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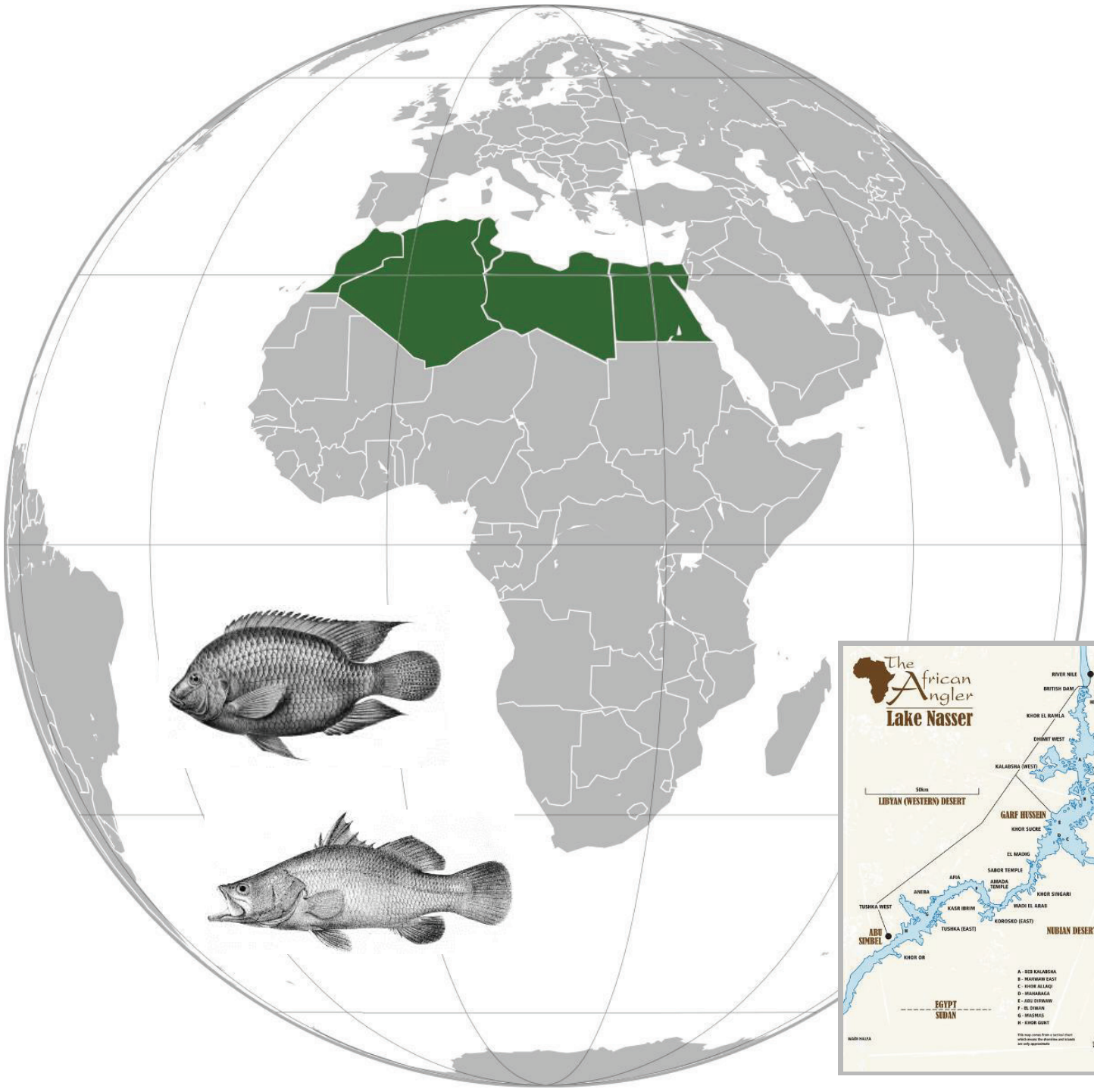

Framework for Rational Fisheries Management Plans for Selected Inland Water Bodies in Northern Region of Africa

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Prepared by: Mohamed EL Sayed Megahed (Ph.D)

Edited by: Obinna Anozie, Mohamed Seisay and Simplice Nouala

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Requests for such permission should be addressed to:
The Director
African Union – Interafrican Bureau for Animal Resources (AU-IBAR)
Kenindia Business Park
Museum Hill, Westlands Road
P.O. Box 30786
00100, Nairobi, KENYA
or by e-mail to: *ibar.office@au-ibar.org*

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Table of Contents

Acronyms and Abbreviations

AU	African Union
AU MS	African Union Member States
AU-IBAR	The African Union Interafrican Bureau for Animal Resources
CAADP	Comprehensive Africa Agriculture Development Program
CBD	The Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EAF	Ecosystem-based approach to fisheries
EEAA	Egyptian Environmental Affairs Agency
EGP	Egyptian Pound
EU	European Union
FAO	The Food and Agriculture Organization of the United Nations
GAFRD	General Authority for Fishery Resources Development
GDP	Gross domestic product
GDP	Gross Domestic Product
HDLDA	High Dam Lake Development Authority
IFAD	The International Fund for Agricultural Development
IUU	Illegal, Unreported and Unregulated fishing
MDGs	Millennium Development Goals
MoUs	Memorandum of understanding
MSY	Maximum Sustainable Yield
NEPAD	New Partnership for Africa's Development
NGOs	Nongovernmental organizations
NPCA	The NEPAD Planning and Coordinating Agency
PFRS	The Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa
RECs	Regional Economic Communities
RFOs	Regional fisheries organization
SDGs	Sustainable Development Goals
UNCLOS	The United Nations Convention on the Law of the Sea

Background

The objective of the Policy framework sand Reform strategy for fisheries and aquaculture in Africa (PFRS) is to create an environment policy environment for increasing the contribution of fisheries and aquaculture to food security, livelihoods and wealth. Improving governance through rational fisheries management plans is therefore considered as a strategic mechanism to achieve this objective.

There is an existing understanding among fishers whose livelihoods depend on inland fisheries in the Northern Africa region that they are extremely important sources of livelihoods. However, poor information on the status of the inland fisheries and the role they play in the economy of the region are preventing an accurate and comprehensive valuation of the inland fisheries. Few countries in the region report national fish production estimates tor FAO. Throughout the current study, it was obvious that some governments consider fisheries sector as a major contributor to the country GDP, however, some other countries are not. The discrepancies of this magnitude prevent proper valuation and management of the inland fisheries and must be addressed. The poor state of knowledge on these fisheries arises from the diverse nature of inland fisheries, the fact that the fisheries are often small scale and diffused over large areas, the fact that much of the harvest is bartered or consumed locally and is not registered as part of the formal economy of a region. The misconception that inland capture fisheries are of low value and not worth monitoring, the inadequate political power of many rural communities that rely on inland fishery resources, and the excessive power of certain stakeholders or sectors that do not want the true value of the resource known for personal or political reasons. In addition, official statistics are often based on estimates, which may not be based on actual data. Major sources of error in these officially reported statistics are:

- Deliberate misreporting;
- Lack of attention to small-scale fishing activities;
- Lack of status, capacity or training of local fishery officers;
- Errors in catch reporting;
- Difficulty in accessing sources of information (women, children and other fishers far from population centers);
- A reluctance to report catches because this is linked, in most countries, to license fees or other forms of taxation.

Africa as a developing continent is currently facing challenge of achieving sustainable food and nutrition security for a growing population in the face of damaging natural resources and expected negative impacts of climate change. The AU's' Comprehensive Africa Agriculture Development Programme (CAADP) is Africa's policy framework for agricultural transformation, wealth creation, food security and nutrition, economic growth and prosperity for all. The CAADP identifies sustainable agriculture as a key sector driving poverty reduction and economic development. In Maputo, Mozambique in 2003, the African Union (AU) Summit made the first declaration on CAADP as an integral part of NEPAD. CAADP aims to stimulate and facilitate increased agricultural performance through improvements in policy and institutional environments, access to improved technologies and information, and increased investment financing. Recent policy directives must raise specific researchable questions which include:

- What are the most effective interventions to develop sustainable inland fisheries for food and nutrition security in poor rural communities?
- How can inland fisheries systems be more resilient, including to climate change?
- How can inland fisheries as natural resources be managed more efficiently to reduce post-harvest waste?
- How can the livelihoods of poor fishers be supported by better access and use rights to inland fisheries resources?

The formulation of the Policy Framework and Reform Strategy for fisheries and aquaculture in 2014 set to address some of these challenges and accordingly identified small-scale fisheries as key priority policy areas for interventions to ensure food security and sustainable livelihoods enhancement.

Executive Summary

Until today, inland fisheries in Africa have not been adequately managed and catches are in decline. This is having considerable Impact on the local people, most of who are in the lower income group and whose livelihood depends directly on the sustainability of the fishing industry. Fish stocks are affected by a number of factors including pollution (eutrophication, toxic wastes, acid rain), river engineering (impoundments, land drainage, flood alleviation), habitat loss through land reclamation and removal of riparian vegetation, afforestation, introduction of non-native species, and overfishing. Thus, the management of inland fisheries is different in nature to that of marine fisheries and is basically focused on; protection, mitigation and rehabilitation. The inland fisheries actions presented in this document will support selected programs to deliver knowledge, technologies and capacity and policy recommendations to support key policies of the AU in food, nutrition security and sustainable fisheries in African member states. The majority of African union member states are currently facing challenge of achieving sustainable food and nutrition security for a growing population. The AU's 'Agenda identifies sustainable fisheries as agriculture sub-sector, a key sector driving poverty reduction and economic development related to food security. In this regard, it is recognized that demand-driven applied innovative solutions are necessary to address key constraints. Inland water fisheries make very significant contributions to the local populations in Africa especially in nutrition and food security. In most rural areas especially landlocked countries, inland water fisheries are very important for food security and income generation. Although most inland water fish is consumed locally, products from inland water fisheries can also be important export commodities. The process of developing a coordinated inland fisheries resources management and development in Africa was initiated by AU-BAR in collaboration with NEPAD NPCA with assistance from with the EU. In recognition of the above identified challenges, AU-IBAR through the Fisheries Governance Project is implementing activities that will Strengthen Policies and Development Strategies for Inland Water Bodies in Africa. In line with the foregoing AU-IBAR has conducted various studies on the Assessment of Fisheries Management and Development Issues of Selected Inland Water Bodies in the West and Central Africa as well as the study for Development/Revision and Implementation of Management Plan for Selected Inland Water Bodies in the North, East and Southern Africa. In view of the generally weak policies governing the management of inland fisheries, the assessment was conducted simultaneously with review of policies and regulatory frameworks for the management of aquatic resources for cross border water bodies, in particular. These combined actions were

aimed and envisaged to bring out development issues; identify strategic issues, challenges and trends of regional character in order to develop the appropriate fisheries management plan for effective, rational and sustainable management that are targeted towards the formulation of a Pan African Action Plan for rational management and development of inland fisheries in the continent. Therefore, in line with the above AU-IBAR in utilizing the resources generated and provided by these studies wishes would organize an Expert Consultative Workshop on Formulation of African Strategy for Rational Management of Africa Inland Water Bodies.

Introduction

Africa has extensive inland waters from both natural and artificial rivers, lakes, streams and ponds, swamps, mangroves, salt marshes, coastal lagoons to reservoirs. The extensive inland waters of Africa have very high diversity of fish species which on record has accounted for two-thirds of total global inland capture production. Inland fisheries are often small scale in nature and spread over large areas forming an integral part of the culture and economy of many peoples and countries in Africa with catches that are almost entirely consumed on the continent hence providing major source of protein for a large part of the continent's rural population. Inland fisheries therefore provide employment and income for several million people. Inland fisheries face serious challenges including weak capacity, both institutional and resource capacities, with resulting unsustainable fishing practices and dwindling resource base; marginalization and gender inequity; environmental degradation; lack of awareness on climate change effects in fisheries and huge post-harvest fish loss. Natural resource decision makers are challenged to adapt management to a changing climate while balancing short-term management goals with long-term changes in aquatic systems. Because fisheries management often interacts with multiple stakeholders, adaptation strategies involving fisheries managers and other partners focused on land use, policy, and human systems, coupled with long-term monitoring, are necessary for resilient systems. The inland fisheries management strategy must: 1) Ensure that management plan have clearly defined impact pathways to deliver the benefits of the plan to users and clearly defined mechanisms to monitor the outcome; 2) Ensure that AU programs are demand driven and based on the priority needs of beneficiaries, engaging member states in the mobilization of stakeholders; 3) Ensure that fisheries governance mechanisms operate efficiently and effectively in all member states; 4) Identifying opportunities to link successful innovation platform from different AU member states to regional level, advocating for adequate and sound investments in inland fisheries to help in enhancing development impact of innovative fisheries platform and supporting capacity development; 5) Market orientation is a key element in addressing inland fisheries development through an fisheries innovation platform; 6) Strong and productive participation of multi-stakeholder will enhanced fisheries governance;7) Long and short- term projects with assured funding will help successful implementation of fisheries management plan; 8) Communication mechanisms are essential for successful implementation of fisheries management plan. It was observed during this consultancy work that major objectives, approaches and policies of inland fisheries management systems in the northern Africa region,

are a shift from maximizing production and employment to sustaining stocks and taking into account wider ecosystem aspects. Policies must shift from the use of command-and-control instruments to inter-sectoral policies, access rights and more participatory approaches. Governance systems, from top-down centralized management towards more participatory management structures involving the devolution of power from the center to lower levels of government. This consultancy report documents the outputs of the inland fisheries of selected water bodies in the northern Africa region consultative study.

