AFRICAN UNION
INTERAFRICAN BUREAU
FOR ANIMAL RESOURCES

REPORT ON REGIONAL CONSULTATIVE WORKSHOP ON ENVIRONMENTAL MANAGEMENT FOR AQUACULTURE FOR EASTERN AFRICA AND GREAT LAKES REGION

27 - 20 August 2015 Kampala, Uganda.





Commissioner Fisheries Uganda, opening the workshop on behalf of the Minister of State for Fisheries



Dr. Seisay of AU-IBAR giving opening remarks on behalf of the Director AU-IBAR





Pariticpants during workshop discussions

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List of Acronyms

AU	African Union
AU-IBAR	African Union Interafrican Bureau of Animal Resources
CAADP	Comprehensive Africa Agriculture Development Program
CAMFA II	Second Conference of African Ministers for Fisheries and Aquaculture
BMPs	Best Management Practices
CITES	Convention on International Trade in Endangered Species
DRC	Democratic Republic of Congo
EAC	East African Community
EAA	Ecosystem Approach to Aquaculture
EIA	Environmental Impact Assessment
EIAA	Environmental Impact Assessments for Aquaculture
FAO	Food and Agriculture Organization
GMOs	Genetically Modified Organisms
IGAD	Inter-Governmental Authority on Development
LVB	Lake Victoria Basin
LVBC	Lake Victoria Basin Commission
LVFO	Lake Victoria Fisheries Organization
LTA	Lake Tanganyika Basin Authority
MS	Member States
MDGs	Millennium Development Goals
NEPAD	New Partnership for Africa's Development
NORAD	Norwegian Agency for Development Cooperation
NPCA	NEPAD Planning and Coordinating Agency
PFRS	Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa
POP	Persistent Organic Pollutants
PPPs	Public Private Partnerships
RFMO	Regional Fisheries Management Organization
SAP	Stategic Action Programme
SENAQUA	National Aquaculture Service
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nation Environment Protection
UNFCCC	United Nations Framework Convention on Climate Change

Executive Summary

A key pillar in the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa is the promotion of sustainable aquaculture development. The policy objective of this policy arena is to jumpstart market-led sustainable aquaculture through a variety of strategies and whereby appropriate support interventionist approaches are supported by strong strategic implementation plans.

For sustainable aquaculture development at this level, there is need to develop and implement strategic sectoral environment management approaches that do not just focus at the farm but also factor in the wider environment. Sustainable environmental management for aquaculture would enable African Union Member States make more realistic and appropriate aquaculture development plans, approve appropriate projects and institute environmental management practices more effectively. Considering the nature of aquaculture, strategic sectoral environment management approaches to that do not just focus at the farm are essential. Thus the ultimate objective of the consultative workshop was to work towards the formulation of a regional environmental management framework Eastern Africa and the Great Lakes Regions to support sustainable aquaculture development.

The specfic objectives of the workshop were to:

1. Inform and enable participants apply the principles of ecosystems approach to aquaculture at the sectoral level.
2. Identify key components to develop and implement appropriate mechanisms for the regions environmental management of aquatic production systems.
3. Formulate a draft regional aquaculture environmental management framework that would support sustainable commercial aquaculture development in the Eastern African and the Great lakes region.

It was evident from the presentations and discussions that Member States and Regional Bodies had taken significant towards environmental management aspects of which did encompass aquaculture. However, it was realised that there were no specific steps for environmental management for commercial aquaculture that were being implemented beyond farm level. Furthermore, there were incoherencies in the existing national frameworks or strategies. There was also variability between approaches among states and regional bodies..

The need to draw a harmonised regional framework as a basis for policy formulation and governance among member states was evident. The benefits of such a framework were summarised as follows:

1. Enable the development and implementation of more realistic, pragmatic and harmonised regional and national policies, strategies and investments both at sectoral level and farm level.
2. Facilitate implementation of EIAA and lower cost for investors
3. Improve productivity, profitability and sustainability of operations that follow guidelines.
4. Facilitate the development and implementation of appropriate BMPs
5. Reduced conflicts with other users
6. Facilitate zoning of areas for aquaculture.
7. Facilitate and lower costs for eco-labelling and certification in zones areas that follow BMPs.
8. Helps ensure safety of products, biosecurity and ecosystem health.

The main outcomes of the meetings were:

1. Reinforcing capacity of participants on Environmental Impact Assessment in aquaculture systems.
2. Reinforcing capacity of participants on the principles of ecosystems approach to aquaculture at the

sectoral level.

3. Identification of main ecosystem issues associated with aquaculture production systems in Eastern Africa and the Great Lakes Region.
4. Identification of socio-economic issues (including policy and governance) in aquaculture environmental management systems in Eastern Africa and the Great Lakes Region.
5. Development of draft guidelines for environmental management framework for sustainable aquaculture development in Eastern Africa and the Great Lakes Region.

1.0. Background

The meeting was organized by African union InterAfrican Bureau for Animal Resources (AU-IBAR) in collboration with the NEPAD Planning and Coordinating Agency (NPCA) with support from the European Union in Kampala,Uganda on 27 -30 August 2015.

Aquatic ecosystems provide several goods and services including fisheries and aquaculture production. Additionally, aquatic ecosystems are the ultimate recipients of pollution from human activity such as industrial and municipal actvities as well as aquatic production practices. Aquatic production systems can have significant environmental and social adverse impacts. The productivity of aquatic production systems, aquaculture not withstanding depends on the status of aquatic resources. Aquatic resources are generally considered renewable. However, even while this might be so, they are not infinite. They need to be properly managed if their contribution to the nutrition, economic and social well-being of the contninents growing population is to be sustained.

The Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa (PFRS) advocates for the sustainable management of aquatic resources for sustainable fisheries and aquaculture development. The FAO Code of Conduct for Responsible Fisheries encompasses this approach. The paradigm of this is enshrined in the Ecosystem Approach to Aquacultre (EAA). The EAA is a strategy for the integration of the aquaculture within the wider ecosystem so as to ensure sustainable development, equity and resilience of interlinked social-ecological systems. In line with these, several African Member states require that environmental impact assessments are part of the requirements for approval of large commercial aquaculture projects. However, it is the continent's overall objective and the objective of Member States to expand commercial aquaculture to the level whereby aquaculture becomes a major contributor to fish production, rural employment, livelihoods and trade. This implies that the number and scales of operations as well as the diversity of technologies employed shall increase.

