In the lake Tchad basin, 4656 canoes, Gill nets (32,867), cast nets (475), lines (5769), seines (149), encircling nets, traps, spears and harpoons, fishing channels, single traps, barrier and fyke traps were identified. These same gears have been identified in the Lagdo dam (Potsma et al. 1993b).

#### **4.2.2. Inland shrimp fisheries**

This fishing is a major activity in the rainforest areas. Down south fishing of the freshwater river prawn is carried out in the coastal rivers of Lobe in the South region, then the Mungo and Ombe in the Southwest regions. The species targeted is *Macrobrachium vollenhovenii* (Gabche et al., 2001). Fishing of this shrimp is done mostly by women in the Ombe and Mungo rivers and by both men and women in the Lobe River in the South. Dugout canoes are used that vary between 6 and 8m in length with 2-3 fishermen. Gears used here are basket traps of various dimensions baited with palmkernel chaff, cassava chaff or leaves (see plate, 7 section 4.3.2.1 below). One fisher can have about 100 to 200 basket traps. These baskets are installed at the river banks in the morning and recovered next day.

### **4.3. Technology for fish capture in marine fisheries**

Technology for fish capture differs with the type of fishing (artisanal and industrial) and with the sector and has already been highlighted in previous sections (4.1.1, 4.1.2., and 4.2.1.). However, some details are given below.

#### **4.3.1. Vessels and gears**

There is a diversity of vessels and gears that are used for fish and shrimp capture in the artisanal sector.

##### **4.3.1.1. Artisanal vessels and gears**

The artisanal vessels are well described in Njifonjou & Mounchipou, (2003) and include:

i/ Small dugout canoes, 4–6 m long using hook and lines to catch mainly catfish and threadfins. These small canoes carry 2 people (see plate 4) and majority are handpulled.

ii/ Medium-sized and plank canoes 7–8 m long (Ghana type) which use set gillnets (100–300 m long, 3–9 m deep and with mesh size of 35–90 mm) to catch croakers, threadfins and other demersal fish. These are either handpulled, sail or engine driven.

lii/ Large-sized planked canoes, 10–12 m long (Ghana type) using special conical shrimp nets locally called ngoto (2.8–5.6 m long) to catch mainly white shrimps (*Nematopalaemon hastatus*). The ngoto nets are common around estuaries of the northern coastal sector of Cameroon. On average, each canoe carries 15–20 ngoto nets with a mesh size of 10 mm. These are engine driven.

lii/ Medium-sized plank canoes, 8–10 m long (Ghana/Nigeria type) which use bonga monofilament gillnets (600–800 m long, 12–16 m deep with mesh size 40–45 mm) to catch bonga (see plate 5) and carry about 22 persons. The Sardinella gillnets are usually 600–800 m long, 10–14 m deep and have a mesh size of 35–40 mm. They are engine driven.

lv/ Plywood Mousgoun<sup>14</sup> canoes installed in Bamusso in 2006 with fishers from the Wouri estuary. These carry out a different type of fishing with equipment not well adapted for use in the sea. These mousgoun vessels each measure 7m long and 1.5m wide. These vessels are essentially very unstable and do not resist sea waves. They are all either handpulled or sail driven.



Plate 4: Dug out canoes (photo Yongbi, 2011)



Plate 5: Awasha fishing boat (photo Yongbi, 2011)

**Other gears include:** the beach seine (also known as drawing net or drawing chain) catches both pelagic and demersal fish in mostly coastal inshore sandy areas; the cast net (locally

<sup>14</sup> Mousgouns originally are traditional inland fishers of lakes and impoundments in the Northern regions of Cameroon. In an attempt by the government to encourage Cameroonians to participate in maritime fishing, in 2006, 30 Mousgoun and their families were moved from the far north to Bamusso in the Bakassi area where they are specialised in shrimp fishing. Others were moved to the Wouri estuary area where they fish in the creeks and estuaries (Total E & P, 2007).

known as mbunja) also used in the artisanal pelagic fishery; hooks and lines mainly to catch barracuda and marine catfish, traps (basket traps: plate 7) and Mbara The “Mbara” is a trap made with mangrove sticks in the creeks provided with a gate and a passage. During high tides fishes get into it and are trapped at low tide. This trap catches all species (plate 6). The basket trap is woven with raffia material and set at the borders of the creeks at low tide and recovered after high tide (Total E & P, 2007).



Plate 6:: Mbara trap in the creeks of Bamusso (photo Yongbi, 2009) Plate7: Basket trap in Bekiri(photo Yongbi, 2009)

#### 4.3.1.2. Industrial vessels and gears

The existing Cameroon fisheries legislation provides that industrial fishing vessels shall not exceed 250 average gross registered tonnage (GRT). The industrial fishing uses otter trawlers, the characteristics of which have changed significantly during the last three decades (Chiambeng & Ngoande, 2011). The fish trawlers use a single net, while the shrimp trawlers use two or four nets simultaneously, one or two on each side of the vessel towed at the extremities of two outriggers. It is worth mentioning that most of these vessels have not been designed and equipped to meet the international standards for fish and shrimp production (Njifonjou, 2002).

The industrial gears are well described in Ogbonna, (2001). In the shrimp trawls used in Cameroon, the netting material is either polyethylene (PE) or polypropylene (PP) and the mesh size in all trawl sections, apart from the codends, is between 33 and 42 mm. The twine diameter is around 1.4 - 1.6 mm in all sections except in the codend which has 1.9 mm or larger. The mesh is all diamond-shaped. The legal codend mesh sizes for fish trawls and shrimp trawls are 70 mm and 50 mm stretched, respectively. A technical sketch of a typical shrimp trawl net is given in Figure 5 .The otter boards are not uniform in weight and dimension and range from: 2.00 - 4.00 m in length, 1 - 2 m in height; and 200 - 270 kg in weight. The backstrops are about 4.5 m long made of steel wire ropes of 14 - 16 mm diameter with G-hooks, the pennants are usually 7.00 m long wire rope steel of 14 mm in diameter with G-hooks and recessed links. Shackles of 21 - 22 mm are used.

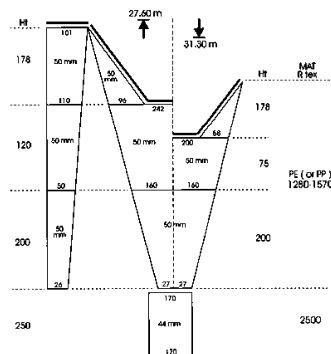


Figure 5: Technical drawing of fishing gear for shrimp trawler operating in Cameroon waters (Ogbonna, 2001)

#### 4.4. Data collection system and interpretation

Data collection and interpretation is an essential tool for the proper management of fisheries resources. It provides useful information on the status of the resources, fishing pressure, reproduction of the various target species amongst others (FAO 2006), for appropriate management measures to be considered.

##### 4.4.1. Collection of data

Presently, in Cameroon there is no data collection system in place for both marine and inland fisheries. The ARTFISH software, designed for collecting data on artisanal landings was put in place in Cameroon in 1998 by FAO and used in the 1995 frame survey. This programme since then has been abandoned. Existing statistics in the artisanal sector are just vague estimations and extrapolations and the actual volume of fish production in this sector is unknown (MINEPIA, reports). Collection of statistical data in both the marine and inland sectors is rendered difficult by many factors including:

- Inadequate funding by government of the MINEPIA regional and divisional services and Fisheries Research Stations responsible for data collection (MINEPAT, 2009)
- The absence of landings of fisheries products in the Douala port by majority industrial fishing vessels fishing in Cameroon waters (FAO, 2007, Chaimbeng & Ngoande, 2011);
- the multiplicity, fragmentary nature of distribution and difficult access to majority of the fishing camps both inland and along the coast. For instance, most fishing camps in the maritime sector are localized in enclaved mangrove forests accessible only by sea (e.g. Bakassi) (MINEPIA Frame survey, 2009).
- Insufficient man power for data collection. MINEPIA agents responsible for data collection are also expected to collect alongside landing taxes for fisheries products. They are expected to match the volume of product landed with amount of revenue collected such that sometimes they forget registering part of the landings and their corresponding taxes. Fisheries Research Stations too lack manpower for effective data collection and research and most of the times use MINEPIA field staff.

We find that most of existing data has been collected within the framework of a University Thesis (Ph.D and MSC.) in foreign universities through grants, then obligatory EIA's, and regional, subregional and international projects (GCLME, FAO, SLP, WorldFish etc) funded

through government institutions. However, the government too in its little efforts has contributed to some data collection through relevant institutions (IRAD, MINEPIA, MINEPAT etc).