Objectives of the Regional Plan

The major objective of this consultancy therefore is to develop, strengthen or enhance the management plans for inland fisheries development. This will be achieved through assessment of fisheries management and development issues in selected water bodies with the aim of identifying strategic issues, challenges and trends of regional character in order to develop the appropriate fisheries management plan for effective, rational and sustainable management and development of inland fisheries of Africa. The overall objectives of the regional aims to:

- Assist Governments in establishing the scientific basis for regulatory and other measures for the conservation and improvement of inland fishery resources; to formulate such measures through subsidiary bodies as required, and to make appropriate recommendations for the adoption and implementation of these measures;
- Encourage efforts on a national basis and, when appropriate, to coordinate such efforts on a regional basis with a view to preserve the quality of water;
- Assist in the development of aquaculture and stock improvement, including the control of fish diseases, the importation and introduction of exotic species;
- Assist in appraising the economic and recreational values of inland fisheries and their development;
- Promote and assist in the utilization of the most effective fishing craft, gear and techniques;
- Promote and assist with activities for the processing, preservation and marketing of fish and fish products;
- Encourage education and training through the establishment or improvement of national and regional institutions and by the promotion and the organization of symposia, seminars, study tours and training centers;
- Assist in the collection, interchange, dissemination and analysis of data related to inland fisheries;
- Consultation meetings with the Authorities of selected inland water management bodies

as well as other key stakeholders of the water bodies;

- Identify and collect the documentations having a direct or indirect bearing on inland water body assessment initiative, including existing fisheries policy, strategies, management plans & policies, MoUs (if any) and relevant legal instruments such as legislative framework for transboundary water bodies;
- Review and provide update information on the status of fisheries inland water bodies by highlighting the potentials, fisheries production, prospects, challenges and priority areas for development to ensure increased contribution of fisheries resources of the inland water bodies to the socio-economic growth of the member states in particular and AU at large;
- Identify the main internal and external drivers (strategic issues) relevant to inland fisheries within selected water bodies in the region (s) of assignment;
- Develop a management plan or improve, strengthen and enhance an existing and draft plan for effective implementation;

Outline the proposed methodology for conducting the proposed activities

Inland Fisheries Resources of selected water bodies in the Northern Africa Region

There are numerous important global issues regarding inland fisheries in the northern Africa region. They are extremely diverse in terms of their size, level of exploitation, contribution to the GDP; they cover a broad geographical range; they are practiced by the poorer fisher and un-empowered men and women. The inland fisheries in the northern Africa region are undervalued resource due to the poor state of information on the inland fisheries statistics. The region suffers from weak state of statistics including; inadequate data collections systems; selective data collection; double counting of landings; confusion with aquaculture; and political pressure. However, Inland fisheries in the region deliver food, nutritional security and income to millions of rural households. The inland fisheries support socioeconomic factors and United Nation Sustainable Development Goals (SDGs), and AU's' Comprehensive Africa Agriculture Development Program (CAADP) as it supplies protein and essential macro-nutrients and support daily livelihoods of men and women fishers. The identified management practices of exploitation in the region include; by catch, fishing effort or size limits, the management of fish habitat (e.g., river flow regulation, management of aquatic vegetation and the use of fisheries enhancements (stocking of hatchery fish). This consultative report documents the status of inland fisheries of selected water bodies in the northern Africa region for effective management

decision based on knowledge of the state of the inland fisheries. The contribution of inland fisheries to national Gross Domestic Product (GDP) is indicator referred to by decision-makers and donors when highlighting an inland fisheries sector's importance for a national economy. If it is managed effectively, in addition to supplying food and provides livelihoods for fishers and processors, is a source of hard currency from exports of fishery products (i.e. Nile perch export from Lake Victoria). The development of a detailed analysis can highlight the various opportunities and constraints associated with the inland fisheries in the region and Lake Nasser as selected inland fishery in the region. External influencing factors, such as national policy and the infrastructure in place represent the enabling environment for the governance of the inland fisheries and influence the likelihood of success for management activity.

Profile of Inland Fisheries Resources in the Northern Africa Region by country

Algeria

Algeria has a surface area of 2 381 740 km2. Most of the country (86%) is situated within the Sahara Desert. The limited rainfall and runoff has fostered construction of storage dams to ensure adequate water supplies for crop irrigation. High salinities and irregular inflow limit the potential use of most natural lacustrine bodies. There are no important freshwater lakes. Several internal drainage basins possess salt lakes and marshes. The largest basin, containing Lakes Chott Melshir and Chott Merouane. Sebkha d'Oran is lying near the coast in the west. To the northeast is the Oubeira Lake. For most Salt Lake basins only, a small proportion of the area has standing water. There are eleven river ("oued") basins which discharge into the Mediterranean Sea from a combined catchment area of 132 910 km2. The largest is the Oued Chelif (29 300 km2 catchment; 0.55 km3 discharge). There are two important floodplains: Garaet el Mkhada and Chott Zahrez Chergui. To date some 21 large dams have been constructed and considered reservoirs (Bakhadda, Erraguene, Ghrib, Meffrouch, Beni Bahdel, Fergoug, Grande Kabylie, Merad, Bou Hamidia, Fodda, Hamiz, Sarno, Bouzzoul, Foum el Gherza, Irhil-Emda, Sidi Mahomed Ben, Aouda, Cheffia, Foum el Gueiss, Ksob and Zardezas). Most are for irrigation usage, and a smaller number produce hydroelectricity or supply municipalities. At present little fishery development has taken place in these reservoirs. Unofficial records declared the pikeperch, a fish living in fresh water and caught mainly in dams in Algeria, has been exported towards European markets. The available capture fisheries data at FAO is from 1980- 2014 and does not show any contribution of inland capture

fisheries to employment. According to Algerian office Nationales des Statistiques in 2005 in the period 2000–2004, production (tonnes/year) from Lake/lagoon were 119.97 in 2000 and 40.60 in 2004 without listing fish species caught. The capture fisheries statistics from Impoundment were 201.14 (t) in 2000 and 590.10 (t) in 2004 and the reported captured species were Carp, barbell, Cyprinodon fasciatus, Atherina sp. Personal communication shows that most captured species in all inland water bodies belongs to the families of Mugilidae and Anguillidae. Mugilidae and Anguillidae are exploited from the capture fisheries of the inland water bodies in Algeria.

Egypt

Egypt, with an area of 995 450 km2 is an almost rainless block of desert consisting of high plains and hills in the east and along the Nile Valley. The Nile River forms the main axis of the country and stretches some 1 300 km from the Sudan border to the Mediterranean. Major Lakes and depressions in Egypt are:

Artificial Brackish Water Lake

Lake Quarun: Originally was a freshwater lake, process of salinization has been accelerated since the closure of the Aswan High Dam. Salinity is 34.5 ‰. The freshwater fauna has virtually disappeared, and the lake has since been stocked with a variety of brackish water species. Tilapia zillii, Mugil cephalus, Mugil capito and Solea vulgaris - all introduced in 1928. Their fry is restocked into the lake each year by general authority of fish resource development (GAFRD).

Artificial Freshwater Lakes

- Lake Nasser
- Wadi Natrum
- El Faiyum Oasis
- Qattara depression
- Siwa Oasis
- Bahariya Oasis
- Farafra Oasis
- Dakhla Oasis
- Kharga Oasis
- Amer
- Ruwayan

- Nozha Hydrodrome

River Nile

The stream measures 1 300 km in Egypt. The official statistics available at FAO covers the period from 1980 to 2009. The production (thousand tonnes) from inland fisheries in 1908 was 108.1, while in 2009 was 259. 5 represent 23.75 % of total fish production in Egypt. The available data on employment (thousands) in inland fisheries was 65.8 in 2000.

Libya

Libya, with a surface area of 1 759 540 km2 consists almost entirely of desert plateau except for a narrow cultivated coastal strip. The economy is based on oil export. There are several desert irrigation projects and most of the water used is derived from groundwater sources. There are no perennial rivers and the rainfall patterns result in both flash floods and severe drought being common. There are only a few small saline desert lakes (Gabr Aoun). Only short seasonal rivers. Two small impoundments: Wadi ghan (0.021 km2) and Wadi Zart (2.94 km2). Concerning inland catch range and potential yield, inland fisheries in Libya are negligible. No information available for Wadi Ghan or Wadi Zart Reservoirs. Free stocking (Carp and some tilapia) was carried out in the past at Wadi Kaam (Khoms/Zliten area) and Wadi Mjinine (Tripoli area) reservoirs, and more recently carp have been stocked in Abou Dzira Lake near Benghazi. Results thus far do not indicate much potential for commercial production.

Mauritania

Mauritania, surface area 1 030 400 km2 divided into three distinct zones:

1. A narrow southern belt along the Senegal River Valley which is relatively well vegetated;
2. An intermediate central belt of broad sandy plains and dunes fixed with scrub grasses; and
3. A northern desertic belt of rocky plateaus and sand seas.

The climate is extremely hot and dry with very little rainfall, which is confined to the south between July and August. Mauritania is mainly occupied by nomadic peoples. Settled agriculture is confined to the valley of the Senegal River. There are several lakes associated with the Senegal Floodplain system. These include Lake Rkiz and Lake Iianbrank. The only permanent rivers in the country are the Senegal, which forms the border with the Republic of Senegal for over 600 km, and the lower reaches of its tributary, the Gorgol, which drains the Massif de l'Assaba. Another tributary, the Garfa, is seasonal. There is one important reservoir: Foum-Gleita. There is no official data reported to FAO on inland capture fisheries. The only

reported data to FAO was from 1980 to 2014 regarding the employment (thousands) in inland fisheries which reported to be 10.83 in the year 1980 and 1.00 in the year 1990.

Morocco

Morocco has a surface area of 446 330 km2. The center of the country is occupied by the high Atlas Mountains which separate fertile coastal plains from inland pre-Saharan semi-arid areas. The climate is semi-tropical in lowland areas and cooler in the mountains. The rainy season extends from November to March but is unreliable and produces both flash floods and droughts. The economy is based on agriculture, mineral extraction and tourism. There are several small natural lakes. Ait-Ouarda, Azigza, Ifni, Sidi-Ali and Isly. There are several river basins, including Moulouya, Rbia, Tensift and Sous. There are more than 30 impoundments in Morocco, with a total reservoir area of over 500 km2. Nothing reported officially on inland fisheries in Morocco.

Tunisia

Tunisia has an area of 15 536 km2. The Atlas Mountains dominate the topography of the northern part of the country, rising to a maximum elevation of 1 544 m ASL. The south is mainly desert (40% of the total land area). The interior is hot and dry, while the coastal zone is more moderate. The north generally receives adequate rainfall. Due to low runoff and high salinities water quantity and quality limit irrigation agriculture in most parts of the country. Kelbia (100 km2) and Sidi Mansour (35 km2) are the two largest low-salinity lakes. There are several others of less than 1.0 km2. A number of salt lakes and marshes occur in the country, some of large basin size (i.e., Chott Djerid, 4 580 km2; Chott Fedjadj, 570 km2; Sabkhet Sidi El Hani, 360 km2). The term "chott" or "sebkha" defines a non-permanent water body (swamp or lake), submitted to the occurrence of seasonal precipitations. Four small river systems discharge into the Mediterranean Sea; the Oued Medjerda is the largest of these. Several landlocked rivers discharge into salt lakes. Total national runoff is only 2.5 km3/year of rainfall of 33 km3/year (90% is lost as evaporation). There are 14 large dams/reservoirs with a combined area of over 176 km2. The two largest are Bourguiba-Sidi Saad (90 km2) and Sidi Salem (43 km2). The total impounded volume is 1.451 km3 or 58% of total annual runoff. There are some 15 small earthen dams which store irrigation and potable water. There are also small reservoirs associated with nine principal oases, with a combined area of 0.03 km2. Nothing reported officially on inland fisheries in Tunisia

Study of selected inland fisheries in the Northern Africa Region

Lake Nasser

Lake Nasser is the second largest human-made lake in the world and was filled in 1964 after the construction of the High Dam at Aswan. The reservoir is about 480 km long, consisting of 300 km (Lake Nasser) in Egypt and 180 km (Lake Nubia) in Sudan. The only source of water is the River Nile with its inflow in the south. The lake is long and narrow, often with dendritic side areas called khors. There are 100 "important" khors. At 180 m above mean sea level, the total surface area of the khors, i.e., areas outside the main valley covered by water, is about 4900 km2, 79% of the total lake surface area. However, they contain only 86.4 km3, 55% of the total lake volume. Lake Nasser is eutrophic and at times the upper layer has a high concentration of chlorophyll a. The average water temperature ranges from 15.0°C in February to 32.4°C in August; dissolved oxygen from 0.0 to 1003 mg/L, and transparency from 0.2 m in August to 6.1 m in December. The fishes recorded in the lake originate from the River Nile. The predominant species (Table 1) for sale as fresh fish are the tilapias (in particular Oreochromis niloticus, Lates niloticus and Labeo and Bagrus spp.). The main salted fishes are Hydrocynus forskalii and Alestes spp. The highest total fish production was 34,206 t in 1981 and the lowest was 751 t in 1966. Lake Nasser is important inland fishery system that integrates social, economic and ecological factors, which require the formulation of a management policy for sustainable fish production. To improve understanding of fisheries performance in Lake Nasser, this consultancy report presents the analysis of the inland fisheries of the lake. Individual interviews and focus group discussions were used to collect quantitative and qualitative information about fisheries performance, employment creation and food security.

The key features of Lake Nasser

- Trammel and gill nets are the main fishing nets used by fishers in Lake Nasser.
- All fish caught are destined for local consumption, with no record of exports. This is similar to the value chain for Egyptian aquaculture.
- Fish processing is an important subsector of the Lake Nasser fisheries. Some fish species (mainly tigerfish and Alestes spp.) are only consumed after going through a salting process. These species comprise about 13% of total catch. Processing of fresh tilapia and Nile perch (fillets and degutted) has developed more recently to meet demand from local

tourist hotels.

- Tilapia and Nile perch are sold fresh on ice. Since fishing trips take on average 2.5 days from the fishing ground to landing harbors, ice is essential to maintain quality during transport to landing sites and during delivery to markets. However, availability of a sufficient supply of clean ice is an ongoing problem.
- Intermediaries play an important role in collecting catches from fishers in their fishing camps and selling on to wholesalers at landing sites or in the market.
- The inland fisheries of Lake Nasser contribute significantly to direct job creation. One hundred metric tons (t) of fish caught and sold provides an average of 29.99 full-time equivalent jobs. Fish processing also contributes to direct job creation, providing 5.8 full-time equivalent jobs for each hundred tons processed. No women are employed in the fisheries or fish processing sectors in Lake Nasser inland capture fisheries, although there are prospects for female employment in fish processing. Most of the fishers (57%) are under 30 years old and 49%–59% of other employees are under 30. Using official General Authority for Fishery Resources Development (GAFRD) fish catch statistics for Lake Nasser, this leads to a total employment estimate for the value chain of 8227 full-time equivalent jobs.
- The average catch in the three fishing harbors (Figure 1) per boat per day was 42 kilograms (kg), and the average catch per fisher per day was 20 kg.
- Fishers obtained a relatively low percentage (49%) of the final consumer price, due to the long supply chain.
- The average total cost in the three fishing harbors was EGP 5210/t. This represents the breakeven sales price; i.e. the average price of all fish sold by a fisher must be more than EGP 5210/t if the fisher is to cover operational costs.
- Wages of fishers represented the highest proportion of operational costs in the three harbors (54%). Similarly, fishing nets represented 54% of annual fixed costs of fishing.
- Operating costs represented the highest percentage (73%) of total costs for all fisheries subsectors in the value chain, while fixed costs accounted for the remainder (27%).
- For the fishing subsector, operating profits were 37% and net profits were 15% of sales. For intermediaries, operating profits were 13.4% and net profits were 10.8% of sales. Corresponding figures for the wholesaler subsector were 21.7% and 20.5% of sales, and for the retail subsector, 25% and 22.2% of sales.
- Operating profits generated throughout the value chain were EGP 8972/t for fish caught and sold, net profits were EGP 6896/t, and value added (net profits plus wage earnings) was EGP 10,375/t. The fishing and retail subsectors together contributed more than

60% of total profits and value added for all of these indicators, with intermediaries and wholesalers contributing the remaining 40%.