Sustainable aquaculture at this level of development, requires the implementation of strategic sectoral environmental management approaches whose focus goes beyond the farm and encompass the wider ecosystem. This is iniviteable because aquaculture practice is dependent upon the status of the ecosystem. For example, at geographical level, a cluster of farms that share a common waterbody or watershed need coordinated management. Cultured species are also sensitive to water quality and are therefore extremely vulnerable to the damage inflicted by other users of the waterbody or watershed. Furthermore, while disease incidences can be controlled at farm level, their effects occur at the watershed level and often do require control, management and mitigation at the watershed level. Likewise, exotic fish that escape from fish farms have impacts across the entire watershed; so do the external drivers of aquaculture such as population growth and development, trade and climate change. Watershed boundaries, trade and climate change transcend national boundaries.

Sustainable aquaculture development founded on the principles of EAA therefore requires transboundary initiatives. Common, coherent and practical regional policies and frameworks that promote the development and practice of aquaculture within watershed resource limits are necessary for sustainable sectoral aquaculture development. This will enable member states make more realistic and appropriate aquaculture development plans, approve appropriate projects and institute environmental management assessments more effectively.

2.0. Objectives of the Workshop

This workshop was among the first steps towards meeting the conditions of a critical benchmark for sustainable market-led aquaculture development consistent with Africa's 2025 agricultural transformative agenda and the cardinal recommendation of the Second Conference of African Ministers for Fisheries and Aquaculture (CAMFA II). Environmental management is among the key components for sustainable aquaculture development and growth. The overall focus of the workshop was to embark upon the development of an appropriate regional framework on environmental management for sustainable aquaculture development within the Eastern Africa and the Great Lakes Region as basis for the region's aquaculture development policies and strategies.

The specfic objectives of the workshop were to:

1. Inform and enable participants apply the principles of ecosystems approach to aquaculture at the sectoral level.
2. Identify key components to develop and implement appropriate mechanisms for the regions environmental management of aquatic production systems.
3. Formulate a draft regional framework on environmental management for commercial aquaculture development and zonation for Eastern african and the Great lakes region.

3.0. The Participants Profiles

The meeting was attended by national aquaculture and environmental managers from Member States of the Eastern Africa Region that comprised the East African Community (EAC) and the Inter-Governmental Authority on Development (IGAD). The FAO was represented by the Aquaculture Officer from FAO, Uganda. The regional bodies represented were IGAD, Lake Victoria Fisheries Organisation (LVFO) and Lake Tanganyika Authority (LTA).

4.0. Opening Session

The meeting was officially opened by the Commissioner of Fisheries and Aquaculture in Uganda, Mr. Lovelock Wadanya, on behalf of the Hon. Minister of State for Fisheries in Uganda, Professor Nyiira Zerubabel Mijumbiwho. The Commissioner welcomed the participants and expressed his heartfelt appreciation for the organizers for selecting Uganda as the AU-IBAR destination of choice for a high profile meeting twice in a row (see appendix 3) . Dr. Mohamed Seisay, the Senior Fisheries Officer at AU-IBAR, welcomed the participants on behalf of the Director of AU-IBAR.

5.0. Summary of Presentations

5.1. Session 1: Opening of the Workshop

Two presentations were made at the opening from AU-IBAR that gave an overview of the purpose of the workshop:

5.1.1. The Objectives of the Workshop (by AU-IBAR)

The Comprehensive Africa Agriculture Development Programme (CAADP) and the Second Conference of African Ministers for Fisheries and Aquaculture (CAMFA II) overall objective is to increase production within the agricultural and therefore fisheries and aquaculture sectors threefold by 2025. Consequently, through the PFRS an enabling environment that shall facilitate the jumpstarting of sustainable commercial

aquaculture development on the continent is to be achieved. Unlike small-holder subsistence systems, commercial aquaculture implies larger economies of scale and volumes of fish produced within concentrated areas to attract markets and the development of value chains.

The non-static and dynamic nature of aquatic environments makes them vulnerable to effects of human activity within the ecosystem. Safeguarding aquatic environmental health therefore becomes a pre-requisite if commercial aquaculture production, food safety and other aquatic resource uses are to be sustained. Establishing common, coherent regional frameworks and policies that promote the development and practice of environmentally sound commercial aquaculture will have the following benefits:

1. Enable the development and implementation of more realistic, pragmatic and harmonised, policies, plans and investments both at sectoral and farm level.
2. Enable the selection of appropriate production technology such as species, systems, etc.
3. Facilitate as well as lower the costs of undertaking of Environmental Impact Assessments for
4. Improve productivity, profitability and sustainability of operations that follow guidelines.
5. Facilitate the development and implementation of appropriate BMPs
6. Facilitate ecolabelling and certification, lowering costs for producers and making it easier for supervision
7. Reduced conflicts with other users
8. Facilitate zoning of areas for aquaculture.
9. Helps ensure safety of products

5.1.2. Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa that focused on Sustainable Aquaculture Development (by AU-IBAR)

This presentation provided an overview of the PFRS, it background, objectives and key policy arenas. Sustainable Aquaculture Development falls under Policy Arena for sustainable aquaculture development. The objectives for this policy arena are to jumpstart market-led sustainable aquaculture through a variety of strategies and, where appropriate, support interventionist development approaches in aquaculture by strong strategic and implementation plans.

The expected outcomes of this Policy Arena are:

1. Market-led aquaculture investments operating in many countries
2. Accelerated growth rates reported in several countries across Africa
3. Enabling environment for investment and governance significantly improved in many countries continent-wide
4. Public Private Partnerships (PPPs) in aquaculture development significantly strengthened in many countries
5. Increased strategic cooperation in many areas of aquaculture at regional levels
6. Existence of harmonized and coherent policies, institutional and legal frameworks for aquaculture in shared ecosystems.