#### 4.4.2. Interpretation of data

Data analysis is mostly carried out by scientists of the Research Station for Fisheries and Oceanography Limbe (SRHOL) and the Fisheries Research Station Fouban in collaboration with MINEPIA scientists for both marine and inland fisheries. For the marine fisheries sometimes this is done with the assistance of regional workgroups (e.g. FAO/CECAF<sup>15</sup> regional task work groups), regional projects (GCLME) or international workshops (IOC). Data collected is mainly: catch data, effort data, biological data, and environmental data (Djama, 1992). Catch and effort data are useful in assessing the fish stocks. In these assessments the use of fishery models: the Surplus production models (Shaefer, 1954) and Dynamic pool models (Beverton and Holt (1957) and others are imperative. There exist under the GCLME project, regional specialized laboratories for analysis of data. The centre for biological data (stomach content) is in Angola and that for productivity in Accra while that for tele-detection is in Nigeria (Source: GCLME Newsletters). In cases where data is collected through international projects, and EIA's these are analysed within the framework of the projects.

#### 4.5. Post harvest techniques

Postharvest treatment of fishery products is not well developed in Cameroon due to lack of appropriate infrastructure for the commercialization of fresh products (Eyabi Eyabi, 1994). However, artisanal techniques are used mostly with the artisanal fishery sector where  $\frac{3}{4}$  of the products landed are smoked due to lack of cold storage facilities in the case with marine fisheries. This sector employs a good number of people and involves mostly women (MINEPIA Frame survey, 2009)

The most common techniques used are sun-drying and smoking (Eyabi Eyabi, 1995). These techniques are still rudimentary all over the country and their utilization depends on the geographic conditions of the area. Smoking is mostly in the littoral and forest zones (low humidity conditions) and concerns mostly small pelagics like *Ethmalosa fimbriata* and *Sardinella maderensis*. The technique involves the use of traditional Banda that are either open, or covered on the sides with zinc and of either mangrove wood (Bakassi and Douala areas) (see plate 8) or rubber wood (Limbe area). Sun-drying is practiced in the north due to the hot nature of the climatic conditions with low humidity.

Slow Refrigeration is a method used (2 to 3 days) mostly in the Littoral and South regions by fishers who destine their catches for inland markets (Chiambeng, 2011). Fresh fish is caught and stored in ice boxes (old fridges) containing ice blocks at sea for 2 to 3 days. Then carried to

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<sup>15</sup> There are two FAO/CECAF Working Groups. One is on Small pelagic and another on demersal resources. The overall objective of the working group is to assess the status of the small pelagic and demersal resources and recommend management and exploitation options aimed at ensuring optimal and sustainable use of these resources.

the landing sites and sold to fish traders from inland cities like Yaounde, Edea, Douala etc. There is a network of fish mongers who move from fishing port to fishing port with ice boxes buying fresh fish which they carry back to markets and sell fresh.

Fish cold stores do exist in township areas. In Douala and Yaounde especially have large cold rooms for storing fresh products which are retailed to customers. Fresh fish destined for Yaounde and other cities is transported in isothermal trucks, ice coolers and sometimes in drums.



*Plate 8: Traditional smoking Banda (photo Yongbi, 2010)*

Post harvest losses are mainly in the artisanal sector and have generally been estimated at 15% by most experts and quantified at 20,230tons (Njifonjou & Pierre, 2009; Koane 2007). In addition to non use of ice storage facilities at sea by fishers low use of improved ovens for smoking by fish smokers in majority fishing camps increase these losses.

Majority fishing camps lack electricity (especially Bakassi area), not to mention ice producing facilities such that fishers go out fishing for long hours at sea without cold storage facilities (MINEPIA Frame survey, 2009). A good example is the Ghaniain Purse seine (Awasha) that sometimes return late night and have to discard more than half of their catches (hundreds of kilos) due to spoilage (Chiambeng & Holvoet, 2008).

Improved ovens for smoking are also scanty especially in the Bakassi area where production is highest. Traditional ovens used involve much heat loss, high wood consumption and long duration smoking time. This technique is often accompanied by fire disasters, loss of product or poor quality finished products and women fish smokers often complain of various illnesses including eye problems (Eyabi Eyabi, 1994). It is also, accompanied by massive deforestation of mangrove forests especially in the Bakassi area which is very bad for sustainable management of the fisheries given the important role played by mangroves in fisheries (nursery ground for fishes) ( FAO, 2005) .

Loss of product, poor quality product and illnesses all contribute to reduced income and increased poverty for the fishers and women actors. In an attempt to reduce these losses the

Fisheries Research Station (IRAD, Limbe has improvised improved Chorkor ovens<sup>16</sup>, and local ice boxes that are presently being vulgarized (Eyabi Eyabi, 1994).

#### **4.6. Monitoring Control and surveillance**

Decision n° 024/MINEPIA du 15 February, 2006, provides the modalities for MCS in the fisheries sector. Following this decision, a control brigade for fishing activities has been set up in the Directorate of fisheries (DPA). It is the BCSAP (Control Brigade) that has the task to put in place an MCS system for Cameroon. The VMS (Vessel Monitoring System) satellite system in place is the ARGOS system. In 2007, 70 transceivers were installed on industrial fishing vessels which were being controlled to some extent. During this period some stakeholders who violated the 3 nautical mile limit were brought to order (Pers comm. MINEPIA Delegate for Littoral). Presently, BCSAP and its decentralized services have limited means to execute its mission because it lacks a coastal command centre, a limited number of operational tools and sufficient finances.

Procedures for collecting quality data for efficient monitoring and control are practically non-existent. It is therefore necessary to develop and put in place tools to guarantee monitoring and effective control. In light of the above, the fisheries administration decided to acquire smaller vessels to reinforce the ARGOS system. Today, most boats have transceivers and the installation of transceivers has become a prerequisite for the issue of licenses. Notwithstanding, MCS is little operational in the coastal waters of Cameroon (Source MINEPIA).

#### **4.7. Human resource availability/capacity building**

The Research Station for Fisheries and Oceanography Limbe (SRHOL), the Marine Ecosystem Research Center in Kribi (CERECOMA) and the Aquaculture Station in Foumban have nine researchers trained in the field of fisheries sciences to the level of M.SC (Master of Sciences Degree) and Ph.D. (Doctor of Philosophy) and in foreign universities. There are about 15 technicians with qualifications ranging from Advanced Level GCE (General Certificate of Education) to B.SC (Bachelor of Sciences Degree) in the science field. Many of the researchers in the field are gone on retirement and those remaining are close to retirement. Others have left the service in search for better remunerations in regional projects and international organizations. There has been no recruitment of researchers and technicians for long in the public service such that the sector presently is impoverished in research and technical staff.

MINEPIA the responsible ministry for fisheries has field staff trained in fisheries and aquaculture to diploma level from the local fisheries schools (e.g.in Foumban). These MINEPIA staff are distributed in the different regional and divisional offices and assigned with the task of following up fishing activities mainly collection of data on landings and taxes. Even with MINEPIA, the level of staffing is inadequate and there is need for more trained personnel on the field.

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<sup>16</sup> IRAD improved ovens are of two types. There is the hybrid brick oven and the hybrid block oven. Smoking hours were found to reduce from 40hours with the traditional Mbanda to 10hours with the hybrid block and 8hours with the hybrid brick. Also, wood consumption was 1/25<sup>th</sup> and 1/20<sup>th</sup> with the brick and the hybrid block ovens respectively and 1/8<sup>th</sup> with the traditional Mbanda. (IRAD, Batoke, 2005)



Training to degree level in the field of fisheries recently started with the creation of a Department of Fisheries and Hydrobiology in the University of Buea since 2008 and of the Institute of Fisheries Sciences of the University of Douala created 1992 which just became operational in 2010. The University of Dschang too has been training in aquaculture over the years as well as the MINEPIA Fisheries school in Fouban and the Forestry school in Mbalmayo. The HIPC initiative has come up with the creation of two mass Training Centers for young fishermen in Douala and Limbe to train at least 100 fishermen every six months, organize them in fishing groups and support them with small loans. Additional efforts to build capacity has all along been through training workshops, seminars, short courses and degree programmes within and out of the country sponsored by subregional, regional or international institutions (GCLME, WWF, FAO etc).

Presently, manpower is available with graduates from the University of Buea, Dschang and the MINEPIA fisheries schools and we expect that the present recruitment schedule announced by the government (25 000 youths to be employed) will give some consideration to the fisheries sector.

There is no academy in Cameroon that trains in navigation. However, most Cameroonians in this field received training abroad in the Regional Academy in Tema Ghana of which Cameroon is a partner. However, through cooperation with the Spanish government, a marine Academy has just been built in Limbe and is awaiting inauguration.