- Fish processing is an important subsector of the fisheries value chain in Lake Nasser. Processing of fresh fish generated 5.7 full-time equivalent jobs /100 t of processed fish, while salted fish processing generated 5.5 full-time equivalent jobs /100 t processed. Fresh fish processing led to higher value added (EGP 3652/t) than salted fish processing (EGP 2507/t).

The above figures confirm that the fishery in Lake Nasser generates considerable profits and employment. However, the current study also suggests that the fishery is under pressure from overfishing. Critical factors facing the fisheries sector and impacting profitability can be grouped into those related to:

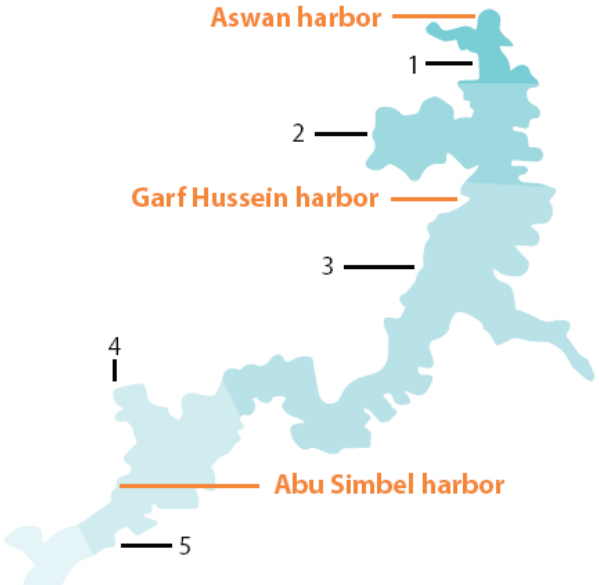
i. Inputs (the availability and price of fuel have had a critical impact on costs and profits);
ii. Marketing, transportation and sale of product;
iii. Availability of daily work requirements (bread and other food);
iv. Availability and quality of fishing gears;
v. Access to credit;
vi. Availability and quality of ice and salt;
vii. Obtaining licenses and permission for fishing or processing;
viii. Poor living conditions in the lake;
ix. Competition at the fishing grounds;
x. Absence of security in and around the lake;
xi. Lack of experience in using new fishing methods and consumption of fish by predators (i.e. crocodiles);
xii. Poor postharvest handling and;
xiii. The absence of a fish auction.

It is recommended that some of the necessary actions be the responsibility of the sector itself, some the responsibility of the government, and some the responsibility of donors and nongovernmental organizations (NGOs). For meaningful improvements to take place in value chain performance, substantial action and investments will be needed by many stakeholders.

Table 1. *List of fish species in Lake Nasser*

Family	Species	Family	Species
PROTOPTERIDAE	*Protopterus aethiopicus*	CLARIDAE	*Clarias anguillaris*
POLYPTERIDAE	*Polypterus bichir*		*C. Lazera*

Family	Species	Family	Species
MORMYRIDAE	*Mormyrops anguilloides*		*Heterobranchus bidorsalie*
	Petrocephalus bane	SCHILBEIDAE	*Eutropius niloticus*
	Marcusenius isidori		*Schilbe mystus*
	Gnathonemus cyprinoides		*S. uranoscopus*
	Mormyrus kannume		*Siluranodon auritus*
	M. caschive	BAGRIDAE	*Bagrus bayad*
	Hyperopisus bebe		*B. docmac*
GYMNARCHIDAE	*Gymnarchus niloticus*		*Chrysichthys auratus*
CHARACIDAE	*Hydrocynus forskalii*		*C. rueppelli*
	H. lineatus		*Clarotes laticeps*
	H. brevis		*Auchenoglanis biscutatus*
	Alestes nurse		*A. occidentalis*
	A. baremose		*A. spp.*
	A. dentex	MOCHOKIDAE	*Synodontis schall*
DISTICHODONTIDAE	*Distichodus niloticus*		*S. serratus*
	D. rostratus		*S. clarias*
	D. engycephalus		*S. batensoda*
CITHARINIDAE	*Citharinus citharus*		*S. khartoumensis*
	C. latus		*Mochocus niloticus*
CYPRINIDAE	*Chelaethiops bibie*		*Chiloglanis niloticus*
	Raiamas niloticus	MALAPTERURIDAE	*Malapterurus electricus*
	R. loati	CICHLIDAE	*Oreochromis niloticus*
	Labeo forskalii		*O. galilaea*
	L. niloticus	CENTROPOMIDAE	*Lates niloticus*
	L. coubie	TETRODONTIDAE	*Tetraodon fahaka*
	L. horie	OSTEOGLOSSIDAE	*Heterotis niloticus*
	Discognathus vinciguerrae		
	Barbus werneri		
	B. prince		
	B. neglectus		
	B. anema		
	B. bynni		



1. Misr Aswan Company (187 km shoreline)
2. Aswan Sons Cooperative Society (300 km shoreline)
3. Fishermen Cooperative Society (Mother) (800 km shoreline)
4. Nubian Cooperative Society (370 km shoreline)
5. El-Takamol Cooperative Society (66 km shoreline)

Figure 1. *Distribution of fishing areas of Lake Nasser. Source: High Dam Lake Development Authority (HDLDA)*

Conflicts between Users

Due to the Importance of the lake as a strategic water reservoir for Egypt, the following should be considered:

- Agricultural development on the lake banks will increase crop production but will also add low quality drainage water to the lake;
- An Increase in power generation will require more water extraction from the lake that may be needed during maximum agricultural demand;
- An increase in navigation will enhance transportation but will also add a new source of pollution; and
- Urbanization and industrialization around the lake Will develop the economy of the region but the lake will be the recipient of all the drainage water of such activities resulting in lower water quality.

Fisheries management and enhancement

The High Dam Lake Development Authority is responsible for the management and development of the lake fisheries. Its goal is to maximize fish production and utilize the high lake productivity through several procedures and regulations: (a) a closed fishing season; (b) restrictions on gear type and mesh size; (c) determination of size for marketing; (d) production and restocking of native fish species; (e) establishment of infrastructure and ice plants at fish landing centers in the north and south regions of the lake; and (f) social welfare of the fishers through policy concern, construction of shelters and provision of medical care.

Socioeconomic aspects

There is a debate on the current state of sociological research on Egyptian lakes. The existing problems can only be understood when viewed from a perspective that takes into account not only the biophysical aspects of lakes but also the socioeconomic ones. In planning for the sustainable development of Lake Nasser, a thorough understanding of organizational, behavioral, environmental and political processes is required. The lake is a contested terrain for several government agencies. This is a major problem that needs to be addressed if any meaningful policy on lake management is to be elaborated and effectively implemented.

Stock enhancement in the lake

Enhancement of fish stocks through repeated stocking with material raised within aquaculture installations is one of the most widespread measures for management of inland fisheries today. Stocking programs have often been implemented without properly examining the

causes for the decline in the fishery or the reasons for suboptimal production. This has resulted in failures of stocking programs in the past because factors, such as overfishing, poor fisheries management and degradation of the aquatic environment were not simultaneously addressed. Few stocking programs have been evaluated in terms of their returns, cost-benefits and associated environmental impacts. Generally, stocking programs focus on maximizing fisheries production for human consumption.

Alien Fish Introductions

The introduction of alien fish species is an important tool in fishery management that has increased fish yields in many places. The introduction of Lates niloticus caused major changes in Lake Victoria, which included the virtual extinction of most of its endemic cichlid species. In contrast, Umnothrissa miodon had little impact in Lake Kariba apart from changes to the zooplankton community. These cases emphasize that the riverine fish fauna in human-made lakes is much less vulnerable to change than the lacustrine cichlids of the African Great Lakes. The fish populations in Lake Nasser would not, therefore, be adversely affected by the introduction of a planktivorous fish species, since there is clearly a vacant niche for such a species. Some possibilities are discussed, with clupeids being preferred, and it is suggested that they could increase the fish yield of the lake by at least 30 000 t/ year at relatively little cost.

Socioeconomic policy Issues in the management of the Lake Nasser fishery

Despite being less important in Egypt's overall economy, the fishery in Lake Nasser has expanded to a remarkable extent over the years. Major issues such as governance and participation, economic and social welfare of labor fishers, settlement and population growth around the lake, and factor share, and resource rents are important in the context of a management policy for sustainable inland capture fisheries. Also, a competitive and more realistic price and marketing structure is needed to replace current marketing and price control. Similarly, government-sponsored programs, such as cage culture, restocking, recreational fisheries and tourism, to improve income as well as to attract new investment in the industry, will require participation by a wider group, not just boat owners.

Fishing rights allocation and fishing labor

Unlike other African lakes (such as Lakes Volta and Kariba) where fishing villages sprang up spontaneously, Lake Nasser did not attract any permanent settlement. Instead, the fishing

industry was developed along commercial lines, utilizing the surplus labor force from other parts of Egypt. Fishing rights were allocated to owners of boats and gear through licenses issued by the lake authority. The boat and gear owners, who are usually wealthy and powerful people, recruit fishers from various parts of the country to work as fishing laborers. The labor force comes from as far as 300 km from the lakeshore. Usually, the boat owners employ immigrant labor on a periodic basis. Fishers stay in the fishing camps for a certain period of time as contractual employees of the boat and gear owners. The boat owner supplies food and other essential items during fishing. At the end of the contract period, fishers are paid and go home. Hence, the common fishers have no ownership over their catch. The entire revenue from fish sales belongs to the owner. The net amount after payment of labor, fishing inputs and other related expenses is profit. There is, however, little information on the structure and conduct of the labor market, and on the socioeconomic background of the fishing labor force. It is suggested that boat owners dictate employment conditions, and laborers get an inequitable share of the total fishing income.

Institutional, policy and legal context governing the fisheries sector in Egypt

The Ministry of Agriculture and Land Reclamation has overall responsibility for managing the fisheries and aquaculture sector. Implementation of sector policy and management was delegated to GAFRD in 1983, when Presidential Decree No. 90/183 articulated the powers and duties of GAFRD. Act No. 124 (1983) on fishing, aquatic life and aquaculture is the main body of fisheries legislation regarding the sector. The act focuses on maintaining the fisheries catch in the Mediterranean Sea and Red Sea, as well as inland waters. The act covers the issuing of fishing licenses to fishers and fishing boat licenses. The act also mentions specifications for fishing nets used by fishers in their fishing activities. This act names the National Institute of Oceanography and Fisheries (NIOF) as the scientific institution responsible for stock assessment studies and issuing advice on fisheries management.

Management of fisheries in Lake Nasser

Management of fisheries in Lake Nasser is a special case compared to other inland lakes in Egypt. Since 1973 the lake was managed under the Ministry of Construction and Housing and Land Reclamation through HDLDA. The Fishery Management Center was responsible for development and research within Lake Nasser. After Act No. 124 (1983), GAFRD became responsible for issuing fishing cards (for fishers) and fishing licenses (for boats). Then in 1996 HDLDA became part of the Ministry of Agriculture and Land Reclamation and in 2001

became fully responsible for fisheries management. In 2010, according to a memorandum of understanding between GAFRD and HDLDA, responsibility for licenses and supervision of fisher societies reverted to GAFRD. However, responsibility for management of harbors remained with HDLDA. Allocation of fishing zones in Lake Nasser is decided according to Ministry of Construction and Housing and Land Reclamation Decree No. 621 (1981) and modified in Decree No. 45 (1985). Since 1979, Lake Nasser has been the only lake in Egypt that was subject to compulsory pricing of fish sales according to several decrees by the Minister of Food Supply. Landing of fresh fish coming from the lake was shared between two state-owned companies, the Egyptian Fish Marketing Company and Misr Aswan Company. The two companies were responsible for processing, freezing, packing and transporting fish to market. On 14 June 2001, the Prime Minister issued several decrees to end the monopoly of the marketing companies and liberalize fish trade. The Prime Minister's decree allocated 60% of the shoreline of the lake to members of cooperative societies and 40% to investment by companies or persons with the relevant technical and financial abilities. In 2004, the lake was divided into six sectors. A tender took place and six companies were selected through the tender. Due to the social importance of the Lake Nasser fishery to surrounding societies, the Governor of Aswan decided in 2004 to organize price setting for fish catches. The Governor formed a committee from representatives of different organizations to determine the fish price. This committee decided fish prices every 2 weeks according to the price of fish at the wholesale market in Cairo (El-Obour market). The Governor also allocated the Egyptian Fish Marketing Company and Misr Aswan Company the entire fish catch in their sectors. However, these measures were unpopular, and in 2008 the fish pricing committee was disbanded, and fishers now sell their catch freely. The Ministry of Interior through the Aquatic Police is responsible for security on the lake. Fishing is only allowed by those with licenses. The Ministry of Interior also works closely with GAFRD to prohibit the use of illegal fishing nets and fishing gear in the lake. Border guards have a limited role in controlling smugglers.

Employment creation in the lake Nasser fisheries

In addition to information on the number of people employed, interviewees were asked to provide the following information for each subsector of the value chain:

- Whether employment is full-time, part-time or seasonal;
- The number of working days per year for part-time and seasonal workers;
- Whether employees are men or women; and
- Whether employees are over or under the age of 30

From the interview responses about the number of days typically worked in the various subsectors, the following full-time jobs estimates were obtained: 1 full-time jobs = 300 days in fishing, fish processing and the intermediary subsector; and 1 full-time jobs = 330 days in the wholesaling and retail trading subsectors. The greatest number of jobs was in the fishing subsector at 18.1 full-time jobs per 100 t of fish sold. This equates to 60% of full-time jobs across the value chain, whereas wholesaler employment contributed only 5% of total full-time jobs. Based on the full-time jobs calculations, it is estimated that each 100 t of fish caught generates around 30 jobs in the value chain. More than 90% of fishers working in Lake Nasser are from Upper Egypt governorates (Fayoum, Sohag and Qena). Meanwhile, 50% of wholesalers and 65% of retailers are also from outside Aswan. This indicates that the fisheries sector is an important source of job creation not just for Aswan but also for other governorates, including those of Upper Egypt. Across all subsectors, most work was full time (>79%), while in fish retailing and wholesaling, almost all employment was full time (97% and 95% respectively). The number of full-time jobs days contributed by those under 30 years of age was 49%–59%, indicating that working in the fisheries value chain is an acceptable option for young men. All fishers interviewed were men, which were attributed to the remoteness of fishing grounds from harbors and poor living conditions in fishing camps. Women were not involved in the fishing sector.