5.2. Session 2: Technical Presentations

5.2.1. The Status of Aquaculture in the Region (by M. Ssebusubi, ICEIDA)

The presentation illustrated of the status of fish supply and aquaculture production in the region over the last twenty years. It was brought to the attention of participants that between 1985–2010 Africa was a net exporter of fish. However, since 2011 Africa has become a net importer (FAO, 2014). The ever growing demand and relative decline in fish supply from the fisheries has created situation that favors commercial aquaculture. New markets and production areas are opening up for aquaculture on the continent (See figures 1 and 2).

The presentation showed how levels of fish production and the socio-economic benefits arising from aquaculture in the region are increasing (Figures 3 to 14 and Table 1). However, it was noted that the regions natural resources for aquaculture remained largely untapped.

Table 1: *Number of Fish Farmers Globally*

	1995	2000	2005	2010	2011	2012
			(Thousands)			
Africa	2 392	4 175	4 430	5 027	5 250	5 885
Asia	31 296	39 646	43 926	49 345	48 926	49 040
Europe	530	779	705	662	656	647
Latin America and the Caribbean	1 503	1 774	1 907	2 185	2 231	2 251
North America	382	346	329	324	324	323
Oceania	121	126	122	124	128	127
World	**36 223**	**46 845**	**51 418**	**57 667**	**57 514**	**58 272**
Of which, fish farmers						
Africa	65	91	140	231	257	298
Asia	7 762	12 211	14 630	17 915	18 373	18 175
Europe	56	103	91	102	103	103
Latin America and the Caribbean	155	214	239	248	265	269
North America	6	6	10	9	9	9
Oceania	4	5	5	5	6	6
World	**8 049**	**12 632**	**15 115**	**18 512**	**19 015**	**18 861**

Adapted from FAO, 2014

The challenges influencing current aquaculture development trends were noted as being:

1. Lack of data to prove aquaculture as a priority in national economies vs established crops
2. Lack of / Poor quality inputs (notably seed and feed) coupled with increasing prices.
3. Small scale farms with uncoordinated production.
4. Short term business outlook by farmers.
5. Aquaculture is a high risk enterprise.
6. Lack of skilled expertise.
7. Additive and Cumulative environmental degradation.
8. Lack of regional aquaculture regulatory frameworks especially in shared waters.

In order to address the above constraints, the following were discussed (Table 2):

Table 2: *Development Needs for Aquaculture in the Region*

Private Sector	Government	Inter-Governmental
• Provision of inputs (feeds and seeds) • Provision of support services e.g. veterinary services • Direct Employment • Credit facilities development • Research and development • Market development	• Policy formulation • Regulations and licensing • Aquaculture Zoning • Research and training • Extension	• Policy • Environment Protection Frameworks • Genetic material controls • Trade agreements • Security