#### **4.8. Research Activities and Marine Protected Areas**

##### **4.8.1. Research Activities**

Fisheries and aquaculture research are carried out mainly by the Research Station for Fisheries and Oceanography, Batoke (SRHOL), Limbe, the Aquaculture Research Station in Fouban, the Centre for Marine Ecosystems Research in Kribi (CERECOMA). All of these are under the Institute of Agricultural Research for Development (IRAD) of the Ministry of Scientific Research and Innovation, (MINRESI), Yaounde. Other, academic institutions include: the University of Buea with its department for Fisheries and Hydrobiology since 2008, the University of Douala with its Institute of Fisheries Sciences that trains in various disciplines of fisheries and recently inaugurated in 2010 and the University of Dschang. Additional research is done through projects in cooperation with international bodies (Centre for International Cooperation in Agronomic Research for Development (CIRAD), German technical cooperation agency (GTZ), Department for International Development (United Kingdom)(DFID), FAO, WWF, UNIDO etc), regional and subregional organisations (GCLME).

Five major fields of research are envisaged at the Research Station for Fisheries and Oceanography in Limbe (SRHOL). These include:

- Knowledge on fisheries and aquaculture potentials of Cameroon waters;
- Improvement of traditional fishing methods;
- Studies on biological cycle of main exploited species,
- Post harvest technology,
- Socio-economics.

However, the Ministry of Livestock, Fisheries and Animal Husbandry (MINEPIA) does carry out research on aquaculture together with the Fisheries Research Station in Foumban. This research is focused mainly on fingerling, table fish production, and feed formulation. CERECOMA carries out research on marine ecosystems involving marine ecology, and protection of marine environment and coastal ecosystems. All along there has not been any strategy document for fisheries research in Cameroon. It is only recently, through the assistance of ACPFISH-II project that a strategy document for research in the fisheries and aquaculture sector has been elaborated<sup>17</sup>.

#### **4.8.2. Marine protected Areas (MPA's)**

There are diverse marine habitats along the coastline of Cameroon and most of these require protection from anthropogenic activities to guarantee biodiversity conservation and the sustainability of the marine and coastal living resources. In Cameroon there are no well defined marine protected areas. Most of the marine protected areas include components of the coastal forest. Marine and coastal protected areas and their current status are illustrated in the table 4 below. We find that there exist sensitive marine areas requiring protection like the Cameroon estuary mangrove and the Ntem Estuary mangrove areas which have not been declared protected areas.

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<sup>17</sup> *The Strategy for Fisheries and Aquaculture research in Cameroon was validated on the 26<sup>th</sup> April 2011 in IRAD, Yaounde sponsored by ACPFISH-II project. All stake holders in the sector were represented (MINEF, MINEPIA, MINDEF, MINEPAT, MINTRANS, SAPEMA, NGO;s etc). From this document, projects can be written up, costed and funded for the development of the sector.*

Table 4: Marine and coastal Protected Areas in Cameroon (Chiambeng, 2006)

Marine Protected area	Status
1/ Douala-Edea faunal reserve	Protected: includes a subtidal component: Douala-Edea faunal reserve at the mouth of the Sanaga River (Worldbank, 1993, Robinson and de Graaf, 1992, IUCN/UNEP (1987) both cited in IUCN, 1995.
2/ Campo faunal reserve	Protected: may not include intertidal habitat. Worldbank, 1993, IUCN/UNEP (1987) cited in IUCN 1995.
3/ Cameroon estuary mangrove area (Tiko-Douala area)	Sensitive area requiring protection
4/ Ntem Estuary mangrove area	Sensitive area requiring protection
5/ Bakassi peninsula mangrove area	Proposed: mangroves at the mouth of the estuary of Rio del Rey and Akwayafe river (IUCN, 1987, Worldbank, 1993a).
6/ Mount Cameroon forest reserve	Recently gazetted in 2010

#### 4.9. Financing in the sector

Most activities are financed by the government and international organizations. Despite claims by the government of the importance it attaches to the fisheries sector, funding of the sector is very limited compared with other ministries. In 2009 MINEPIA received a running budget of 9,7 milliards F.CFA ( HIPC included) and 5,9 milliards F.CFA as public investment budget (HIPC initiative included) which is about 1,2 % of BIP and 10 times less than that for MINADER (MINEPAT, 2009). From this budget, the Fisheries Department was allocated a running budget of 718 million F.CFA of which 191 million was for salaries and diverse advantages (*MINEPAT, 2009*). Fisheries research institutions are financed through the Ministry of Scientific Research and Innovation (MINRESI). In the same year the Research Station for Fisheries and Oceanography, Limbe received close to 30 million FCFA for research and payment of salaries (Source: Annau report IRAD, Limbe, 2010). Poor financing of the fisheries sector is contributing significantly to poor management and degradation of the resources.

The Ministry of Livestock, Fisheries and Animal Industries (MINEPIA) and its attached structures: the Marine Artisanal Development Authority (MIDEPECAM), finance support to small scale fishermen; specifically MIDEPECAM is in charge of training, construction and supply of fishing equipment to fishermen; and the Fund for Development of Marine Fisheries (CDPM), funds activities of the Ministry of Livestocks that cannot be achieved under regular government budget.

There are other local organizations<sup>18</sup>, NGO's and International Institutions (FAO, UNIDO, UNEP, ICLARM/WorldFish etc) that finance the sector. They have provided assistance to the sector through financing of projects at regional and sub-regional levels, capacity building and infrastructure (GCLME project, FAO Fisheries and HIV/AIDS project etc). Different governments too have contributed. This is the case with the Japanese government that financed the construction of the Kribi landing site and the Spanish government that has financed recently the construction of a Marine Academy still to be operational in Limbe( Source: MINEPIA). Cooperation with French government has recently led to the financing of capacity building and sustainable livelihood activities through the CDD project (Debt Engagement Contract with the French government) currently in operation.

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<sup>18</sup> *The fisheries sector in Cameroon does not benefit financing from banks probably due to its consideration as being a high risk sector. Other funding bodies include: PAJER-U (Support Programme for youths in Urban and Rural areas), Micro financial institutions like MC<sup>2</sup> (Mutual Community Growth financial institution) and ADPAM Project (Support to the Development of Artisanal Marine fisheries) that finances training, equipment and provides small credit schemes. The amount varies between 200 000 and 2, 090, 900FCFA (MINEPIA Enquete cadre, 2009).*

## **CHAPTER 5: Major threats to Fisheries Management**

Major threats to fisheries management include amongst others, IUU fishing, habitat degradation, Pollution and Climate Change.

### **5.1. Illegal, Unregulated and Unreported Fishing (IUU)**

#### **5.1.1. Theoretical analysis of the problem**

IUU constitutes one of the most serious threats to the sustainable exploitation of living aquatic resources and marine biodiversity. It causes depletion of fish stocks and future stock growth and damages the marine environment by overfishing and irresponsible fishing practices and techniques. Socio-economically, depletion of fish stocks reduces the size of catches which in turn contributes to lower turnover and eventually job losses. It also, contributes to unfair competition among those operators who abide by the rules and those who do not and causes serious overall consequences for coastal communities and in particular those in developing countries who rely to a large extent on fisheries (Ministerial-led Task Force on IUU Fishing, 2006).

#### **5.1.2. The IUU dimension in Cameroon and impact on fishery resources, production**

The dimension of IUU in Cameroon is very high and thus impacts negatively on the fisheries resources (resource degradation) and fish production (decreased production and low income) (FAO, 2007). It is perceived differently according to the type of fisheries.

##### **5.1.2.1. Industrial fisheries**

At the level of industrial fisheries, illegal fishing, piracy (fishing without licence) is a major problem that has been reported by professionals of the sector. It seems as if, the Cameroon waters, is subject to much pirate fishing<sup>19</sup> due to poor monitoring. Another problem is the use of illegal gears notable small mesh size nets, and the practice of pair trawling by vessels of Chinese origin already discussed in previous sections. Also, fisheries products are landed illegally in foreign countries whereas the law obliges that all industrial landings be done in the country and if need be their exportation be done following normal customs procedures (Doufissa, 2007). This illegal practice is accompanied often by transshipment at sea - a practice banned by the fisheries regulation.

These trends were aggravated strongly following « auto-suspension » of Cameroon in 2004 from the list of countries recommended to export fishery products to European Union. There is good prove to think that a very high percentage of shrimps caught in Cameroon is transported to

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<sup>19</sup> *Pirate vessels have only been documented in Cameroon since 1989 with arrest of 9 pirate boats (FAO, 2007). However, recently MINEPIA and the military have been arresting vessels especially around Douala and Kribi mostly for violating the 3 nautical mile distance. There is an additional problem of security at sea as a result of sea pirates, who attack fishing vessels, with automatic rifles, torture the crew and seize catches and money in the Bakassi area (MINEPIA reports).*

Nigeria illegally, from where they are exported to EU under Nigerian label<sup>20</sup> (Chiambeng & Ngoande, 2011).

Finally, the three nautical mile zone for vessels less than 250TJB is regularly transgressed and there is illegal trawling in this waters resulting to direct conflict with artisanal fishers, with the trawlers destroying their nets (Djama, 1992).