Critical issues constraining the fisheries of Lake Nasser

Many households are dependent on the Lake Nasser fishery for their livelihoods, including the families of fishers, processors, traders, wholesalers and retailers. The businesses stemming from the fishery are profitable at each stage of the value chain, and across the value chain there is considerable value added. Based on the number of years of experience recorded for those working in each subsector of the value chain, it is also clear that in its current form the value chain is relatively stable. However, it cannot be overstated that from a management perspective, the Lake Nasser fishery is in a fragile state. Most of the fish being caught at present are small sized, and total catches from the last year of official reporting (GAFRD 2013) are the lowest they have been in almost 10 years (18,716 t), indicating that overfishing in the lake is a serious problem. The importance of the lake in terms of jobs, income and food security, coupled with the challenges and opportunities identified by the value chain analysis, calls for a change in attitudes by all stakeholders towards management of the Lake Nasser fishery. Effective enforcement of the existing regulations might cause hardship in the short term but is essential if the fishery is to provide employment and financial benefits for fishers, traders, processors and retailers in the future. The structure used to outline the key challenges facing

the Lake Nasser fishery in this section of the report is largely based upon the results of focus group discussions. The main issues identified through three focus discussion groups held with board members of fisheries cooperatives (Nubian, El Takamol, Nile River, "Between Dams" and Aswan Sons associations). The 50 board members who participated in the discussion groups represent actors across the value chain (fishers, traders and processors), are experts in their relevant fields, and were familiar with the various business operations across the value chain. These issues are then explored in more detail throughout the following subsections. Although many of the issues identified here are directly related to poor performance of value chain actors, it is evident that some issues relate to factors outside of the value chain, such as health and safety. It is interesting to note that during one of the focus group discussions, participants remarked that it was the first time they had ever been asked about the issues or challenges they were facing.

Input factors

1. Fuel availability and prices;
2. Living requirements (bread and food);
3. Health, safety, wellbeing and social insurance;
4. Capital and credit;
5. Labor;
6. License renewal; and
7. Other input-related issues include:
    - The cost of ice is high, and the ice is of poor quality; fishers ranked this as a medium importance problem.
    - There is a lack of handling boxes (crates) in Lake Nasser, and there is no supplier of expanded polystyrene foam boxes for use in fish transportation. The use of traditional boxes in fish handling is limited to traders, while fishers use baskets made from palm fronds and cover the fish with a blanket to protect them from the sun. These materials do not insulate the fish from heat and are unhygienic, as they are difficult to clean. Also, these baskets may cause physical damage to fish, increasing the likelihood of contamination and spoilage.

Production factors

1. Absence of security;
2. Poor living conditions and lack of services on the lake;
3. Overfishing in Lake Nasser was a major concern for participants. There were concerns

about:

- The lack of enforcement by government authorities;
- The inaccessibility of various sites to law enforcement officials,
- Electro fishing; and
- The smuggling of captured fish to Sudan.

These factors have reportedly led to a depletion of fish stocks in some areas. Also, since 2011, there has been no enforcement of a closed period during the spawning season (usually from 15 April to 15 May) and a lack of restrictions on net mesh sizes (which would prevent catching tilapia of less than 500 g). These factors cause overfishing, indicated by the presence of large quantities of small tilapia (less than 250 g) in the catches. There were concerns that crocodiles contribute to stock depletion through fish consumption (fishers estimated 30 kg of fish per crocodile per day). On the other hand, the official environmental organization, Egyptian Environmental Affairs Agency (EEAA), stated in a recent report that the contents of crocodiles' stomachs weighed only 7 kg, including stones. According to EEAA, catching of crocodiles is not allowed in Lake Nasser. Egypt is a member of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES lists crocodiles in Appendix 1. (Species listed in Appendix 1 are fully protected, and governments should not allow catching or selling of these species.) Some fishers are calling for the conservation status of crocodiles to be moved from CITES Appendix 1, which requires full protection, to CITES Appendix 2, which they believe would allow hunting of crocodiles in Lake Nasser. However, a listing in CITES Appendix 2 would probably only allow the catching of crocodiles for cultivation or ranching. Furthermore, Egyptian environmental laws (4/1994 and 9/2009) forbid killing and capturing crocodiles, as well as transporting or trading them or their eggs. Fishers also mentioned the problem of migratory birds feeding upon shoreline and shallow-water vegetation that serves as fish habitats, thereby negatively affecting fish stocks.

Marketing (transport, delivery and distribution) factors

- Poor postharvest handling facilities;
- Absence of fish auction;
- Unstable market price and poor market conditions; and
- Fish processing technology.

Recommendations to address input factors

- Establishing general associations to improve access to fishing gear and fishing licenses;

- Training fishers to build skills and knowledge;
- Access to affordable bread and fuel;
- Ending the monopoly on ice production; and
- Training hatchery owners to improve the quality and availability of tilapia seed.

Recommendations to address production factors

- Minimizing or eliminating depletion of fish resources;
- Improving health, safety and wellbeing of fishers; and
- Safety equipment within the lake.

Recommendations to address marketing factors (transport, delivery and distribution)

- Reducing fluctuations in prices;
- Improving the health and hygiene conditions in trader markets;
- Improvements to postharvest fish handling storage and transportation; and
- Investigation into appropriate methods of processing for value addition.

Recommendations to support employment creation

Quantitative data shows that the sector generates a large number of jobs, both directly and indirectly. However, overexploitation of fish stocks in Lake Nasser is leading to smaller and fewer fish, as well as declining revenues at each link in the value chain. The number of jobs created by the sector can be increased through minimizing or eliminating overfishing would allow catch levels to rebound after a short lag period. Improvements to postharvest handling procedures, and particularly the hygiene conditions during transport and sale of fish, would improve quality and reduce waste. In turn, this would lead to greater employment through increased demand for fish. The development of postharvest processing could create more jobs.

Benchmarking: farmed vs. Wild-caught fish

Since Egyptian fish, both wild caught and farmed is rarely exported, it is difficult to benchmark or compare the performance reported in this study with cost and earning data for capture fisheries in other countries. There are few comparable studies on capture fisheries within Egypt. However, it is possible to benchmark costs and earnings from Lake Nasser capture fisheries with the Egyptian farmed fish sector, because the fish products are largely the same and good data is available. In this study, the average retail price for small sized tilapia from

Lake Nasser ranged from EGP 5.1/kg to EGP 8.1/kg (depending on whether it was being sold by the trader, wholesaler or retailer). Price fluctuations of wild tilapia (from Lake Nasser) against large-sized farmed tilapia (grade one is greater than 335 g) from El-Obour market in 2013. The data shows that the lowest prices for wild tilapia were in July and August, followed by October. This indicates that the season with highest catches is from June to November. According to the findings of the field surveys, fish retailers were buying small-sized tilapia (125–200 g/fish) for an average of EGP 4.4/kg to EGP 7.6/kg and selling them at an average of EGP 6.71/kg to EGP 9.80/kg in the morning and EGP 5.51/kg to EGP 8.96/kg in the afternoon. It should be noted that this detailed costs and earnings survey of the Lake Nasser fisheries value chain is the first of its kind. Despite the fact that it is not possible to generate a time-series assessment of changes in value chain performance using this study's data, the outputs may still serve the purpose of baseline data to be used for future benchmarking of changes over time. This data could also be used to evaluate any future interventions on youth unemployment (or other topics).

Implementation CAADP Country Process in the northern Africa region

Enhancing agricultural sector performance - Better policies, capacities and investment programs for higher resource use efficiency.

The Core strategies of CAADP to support agriculture sector (fisheries subsector) in the region are:

- Strategic thinking for the future;
- Mobilizing partnerships for investment programs;
- Advocacy for agriculture common lobbying;
- Polices reforms;
- Building capacities;
- Develop investment plans;
- Improve National development plan;
- Contribution to economic growth and inclusive development;
- Wealth creation by diversifying GDP sources and fisheries as one main contributor to GDP and livelihoods;
- Create Economic opportunities & Prosperity – jobs & poverty alleviation;
- Improve Food Security / food availability;

- Provide better nutrition;
- Support increased agricultural production & productivity;
- Better functioning national agriculture and food markets & increased intra/inter-regional trade;
- Expanded local agro-industry and value addition;
- Improved management & governance of natural resources for sustainable agricultural production;
- Improved and inclusive policy design and implementation capacity for agriculture;
- More effective & accountable institutions to drive planning & implementation of public policies & investment programs;
- Improved coordination, partnerships & alliances within & across sectors & countries (regional trade and collaboration);
- Increased (public/private) investment financing in agriculture achieving better value for money; and
- Enhanced knowledge support & skills development for agriculture through improved Education & Training; Peer learning; Analytical capacity & strategic thinking.

The Sustainable Development Goals (SDGs) agenda

The Sustainable Development Goals (SDGs) agenda makes achieving food security and ending malnutrition a global priority. Within this framework, the importance of inland fisheries in local and global food systems and its contribution to nutrition and health, particularly for the poor are overlooked and undervalued in the northern Africa region. Table 2 highlights SDGs and opportunities for enhancing healthy diets and livelihood in the region.

Table 2. *Commitment to achieving the UN's SDGs through sustainable inland small-scale fisheries and enhancing the impact of fish for nutrition and health of the poor.*

UN's SDGs	Country	AU/AUIBAR commitments
	Algeria Egypt Libya Tunisia Morocco Mauritania	
1 NO POVERTY	• Inland fisheries are enabling poor, rural households in the region to earn an income. • Adoption of better management practices will boost fishers' livelihood and food security and nutrition security in the region.	People depend on fisheries for their livelihoods. AU/AUIBAR works to help the poor, who often rely on fishing as a primary source of income, to develop sustainable, productive fisheries and aquaculture.
2 ZERO HUNGER	• Sustainable fishing boosts fishers yields and household consumption of fish. • Conservation inland fisheries in the region will help fishing-dependent communities protect and rejuvenate fish stocks.	Fish, particularly small fish, is rich in micronutrients like vitamin A, iron, calcium, zinc and essential fatty acids. AU/AUIBAR strives to make fish available and affordable to the poor, to help combat malnutrition and alleviate nutritional deficiencies.
3 GOOD HEALTH AND WELL-BEING	• Sustainable inland fishing combat malnutrition in poor communities in the region. • Awareness campaign will enable households in the region to learn about nutritious foods.	Rural women have a major role in fisheries, but they often have unequal access to the resources and services they need to be successful. By closing this gender gap, AU/AUIBAR helps to improve productivity and increase incomes and food security.
5 GENDER EQUALITY	• Women in the region must have role in inland fisheries to be productive, money-making source. • Women fish retailers must be trained in business and negotiation skills to build their confidence and knowledge.	AU/AUIBAR through its policy and research must shows that using natural resources efficiently, pursuing innovation and having access to credit to invest in business activities, especially for the poor, are vital in the region.
6 CLEAN WATER AND SANITATION	• A healthy rural house with water-efficient technology must be trialed to enable fishing families to be self-sufficient and have access to good live.	AU/AUIBAR with funding organization can propose such projects.
8 DECENT WORK AND ECONOMIC GROWTH	• Governments in the region must strengthening their policies, standards and regulatory frameworks to promote intra-regional fish trade.	AU/AUIBAR must support small-scale fishers and adopt new technologies, incubator programs to provides access to capital and business advice.

UN's SDGs	Country	AU/AUIBAR commitments
	Algeria Egypt Libya Tunisia Morocco Mauritania	
10 REDUCED INEQUALITIES	• Help women access money to invest in agriculture (fisheries sub-sector). • Youth must receive training on fish processing and packaging to boost jobs in the region, especially areas with high unemployment rates.	AU/AUIBAR through its intensive studies showed that Overfishing, ineffective management practices, industrial development, agricultural pollution and the effects from climate change have reduced fish stocks. AU/AUIBAR must promotes a sustainable approach to inland fisheries to ensure that fish stocks are available for future generations.
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	• In the region, local governments must form an alliance to better manage and protect marine resources. • Traders in the region must adopt new methods of preserving fish such as salting to reduce post-harvest losses.	AU/AUIBAR role to ensure that fish are beneficial to nutrition and health and will play an essential role in sustaining healthy diets in the future. If the vision of the SDGs is to be attained, the fisheries sector, in the context of growing demand will require policy frameworks that are nutrition-sensitive.
		To make this happen, coordinated policy actions and investments across relevant sectors are essential. Fisheries must be seen as a core component of the agriculture sector, as well as an entry point for multi-sectoral interventions aimed at improving nutrition and health outcomes. The present narrow focus on productivity gains and economic outputs will not suffice. A more balanced approach to sustaining capture fisheries is required. Complementarities between the capture fisheries and aquaculture sub-sectors must be clearly articulated and capitalized on in order for countries to sustainably increase the quantity and quality of fish supply while promoting nutrition and health gains, particularly for poor consumers, between now and 2063.

13 CLIMATE ACTION	• In the region, communities and government agencies are required together looking at ways to adapt to a changing climate.	AU/AUIBAR and partners are required to study the future impact of climate change on the countries in the region.
14 LIFE BELOW WATER	• Establish Marine protected areas to protect fragile fish stocks.	AU/AUIBAR must help fishers communities in forming conservation groups to protect stocks of inland fisheries, and the country's national fishes.
15 LIFE ON LAND	• Establish Research on the impact of dams and hydropower developments on inland fisheries along the Nile River to help policymakers make informed choices. • Countries in the region must partnering with the government and research institutes to improve management of inland fisheries.	AU/AUIBAR must works with an extensive network of partners to create change for the millions who depend on fish in the continent. Partnerships are essential to bring technologies and innovations to scale and achieve development impact.
16 PEACE AND JUSTICE STRONG INSTITUTIONS	• Establish innovation platform to bring together policymakers, value chain actors and fish farmers to encourage participatory and representative decision-making.	AU/AUIBAR must conduct Research on inland fisheries exploitation advocates for greater governance, giving voice to the Africa's fragile fisheries resources.
17 PARTNESHIPS FOR THE GOALS	• Establish global research partnership for food security in the future.	AU/AUIBAR must conduct a global research partnership for a food-secure future in the continent.
To achieve the above SDGs, there is a need to ensure: • Integrity and Trust: We must be honest, open and accountable with the resources invested in the continent, and we deliver on our commitments; • Fairness and Equity: We must respect and celebrate diversity and actively challenge social and gender inequities that impede progress toward our goals; • Excellence and Innovation: We must pursue high standards of scientific and professional rigor and embrace impartial evaluation, critical reflection, learning and adaptation; and • Teamwork and Partnership: We must seek to leverage our complementary strengths within teams and across institutional boundaries to achieve the greatest impact.		