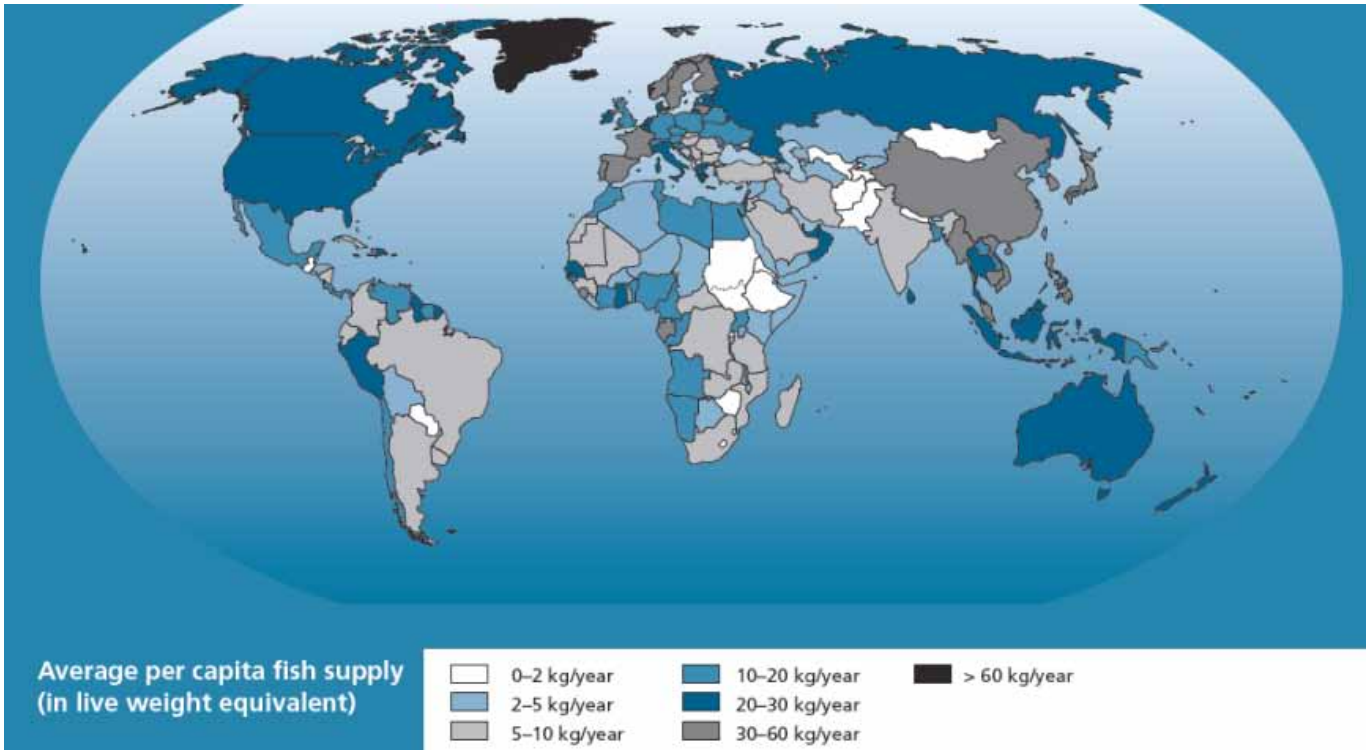


Figure 1: *Global per Capita Fish Supply (Adapted from FAO, 2014)*

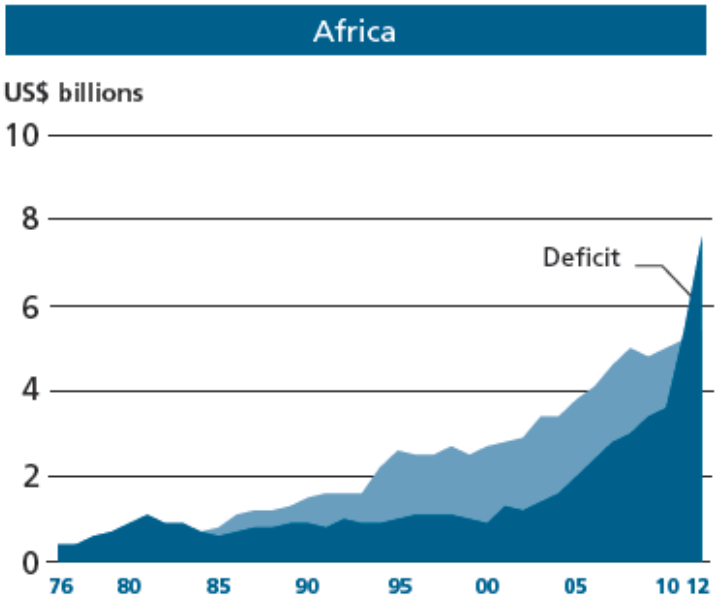


Figure 2. *Deficit in Fish Supply (Adapted from FAO, 2014)*

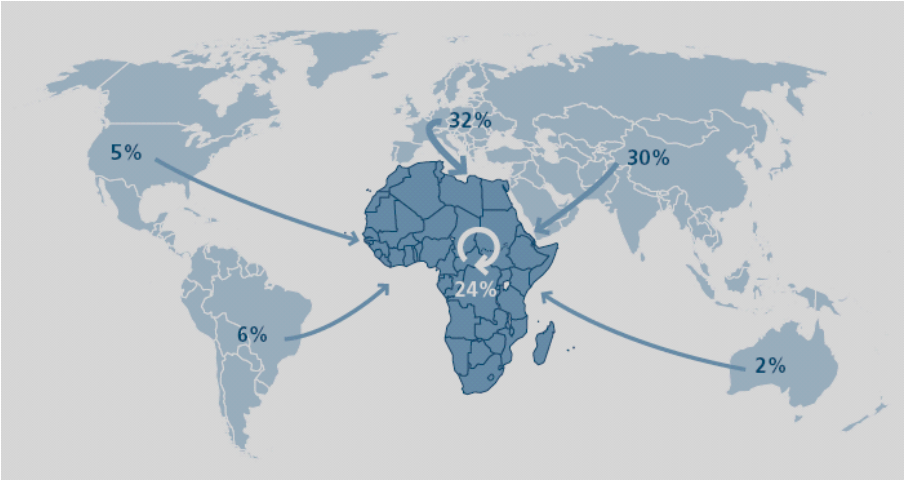


Figure 3. *Fish Trade to Africa (Adapted from FAO, 2014)*

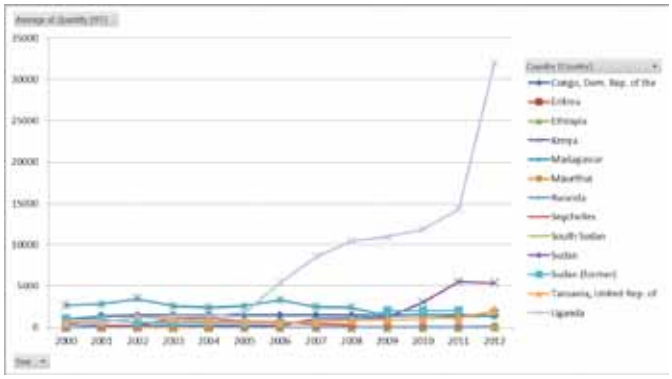


Figure 4: *Aquaculture Production in Eastern Africa and the Great Lakes Region (Adapted from FAO, 2014)*

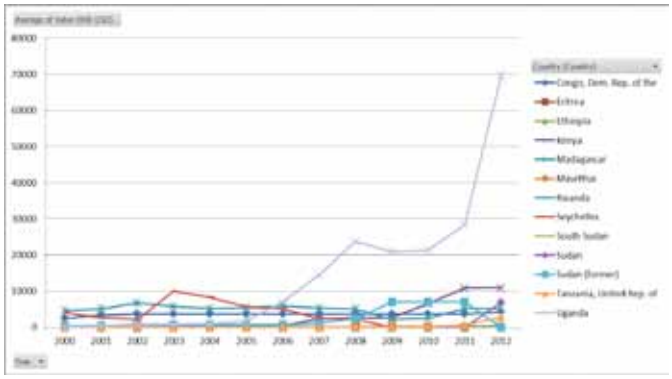


Figure 5: *Value of Aquaculture Production in Eastern Africa and the Great Lakes Region (Adapted from FAO, 2014)*

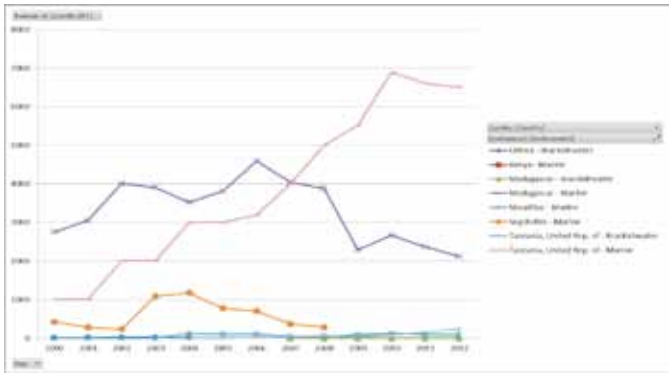


Figure 6: *Marine Aquaculture Production within the Region (Adapted from FAO, 2014)*