The coastal zone is an ecologically sensitive zone, and trawling in this zone is susceptible of destroying small commercial important juvenile fishes and capture of bycatch which are often thrown overboard under the eyes of the artisanal fishers themselves. At the level of undeclared fishing, we find a series of problems that have already been highlighted above. These comprise transshipment at sea and illegal landing abroad which have as immediate consequences underdeclaration of actual catches. Illegal transshipment involves bags of young fish that are often seen in canoes of artisanal fishermen who go out with money or gifts after arrangements with the vessel captains and exchange for fish (illegal sales at sea) ((Eyabi Eyabi, 1995, Chiambeng, 2010a). To this adds the practice of discarding a great portion of catches overboard – bycatch which is not taken into account in the national statistics, due to lack of log books on vessels. In the same line, some vessels have escaped the Douala port, gotten immatriculation in Limbe and land their catches unofficially in the Tiko military and commercial port. Even though fisheries service exists in Tiko, the landings effected are not well documented and don't really reach the integrity of the national statistics.

In terms of illegal fishing, we note first the absence of a mechanism and measures of application of the law. The absence of fisheries inspectors as well as a command centre for BCSAP. This vacuum contributes directly to indiscipline in the sector, and non respect of the law. Finally, there is absence of a management plan, effort limitation, regulation of bycatch, three key elements which for longtime exist, and which have been identified and underlined in diverse sectorial studies since at least 5 years (ACPFIS-II, 2011).

#### **5.1.2.2. Artisanal and semi-industrial fishery**

At the level of illegal fishing, the use of inappropriate and banned fishing gears is a problem. For fishing gears we find very small mesh size fishing nets widely distributed along the fishing camps and also fishing practices with explosives and chemicals. Fishing is also done with use of fish as bait. All these are not environmentally friendly for the sustainability of the coastal marine resources (FAO, 2007).

Also, most operators in the sector use non immatriculated vessels and work without licenses for fishing. To this adds the significant numbers of foreigners of the sub-region (Nigeria especially then Ghana) in the artisanal marine sector (Total, E & D, 2007, Djama, 1992, Njock, 1990, MINEPIA Frame survey, 2009). They reside and operate illegally in Cameroon and export a

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<sup>20</sup> This illegal export is confirmed in FAO (2007), where it is estimated that 49 of 52 shrimpers (94%) licensed that year are Nigerian boats having export agreement with the EU. In addition, Njifonjou & Henry, (2009) estimated that a total of 121,133 tons of pelagic species; 12 000 tons of shrimps and; 1 800 tons of demersals for an estimated cost of 13 894 625 000 frsCFA are illegally exported to Nigeria in the maritime sector.

significant portion of their catches (unknown) illegally to neighbouring countries (Nigeria mostly). Finally, in return there is illegal importation of fishing inputs in form of contraband goods.

An illegal activity linked to exportation of smoked fish is the illegal felling of mangroves for smoking of fish. The effects are devastating on the coastal ecosystem especially on productivity and promoting coastal erosion (WWF, 2005).

In terms of undeclared fishing, it is important to note the absence of a data collection, centralisation and consolidation system on artisanal catches. Outside this consideration, the number of fishers and gears are not well documented in the marine and inland fishing. Illegal exportation, as result of better subregional markets, contributes to the poor mastering of the quantity of fish captured in this sector.

At the level of non-regulated fishing, we note a poorly functional system for deliverance of licences making control of artisanal activities impossible – possession of permit by each artisanal fisher is one of the conditions to begin control in the sector.

We also note here the absence of effort limitation, as well as limitation of number of strangers in the different fishing methods. To this adds the absence of management or co-management plans (*ACP FISH-II, 2011*) contributing to resource degradation and poverty.

### **5.1.3. Strategies for tackling the problem nationally, regionally and internationally**

The International Action Plan (IUU) in its articles 25 to 27, encourages states to develop their NAP-IUU in consultation with all actors of the sector, including regional management organisations. The NAP-IUU (National Action Plan-IUU) has been produced for Cameroon under the assistance of FAO (2007) in consultation with actors of the sector, notably the artisanal fishers, fishing industries and Syndicate of Maritime fishers (SAPEMA). Civil Society bodies involved in Environmental protection also took part together with various administrations in the sector (Ministries of Transport, Defense, Environment and Fisheries). One of the main points diagnosed within the NAP-IUU is the lack of concertation, collaboration, within and between various administrations. This paralyzes initiatives by other ministries contributing to development of the sector (FAO, 2007).

There is need to incorporate the recommendations made in NAP-IUU within the new proposed fisheries legislation for implementation to mitigate IUU fishing. Implementation will require that:

- MCS be reinforced and that,
- issues facing the different administrations as well as those requiring direct collaboration between administrations be identified with respect to the different problems and that an inter-administrative consultative body be created, to discuss at the highest level, measures to be taken, and ensure that organs responsible for execution of these measures are delegated power to do so - within the framework of decisions and dispositions taken by the ministry.

Internationally, IPOA-IUU, in its article 28 to 31 encourages co-operation amongst states on

- Information exchange with log books;
- Data collection during fishing operations ;
- Control of fisheries agents ;

- Technology transfer and harmonisation of regulations.

The problem with Cameroon is the fact that data in the sector is incomplete as a result of illegal landings abroad and even existing data are not coordinated and not centralised and where it is available it is not shared between the different administrations automatically (FAO, 2007). The creation of a regional/subregional MCS will be a good strategy in resolving this problem. Within the framework of this brigade, there will be direct collaboration on transboundary problems which are a priority for Cameroon at the moment. Also, it is important for Cameroon, to continue to participate actively in present sub regional initiatives to harmonise fisheries regulations and at level of MCS. Cameroon should also ratify within the nearest delay, the United nations Accord relative to overlapping stocks (UNFSA) and FAO Accord with respect to respect of international measures (CA, 1993). Then analyse the main new principles that tie within the Cameroon context from the accords and introduce them in the new proposed legislation.

## 5.2. Habitat Degradation

The Cameroon coastal and marine environment suffers from habitat degradation mainly as a result of deforestation, pollution, climate change and the use of inappropriate fishing gears and methods.

### 5.2.1. Deforestation

The mangrove forest is a site for intense sand mining activity especially in the littoral region. Youths without employment excavate sand which they sell out for building construction (SNH, 2009). The transformation of fisheries products also, is accompanied with large scale destruction of mangrove trees for fish smoking either by men or women, building construction and fishing (see plates 9 & 10). The impact is more in the creeks because of the lack of cold storage and ice production facilities to promote the marketing of fresh products (Chiambeng & Holvoet, 2008, WWF, 2005). In addition, some members in the communities are specialized in illegal export of mangrove wood to Nigeria (Total E & P, 2007). Sand mining, smoking of fish, building construction and export of mangrove wood contribute to the destruction of the mangrove ecosystem. This coupled with increased urbanization (Douala area) have led to immense deforestation and degradation of this precious ecosystem.



*Plate 9: Deforestation of mangrove Wouri (photo Folack, 2007) Plate 10: Mangrove wood Bakassi photo Yongbi, 2008)*

### 5.2.2. Pollution



There are many different sources and types of pollution in the coastal zone of Cameroon that contribute to resource degradation. These include: Sewage pollution, chemical pollution, thermal pollution, radioactive pollution, pollution by solid wastes and pollution of marine origin (E & D, 2009).

#### **5.2.2.1. Sewage pollution**

This occurs when domestic sewage from households along the coastal zone is discharged into the sea. These wastes in liquid form will be diluted with the sea water changing its quality. The hotspots for such pollution are: Douala, Tiko, Limbe, Edéa Kribi and fishing communities at Bamusso, Isangele, Njangassa, Yoyo, Bakassi, Ekondo Titi. Domestic sewage contains bacteria (coliforms), fungi and protozoans which also constitute a source of bacterial pollution (Folack, 1995)

#### **5.2.2.2. Chemical pollution**

This type of pollution is as result of the multiplicity of chemicals that are used in the coastal zone. The hot spots for this pollution are: Douala, Edéa, Tiko, and Idenau (E & D, 2009). Other origins of chemical pollution are port installations, waste water from port infrastructure, then pesticides and herbicides from agro-industrial companies like the CDC, HEVECAM, SOCAPALM. etc. that utilize great quantities of fertilizers and pesticides which are eventually transported to the sea by rivers. The hot spots for this are: Tiko, Mondoni, Niété, Idenau.

#### **5.2.2.3. Thermal pollution**

This results from industrial plants that utilize waters for cooling their systems and these are discharged into the sea at temperatures different from that of sea water. Hotspots along the coast for this pollution are: Douala, Tiko, Mondoni, Idenau, Limbe, Niété (Folack, 2007).

#### **5.2.2.4. Radioactive pollution**

This results from radioactive substances and is common in laboratories and hospitals that utilize radioactive substances for research and health purposes. In Cameroon there is a law that regulates the utilization and transport of radioactive substances. Hotspots for such pollution are Kribi (Tchad-cameroon pipeline), Douala (Folack, 2007).