Table 3. *Analysis / description of present situation, problems and issues in the inland fisheries of the Northern Africa region*

Constraints/ Issues	Opportunities	Priority strategic Actions	Objectives	Geographical
Lake of data (Resources)	Human Resources; Research Institutes; and Universities	Implementation of research programs form improved data collection	To help countries to develop management plan based on availability of reliable data	National, regional, and continental
Introduction of Alien species	Economic and biological potentials of introduced species	Complementary studies on alien species	To fill the gap in food and nutrition security by using high productive species	National regional, and continental

Constraints/ Issues	Opportunities	Priority strategic Actions	Objectives	Geographical
Conflict with other users	Economic benefit from different users	Implementation of co-management plan	To create job opportunities and improve economics/ reduce internal immigration	National, regional, and continental
Weak/ineffective/ Lack of policy/ regulations	Enhancement of existing legislations in consultation with stakeholders	Adoption of local, regional, continental and international instruments	To improve fisheries governance	National, regional, and continental
Water quality	This is a global issue and many efforts are spent to improve water quality. Economic benefits from different products, in case of salinization, some new species will be produced	Implementation of monitoring program	To ensure the durability and sustainability of fisheries	National, regional, and continental
Inefficient fishers associations	International funding to assist fishers associations	Capacity building	To improve participation of stakeholders in fisheries governance	National, regional, and continental

Table 4. *Thematic area 1: Priority actions to improve /enhance the contribution of inland Fisheries to Food & Nutritional security and wealth creation.*

Priority Actions	Ongoing Key Actions/initiatives	Geographical Scale
Implementation of research programs and technology transfer and innovation to enhance food security	Exist, but not efficient	National, sub-regional and regional
Implementation of co-management plan	Exist, but not efficient	National, sub-regional and regional
Complementary studies on alien species (EIA, productivity)	Not existing	National, sub-regional and regional
Adoption of local, regional, continental and international instruments	Exist, but not efficient	National, sub-regional and regional
Capacity building	Exist, but not efficient	National, sub-regional and regional

Table 5. *Thematic area 2: Strategic partnership developed and proposed at sub-regional and regional level (Regional Economic community & Regional Fishery Body) with technical & developed partners.*

Priority Actions	Geographical Scale
Active participation of countries in the regions and sub-regions in the official meetings. Enhance the role of RECs and RFBs in regional economic integration.	National, sub-regional and regional
Adoption and implementation of regional and sub-regional frameworks and instruments. Enhance and adopt participatory fisheries management approaches among countries, sub-regions and regions across Africa.	National, sub-regional and regional
Establish strategy for adaptation to climate change.	National, sub-regional and regional
Exchange of experts between countries in the regions and sub-regions in the continent.	National, sub-regional and regional
Networking and harmonization of legal frameworks.	National, sub-regional and regional

Table 6. *Thematic area 3: capacity development and Investment promotion in the inland fisheries in Africa*

Priority Actions	Geographical Scale
Development of infrastructure	National, sub-regional and regional
Enhance fish processing and postharvest handling	National, sub-regional and regional
Enhance /develop fishing gears and boats industry	National, sub-regional and regional
Development of health and social security insurance for fisher communities	National, sub-regional and regional
Training and awareness development	National, sub-regional and regional

Priority areas for sustainable inland fisheries in the northern Africa region

- Priority 1: Implementation of demand-driven applied research programs;
- Priority 2: Implementation of co-management plan for inland fisheries in the Northern Africa region;
- Priority 3: Adoption of local, regional, continental and international instruments;
- Priority 4. Ecosystem approach to inland fisheries (EAF) management;
- Priority 5: Complementary studies on alien species;
- Priority 6. Drivers of Inland fisheries management and the need to Change;
- Priority 7: Implementation of monitoring program of water quality; and
- Priority 8: Capacity development of fisher's associations.

Priority 1: Implementation of demand-driven applied research programs

The objective of this priority is to support selected demand-driven applied research programs at the country, regional and continental level to deliver African public goods in the form of knowledge, technologies, capacity and policy recommendations to support key policies of the AU in food and nutrition security and sustainable agriculture in African countries. Through CAADP it will also strengthen the governance of the African agricultural research system to improve its response to demand from poor smallholder farmers, to increase the role of multiple stakeholders in priority setting and implementation and to improve accountability to users of research products. This promote pro-poor agricultural and rural innovation through the delivery and uptake of country, regional and continental public goods derived from agricultural research, contributing to an overall objective of reducing food insecurity and poverty through pro-poor agricultural and rural development.

Effective participation of the Northern Africa countries

- Inland fishers /stakeholders will determine how the inland fisheries sector should be transformed and establishing the needed actions. As, Stakeholder will provide opinions, information and policy recommendations;
- Establishing functional platforms and partnerships for inland fisheries research and innovation;
- Creating capacity for change– by connecting, networking and learning;
- Strengthening, regional and continental capacity responding to stakeholder demands

within the fisheries innovation platform system;

- Interactions and partnerships for creating capacity among fishers, research, extension, education and trade organizations;
- Effective communication strategies, disseminating and sharing views for policy changes;
- Particular emphasis must place on the need for new and re-balanced partnerships between donors, researchers and the users of research products;
- Securing fund (EU. IFAD, FAO and etc.), to harmonize donor contributions, and a consortium that unites the research centers under a single legal entity;
- Recognize a clear role for AU and AU-IBAR in articulating the demand for research through its regional and stakeholder networks and in holding AU and AU-IBAR accountable to the users of research products;
- Ensure that funded projects should demonstrate reasonable success in terms of uptake of results and impact at the farm level, focusing directly on productivity increases have the most impact on poor fishers, while it was less easy to trace the direct impacts of projects focused on policy;
- Work closely with fisher and fisher associations, and cooperate more closely with national and regional research systems, to have more impact than those that are more isolated without coordination among countries and regions; and
- Ensure that market orientation is a key element in addressing rural poverty through an agricultural innovation and a systems approach.

Relevant actions, directed to complementary research, application and up-scaling of research outputs and related capacity building

- Conservation and sustainable use of inland fisheries, given the geographical focus of this action;
- Establish African continental, regional and national technology platform and communication networks for technology transfer;
- Support to national fisheries research systems; and
- Development support to research programs led by international research organizations and to coordination and capacity building of African institutions is complementary to the research.

Expected results of the priority/action

This action should be implemented by selectively supporting AU and AU-IBAR research programs (i.e., under CAADP thematic areas) and by strengthening the governance of the

national research system through support to AU's short and medium-term plan. The expected results identified through this action include:

1. Scientific, technological, innovations and knowledge, with emphasis on the needs of low income fishers including women;
2. Effective alternative approaches to meeting future fisheries and rural development needs, to guide policy decisions;
3. Capacity for inland fisheries research and its uptake enhanced among researchers, non-research stakeholders and institutions;
4. Partnerships established between AU centers, and non-AU research institutions, and research and non-research development institutions for more effective uptake of research outputs;
5. Improved complementarities with research, extension and innovation programs and activities supported by the AU and international funding organizations; and
6. Strengthened governance of inland fisheries, reflected by inclusiveness, development effectiveness and capacity.

Risks and assumptions associated with the intervention

- Mechanisms to enable fishers to access and utilize public goods from research programs may not work effectively;
- Diverse demands and visions for fisheries research may not be translated into coherent programs and effective research outputs;
- Lack of attention to complementary investments in infrastructure and advisory services may inhibit uptake or up-scaling of results;
- Governments do not promote policies that provide an enabling environment for farmers to take up and profit from research products; and
- National research and extension systems will continue to be underfunded and not be able to bridge the information and demonstration gap between research and beneficiaries.

Priority 2: Implementation of co-management plan for inland fisheries in the Northern Africa region

Responsible fisheries management guarantees the long-term conservation and sustainable use of fisheries resources, maintaining their quality, diversity and availability for present and future generations. This is achieved through; actions of member states, individually, in consultation with national stakeholders, bilateral / multilateral cooperation among member states, efforts of sub-regional and regional fisheries organizations / arrangements and contributions from

relevant governmental and non-governmental organizations. Co-management provides a forum for dialogue between partners sharing inland fisheries, design regulations, share information, negotiate, and communicate. It builds trust and works towards collective action and an efficient and equitable resource management system. This increases the chances of success of the whole set-up of co-management. A slow process is important, especially if 'radical' political changes have been taking place (for example Libya, Egypt and Tunisia political situations - co-management takes time). Perceived success correlated with duration project and different in view of government officials, local fishers and stakeholders.

Principles identified in the inland fisheries co- management in the Northern Africa region

1. Principle 1: A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted; the fishery must be conducted in a manner that demonstrably leads to their recovery target stock;
2. Principle 2: Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends; and
3. Principle 3: The fishery is subject to an effective management system that respects local, national, international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Identified main approaches to fisheries management in the Northern Africa region

1. No management at all;
2. Government led fisheries management;
3. Traditional / community management; and
4. Co-management;
    - Co-management is not a recipe to get out of fisheries management problems. Often these problems are a direct reflection of a far wider problem (weak states, poor democratic structures, lack of management resources in relation to the number of fishers or to the type of fishery, etc.);
    - Look at co-management as an institutional and organizational learning project where ideas are tried out. This puts a strong focus on the process. Principles includes; participation, openness & transparency, preferential support for vulnerable groups;
    - Better/easier to start when resources are not yet overfished;
    - In many situations co-management will require (building fisher's organizations and

capacities; suitable legal framework; setting up (in-) formal co-management structures; and

- Building the capacity of government personnel (knowledge, skills, and attitude).

General considerations for responsible fisheries management process in the Northern Africa region

- Responsible inland fisheries management must take into consideration four dimensions of sustainability – biological, environmental, social and economic – and must be supported by an appropriate institutional framework;
- Management objectives should be long-term and be translated into appropriate and effective actions covering concerned fish stock units and their exploitation to maintain or restore stocks at levels capable of producing Maximum Sustainable Yield (MSY), as a whole based on the best scientific evidence;
- The precautionary approach must be applied widely to conservation, management and exploitation of living marine resources, whilst taking into account uncertainties in information and setting stock-specific reference points;
- Mechanisms must be in place for the authorization, regulation, monitoring, control and surveillance of fishing activities, methods and practices, in compliance with set management measures;
- A balance between availability of fisheries resources and fishing capacity and exploitation rate must be ensured;
- Legal and administrative frameworks sanction provisions, and enforcement schemes must be in place for the effective implementation of fisheries resource conservation and management;
- Step-up actions to combat Illegal, Unreported and Unregulated (IUU) fishing;
- Further assistance needs to be delivered to countries in the region to strengthen their national capacity to sustainably develop, manage, regulate and monitor their fisheries and to improve market access for their fishery products;
- Regional Fishery Bodies (RFB) can play a critical role in promoting long-term sustainable fisheries where international cooperation is required in conservation and management. FAO, in recognizing that such collaboration is crucial in order to accomplish the goal of responsible and sustainable fisheries, fosters and promotes the work of RFBs.
- Implementation of policy, legal and operational frameworks, that includes (decisions on broad policy matters, structure and content of legislation and structure of operational procedures); and

- Institutional arrangements, priorities, and responsibilities that includes (Capacity and financial resources).

Conditions for successful fisheries co-management systems in the Northern Africa region

1) Individual and household level

Box 1. *Individual indicators for co-management success*

Involvement: in co-management design; in decision – making; in defining boundaries; in rule development.

Capability: to express an opinion; to make decisions; to priorities issues; to participate in a meeting; to write a proposal; to speak in public; to work in committees.

Control: over the process; over resources; over people's own life.

Access: to knowledge; to meetings; to resources.

Skills: to repair and maintain technical equipment; to manage a project to solve a problem.

Personal change: in awareness; in sense of responsibility; in self-confidence; in initiative; in self-respect; in generating new ideas; in willingness to deviate from customs and community values; in willingness to take risks.

2) Community level

- Clear objectives and benefits;
- Presence of existing rules and 'conservation ethic';
- Clearly defined boundaries;
- Clearly defined membership and effective representation;
- Participation by those affected;
- Legitimate (traditional) local institutions;
- Local leadership;
- Legitimacy of institutions, rules and regulations;
- Social preparation, capacity building, empowerment;
- Conflict management mechanism;
- Partnership and building trust;
- Local political support;
- Adequate and secure financial resources;
- Strong enforcement and control; and
- Property rights over the resource

Box 2. *Community indicators for co-management success:*

Communication: commitment of stakeholders; recognition of stakeholders; understanding between stakeholder's groups; expression of different viewpoint; level of open disagreement.

Representation: of various stakeholders; of various social groups; of women; of socially marginalized groups.

Collaboration: between individuals; between neighborhood groups; between various social (differentiated groups).

Trust: between staff and government; between staff and beneficiaries.

Support: of higher government levels; of local leaders; of NGO; of the project staff; of village based organizations.

3) Resource characteristics

- State of the stock; and
- Uncertainty and risk (variability of yields and season)

4) Government level and external

- Legislation;
- Government structures and NGOs;
- Demographic factors;
- Technological change;
- Political willingness of the national government to enabling policy and legislation;
- Presence baseline data and supporting research;
- Presence external organizations and 'change agents;
- Coordinating body and agreements;
- Accountability, networking and advocacy; and
- Markets.

Essential elements for formulation of Fisheries Policy and Legislative Framework for inland fisheries in the Northern Africa region

1. Formulation of Management Plans
    - Multidisciplinary and stakeholder participation
2. Data Collection, Research and Analyses
    - Fish stocks, ecology, environment, fisheries, social and economic
3. Adoption of Fisheries Regulations

- Catch Control
- Capacity/Effort Control
- Access Control
- Port state measures
- Post-harvest and trade measures

4. Implementation
   - Effective legal, administrative and institutional structures
   - Management actions
   - Monitoring, control and surveillance - management in partnership
5. Review Process
   - International and regional law + policy

Box 3. *Co-management indicators for success*

Success in terms of material output: size of yields; catches per unit effort; hectares of protected areas; occurrence of destructive practices by local people.

Success in terms of human involvement: number of people attending the training; number of participants in project; frequency of staff-meetings; size of the network.

Success in terms of project benefits: division of benefits; economic opportunities; well-being in terms of health; well-being in terms of income; flow of investments; education level.

Success in terms of management structure: management institution designed and active; management plan and regulations designed and implemented; enforcement structure in place; conflict solving mechanisms in place; leadership;

Success in terms of participation; types of participation; dimension of participation.

Box 4. *Question must have identified in the co-management plan of the Northern Africa region*

- Who is taking the initiative? Environmental groups, the (local) government, groups of fishers, scientists, external NGOs…
- Why was the initiative taken? Over-fishing, destructive fishing, a conflict over fisheries (geographically, large-small scale, gear, migrant fishers), lack of control and enforcement, government policy, NGO priority…
- Is the process top-down or bottom-up?
- Who is participating? government officials, fishers (which?), women's groups, village groups, external agents, private companies…

- Division of responsibility? Who is bringing what in? Finances, skills, time, resources, knowledge…
- How the various objectives and motivations of people to participate are reconciled is there common ground? How are benefits divided?
- How is the idea communicated? Meetings, written, radio, government order…
- What is the context? Political, economic, social, cultural…
- Does the community/user group have property rights?
- Are there existing, traditional fishing regulations and institutions?
- What laws and regulations apply to the fisheries?
- What measures are in place? Gear restrictions, open-closed seasons, temporary closures, MPAs…
- Is control and enforcement effective?
- Ecological state of the resources: feasibility study, stock assessments, baseline data.