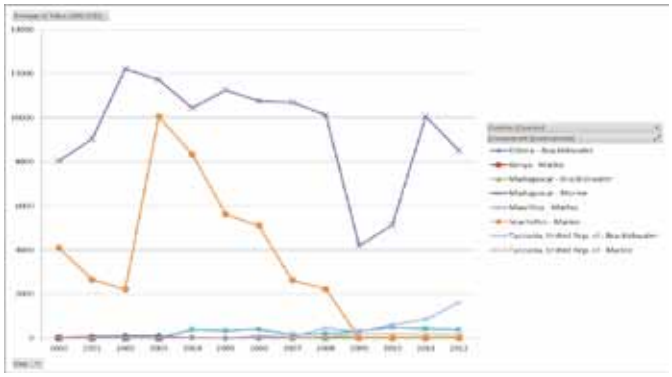


Figure 7: *Value of Marine Aquaculture Production in the Region (Adapted from FAO, 2014)*

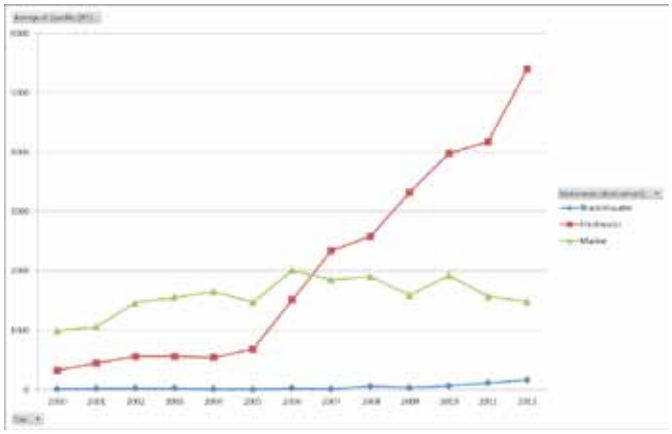


Figure 8: *Volume of Aquaculture from the Different Environments within the Region (Adapted from FAO, 2014)*

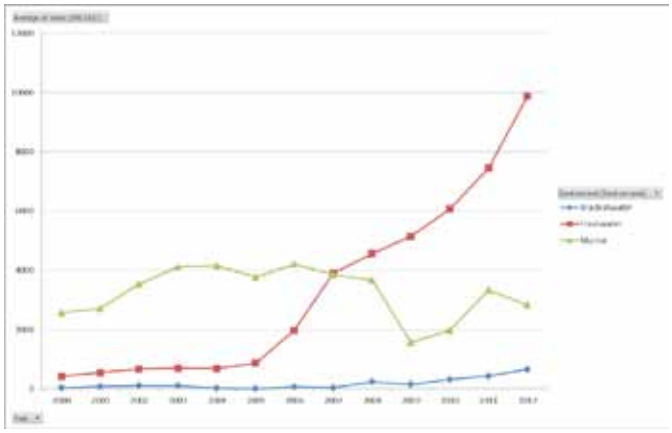


Figure 9: *Value of Aquaculture Production from the Different Environments s within the Region (Adapted from FAO, 2014)*

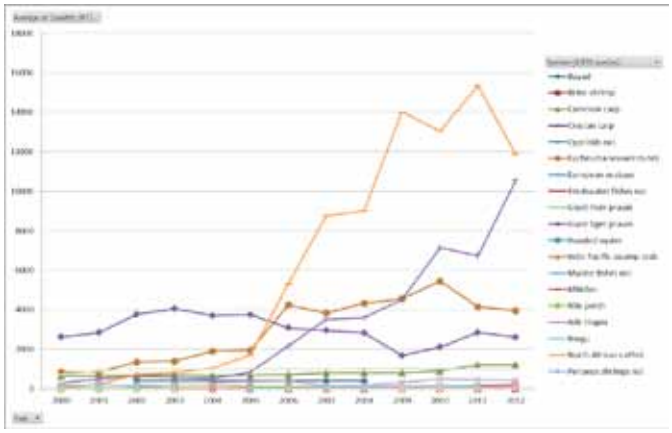


Figure 10: *Quantity of Aquaculture Production by Species (Adapted from FAO, 2014)*

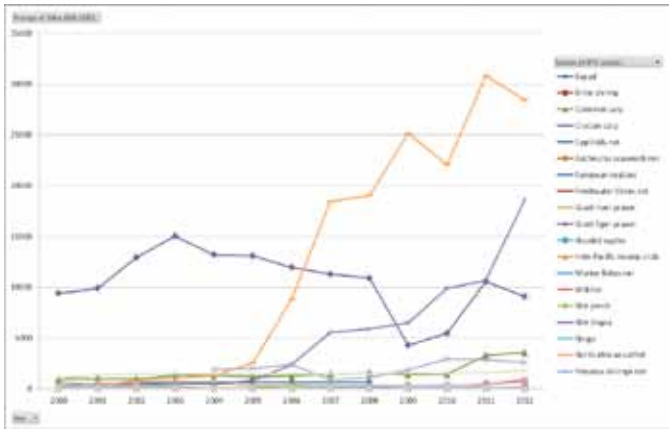


Figure 11: *Value of Aquaculture Production by Species (Adapted from FAO, 2014)*

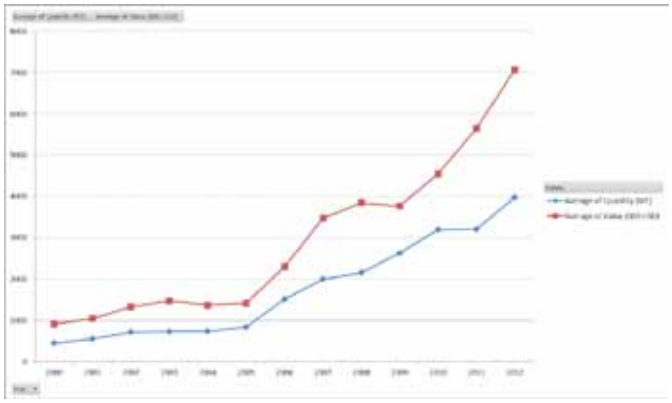


Figure 12: *The Overall Picture of Aquaculture Production in the Region. Adapted from FAO, 2014.*