#### **5.2.2.5. Pollution from solid wastes**

These comprise solid wastes from municipalities and industries that are dumped into the environment and eventually reach the sea. This pollution is common in coastal cities like Douala, Limbe, Tiko, Edéa, Kribi (Gabche et al., 1998).



*Plate 11: Solid wastes at beach in Kribi (Photo Folack, 2007)*

On the other hand, we find solid wastes like plastics, pieces of nets, glassware, cans (marine debris) which can be harmful to sea birds, and marine mammals and big fishes in cases where they are misidentified for prey (see plate 11).

#### **5.2.2.6. Pollution of marine origin**

Pollution of marine origin is as a result of activities that take place in the sea: petroleum exploration and exploitation, hydrocarbon transport etc (see plate 12). These activities discharge toxic substances (drilling muds, production waters, oils etc) that contain heavy metals which could be incorporated into the food chain and affect fish and humans eventually. Hot spots for such activities are: Bakassi, Kribi, Souelaba.



*Plate 12: Oil platform at Ebome, Kribi (Photo Folack, 2007)*

Also, many activities carried out aboard fishing and transport vessels at sea too can contribute to the degradation of the environment and the fisheries resources through pollution. The main sources of this pollution are: Hydrocarbons (fuel and lubricants), diverse paints (heavy metals), cleaning and repairs solvents, waste water, organic compounds, soap and detergents (phosphates and surfactants)(Folack, 2007).

#### **5.2.3. Climate Change**

The impact of climate change on the fisheries resources has not been well documented. However, the present degradation of the coastal mangrove ecosystem has been partly attributed to effects of climate change (Ajonina, Pers comm.) and this would affect fisheries resources indirectly since mangroves have a direct link with fish production (WWF, 2005; SNH, 2009). At the level of fishing camps we find that sea level rise and wave action has resulted to increased flooding with loss of life and material especially in the Littoral and Southwest regions.

In the Littoral region, the effect is most pronounced in Cap Cameroon, where major installations by government, homes, and schools have been destroyed and most of the land permanently occupied by water (Chiambeng & Holvoet, 2008). In the Southwest region this action is prominent in Bamusso, Adiata, Barracks. In these camps fishers attempt to fight flooding by building “Make Shift houses” (see plate 13) on stilts using mangrove wood, and construct local bridges that serve as pathway for movement from one end to the other in the camps (Chiambeng, 2011). Increase in sea water temperature<sup>21</sup> too has been documented within the framework of the Dr Fridjof Nansen surveys along the Cameroon coastline (Krakstad et al. 2004, 2005, 2006). This can impact on primary and secondary production with the disappearance of some species that may be important to the ecosystem (Yaqub, 2000). There is need to give consideration to research in this aspect for sustainable management of the resources.



*Plate 13: Make shift homes and traditional bridge pathway in Kange fishing port (Photo Folack, 2007)*

### **5.3. Over Exploitation and poor management**

#### **5.3.1. Marine fisheries**

The fisheries resources of Cameroon marine waters are either fully exploited or in state of over-exploitation. This over exploitation has been demonstrated in many findings including Djama et Pitcher, (1997, 1989); Njock, (1985, 1990, 2000, 2001); Djama, (1988, 1992, 2004) etc. Analysis of biological parameters of some exploited species in the coastal waters of Cameroon and comparing the values of these population parameters (especially L infinity) with the existing lengths observed in fish landings revealed that the scianids (croakers) are being overexploited whereas the clupeids

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<sup>21</sup> Nansen Survey results show that between 2004 and 2006 temperatures increased from 27.5°C to 28.8°C in Limbe, 27.4°C to 29.2°C in Wouri estuary, 27.2°C to 28.6°C in Kribi and from 27.2°C to 28.4°C in Campo (Krakstad et al. 2004-2006).

(*Sardinella spp.*, *Ethmalosa fimbriata*) mostly exploited by the artisanal fishery are comparatively fully exploited and in a much better shape (Djama, 1988). In another study, Njock, (1990) found an estimated MSY of approximately 18000 tons of fish per year for an effort of about 2300 fishing days for eight target demersal species *Pseudotolithus spp.*, *Cynoglossus spp.*, *Galoides decadactylus*, *Pentanemus quinquarius* and *Arius spp.*). In his analysis he also found that their exploitation rate was above 0.5 indicating that they were already in a state of overexploitation. A similar situation was demonstrated with catch data on croakers (*Pseudotolithus spp*) from Cameroon within the framework of the CECAF working group on the assessment of demersals in Sierra Leone 2008. The Current fishing mortality was 271% higher than the fishing mortality at MSY. The current biomass is 59% higher than that at MSY (0.1) indicating a situation of over-exploitation (CECAF working Group Report, 2008). Regular update of the stocks is necessary for proper management. There are difficulties assessing shrimp status using any scientific models due to mixed data since shrimps catches landed are not segregated into different species by the responsible scientists (recorded generally as crustaceans). However, the trend in catches has decreased significantly from 942 tons in 1970 to 236 tons in 2010 indicating over exploitation (MINEPIA reports).

In Cameroon's fisheries, the common tools of management are controlling mesh sizes, minimum sizes for some species, prohibition of some gears and limiting access to the coastal zone by industrial vessels in the fishery to protect vulnerable coastal resources (especially juvenile fish) and reducing conflict. Cameroon does not yet have the capacity to limit authorized access to the resources for both the industrial and artisanal sectors (Djama, 1992). There is lack of control of fishing activities both in the industrial and artisanal sectors (fishing zone, gears, mesh sizes) resulting to fishing in nursery zones and the excessive capture of juveniles. In the marine environment, this is aggravated by the practice of Pair trawling<sup>22</sup> by Chinese trawlers (prohibited since 2000 in Cameroon waters) which has contributed significantly to the degradation of the stocks. Also, industrial vessels with exception of some Time Charter boats are not equipped with environmental friendly technologies<sup>23</sup> By-catch Reduction Device (BRD), Turtle Exclusion Device (TED) to guarantee sustainability of the resources (Njifonjou, 2002). These issues are of prime importance because it shows that operators are not adhering to the law and encourages all other stakeholders in the sector to act according to their own interests. There is no mechanism in place to control fishing effort and there is unregulated entry and exit of pirate boats into Cameroon waters. Catches are landed abroad resulting to biases in the national catch statistics for fish production. Also, there is no implementation of "closed seasons" and Marine Protected Areas (MPAs) are limited.

There is poor control over licensing and no regulation for false declarations - for example of tonnage. Many vessels declare false tonnages and operate without licenses onboard either all the

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<sup>22</sup> Order N0. 0025/MINEPIA/DIRPEC/SDEPIA/SP of 16th February, 2000 bans pair trawling in Cameroon waters while Law No. 94/01 of 20<sup>th</sup> January 1994, chapter 2 in its article 12.bans use of explosives, electric fishing, fire arms, chemical substances in fishing (Doufissa, 2007)

<sup>23</sup> Chiambeng (2008) working on an industrial shrimper in the Cameroon waters (Agha Heleni) estimated the following composition with shrimp trawl landing: Discards (25%) Plastics and plant material (15%), Fish (46%), shrimps (6%) and others mostly crabs (8%).

year or for most of the year. FAO (2007) analyzed licensing for 2004, 2006 and 2007 and found that:

- i/ Some operators fraudulently declared tonnages less than the real tonnage of the vessels they were operating;
- ii/ No vessels were licensed in 2006, but many vessels continued to operate normally without licenses;
- iii/ Licenses were given to operators late in 2007 (May), meaning that vessels operated for 5 months without licenses. This situation repeats itself each year.

The dominance of foreign fishers in the fishing population (e.g only 17% Cameroonians in the artisanal sector) makes it difficult to ensure that the foreigners apply the regulations of the nation where they operate (MINEPIA Frame survey, 2009).

The existing MCS does not have the minimum tools or finances necessary to function. A system of data collection for efficient monitoring and control are practically non-existent. This is also the case with the installation of observers.

#### **5.3.1.1. Strategy for tackling the problem**

FAO, (2007) proposed the following recommendations to improve on the resources:

- i) Developing a programme of scientific observer onboard vessels which involves training and installation of observers;
- ii) Installing and improving the scale of data collection on all industrial vessels in collaboration with other administrative departments at ports. This will involve the institution of an official log book onboard industrial fishing vessels for regular declaration of catches by operators;
- iii) Implementing new technologies (BRDs & TEDs) for industrial fishing vessels;
- iv) Finalising the installation of ARGOS transceivers and making operational the VMS system;
- v) Reinforcing MCS through an effective system of vessel monitoring, registering of vessels and proprietors, training of control agents and planning, financing and establishing a system of data-sharing and archiving;
- vi) Installing a system of radio communication with industrial vessels that permits BCSAP (Control Brigade) to communicate directly and at all times with fishing vessels.
- vii) Establishing a command office in Douala for monitoring fishing activities, under the direct command of BCSAP, with an integrated radio communication system, VMS terminals, and a database permitting the centralization of information on activities and monitoring of the sector.