Box 5. *The Fisheries manager's toolbox*

- Access limitations / Access rights (a form of input restriction);
- Restrict effort input;
- Restricted output;
- Ecosystem protection;
- Habitat enhancement;
- Indirect economic instruments;
- Encourage other uses of the aquatic area;
- Encourage / provide other income generating activities (aquaculture?); and
- Market-based tools.

Friend of the sea criteria in the inland fisheries management

- Target stock is not overexploited;
- No by-catch of endangered species;
- Compliance with regulations (IUU, minimum size, etc.);
- Social accountability;
- Gradual reduction of carbon footprint; and
- Ensure that inland fisheries are certified

Certification for sustainability in inland fisheries (eco-labels)

Principle of eco-labels for sustainability in inland fisheries in the Northern Africa region

- Eco-labeling is a market-based tool to promote the sustainable use of natural resources;
- Eco-labels (tags) are seals of approval given to products that are deemed to have fewer impacts on the environment than similar products;
- A label gives buyers and consumers the choice to differentiate and select products that are ecologically friendly produced from between products that are conventionally produced;
- The goal of eco-labeling initiatives is to promote sustainably managed inland fisheries and highlight their products to consumers; and

Box 6. *Conclusions from the management plan in the northern Africa region*

- Co-management should be viewed in the socio-cultural, economic and political context of country in the Northern Africa region;
- All the co-management factors interact and are shaped by past and future conditions and also by food security;
- Taking enough time for social preparation and value formation is vital to the co-management process;
- Flexibility of co-management is the key of implementation success;
- Strengthen policies and development strategies for inland water bodies;
- There must be national and regional development policies consistency with regional policies and strategies;
- Consistency with partner government's policies and strategies for shared inland water bodies;
- Co-management consist of developing or reviewing fisheries management plans on inland waters bodies and strengthens management institutions for implementation (e.g. Support formulation/review of regulatory frameworks for integration of ecosystem-based approach to fisheries (EAF) in inland water bodies);
- Strengthen stakeholder organization, participation and promotion of community based management of small-scale fisheries; and
- Co-management include support establishment of community-based fisheries surveillance, enhance capacity and empowerment of stakeholders and fisher's flocks organizations for effective participation in fisheries management and decision-making process, with particular reference to women and youth organizations.

Priority 3: Adoption of local, regional, continental and international instruments

To achieve this priority, two activities must be coordinated:

1. Inland fisheries governance; and
2. Inland fisheries management

1. Inland fisheries governance

Governance is an important issue for management of land fisheries which, determines the manner in which power and influence should exercise over the management of the inland fisheries. This includes the combined use of the legal, social, economic and political arrangements to manage inland fisheries. The inland fisheries governance has international, national and local dimensions and includes legally binding rules as well as customary social arrangements.

The establishment of institutions, policies and processes through which management may be realized as fundamental to effective inland fisheries governance includes:

- National fisheries management authorities in each country of the Northern Africa region are usually a key part of governance structures, representing the legal state entity with authority for performing specific fishery management functions;
- Co-management committees, fishers' associations and other groups, and the relationships among them, also form part of the institutional arrangements for inland fisheries governance;
- Inland fisheries policies define courses of action of a government or decision-making body, and are designed to influence future decisions or actions;
- The makeup of inland fisheries governance includes (sustainability, actors, structure);
- The way the actors organize policy should include (Ecology; Market; Policy; State; Politics; Polity; Society; Economy; Civil society);
- Making inland fisheries policy takes place at different stages with different participants and different rules;
- Stakeholders are important as they can have different views on the balance of economy, ecology and society; and
- Stakeholders differ in the definition of problems, which solutions are legitimate and which rules of the game are negotiable.

Challenges facing inland fisheries governance in the Northern Africa region

- Inland fisheries are diverse, dynamic and complex;
- Diversity of resource type and human systems that exploit them and diversity of post-harvest arrangements;
- Complexity in relation to the multiple linkages that occur between ecosystem, production and consumption (fish chain) and between fishery and non-fishery activities;
- Dynamics derive from multiplicity of linkages and the uncertainty due to unpredictable environmental effects on fish stocks to domestic and/or global markets. Actors continuously change their behavior which makes the dynamics unpredictable;
- Fisheries are generally too diverse, complex and dynamic to be governed effectively by one single agent or institution;
- Multiple 'governors' must share the burden;
- Multiplicity of stakeholders involved in inland fisheries (different power, agendas, perceptions). Their interaction (positive and negative) determines what actually happens;
- For challenges and concerns to be addressed adequately by those involved in governance their characteristics first have to be understood;
- Understanding the 'nature of the problem' will help in evolving means to strengthen inland fisheries governance systems;
- Managing the fisheries efficiently requires some form of 'interactive' or 'participatory' governance, public–private partnerships and informal networks that emphasize collaboration and co-ordination between representatives of the state, the market and civil society;
- Fishing communities lose control over and access to fisheries resources in local environment and other users take over;
- Development of conventions and international agreements tend to focus on aquatic ecosystem rather than on local communities;
- Market driven arrangements (certification) tend to focus on ecosystems rather than on people; and
- Solutions may be of long term interest to fishing communities but don't address immediate concerns (food and income).

The right way for effective inland fisheries governance in the Northern Africa region

- Establish and maintain institutions (a formal framework and norms and rules for decision making) which enable communities to address;
- Risk of exclusion from resources and markets due to globalization, competing uses of

resources;

- Provision of an institutional framework to control access and questions of distribution of access;
- Reverting overexploitation to sustainable exploitation;
- Reconciling immediate needs of fishing communities with international agreements;
- A fisheries governor has to cope with uncertainty and change;
- Deal with many stakeholders;
- Guide conservation and development, regulate processes, solve problems, mediate negotiations and create new opportunities;
- A fisheries governor needs information on the current and desired state of the fish chain and how to get there;
- A fisheries governor needs tools (management plans, gear controls, licensing);
- Take action in all parts of the fish chain and at all governing levels (local, national, international); and
- Governance entails the totality of interaction between those governing and those being governed.

2. Inland fisheries management

In all policies and regulations exists in the Northern Africa region there is confusion between governance and management. If fisheries governance would be the same as the way inland fisheries are managed then the terms would be interchangeable. So, the fisheries authorities in the region must recognize the difference between governance and management:

- Related but different;
- Management is about action, Governance is about politics;
- Management is the implementation of decision and action according to the rules;
- Governance is about sharing responsibility and power. It is about setting policy agenda and objectives and about the process of implementing management actions. It pays attention to institutional arrangements for governing activities;
- Governance does not limit itself to one sector (e.g. fisheries) but looks at the relationship between fisheries and other parts of society;
- Governance looks at longer-term societal trends and needs;
- Governance is more strategic, while management is more operational;
- Management relates more to the efficiency of professionals working towards a target or goal; and
- Governance is about intellectual innovation in creating a vision for a better world.

Box 7. *Summary of key elements in adoption of local, regional, continental and international instruments in the Northern Africa region*

- Governance structures in the Northern Africa region must provide appropriate legal, social, economic and political arrangements so that appropriate management strategies can be developed for different inland fisheries;
- The main constraints of inland fisheries governance are insufficient financial and human resources and economic importance of inland fisheries for each country in the region is different;
- Lack of awareness and information about the local, regional, continental and international instruments;
- Lack of statistics and information regarding inland fisheries production, thus management measures are often undermined by data gaps;
- There is a need for aligning national fisheries legislation with the local, regional, continental and international instruments;
- There is a need for implementation of the Ecosystem Approach to Fisheries;
- There is a need for developing food safety and quality assurance systems for fish and fisheries products and mitigation measures for post-harvest losses;
- There is a need for implementation of national plans of action for fishing capacity and tackling the problem of overcapacity and to combat IUU fishing;
- Lack of mitigation measures on by-catches and discards frequently occur in major inland fisheries and are not always monitored;
- Lack of implementing stock recovery plans and management measures to ensure sustainable inland fisheries;
- Lack of implementing measures related to the protection of endangered species, selectivity of fishing gear and the prohibition of destructive fishing methods and practices;
- Essential needs of contribution of RFBs and NGOs efforts to generate more awareness and cooperation with Northern Africa countries in addressing IUU fishing and working with civil society to increase recognition of access rights to fishery resources;
- Apart from seeking direct ways to overcome these constraints, improvement of institutional structures and regional and international collaboration must be identified as key factors to improve the implementation of the governance;
- The need to establish awareness and use of holistic fisheries risk assessment in fisheries policy design, by the fisher's community;

- The need to establish food security portal for the region;
- The need to disseminate Information on the structure, products and value of intra-regional fish trade in food security in the region and between other AU member states must be made and available to stakeholders; and
- The need to develop /revise policies, certification procedures, standards and regulations, in national and regional fisheries products trade to improve food security policy frameworks.

Priority 4. Ecosystem approach to inland fisheries (EAF) management

One of the most important aspects in inland fisheries management in the Northern Africa region is the Ecosystem Approach to Fisheries (EAF). The purpose of EAF is:

- To plan, develop and manage fisheries in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by aquatic ecosystems; and
- EAF looks especially at the effects of fishing on all components of the ecosystem, and at the external impacts on the aquatic ecosystem (fish stocks).

EAF strives to balance diverse societal objectives by taking into account the knowledge and uncertainties about biotic, a-biotic and human components of ecosystems and their interactions, and applying an integrated approach to fisheries within ecologically meaningful boundaries. In EAF two different paradigms are combined:

- Ecosystem management, with a focus on protection and conservation of biodiversity, ecosystem structure and functions by managing plant and animal species and physical components of ecosystems (protecting from human influence); and
- Fisheries management has a focus on providing food and livelihood/income for humans by managing fisheries activities.

EAF involves unique types of relationships among living creatures

- Predator-prey;
- Competitors for food or space;
- Parasite-host;
- Symbiosis (both benefit); and
- Commensalism (one benefits, no effect on the other)

Biological and Ecological effects of fish capture from inland fisheries

- Removal of part of the targeted population;
- Reduction of numbers, biomass;
- Change of genetic diversity in the stock due to selection of large individuals, certain sub-populations, early spawners, etc.
- For other species capture means removal of predator, prey or competitor;
- Pollution from engines, vessels;
- Ghost fishing by lost gear (esp. traps, gillnets); and
- Ecosystem boundaries can be selected based on what is practical for the fishery in the area.

Human activity affecting inland fisheries

- Climate change (Rising water temperature; species structure; Sub-tropical species seem to move into temperate waters; due to nutrient input from rivers systems it became eutrophic; anoxic layers below a certain depth);
- Introductions (Alien species);
- Mechanical habitat destruction;
- Human expansion;
- Altered ecosystems;
- Pollution (Poisonous and hazardous dissolved chemicals from agriculture, industry, domestic waste water, mining (PCB, dioxine, heavy metals, pesticides, hormones); affect health of fish and humans already in very small quantities; Accumulation (higher concentrations) in organisms that are higher in the food chain; eutrophication (organic matter, nitrates, phosphate, ammonium, etc); affects water clarity, oxygen level, fish stock composition; Nylon and plastic waste); and
- Fishing itself.

Box 8. *The key principles addressed by EAF in the Northern Africa region*

- Inland fisheries should be managed to limit their impact on the ecosystem to an acceptable level;
- Ecological relationships between species should be maintained;
- Management measures should be compatible across the entire distribution of the resource;
- Precaution in decision-making and action is needed because the knowledge on ecosystems is incomplete;

- Governance should ensure both human and ecosystem well-being and equity;
- EAF should has a focus on interactions within the ecosystem;
- EAF should recognizes man as an essential component of the ecosystem;
- EAF is comprehensive, it ensures that all key components of the fishery system are taken into consideration, while also taking into account external drivers;
- EAF should encourages use of the 'best available knowledge' in decision-making;
- EAF should promotes the adoption of an adaptive management system;
- EAF should evolve from existing fisheries management institutions and practices;
- Choosing for an EAF means that more uncertainty is introduced because ecological processes are not well known, variable and dynamic;
- Indicator to be selected should be one that is modified by the fishery;
- The selected parameters can be estimated with reasonable certainty and with indicators that are already collected, or could be "easily" collected;
- All stakeholders should agree (meaningful and workable); and
- The choice should be well explained to all parties involved.

Objective and Indicator to be monitored

Objective	**Indicator to be monitored**
Reduce discards	Number of discards
Reduce mortality of rare/vulnerable/protected species	Number of dead individuals of rare/vulnerable/protected species
Increase ratio of large fish in catch	Size spectrum of catch
Maintain fishery employment	Number of fishers
Reduce dependency of community on fishing	Type of employment & sources of income

Priority 5: Complementary studies on alien species

- Conservation of endemic genetic resources
- Genetic management of introduced species
- Socio-economic and environmental impact assessment

Priority 6. Drivers of Inland fisheries management and the need to Change

Drivers of the Inland fisheries management in the region	Why Inland fisheries management in the region must be used	Purpose of Inland fisheries management plan
• Provision of food for a growing population (food security); • Achieving livelihood security in rural communities; • Degraded ecosystems and loss of associated biodiversity; and • Loss of associated values and functions.	• To describe the area's needs in terms of sustainability; • To find solutions for constraints and challenges • To describes what should be done; • To define a series of actions to maintain and/or enhance the area's performance; • To focus is on the area as a whole, not on individual species; and • To ensure sustainability & management of inland fisheries as a matter of compromising perceptions and objectives through negotiations among various stakeholders in a real-life local context.	• Ensure compliance with local, national and international policies (CBD, UNCLOS, MDGs); • To identify factors that affect, or may affect in the future; • To identify the objectives of management: short term versus long term; • To define the monitoring requirements; • To maintain continuity of effective management; • To obtain resources (budget, staff); • To enable communication within and between sites, organizations and stakeholders; • To manage/resolve conflicts; • To ensure participatory management planning; • To help fisheries managers to look to the points of interest of all stakeholders and be aware of the required protection and conservation of an area; • To identify and resolve which existing and/or arising conflicts and threats have to be managed; and • To ensure that the management plan should be user-friendly.

Strategy to change and tips for facilitation of conflicts in inland fisheries management in the Northern Africa region

- Separate the people from the problem; focus on interests rather than positions;
- Look for common ground;
- Insist that the agreement is based on objective criteria;
- Generate a variety of options before settling on an agreement;
- Attempt a stepwise resolution per component (break down issue into manageable chunks);
- Keep breaking the ice by maintaining a sense of humor and putting things in perspective;
- Empathize (not sympathize) with all parties;
- Move to a nice and neutral meeting place (neutrality);
- Build friendly relationships between people using icebreaker and social events
- Avoid "offensive" language;

- Be open to creativity!!!, assess ways forward by unorthodox, innovative, creative setups;
- Conflict in resource management (e.g. in fisheries ecosystem) is driven by the interdependencies between and contradictory needs of social, economic and ecological system;
- Managing power dynamics and stakeholder diversity is a key feature in managing conflict in fisheries governance processes;
- If not managed well, those with dominant power may end up dominating key governance dialogue and decision making;
- Conflict could be used productively as a transformative agent for decision making, rather than trying to avoid it;
- Conflict could be solved by embedding conflict resolution mechanisms within fisheries governance frameworks; and
- Conflict management resolution should therefore be used as part of fisheries interventions decision making (governance) levels and processes.