Figure 13: *Employment from the Fisheries and Aquaculture in Africa (Adapted from FAO, 2008-2015).*

5.2.2. Natural Resource Requirements for Aquaculture (by AU-IBAR)

FAO Statistics show that aquaculture production in Africa, as in the rest of the world, is rapidly growing. To sustain and expand this growth trends and meet development goals, the natural resource inputs for aquaculture need be safeguarded. Commercial aquaculture value chains entail the utilization of resources for production, harvesting, processing, marketing and utilization of wastes. This places demands on spatial resources for land and water, volume and quality of aquatic resources and on the ecosystem for inputs (such as seed) and the assimilation of wastes.

These resources and the healthy functioning of these resources are not limited to defined areas; they are transboundary in nature. Consequently, the management of these resources for aquaculture to a large extent should be done based upon ecosystem boundaries, not only political boundaries.

Further to this, these resources have multiple functions and users. The needs of these multiple uses and the impact of aquaculture on these other uses will also need to be taken into account.

5.2.3. The Regional Environmental Status and Implications for Aquaculture Development Potential (by B. Cheche, NEMC, Tanzania)

Ms. Cheche gave an overview of the value of the fisheries sector to the region, the biophysical status of aquatic resources and the potential impact of climate change on these in relation to the implications on fish production. The current challenges arise from land degradation, pollution, loss of habitat, deforestation, poor natural resource management and climate change. These are likely to impact production negatively if not managed because water quality and quantity, land suitability as well as the accessibility to these other resources (stocking material inclusive) for aquaculture are likely to become compromised. Sustaining these resources for fisheries and aquaculture production and mitigating against negative impacts environmentally and socio-economically that may accrue shall require a concerted effort based upon sound policies and frameworks.

5.2.4. The Ecosystem Approach to Aquaculture (by J. Olwoo, FAO Uganda)

The Ecosystem Approach to Aquaculture (EAA) is a strategy for the integration of aquaculture within the wider ecosystem in order to promote sustainable development, equity, and resilience of interlinked socio-ecological systems. The primary goal of this approach was summarized as being to overcome sectoral and intergovernmental fragmentation of resource management efforts and develop institutional mechanisms for effective coordination among various sectors active in the ecosystems where aquaculture operates. The principles upon which this approach is founded and what the expected outcomes of its adoption were explained. The full document from FAO is available online (Online: ftp://ftp.fao.org/docrep/fao/011/i0339e/

i0339e.pdf). This document forms part of the basis for Best Management Practice for the development of Sustainable Aquaculture in compliance with the FAO Code of Conduct for Responsible Fisheries.

5.2.5. Environmental Impact Assessment in Aquaculture: Components and Process, (Strategic EA) Site Selection and Carrying Capacity Estimation (by S. Ochola, Kenyatta University, Kenya)

Dr. Ochola's presentation described the different options for undertaking and monitoring environmental management both at the project level and wider sectoral level. The need for undertaking regional Strategic Environmental Assessments to facilitate spatial assessments to select and designate aquaculture zones/ areas where production and management can be based upon the ecosystems carrying capacity as well as transboundary environmental management of shared resources and catchments was consequently appreciated by participants. Such an approach would facility the development of appropriate regional policies and frameworks that would serve to guide and support to national development strategies.

5.3. Session 3: Policies Affecting Aquaculture Development

5.3.1. International and Continental Policies (by AU-IBAR)

The global and continental policies on environmental and agricultural development provide the guiding principles for sustainable aquaculture development. It was also recognised that aquaculture in practice is a multi-disciplinary field.

Globally the major policies are the Millennium Development Goals, Convention on Biodiversity, Agenda 21, Aarhus Convention, ICES Code of Practice and Code of Conduct for Responsible Fisheries. At continent level, Africa's agricultural hence fisheries development objectives are guided by the CAADP that recognizes the international policies.

5.3.2. Regional Policies Guiding Aquaculture Development

The Eastern Africa and Eastern part of the Great Lakes Region falls within jurisdiction of the East African Community (EAC) and Inter-Governmental Authority on Development (IGAD). The following is a summary of their regional strategies on Environmental Management.

5.3.2.1. Overview of IGAD Environmental Management Strategies and Status of Implementation (by E. Dejen, IGAD)

Approximately 980,000 tonnes of fish are produced in the region annually. Nine percent of this production comprises fresh water aquaculture. There is hardly any marine aquaculture in the region.

IGAD's strategy in Environment and Natural Resource Management centre around the (i) Development of a regional framework for transboundary resources management, (ii) Identifying and mapping regional transboundary resources, (iii) the development of regional framework of compatible environmental impact assessments, (iv) assisting member States to comply with the provisions of, and benefit from the international instruments, and (v) ensuring follow up on the emerging and re-emerging issues. IGAD has developed regional environmental policies that complement national environmental policies notably:

i. IGAD Regional Environment Policy,
ii. IGAD Environment and Natural Resources Strategy;
iii. IGAD Regional Environment Impact Assessment (EIA) Policy Framework,
iv. IGAD Regional EIA Protocol
v. IGAD Regional EIA Guidelines
vi. IGAD Regional Biodiversity Policy

These policies are general. None of them specifically address issues related to aquaculture development. The need to develop specific aquaculture policies particularly pertaining to the use of shared water bodies was reiterated.