#### **5.3.2. Inland fisheries**

The state of exploitation of the inland fishery is poorly documented. However, observations have been made on decreased landings in most impoundments and lakes inland indicating resource depletion (Source: MINEPIA reports). Postma et al. (1993a) observed decreased fish production

in the Ladgo dam between 1990 and 1991(11 000 t to 10 675tons). This tendency has remained all along and in 2004 production was at about half its 1990 value (6000 tons: Pers comm. MINEPIA Staff Lagdo). The same holds with the other dams. In the Lake Tchad, Onuoha (2008) indicates decreasing resources as a result of many factors including over exploitation. This decreasing trends in production is an indication of over-exploitation. Research is required to determine the actual status of these resources before management measures are taken.

## **5.4. Conflicts in the fisheries sector**

Conflicts are at two main levels in the marine sector: Over the resource amongst fishers and at institutional levels.

### **5.4.1. Over the resource**

#### **5.4.1.a. Marine fisheries**

The 3 nautical miles exclusion zone for industrial vessels of less than 250TJB is regularly subject to transgressions and illegal trawling. Physical interactions include gear destruction caused by trawlers trawling on canoe fishing grounds (Djama, 1992). This conflict is a result of competition for the same resources in the same fishing grounds and the effects of encroachment have been detrimental to artisanal fishermen, not only with regard to the destruction or loss of their fishing gears, but because trawlers also catch a large quantity of small fish on coastal fishing grounds impoverishing their resources. Conflicts do exist also in the artisanal sector over fishing grounds between the stationary Bottom Gill Net (BGN) and drift BGN. Most often the drift BGN gets entangled with the stationary BGN resulting to conflict. This is very common with the Mousgoums in the Bakassi area (Total E & P, 2007). In Cap Cameroon too, there is constant conflict between migrant fishers and Cameroon Mousgoun fishers from Magba and Bankim, close to the Mape dam who recently installed themselves to carry out fishing. This conflict is over access to the resources (fishing grounds) and most of the time ends up in a deadly fight and loss of fishing gears. (Ngo Likeng, 2006).

#### **5.4.1.b. Inland fisheries**

Conflicts in the inland fisheries sector are not well documented. The shrinking resources disrupt economic livelihoods resulting to conflict inland in dams and lakes of Cameroon. This has contributed and is still contributing to increased competition amongst the various livelihoods over the available resources and increased migration with fishers in search of areas of better opportunities. A good example is seen in the Lake Tchad basin where there is conflict as to which countries that border Lake Chad have the rights to the remaining water such that fishers constantly fish across borders resulting to conflict with gendarme from Cameroon and Chad seizing fishing nets and traps and they will have to pay heavily to get them back (Onuoha, 2008). Alongside, there is increasing violence between the lake's dwellers where farmers and herders constantly divert the water for their crops and livestock and enter into conflict with fishers who want to conserve the remaining water and the fisheries resources so that they can continue fishing.

In the Mape dam conflicts are as result of non respect of fisheries legislation on fishing gears especially with the *goura* (malian basket traps), *taro* (beach seine) and cast nets. The basket traps are forbidden when built with small mesh sizes and are either installed at the water banks (20-30cm depth) and covered with grass or baited and installed at the bottom (2-3m). The *taro* is a type of beach seine with small mesh size at the codend used by Nigerians which is criticized by other fishers because it catches both young and adult fish. The castnet like the *taro* is also banned. These inappropriate fishing gears used mostly by foreign fishers cause conflicts with Cameroon fishers since they are considered as depleting the lake resources. (Njock et Kébé)

The study and resolution of these conflicts is a major prerequisite for the formulation of policies on the sustained development of the fisheries sector.

#### **5.4.2. Institutional conflict**

The main institutions involved with fisheries management (MINEPIA, MINDEF, MINRESI, MINTRANS, MINEP) carry out their tasks independently without any coordination leading to conflict. For instance, there exist conflicts between the Ministry of Defense and MINEPIA over the control of fishing vessels at sea. This lack of inter or intra-institutional cooperation and of a policy in place to resolve such matters significantly contributes to poor management.

In another dimension, there is conflict between industrial fishing vessels and sea pirates which has been discussed earlier in section 5.1.2.1. Socially, at individual level, too conflict does arise between resident Cameroonians and foreigners in fishing communities (MINEPIA Frame survey, 2009).

#### **5.4.3. How conflicts are addressed**

The conflict between the artisanal and industrial fishery has been a long standing and difficult problem due to the lack of implementation of the fisheries regulation. In particular, the identification of trawlers behaving illegally by artisanal fishermen is not sufficient because the legislation recognizes only reports from a sworn officer - either from the Port Authority, the Navy or from the Ministry in charge of fisheries (Djama, 1992). Further, because very often none of these is present when the damage is done, evidence from the artisanal fisherman alone is very difficult to consider. Moreover, even if the report is done by a sworn officer, and the illegal vessel is fined, there is no provision in the actual fisheries legislation for any compensation to be given to artisanal fishermen rather, the fine goes to the public treasury. Some measures geared towards the resolution of this conflict include:

- i/ A recent revision of the fishery regulation extending the artisanal zone to 5 nautical miles. This legislation is awaiting promulgation;
- ii/ Training workshops have been organized with industrial fishers on MCS, and the construction, installation and use of TEDs and BRDs on vessels with the assistance of FAO;.
- iii/ There is progressive reinforcement of MCS where the government has recently supplied five light boats that could cover 5 nautical miles for MCS operations and activities. Further, the use of VMS is obligatory on all registered vessels.

Regarding the precarious security problem and piracy, the government recently created a military task force (BIR) to handle issues concerning the security of fishing vessels at sea. This task force carry out regular control of the territorial waters and are also installed aboard fishing vessels during fishing operations.

However, the role of the traditional and local government administrations has been very usefull in the resolution of conflict in the artisanal sector<sup>24</sup>.

### **5.5. Other Threats**

There are no studies yet on the impact of trawling on seabed habitats in Cameroon. However, it is known elsewhere that during trawling, outrigger vessels using two or four trawl nets continuously sweep over the bottom of the sea-bed with the tickler chains stirring up the bottom. (Ogbonna, 2001). This destabilizes both the infauna that lives buried in the sand or mud and the epifauna which lives on the surface of the bottom. Constant trawling activities in the shrimping grounds also may disturb any eggs and larvae living in these habitats and therefore population development. Such impacts of trawling may affect benthic invertebrates such as sea snails, crabs, squids, annelids like polychaetes and oligochaetes, bivalves, gastropods and cephalopods, squids and lobsters) (Ogbonna, 2001). Full scientific investigations are necessary into the species composition and extent of such habitats, and implications that their disturbance may have for biodiversity and ecosystem functioning.

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<sup>24</sup> *The administrative and traditional authorities play a great role in conflict resolution in artisanal fishery sector. Conflicts are either solved amicably, by the chief or by the government administration (subdistrict Officer or Forces of Law and Order) in cases where the first two have failed (Total E & P, 2007; Frame Survey, 2009).*



## CHAPTER 6: Fish Production, Commercialisation and Consumption

### 6.1. Marine Fisheries

#### 6.1.1. Industrial fisheries

Determination of total fish production in Cameroon in both marine and inland waters cannot easily be made using the data available. The exact magnitudes of catches of industrial and artisanal vessels obtained within Cameroonian EEZ, which are sold, exported at sea, or landed in neighbouring Nigeria, are difficult to determine. Also, the catches unofficially landed at the military port in Tiko are not considered herein. However, following statistics of industrial landings in the main port in Douala, we find that production has decreased drastically since the the 1970's. This period 35 trawlers landed 18788tons of fish which is about 6 times the quantity of landings registered today by 39 trawlers (MINEPIA reports). Fish and shrimp production by industrial fleets between 2003 and 2010 are given below in table 5. We find that shrimps are very poorly represented in the total catches. This low representation of shrimps is confirmed with data from Nansen survey (Krakstad et al.2005). During this survey catch rates of between 35 kg/h and 100 kg/h were recorded for *Nematopalaemon hastatus* (ou Ndjanga); 1.5 kg/h for *Parapeneopsis atlantica*; 0.45 kg/h for *Penaeus monodon* 1.4 kg/h to 2.7 kg/h for *Penaeus notialis*; and 0.7 kg/h to 10 kg/h for *Parapenaeus longirostris*. Also, these scientists found some species of shrimps: *Aristeus varidens*, *Parapandalus narval*, *Heterocarpus ensifer*, *Nematocarcinus Africana*, *Pesiopenaeus edwardsianus*, *Plesionika martia* and *Solenocerca africana* in small quantities with average catch rates of 2kg/h.