Priority 7: Implementation of monitoring program of water quality

Capacity building

- Infrastructure
- Training
- Database and networking
- Develop and enforce polices to protect inland water bodies

Priority 8: Capacity development of fisher's associations

Fishers association's capacity development in the Northern Africa region is recognized as a high priority. It is also important because of capacity development must play in supporting sustainable inland fisheries management. Throughout the investigation of the present consultancy, it is recognized that capacity exists, but needs to be strengthened. Capacity development in fisheries sector in the Northern Africa region have traditionally focused mainly on training and improvement of practical skills (i.e. fishing techniques, fish handling, storage, and preservation), as well as provide scientific advice for fisheries management purposes.

Box 9. *Initiatives of a holistic/systemic view of the context in which fisher's associations operate in the Northern Africa region*

- Initiatives of capacity development for fisher's associations must be participatory in all stages (design, implementation and monitoring);
- Initiatives must provide flexible and suitable learning pathways taking into considerations the overall societal/political context in which initiatives operate;
- Initiatives must be integrated based on regional/geographical, intrasectoral and intersectoral linkages;
- There is a need for development of appropriate incentives to the initiatives of capacity development;
- There is a need for capacity development to those delivering capacity developments for effective delivery; and
- The fishing rights must be assigned to the fishermen's cooperative associations rather than to private individuals and companies for reasons of equity and not efficiency and thus, active fishermen should be the beneficiaries of the fish resources.

Requirements for capacity development

- Measurement of fishing capacity;
- Registration database development;
- Capacity monitoring systems;
- Develop alternative livelihood options;
- Economic-impact analysis;
- Rationalization of economic instruments;
- Awareness building of fisher's communities;
- Development of informed, rational fisher representation;
- Reporting systems;
- Strengthen regulatory structure;
- Upgrade legal process & capacity;
- Development of civil governance mechanisms;
- Certification and traceability.

The role of Fishermen's associations

The role of fishermen's associations in the Northern Africa region is trying to influence those who make the decisions to do so in fishermen's favor. Thus, the fishermen's associations recognize themselves to be responsible for certain tasks in fisheries management. This has

to do with decentralization of decision-making, which promotes efficiency in, gathering and processing all the information necessary to enable a central management authority to take informed decisions. Individuals are likely to act in their own interest. Thus, decision-making by fishermen's associations will lead to more equitable results than decision-making by individual fishermen or fishing firms. The decisions on fisheries management issues taken collectively by fishermen will imply an equitable distribution of the benefits of fishing (when the decisions are taken within democratic organizations). In this way, the fishermen will be the principal beneficiaries of the resources they harvest.

Box10. *Requirements for effective capacity development of fishermen's associations in the Northern Africa region*

- Organize fishermen's associations under umbrella of legal framework;
- Capacity building of fishers and workers in the fisheries sector;
- Improve local awareness of stakeholders on policies and regulations;
- Creating capacity for change– by connecting and learning;
- Strengthening and integrated capacity responding to stakeholder demands within the agricultural innovation system in a gender sensitive manner;
- Strengthening fisher capacities for gender sensitive agricultural innovation;
- Enabling environment for implementation – by advocating and communicating;
- Conducting strategic analyses to generate evidence to support increased investments in capacity strengthening;
- Catalyzing development, testing and scaling up of new approaches for human and institutional capacity strengthening;
- Develop national, regional and continental action plans for human capital formation to attain food security in African countries;
- Inventory of institutional, regulatory frameworks and policies governing and guiding the technical, educational, and research agencies in support of inland fisheries.

Risks associated with intervention develop/enhance management plan in selected inland water bodies in northern region of Africa

- Inland fisheries sustainability ultimately depends on the political commitment from African governments and on their willingness to commit financial resources;
- There is a risk that some governments in the region may not promote policies that are conducive to inland fisheries management plans or to providing an enabling environment for fishers to take up and profit from research products;

- There is a risk that the effectiveness of inland fisheries management plans could be compromised by competing interests of stakeholder groups;
- Poor commitment and cooperation by the Regional Economic Communities (RECs) and the Regional Fisheries Bodies (RFBs) for effective participation in the action implementation;
- Poor commitment of the region for program implementation at national levels due to paucity of capacity or lack of willingness to participate;
- Non-compliance by the stakeholders (the fish-folks and their organizations) in action implementation process and also weak capacities by these organizations for effective participation;
- Inadequate institutional and human resource capacity amongst RECs and RFBs may hinder effective collaboration/participation in action implementation;
- Unpredictable events such as rapid depletion of fish stocks, environmental pollution, climate change phenomenon and other natural disasters as well as uncontrolled fishing practices (IUU), and piracy may undermine action implementation and outcomes;
- Mechanisms and linkages to enable poor fishers to access and utilize public goods from research programs may not work effectively;
- Diverse demands and visions for fisheries research may not be translated into coherent programs and effective research outputs;
- Lack of attention to complementary investments in fisheries infrastructure, advisory services or micro-finance may inhibit uptake or up-scaling of results;
- Governments in the region do not promote policies that provide an enabling environment for fishers to take up and profit from research products;
- National research and extension systems will continue to be underfunded and not be able to bridge the information and demonstration gap between research and fishers;

Appendices

Appendix 1. Conditions affecting the success of Fisheries Co-management in the Northern Africa region

Individual and household level	
1. Individual incentive structure	• The most successful cases where those where the people themselves saw the need to organise themselves; • The higher the dependency on the resource, the more people are inclined to undertake action; • If resource users develop initiatives on their own and are willing to invest own resources, it works best. It means they are willing to give up short-term benefits, for long-term benefits. Quotas and licenses can help here; and • Other incentives are economic (income), social (prestige, values), or political (elections, in line with policies, acquiring recognition of local institutions). People have to see themselves as actors, not passive recipients. There is no guarantee that co-management will lead to higher income or catches. People need to be informed on the risks involved.
2. Problem recognition	• The users need to see a problem with the resources; • Understanding of the root causes will help in the formulation of the solution; and • Willingness to act depends on the type of explanation for problems: rational, mythical, denial, etc. Where problems are perceived as external, people may resent taking action.
Community level	
3. Clear objectives and benefits	• The people, who are affected by management decisions, must be involved in developing the management objectives; and • Partners need to agree on the issues to be addressed and how to tackle them. Benefits need to be divided equally. It is hard to measure benefits, as some are intangible or long-term.
4. Presence of existing rules and 'conservation ethic'	• Where community members have a history of 'collective action' i.e. are used to working together, it is easier to set up co-management structures; and • Existing, traditional rules that concern resource management provide a strong basis for co-management will work well in establishing resource management rules and achieve sustainability, equity and efficiency. Where no 'conservation ethic' exists, it is harder to set up co-management.
5. Clearly defined membership and effective representation	• The stakeholder group is often larger than the local community (e.g. traders, business people, boat owners), but membership should be defined as to who has a clear stake in the fishery; and • A stakeholder analysis may be a good tool to identify all groups and interests, and find a well-balanced representation. The process of involving all relevant stakeholders may be time consuming, but may lead to more acceptable and sustainable arrangements.
6. Group homogeneity	• Where there is a high degree of homogeneity in terms of kinship, religion, ethnicity, and fishing techniques, co-management is easier; and • However, often fisher communities are not homogeneous and different viewpoints may exist between different groups. Reaching consensus may be difficult even in small groups. But issues need to be addressed, on various levels. An overlap of interests will stimulate the process.
7. Participation by those affected	• Partnership and sense of ownership over the process is important; and • Partners need to feel that the process not only benefits them, but that they are part of it. It is important to have clarity about each other's roles, goals, purpose, operation, style, and limitation. So, dialogue and synchronisation are important. Early and ongoing participation is important to allow partners to demonstrate commitment. It also helps the participants to develop greater understanding of the problems involved.

8. Legitimate (traditional) local institutions	• Co-management requires legitimate organisations with clearly defined membership, and working separately from the government and political pressures. Organisations need to have the legal to exist and make arrangements and rules related to resource use; and • Local traditional leaders often play a vital role in the functioning and resilience of this resource management system. The local elite may not be the appropriate leaders for co-management.
9. Local leadership	• Leaders often take the initiative for co-management and are the link between the community and external agents or government; and • Training in leadership skills can help. Core group formation may produce committed individuals and leaders. External agents should not act as leaders; they have to come from the community. This to avoid dependency. Lack of effective leadership hampers fisheries co-management.
10. Legitimacy of rules and regulations	• The active participation of partners in management, planning and implementation is directly related to their sense of ownership and commitment to the co-management arrangements. Objectives need to be defined communally; and • The legal process formalises rights and rules and provides legitimacy to local participation. External agents and the co-management arrangements must rrespect the local culture and fisheries. A true devolvement of power is crucial to a legitimate process so that local decisions and management structures are respected.
11. Social preparation, capacity building and empowerment	• Awareness raising and social preparation are important first steps in the co-management process; • Capacity building needs to help create the technical capacity of people to manage resources and create new attitudes and mind frames; • It is important to strengthen the position of the marginalised in the community, including poor fishers, women, etc. Their participation is vital to success of the co-management arrangements. Empowerment is only functional if it is based on the local socio-economic and political context; and • It is also important to increase the economic and political power of the community (for example in their relation to traders). Watch out for co-management to be hijacked by powerful groups or individuals!
12. Conflict management mechanism	• Absence of conflicts or other severe disruptions support strong co-management. If resource users are to follow rules, a mechanism for discussing and resolving conflicts is a must. Conflict management should be conducted at the local level where solutions can be found quickly. • Conflicts in the village or issues of rivalry may hamper the process. Also, in situations where the level of poverty is high, or where being security or health issues, the co-management process is negatively affected.
13. Partnership & trust	• A relationship of trust and mutual respect needs to be developed between the partners. Good and open communication helps, for example through discussion forums, as well as meeting the mutually agreed targets and objectives; and • Building trust takes time and can easily be undone if one party breaches the agreement. There is usually a low level of trust between fishers and the government.
14. Local political support	• Co-management needs long-term support of the local government unit - the local 'power structure' has to be involved. The cooperation of the local political elite is important. There must be an incentive for local politicians to support co-management This requires a mind shift. Local resource users need to develop the skills to deal and interact with political officials. Sometimes fisher's organisations make informal ties, which can work.

15. Adequate and secure financial resources	• Sustained and timely funding needs to be available to finance the various operations and facilities (planning, coordination, enforcement, etc.). The co-management arrangements also need to be supported by partners who will invest their own funds and time; • The establishment oflong-term political and financial mechanisms help to ensure sustainability (longer than fisheries officials' tenure position); and • Be aware of large funders (World Bank, African/Asian Development Bank) who might have conflicting priorities/interventions. Often co-management projects stop when funders pull out. This threatens further existence of the local arrangements.
16. Strong enforcement and control	• Vigilant enforcement of rules and regulations is vital to co-management. It is important that individuals perceive the rules/law as 'fair'. Rules need to be simple and attainable. Effective enforcement requires the participation of all partners. Enforcement can be carried out by a separate unit, in collaboration with existing enforcers (traditional organisations, fishing leaders, church), or by formal institutions (navy, police, coast guard); and • In general, the motivation to comply with the rules is based on rational decisions (cost-benefit analysis). Social pressure can help in increasing compliance (peer pressure). In addition; there might be socio-cultural mechanisms that regulate behaviour (fear of ancestors, god, moral obligation, etc.). Where enforcement is lacking, the management system may collapse.
17. Property rights over the resource	• User rights must be formalised, people should be more inclined to set-up management structures and rules that limit resource use. Legal ownership over resources addresses individual or collective property rights and the allocation of resource use rights. Collaboration with the government is required to protect and enforce these rights. Without property rights, people have no claim towards outsiders who will otherwise keep on using the resource.
Resource characteristics	
18. State of the stock	• In the case of an over-exploited stock, users are more inclined to collaborate in resource management. Where outsiders use destructive gear, local communities are more inclined to collaborate to counter this.
19. Uncertainty and risk (variability of yields and season)	• Variability in catches may obscure the state of the stock or declining fisheries. Especially where dependency on the resources is high and where resources are vulnerable to unsustainable use, risk needs to be avoided; and • Where people have more security, their willingness to participate in co-management over the long-term is larger. Uncertainty leads to short term perspectives and hence may negatively affect individual incentives.
20. Appropriate scale	• The scale of the co-management arrangement (local, municipal, provincial) should be appropriate to the ecology of the area, the number of people/ communities involved, and the level of management authority required. Smaller numbers are easier in the decision-making process and are 'better manageable'. Cohesion of management actions at a wider spatial scale is important in the future.
Central government level and external	
21. Political willingness of the national government	• The responsibility, authority and functions of government agencies and local organisations should be specified in a co-management contractual agreement. Government departments (fisheries, environment) and agencies have to be willing to work together with the local organisations and support co-management on the longer term. Training and capacity building for government officials is important. They can provide administrative support and technical assistance to the process. In some cases, government fisheries administrators may feel reluctant to work with fishers. They fear that local resource users may interfere with their work and mandate.
22. Enabling policy and legislation	• Supportive legislation and policy need to spell out jurisdiction and control, rights and provide legitimacy to property rights. For operational (day-to-day rules) the legal system needs to be fast and flexible to allow for adaptive management. In some places, local communities have set up management structures without legal backing, so this is possible too.

23. Availability baseline data and supportive research	• It is important that research institutes are involved in the co-management; • Baseline data is important to assess changes resulting from management; and • Stock assessments and monitoring will help to convince the government of the need for more appropriate ways of fisheries management. The findings of the stock assessment need to be compared with the perceived state of the stock by fishers. Local indigenous knowledge is important to be included. A link between research and sustainable livelihoods/ poverty reduction helps in sustaining support and funding.
24. Presence external organisations and 'change agents'	• External agents are often needed to accelerate the process. They can help define the problem, provide advice, ideas, and expertise, guide in problem-solving and decision-making and help with development of management plans and policy. The external agent needs to be objective and trustworthy and serve a catalytic role only, i.e. they should not interfere directly. Often fishers are aware of deteriorating resources. An external agent can help to find the root of the problems. Their willingness to stay long-term in the community helps yet is not always ideal if the person is junior or has strong ideological views on development. Where people have collaborated with external organisations or NGOs, the level of trust is higher and expectations are moderated, which makes collaboration easier.
25. Coordinating body and agreements	• Adequate coordination is important when several partners are involved. The aim is to facilitate quick and efficient decision-making. The coordinating body can also serve as an appeal body or discussion forum for those who question decisions taken by the management body or enforcers. It is also important that aims, role, function, authority and responsibilities are written down in a formal agreement. Poor coordination can lead to confusion, unnecessary duplication of efforts, or even conflicting activities.
26. Accountability	• The process of co-management needs to be open and transparent. All partners need to be held equally accountable for upholding the co-management agreement. There need to be accepted standards for evaluating the management objectives and outcomes. Without structures that allow for accountability, decision-making can become corrupt and arbitrary. A local level institution can provide a voice for resource users and hold up accountability. An outside body can provide checks and balances and make the process more accountable in a formal way.
27. Networking and advocacy	• The formation of a network of community organisations is a strong tool for implementing co-management. Networking provides opportunities to learn from each other. Alliances and networks can help to solve larger issues. Networking can be with other communities, with powerful agents, with other NGO's or business, or with donors and government agencies. NGOs can be crucial in bringing in information and expertise on co-management. Experience with cooperation with the government and NGOs positively influences the co-management process.
28. Markets	• Where people have (direct) access to markets, prices paid for products are higher so that catches could potentially be reduced. Stable markets provide people with a longer-term perspective and stronger inclination to manage resources for sustainability. Accessing markets for sustainably caught species can help in obtaining an incentive for sustainable management and higher prices.