5.3.2.2. Aquaculture Potential: Opportunities, Issues and Challenges for Lake Tanganyika Basin (by K. Katonda, Director, Lake Tanganyika Authority)

The Lake Tanganyika Basin (LTB) has a high potential for aquaculture production because of the numerous lakes, rivers and wetlands in the Basin; availability of suitable native species; locally available required inputs for feed production; suitable temperature for fish growth; and expanded local, regional and international market access and trade. Aquaculture, therefore, presents immense opportunities for socio-economic development in terms of improving food security; providing employment, income generation, regional economic growth and overall poverty reduction; improving livelihoods of the rural communities; and reducing pressure on the capture fisheries. Development of aquaculture in the LTB, however, is constrained, inter alia, by the low adoption of appropriate technologies including biotechnology and bio-safety; inadequate aquaculture extension services; low capacity in fish disease diagnosis; inadequate expertise; insufficient infrastructure; poor culture management; unavailability of quality fish seeds and feeds; and inaccessibility to capital and markets. There are also environmental issues associated with aquaculture practice in the LTB. These include loss and degradation of habitats; introduction of exotic or introduced species; and the spread of human diseases through vectors, usually associated with poor water management.

The instruments which guide the Lake Tanganyika riparian countries in the management of the resources of the lake and its basin include all the internatinal instruments to which LTA Member States are signatories. Additionally, LTA Member States have signed the Convention for the Sustainable Management of Lake Tanganyika (the Convention); the Stategic Action Programme (SAP) for the Protection of Biodiversity and Sustainable Management of Natural Resources in Lake Tanganyika and its Basin; and the Protocol on Aquaculture for Lake Tanganyika and its Basin. Under these, the LTA Partner States obliged to separately and jointly manage the fisheries, harmonize fisheries laws and policies, regulate aquaculture, prevent and minimize adverse impacts, conserve biological diversity, prevent and control pollution, control access to genetic resources, implement requirements and procedures for environmental impact assessments, address accidents and emergencies and exchange information.

The stakeholders in the Lake Tanganyika Basin who should be consulted during the process of developing the regional environmental frameworks include the Ministries responsible for water, environment, fisheries, transport, trade, planning, agriculture, land, and Local Government Authorities (LGAs). Other stakeholders include fishers, fish farmers, Co-management Institutions, Village Governments, municipal water supply and sewerage departments, shipping routes, and town planners.

5.3.2.3. Aquaculture Potential: Opportunities, Issues and Challenges for Lake Victoria Basin (by R. Tumwebaze, LVFO Secretariat)

Lake Victoria Fisheries Organization (LVFO) is the Fisheries and Aquaculture technical arm of the East African Community (EAC). It was formed by a Convention signed in 1994 by the three Partner States (Kenya, Uganda & Tanzania) that share Lake Victoria and became operational in May, 1996. It is a Regional Fisheries Management Organization (RFMO) and has a mandate to coordinate the management and development of the Fisheries and Aquaculture resources in the EAC.

The development and management of aquaculture at regional level is guided by the following:

1. EAC Development Strategy 2011 to 2016: 4.6.4 (c) Development and implementation of aquaculture in East Africa.
2. Protocol on Environmental and Natural Resources Management. Article 16: Management of Fisheries Resources.
3. LVFO Convention: promotes effective management and optimum utilization of the fisheries and prevents introductions without consent.
4. LVFO Strategic Vision (1999-2015) and Draft LVFO Strategic Plan 2016-2020;
5. Fisheries Management Plan for Lake Victoria (2009-2015) (currently being updated) Promotes aquaculture.
6. EAC Regional Strategy and Implementation Plan for Sustainable Aquaculture (2015-2020) - guidance to aquaculture development.
7. EAC Sanitary and Phyto-sanitary Protocol - Food safety.
8. EAC Food Security Action Plan (2011-2015) – promotes aquaculture.
9. LVFO Council decisions: In June 2002, LVFO Council "recommended enhancement of fish supply through promotion of aquaculture", in May 2004 LVFO Council agreed on "Practice responsible aquaculture in Lake Victoria, In February 2009, LVFO Council approved a Regional Aquaculture Strategy and Investment Plan.

The Regional Environmental Management Strategies include the following:

1. Protection of environment and critical fish habitats (Banned use of beach seines and trawling, use of traps and weirs across river mouth, use of cast nets, tycoon (forcing fish into a net), use of dynamites and explosives).
2. Regular Resource monitoring-Biodiversity (conducting regular hydro-acoustic surveys, Catch Assessment Surveys and Frame surveys).
3. Harmonization of Policies, regulations, standards and guidelines (control of exotic genetically modified species introduction, no introduction of alien species without consent of other Contracting Parties.
4. Participation of resource users: Co-management- Beach Management Units on Lake Victoria (BMUs) (have regional and national guidelines on Beach Management Units).

On the status of Environmental Impact Assessment for Aquaculture (EIAA), LVFO does not have EIAAplans and programmes and they are yet to be developed. However, LVFO has plans to conduct studies and zone areas for cage culture on Lake Victoria, develop regional guidelines and Standard Operating Procedures to guide cage culture development in the lake, harmonise standards and regulations governing use, promote compliance and build human capacity for cage culture development. The major limitation LVFO faces that have hindered progress and implementation in this respect is the lack of funding.

The stakeholders who should be consulted at regional level are LVFO Secretariat since it is the technical arm of EAC on fisheries and aquaculture, East African Community Secretariat and its programs on trade, environment and food security and the Lake Victoria Basin Commission (LVBC) which is the EAC institution responsible for coordinating environmental issues in the Lake Victoria Basin (LVB).

5.3.3. Overview of National Policies

The following presentations were given by Member States on the status national environmental policy for aquaculture.

5.3.3.1. Regional consultative Workshop on Aquaculture and Environmental Management in Eastern Africa and the Great Lakes Region (by C. Mulumba, Chef de Division Peche, DRC)

Geographic overview

The Democratic Republic of Congo (DRC) covers an area of 2.345.000 km². It shares borders with nine other countries namely: Republic of Congo, Central African Republic, Gabon, Sudan, Rwanda, Burundi, Tanzania, Zambia and Angola. The population is estimated to be more than 70 million (2010). The GDP growth rate was 6.7% in 2007. Agriculture and fisheries (including aquaculture) account for 49% of the country's GDP.