Table 5: Production of fish and Crustaceans (mainly shrimps +crabs + lobsters) by shrimpers (2003 -2010) (source: MINEPIA Littoral reports)

Year	Number shrimpers	Production (tons)		Total production (tons)
		Fish	Shrimps	
2003	63	6895	530	<b>7425</b>
2004	55	4000	302	<b>4302</b>
2005	64	4041	281	<b>4323</b>
2006	51	3250	251	<b>3501</b>
2007	76	3811	460	<b>4271</b>
2008	56	3003	297	<b>3300</b>
2009	58	3 418	345	<b>3 419</b>
2010	39	2577	236	<b>2, 813</b>

During the Nansen survey, attempts were made to determine the potentials of some of the resources. A list of the species and their potentials is given below in table 6 for small pelagic. The potential is high for large pelagics (Carangids, Scombrids, Barracudas and Hairtails) all three years (see table 6) and lower for *Illisha africana* and *Sardinella spp.*

Table 6. Summary of biomass estimates for the main Species group (Krakstad et al. 2004, 2005 & 2006).

Species group	Year		Average Length size
Sardinella	2006		Between 12.1 – 15.5 cm for <i>S. maderensis</i> and 21 cm for <i>S. aurita</i>
	2005	5 000	
	2004	11 000	
P1 ( <i>Ilisha Africana</i> )	2006	6 000	Average size 11 cm.
	2005	7 000	
	2004	2 000	
P2 (Carangids, Scombrids, Barracudas and Hairtails)	2006	13 000	Average length size 23 cm.
	2005	30 000	
	2004	14 000	

For demersal resources, catch rates of the various species grouped by family during the three Nansen surveys are given below in table 7. We find highest catch rates for grunts and croakers and least for groupers all three years in the inner shelf between 0 and 50m indicating higher potential for croakers in this area of the coastline compared to other demersals.

Table 7: Catch rates (kg/h) of valuable demersal species grouped by families in swept area bottom trawl hauls (2004, 2005 and 2006). Inner shelf (0– 50 m).

Year		Average Depth	Seabreams	Snappers	Groupers	Grunts	Croakers	Others	Total
2004	Mean	31.1	4.9	8.1	1.1	22.4	18.9	230	285.5
	%catch		1.7	2.8	0.4	7.9	6.6	80.6	100
2005	Mean	30.8	2.5	7.6	0.7	135.4	26.6	210.6	383.4
	%catch	-	0.6	2.0	0.2	35.4	6.9	54.9	100
2006	Mean	32.5	1.4	0.9	1.4	0.7	16.3	174.4	195
	%catch	-	0.7	0.4	0.7	0.4	8.4	89.4	100

### 6.1.2. Marine artisanal and semi-industrial fisheries

There exist no data on the production of the artisanal estuarine shrimp *Nematopalaemon hastatus* even though it is harvested in large quantities. Also, data on marine artisanal and semi-industrial catches fish catches are lacking for reasons already discusses in section 4.4. However, extrapolation produced by MINEPIA (2005) estimate this production at 62,876 tons.

### 6.1.3. Inland fisheries

Fish production inland is mainly in 4 reservoirs and these include: Lagdo Lake (the largest) belonging to the Niger basin, Mbakaou and Bamendjing of the Sanaga River system, and the Maga Reservoir of the Lake Chad basin and some major river systems<sup>25</sup>. For the impoundments, statistical data on production in these water bodies is very scanty and even much scantier with the rivers. Much of the works date far back and were executed through projects funded by international organisations. There is also lack of a data collection system in the inland sector making evaluation of its potentials difficult. However, according to estimates made from studies in some sites it is believed that at least 40 000tons of fish was produced in this sector in the 1960's and this production has dropped to 20 000tons in 1990's. This period Van der Knaap, (1990) estimated fish production to be 11 000 t in Lagdo, and this dropped to 10 675 in 1991 (Postma *et al.*, 1993a), while Crul (1992) estimated production to be 1 582 t and 2 530 t for the Mbakaou and Bamendjin dams respectively. Elsewhere, Lake Bambalang has been documented to contribute enormously to over 15.000 tonnes of fish produced annually in the North West region (MINEPIA report provincial delegation NW, 2008). In recent studies, Tiotsop, (2003) estimated a production of 70 000tons /year for all the seven regions of Cameroon with the Waza –Logone plain representing about 50% of this production.

Harvesting of the freshwater shrimps is a popular activity in the South and Southwest Cameroon. Statistics on production of the freshwater shrimp *Macrbrachium vollenhovenii* in the Southwest region (Ombe river) is very scanty. However, in an attempt to study this resource, Gabche et al, (2001) followed up catches and registered an increase in landings from 100kg in 1988 to close to 800kg in 1998 (Gabche et al.(2001).

## 6.2. Fisheries production and Economic growth

The contribution of the fisheries sector to economic growth can be assessed by its role in employment and income generation. Employmentwise, the artisanal marine and inland sectors are both dependent on the rural population and employ above 200 000 people with 65 000 directly (fishers) and 135 000 indirectly( fishmongers, traders, boat builders, smokers etc) while the industrial sector on its part employs about 1500 people (Chiambeng & Ngoande, 2011). Economically, the contribution of marine industrial fishery to economic development between 2004 and 2009 is given below in table 8. We find that this sector contributes annually 3 to 7 milliards de FCFA to the national economy (Source: MINEPIA reports). This figure is close to estimates by

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<sup>25</sup> For inland rivers, Tiotpsop, 2005 registered 23 tons in the river Nyong between October 2004 and 2005 composed essentially of *Chrysichthys* spp. *Mormyrus* spp, *Synodontis* spp, *labeo* sp, *Brycinus macrolepidotus*, *Lates niloticus* and *Clarias* spp.

Njamen & Njifonjou (2007). These authors estimated this contribution to close to 8 182 284 000 FCFA.

Table 8: Contribution of industrial fisheries sector to economy (Source: MINEPIA reports)

Année	Production (Kg)		Valeur du produit (FCFA)		Valeur Totale (FCFA)
	Poissons	Crevettes	Poissons	Crevettes	
2003	1 866 810	530.498	2 165 499 600	3 448 237 000	5 613 736 600
2004	1 241 906	301.510	1 308 968 924	1 959 815 000	3 268 783 924
2005	1 552 987	273.113	2 021 989 074	1 828 664 500	3 850 653 574
2006	1 996 631	251.44	2 270 169 447	1 508 640 000	3 778 809 447
2007	3 664 022	460.998	4 349 194 114	2 765 988. 000	7 115 182 114
2008	2 869 465	297 140	3 460 574 790	1 782 840 000	5 243 414 790
2009	3 418 720	345818	4 181 094 560	2 074 908 000	6 256 002 560

### 6.3. Aquaculture production and food security

The role of aquaculture in the Cameroon economy is marginal as the sector employs only about 3500 to 4200 people for a production of about 870 tons (FAO, 2009). Species cultured are mainly tilapia (*Oreochromis niloticus*) and catfish (*Clarias gariepinus*). In fact, the contribution of fisheries and aquaculture to the PIB is less than 1%. The potential contribution of aquaculture to national economy was estimated at 85,7million CFA in 2004. Despite this minimal contribution, feasibility studies have shown that the sector has very great potentials for development. Estimation in 1990's situated the potentials of aquaculture to 20 000 tons/year (FAO, 2009). This potential can contribute significantly to closing the deficit in fish imports which is at 120,000 tons of fish/yr (FAO, 2007) if well exploited.

Major setbacks in aquaculture production include:

- Insufficient fingerling supply especially of catfish,
- Poor training of fish farmers in production techniques,,
- Inadequate manpower in the field of aquaculture,
- Poor financing of the sector by government,
- Poor access to credit by fish farmers.

### 6.4. Transportation and Commercialisation and Consumption of fishery products

Transportation of fisheries products in Cameroon is still rudimentary with use of local techniques. It is done either by road, sea or by the railway. By road smoked fish is either packaged into cartons tied with rubber bans or in baskets and covered with paper, then stocked in trucks. Most smoked fish from coastal cities is transported inland especially to the Western and NorthWest regions. Smoked shrimps are transported in plastic bags of about 50kg (see plate 14). Fresh products by road are transported in isothermal trucks mostly by wholesalers and in ice coolers and iced drums by small scale buyers from distant cities.



*Plate 14: Transport of smoked shrimps from Mabeta, Limbe*

In the sea smoked fish in great quantity is transported in cartoons rapped in plastic bags to prevent soaking. Shrimps are transported in plastic bags too. Fresh products are transported in ice containers in canoes by fish traders (see plates 14 & 15 respectively) who parade the fishing ports buying fresh fish which they carry to the cities for marketing.

By railway, smoked products mostly are transported from Douala to other cities like Yaounde, Kumba. Inland, smoked and sundried fisheries products are transported from Lagdo by trucks to Ngaoundere then from Ngaoundere to Yaounde and Douala in the south by rail.