Appendix 2. Evaluation Matrix

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Comparative Analysis	Case Studies
		Management / Staff	External Stakeholders	Partners (& Other)				
Relevance								
Is there a continued need for the management program?	Evidence that the programs respond and or adapt to changes in government policy and priorities.							
	Key informants attest to the need for and importance of the programs (i.e., importance of the objectives of the program; components are still relevant, etc.).							
Is there a current role for Government intervention, and is the program consistent with FAO and AU priorities?	Evidence of appropriate governmental role and responsibility in the area of commercial fisheries.							
	Activities of programs support governmental roles and responsibilities.							
To what extent are the mandates and activities aligned with FAO and AU priorities and objectives?	Evidence that the program is aligned with departmental mandates, priorities and strategic outcomes.							
	Key informants attest to the ability of the programs to fulfil departmental mandates, priorities and objectives.							
Effectiveness								
To what extent has the program produced its intended outputs?	Evidence that the activities in the logic model are completed and lead to the development of expected outputs.							
	Evidence that outputs presented in logic models have been completed as planned for in each program area.							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Com-parative Analysis	Case Studies
		Management / Staff	External Stake-holders	Partners (& Other)				
To what extent have program activities led to the completion of management plans for major stocks?	Evidence that management plans and supporting documentation are completed and up-to-date for each major fishery and that the fishery is delivering the goals set out in these plans.							
	Percentages (%) of major stocks with current management plan.							
	Opinion of program staff, partners, and stakeholders that management plans are completed, accurate and appropriate, and up-to-date for major stocks.							
	Management plans and or supporting documentation demonstrate that the program provides for continuous, new and or expanded opportunities for commercial harvesting.							
To what extent have program activities led to the stable access and allocation of fisheries resources?	Opinion of program staff, partners, and stakeholders on the degree to which access to and allocation of commercial harvesting opportunities is equitable, fair, and transparent.							
	Evidence that there is a system and criteria in place for providing access and allocation to commercial fisheries.							
	Percentages (%) of major stocks with stable sharing arrangements, if possible.							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Com-parative Analysis	Case Studies
		Management / Staff	External Stake-holders	Partners (& Other)				
To what extent have program activities assured that stakeholders are engaged in the harvest decision-making process?	Number and nature of consultations held with partners and stakeholders to discuss stock management objectives and fishery management plans with commercial harvesters.							
	Evidence stakeholders are engaged in harvest decision-making process.							
	Opinions of program staff, partners, and stakeholders on the comprehensiveness and effectiveness of consultations.							
	Percentages (%) of inland fisheries research projects completed v. planned.							
	Percentages (%) of collaborative funding utilized.							
To what extent do program activities assure that appropriate information is available for making informed decisions?	Opinions of program managers on the degree to which key information is available for them to make program and policy decisions.							
	Evidence that program outputs have influenced decision making and led to the achievement of program or departmental goals and objectives.							
To what extent have program activities created awareness of the value and role of fisheries to African society and the economy?	Evidence to confirm that the National Fishers program is publicized consistently each year.							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Com-parative Analysis	Case Studies
		Management / Staff	External Stake-holders	Partners (& Other)				
	Evidence to confirm that countries has completed activities to provide advice, guidance and information to commercial fishers.							
	Evidence that partners and stakeholders believe local or national activities generate awareness of the value and role of the commercial fishery to African.							
	Evidence that managers, partners and stakeholders understand the role of the commercial fishery to African.							
To what extent do program activities ensure fishers have responsibility for shared stewardship in resource conservation and enhancement of fisheries resources?	Evidence to confirm that fishers have taken on responsibility for shared stewardship in resource conservation and enhancement as a result of the governments activities.							
	Evidence that partners and stakeholders believe that fishers are demonstrating shared stewardship in resource conservation and enhancement.							
	Evidence to confirm that fishers have undertaken resource conservation or enhancement activities.							
To what extent has the program resulted in the sustainable management of major stocks?	Evidence that fisheries management plans consider both anthropogenic and non-anthropogenic pressures.							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Comparative Analysis	Case Studies
		Management / Staff	External Stakeholders	Partners (& Other)				
	Evidence that fisheries management plans utilize scientific inputs concerning the sustainability of major stocks.							
	Evidence that fisheries management plans account for information provided by funding organizations such as AUIBAR partners (e.g. strategic policy, regulatory affairs, etc.) regarding the sustainability of major stocks.							
	The fisheries are managed in accordance with FAO and AU and result in the sustainable harvest of African fish stocks.							
	Number of permits and licences are commensurate for parameters specified in Fisheries Management Plans and landed value of the commercial fishery.							
To what extent does the program provide public confidence in the fishery management regime?	*Documentary evidence characterizing how confident African are in Africa's fishery management regime.*							
	Opinion of program staff, partners, and stakeholders that there is public confidence in the fishery management regime.							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Com-parative Analysis	Case Studies
		Management / Staff	External Stake-holders	Partners (& Other)				
To what extent are fisheries managed in accordance with conservation goals and FAO and AU policies?	Evidence to confirm that the government and authorities reviews and incorporates scientific information and advice and input from FAO and AU partners to manage the fishery.							
	Evidence that DFO communicates the department's priorities, goals and objectives to delegated authorities responsible for managing the fishery.							
	Evidence that national governments has developed an appropriate monitoring system for ensuring that fisheries adhere to departmental policies and conservation goals.							
	Opinions of program managers that the funding organizations and FAO and AU is receptive of information and advice provided by fisheries management and governance programs.							
	Evidence from government monitoring system that fisheries are adhering to conservation goals and FAO policies.							
	Evidence that fishers' stewardship efforts contribute to achieving conservation goals and support FAO and AU policies.							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Com-parative Analysis	Case Studies
		Management / Staff	External Stake-holders	Partners (& Other)				
To what extent does national Science or Strategic Policy contribute to the expected outcomes?	Evidence that the appropriate communication channels between the programs and FAO partners have been established and are functioning appropriately.							
	Evidence to confirm that information and advice provided by FAO partners informs program activities.							
	Opinions from program staff in Fisheries Management that inputs provided by FAO partners are effective in improving program delivery and the achievement of conservation and stock rebuilding objectives.							
What key factors or risks influence the success of the program?	Program staff identify key risks or challenges that affect the delivery of the programs.							
	The programs have established systems in place to monitor and mitigate internal/external risks.							
	Evidence of internal/ external factors or risks that have influenced the achievement of program outputs.							
	Documented management actions to address the influence of internal/ external factors or risks.							
Are there any unintended outcomes, positive or negative, that can be attributed to the program?	Identification and assessment of unintended positive and negative outcomes reported by staff, stakeholders and/or observed by the evaluator (high profile or recurring items or issues).							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Com-parative Analysis	Case Studies
		Management / Staff	External Stake-holders	Partners (& Other)				
To what extent is the governance and management structure clear and functioning adequately?	Governance and management structures are documented and roles and responsibilities are described.							
	Documentation highlighting that governance and management structures are functioning as intended (regular meetings, attendance by required managers, issues discussed as intended, etc.).							
	Opinions of program staff to confirm that governance and management structures are functional and lead to effective results.							
	Evidence to confirm that management makes decisions to inform the delivery of program activities.							
	Opinions of regional and branch staff that roles and responsibilities of staff in the Regions are clearly defined and are working effectively .							
To what extent is the design and delivery of the program clear, appropriate and efficient?	Views of respondents on adequacy of resources, systems and tools, and ways to enhance efficiency.							
	Evidence of existing performance measurement strategy and reporting system in place and operational.							
	Key informants view on consistency of the Strategy and reporting system.							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Comparative Analysis	Case Studies
		Management / Staff	External Stakeholders	Partners (& Other)				
	Opinions from program managers that data collected is being used for decision making							
	Evidence on the challenges and benefits of the current program design.							
To what extent do the activities of the program complement, overlap or duplicate with other programs of FAO, or other Territorial Governments?	Evidence that the programs are unique and or similar to other programs across Africa.							
	Perception of key informants regarding the program overlap/ duplication with other programs.							
To what extent could the efficiency/ economy of the program and its activities be improved?	Evidence regarding the economy of the program compared to other similar programs, including: ratio of overhead cost to program expenditures; # of staff members employed to deliver the program, if possible.							
	Breakdown of program budget between operating expenditures and program activities, if possible.							
	Evidence regarding the cost of managing a fishery as compared to its value (landed, landed plus secondary, or cultural/heritage).							
	Extent to which there are alternatives/ complementary services that could be offered.							
	Stakeholder views of delivery modifications to the program that would make it more cost-effective.							

Issue/ Questions	Indicator	Line of Enquiry						
		Interviews			Survey	Document & file Review	Lit Review & Comparative Analysis	Case Studies
		Management / Staff	External Stakeholders	Partners (& Other)				
Do the programs demonstrate use of best practices and or lessons learned in the design and implementation of their activities?	Best practices and lesson learned identified by key informants.							
	Evidence that the programs apply best practices or lessons learned to current program activities.							
	Best practices and lessons learned from literature review and comparative analysis.							
	Evidence that program outputs have incorporate best practices and or lessons learned.							

Appendix 3. Management Action Plan

Management Actions	Actions Completed	Actions Outstanding	Target Date	Supporting Evidence
Prepare a work document outlining key aspects (e.g. governance, structure, key priorities and objectives) subject to discussion in the context of this review.		Discussion (client sectors) to get input to the work document.		
		Discussion with Regional Science in close collaboration with regional coordinators to get input		
		To the work document.		
		Finalization of the work document.		
Integrate the key outcomes from the broader review of other FAO and AU collaborative activities with Industry to the work document.		Discussion (client sectors) to identify which outcomes of the broader review on collaborative activities are pertinent to integrate into the review discussions.		
		Discussion with Regional Science in close collaboration with regional coordinators to get input on outcomes from the broader review that are pertinent to the review discussions.		
		Finalize the document that will guide further steps of the review.		
Perform a review of the Fisheries Science Collaborative Program and finalise a document outlining the new fisheries management plan (vision, governance structure, etc.).		Hold discussions to get input on the new fisheries management plan.		
		Discussion with Regional Science in close collaboration with regional fisheries management plan coordinators to get input on the new fisheries management plan		
		Engage with key industry stakeholders to get input on the new fisheries management plan.		
		Finalize the document outlining the new proposed fisheries management plan.		
Approval and implementation of the new proposed governance structure for the Fisheries Science Collaborative Program.		Submit the document to the National Science Directors Committee for review and approval.		
		New FSCP ready for implementation.		
Research best practices		Scan government departments(e.g. Agriculture) for examples of successful engagement effectiveness measurement tools		
		Engage Communications		
Inventory current engagement process (e.g. advisory committees, advisory boards)		Develop schedule of planned consultations		
		Define each stakeholder group		
		Define desired outcome for each consultation		
		Define effectiveness for each stakeholder group		

Management Actions	Actions Completed	Actions Outstanding	Target Date	Supporting Evidence
Draft report on findings		Draft report summarizing findings, providing definitions of stakeholders and effectiveness and a proposed method for evaluating effectiveness.		
Incorporate into the fisheries management plan		The logic model for fisheries management plan speaks to stakeholder engagement. This measure will be incorporated into the Performance Management Strategy.		
Approval of Economic Prosperity Strategic Outcome Committee		Present licence proposal to Economic Prosperity		
Consult with System Modernization Team		Seek guidance/advice/confirmation from systems modernization team about how this licence could fit within the scope of that project		
Ministerial approval to consult		Minister's approval to proceed with stakeholder consultations		
Consult with provinces and stakeholders		Consult villages and cities on proposed licence, and their role in licence issuance for different species		
		Consultations with key stakeholders through existing advisory meetings; seek feedback on essential elements of licence design and delivery, including regulatory components such as fees and measures such as catch reporting		
		Consultations with general public; on-line and mail-outs.		
Finalize and implement marine licence		Finalize licence parameters (scope, fees, catch reporting, etc.) based on consultations feedback		
		Communicate consultation results and proposed licensing regime to provinces and stakeholders		
		Seek final approval from Minister to implement new licence		
		Finalize licence distribution system, e.g. on-line, Post, new licensing system		
		Regulatory amendments to establish licence and to authorize provinces to issue certain licences		
		Establish administrative arrangements with countries to issue licences different species		
		Develop marine waters fishing guide		
Compile inventory of stocks and current status of fisheries governance implementation for each		Create an inventory of fisheries governance implementation based off the Fisheries Checklist major stock list		
		Confirm and update the table with the regions		

Management Actions	Actions Completed	Actions Outstanding	Target Date	Supporting Evidence
Set priorities for fisheries governance implementation through an integrated planning approach including regional Science and Resource Management		Government and Science to work together in each region to set priorities for fisheries governance implementation, with priority given to the management framework. Compare priorities with the schedule for multi-year stock assessments to ensure science capacity is available		
Stakeholder Consultations	Strategic planning and senior management briefing	Completion of regional face to face meetings		Face to Face Meeting
	Launch of online consultation assets	Closure of online consultation period		Online Consultation period:
Review and analysis of consultation data		Review and analysis of consultation data		
		Consultation report provided to Senior Management		
Development of a work plan for moving forward on fisheries modernization		Development of a work plan for moving forward in fisheries modernization		
		Submission of recommendations and options to senior management working group		
Implementation of work plan for fisheries modernization		Evaluation of commercial fisheries management policies		
		Development of national licensing policy approach		

African Union – Interafrican Bureau for Animal Resources
(AU-IBAR)
Kenindia Business Park
Museum Hill, Westlands Road
PO Box 30786
00100 Nairobi
Kenya
Tel: +254 (20) 3674 000
Fax: +254 (20) 3674 341 / 3674 342
Email: ibar.office@au-ibar.org
Website: www.au-ibar.org