*Plate 15: Fish mongers with ice containers in canoes buying fresh fish from fishing ports*

The main markets for fishery products are both internal and external. Internally, we have fishmongers, fish traders, restaurants, wholesalers who are responsible for the commercialization of this product. Fishery products are stocked in cold stores and either sold to the local populace or distributed to other cities around. For the artisanal fishery, the main markets are at the landing sites: Youpwe and Yoyo, in the littoral, Boa Manga and Londji in the South, Kangeh, Mabeta, Limbe and Idenau, Enyenge, Bamusso, Bekumu in the Southwest region. In Boa manga fish is sold fresh while in the others they are mostly sold fresh and smoked. Smoked sales (mostly small pelagic *Ethmalosa fimbriata* (Bonga) and *Sardinella maderensis* (Strong kanda) are dominant in the Bakassi area due to lack of cold storage facilities. Fresh fish is either sold in basins, buckets, or baskets for small pelagic and in

kilograms, hips, buckets and sometimes basins for demersals (Chiambeng, 2011). The marketing of smoked fish is by counting in pairs per thousand francs CFA in the fishing ports.

Other markets exist inland in the cities and villages. Fish traders from the different regions constantly visit these coastal fish markets and purchase smoked fish in large quantities which they transport either by car or by train to different cities and sell in small quantities ranging from 100 to 1000 frsCFA. Prominent cities for this activity are Baffoussam in the Western region, Bamenda in the North western region and Yaounde in the Central region.

Inland, production is very high in the north (Lagdo, Maga) and most of the fish is processed (smoked or sun dry). The processed fish is marketed in the South (Ngaoundere, Yaounde), in the extreme north and in neighbouring Nigeria (Holvoet, 2006). Achu (2009) identified seven fish markets for smoked fish from inland fisheries in Yaounde and its periphery. The sources of fish sold in these markets were River Nyong, Lagdo dam, Mape and Tibati. This author found that the cost varied with species and size of fish. An average cost of a kilogram of fresh life Catfish was 1510 F CFA (2,30 Euro) and the selling price of the retailers was 1855 F CFA (2,83 Euro). 1 euro~655 fcfa. The external market is mainly in neighbouring countries especially Nigeria and has already been discussed in previous sections.

Fishery products from the marine environment are consumed in almost the whole country especially Littoral, Central, Western, Northwest and Southwest regions. Products from inland impoundments especially from the North are channeled mostly for consumption to Ngaoundere, Yaounde and Douala. According to FAO statistics (FAO, 2007) fish consumption is at 15,5kg/inhabitant while annual fish requirement for the population is at 247 500tons. The townships of Douala and Yaounde consume three quarters (80%) of the fishery products landed in Cameroon (Chiambeng and Ngoande, 2011). Shrimps being very rare in catches (about 5%) industrial catches are sold to hotels, restaurants and private individuals mostly at prices ranging from 2000 Frs to 10 000 frs CFA per kg depending on the species.

## **7/ Conclusion**

The fisheries resources of Cameroon has undergone significant changes in production over the last years with industrial production dropping drastically from 9000tons around the year 2000 to about 4 000tons in 2010. These changes have been more with the industrial sector compared with the artisanal sector. The Cameroon Fisheries policy in general, is lacking in many aspects including poor implementation and non respect of international convention with respect to living marine resource management, conservation and exploitation. The living resource provisions of these international laws can be generally seen as imposing significant new Cameroon obligations, and commitments involving marine living ressources and their management. For sustainable management and exploitation, the following requirements are recommended:

- The fisheries legislation must be revised to meet international requirements and harmonized with those of coastal states jointly exploiting the migratory stocks. This will need that Cameroon reinforces existing cooperation at subregional, regional and international levels and that other relevant conventions relative to conservation and exploitation of marine living resources (e.g. UNFSA, CA, Fish stocks Agreement and the Compliance agreement) are ratified;

- Reinforce existing conventions on cooperation in the fisheries sector and make efforts to implement provisions accordingly;

- Research be reinforced nationally through proper funding and training programmes and data collection (on bycatch, pollution, biology, impact of trawling, climate change etc) and exchange programmes developed and executed for sustainable exploitation within and out of the EEZ;
- Relevant data from research on the carrying capacity of the fisheries be used to effect fishing effort control either by reducing the number of fishing vessels fishing in the marine waters, or hours spent fishing. Also, Catch quotas need to be allocated for the various species, nursery and spawning grounds identified (through research) and closed seasons initiated after proper research for protection of nursery and spawning grounds;
- Research be carried out on impact of trawling on the marine ecosystem and on inappropriate fishing methods and gears, pollution and mangrove deforestation then appropriate measures be taken to reduce resource degradation as a result of these factors and environmental friendly fishing methods with use of BRD's and TEDs' be made mandatory.
- Implementation of existing legislation needs to be reinforced through proper MCS to reduce IUU fishing, provide additional protection to the nursery zones and reduce conflict between artisanal and industrial fishery;
- The organization of MINEPIA has to be reviewed in a view to promoting intra and inter-institutional cooperation with respect to conservation and management of the fishery resources;
- Build capacity for stakeholders at all levels and sensitize on fisheries regulation and relevance for sustainable management of the resources
- Create an appropriate environment for fishing by improving on the social and institutional infrastructures in fishing communities, encouraging the participation of Cameroonians in marine fishing and putting in place a platform for conflict resolution;
- A management plan be drawn for the sector with assistance of the recently developed policy document, then programmes and projects elaborated and funded;
- Frame surveys be carried out systematically to evaluate the actual socioeconomic status of the actors in the sector.

## **8/ Cooperation in Fisheries**

As earlier mentioned (section 3.2.2.2e) Cameroon in its efforts to abide to UNCLOS and other International laws has gone a long way to establish cooperation in the fisheries sector at subregional, regional and international levels. However, more efforts need to be made to ratify other relevant international conventions and to implement provisions of conventions already signed for sustainable management of the fisheries sector. Some of these agreements/conventions are listed below in table 8.

Table 8: Some Conventions/Agreements in the fisheries sector

<b>Regional and Subregional</b>	<b>Area of Cooperation</b>
Partnership for African Fisheries (NEPAD)	Regional Fisheries Management Organizations, including in the management of transboundary and shared aquatic resources and ecosystems
Fishery Committee for Eastern Coastal Atlantic (CECAF)	Promotion of the collection and analysis of statistical, biological and socio-economic data and their dissemination, and the formulation of management recommendations for implementation
Intergovernmental Organisation on Information and Cooperation for the Commercialisation of Fishery Products in Africa (INFOPECHE)	Quality assurance and postharvest technology
Sub-Regional Fisheries Commission (SRFC), Dakar, 1985	Conservation and Sustainable exploitation of fishery resources
Regional Fisheries Committee for the Gulf of Guinea (COREP) 1984	Sustainable exploitation of fisheries resources
Self Sustainable Livelihoods Programme (SLP), Benin (DFID United Kingdom)	Poverty alleviation, improvement of livelihoods
Economic Commission for Livestocks and Fisheries Resources (CEBEVIRHA) of the Economic Community of Central African States (CEMAC), 1987	Conservation and Sustainable exploitation of fishery resources
Guinea Current Large Marine Ecosystem Project (GCLME)	Fishery management, environmental protection and biodiversity conservation
Agreement Protocol between Cameroon and Equatorial Guinea (6 November 1980)	Maritime limits
Agreement between Cameroon and China	Fishery postharvest technology (cold storage facilities)
Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean (ATLAFCO), 1991	Evaluation and conservation of fisheries resources
<b>International Cooperation</b>	
Food and Agricultural Organisation (FAO)	Conservation and Sustainable exploitation of fishery resources ; Aquaculture
Ministerial Conference on Fisheries Cooperation amongst Coastal African States (COMHAFAT)	Climate change, biodiversity protection
United Nations Convention on the Law of the Sea (UNCLOS)	Maritime issues, traffic, pollution, conservation and management of living resources, protection of marine environment etc
International Maritime Organisation (IMO)	Safety at sea and prevention of marine pollution
1995 FAO Code of conduct for Responsible Fisheries	Fisheries management
Convention on International Trade in Endangered Species (CITES)	Wildlife habitat conservation, Animal Welfare and Right, Wildlife Ecology, protection of Endangered animal species
Convention on Biodiversity (CBD)	Marine and Coastal biodiversity conservation
International Whaling Commission (IWC)	Conservation of Cetaceans
Global Environmental Facility (GEF)	Environmental conservation ; Conservation and sustainable use of biological resources
Commonwealth Fisheries program	Sustainable fisheries, policy development
Joint FAO/WHO International Codex Alimentarius Food Standards Program, 1963	Trade of food commodities, processing requirements
Intergovernmental Oceanographic Commission (IOC)	Oceans and coastal zone management, global environmental change research ; education, training and technical assistance



	oceanographic research programs
Large Marine Ecosystem Program (NOAA)	Productivity, (ii) fish and Fisheries, (iii) pollution and ecosystem health, (iv) socioeconomics, and (v) governance
Abidjan Convention on the protection of coastal and marine environment of west and Central Africa	
Abidjan memorandum on marine turtle conservation and protection	

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