The hydrographic network is particularly diversified and perennial, with the Congo River 4,700 km long. The various water bodies, represented by the immense river network, the flood plains and the lakes cover about 86,080 km2 of surface area which is about 3.5 % of the national territory surface area. These water resources are:

i. Lake ecosystems (49,5802 Km²)
ii. River ecosystems (35,700 Km²)
iii. Marine ecosystem (800 Km²)

All these water bodies have been the subjected to assessments that suggest the sustainable National fishery production potential is about 707,000 metric tons of fish per year.

Aquaculture in the DRC

Aquaculture in the DRC has long been regarded as an activity of the poor that is unable to develop beyond subsistence levels that is far from offering agri-business opportunities. It is essentially a subsistence activity in rural areas and is among the least competitive of the agricultural production systems for farmers on the whole. In the peri-urban areas however, aquaculture tends to be commercial especially around certain large densely populated areas.

According to FAO (2009) the country's estimated annual aquaculture production is about 3,000 tons. The major fishes farmed are:

i. The tilapias, mainly tilapia rendalli and Oreochromis macrochir in ponds, and Oreochromis niloticus in small reservoirs of water;
ii. The African Catfish, Clarias gariepinus.

The estimated national surface area under aquaculture production is 12,342 ha consisting of largely ponds. Due to lack of statistical data, there is controversy over the accuracy of annual aquaculture production estimates. Average pond yields are estimated at, an estimated 35 to 50 kg of tilapia/are[1]/ season. The national development agenda supports aquaculture development. Low productivity is a result of multiple technical, socio-economic and institutional constraints. Aquaculture infrastructure and the availability of adequate human and material resource capacity for undertaking aquaculture need addressing. For example, most of the fish nursery centers are not functional.

The DRC's climatic and aquatic natural resources make the DRC a favorable country for aquaculture production. Fish consumption levels in the DRC were estimated to be about 5.7 kg/capita/year in 2006 by FAO (2009). This makes increasing aquaculture production to supplement fishery yields a need additional need for nutrition security if FAO's recommended food security standard of 12 kg/capita/ year in Africa is to be met.

[1] *A local unit of measure. One are is about 100 m2.*

Institutional and legal framework

Aquaculture in the DRC is administered by the National Aquaculture Service (SENAQUA) that is a component of the Ministry of Agriculture, Fisheries and Livestock. SENAQUA's objectives are to:

i. Increase aquaculture production
ii. Diversify production techniques
iii. Evaluate and value the physical resources for aquaculture (valleys, streams, etc.)
iv. Promote the development of Aquaculture
v. Registering fish farmers
vi. Developing national aquaculture policy
vii. Undertake applied research in the field of domestication of new aquaculture species.

The current legislation is out-of-date and inapplicable for some situations. The sector is still governed by the colonial decree of 1937. It contains provisions which partially regulate the activities of aquaculture pending the promulgation of the draft of the new law developed with the support of FAO.

The National Aquaculture Policy: Despite the low production, the country has a sectoral policy for Aquaculture (2012), and a plan for the development of Aquaculture 2010 - 2015. Both plans have been prepared with support from FAO. These instruments respectively outline the main direction for the development of the aquaculture sub-sector and identify the specific corresponding activities to be undertaken accordingly. The national aquaculture policy is based on sustainable development and defines the overall and specific development objectives.

Vision of DRC's Fisheries and Aquaculture Policy: The fisheries and aquaculture policy aims to support the development of a sector that is driven by dynamic public and private actors capable of creating jobs and increasing production through the sustainable exploitation of fisheries and aquaculture resources in order to reduce poverty, ensure food security and access to basic social services.

Overall Policy Objective: The objective is to bring the aquaculture sector into a dynamic of sustainable management in order to improve productivity through entrepreneurship, taking into account the environment. The specific objectives which are:

i. Promote aquaculture in all its forms;
ii. Improve the productivity of aquaculture by strengthening the capacities of aquaculture organizations and economic operators;
iii. Improve the structuring and management of aquaculture organizations;
iv. Ensure better utilization of aquaculture products;
v. Stimulate research through the ecosystem approach, the selection of appropriate strains for aquaculture and the development of highly nutritious foods from local by-products; Promote financial systems (microcredit) specific to aquaculture.

Various programs are being implemented with a view to:

i. The "Ecosystem Approach to Fisheries" Program implemented by FAO in collaboration with AEP / Nansen and funded by the Norwegian Agency for Development Cooperation (NORAD).
ii. Plan, develop and manage fisheries and aquaculture to address the multiple national socio-economic needs without compromising the sustainability aquatic ecosystems for the benefit of future generations.
iii. Make coherent current policy to ensure compliance with the FAO Code of Conduct for Responsible Fisheries.

iv. The Strategic Action Program for the Sustainable Management of Lake Tanganyika meant for promoting biodiversity conservation and the sustainable use of resources.

5.3.3.2. Developing Sustainable Aquaculture in Tanzania. Emerging Environmental Issues & Perspectives (by Dr. C. Mahika, Ministry of Livestock and Fisheries Development, Tanzania)

The United Republic of Tanzania has vast fresh water and marine resources that can be utilized for aquaculture. Tanzania seeks to develop an environmentally friendly aquaculture industry as among the avenues to address food and nutritional insecurity, poverty and inadequate employment.

Aquaculture and the Environment: The development of environmentally sound aquaculture is imbedded in Tanzania's policies and instruments, including in the National Vision 2025, Kilimo Kwanza 2010 , MDGs and the Fisheries Sector Development Strategy. Launched in 2009, Tanzania's Aquaculture Development Strategy (NADS) sets the framework for spurring market-driven and private sector-led and environmentally sound aquaculture development in Tanzania. The NADS and the Draft National Aquaculture Development Plan (NADP) provide guidance in identifying priorities and players, delineating roles and setting the short, medium and long term supportive resource demands. These documents also underpin key challenges to the development of aquaculture in Tanzania, including availability of hatchery-produced and affordable fish seed, quality and affordable fish feeds, storage and processing facilities, extension services and credit facilities.

Environmental procedures: The Aquaculture sub-sector is regulated under the Fisheries Act of 2003 (currently under the final stages of review) and its Regulations of 2009. Pursuant to Section 37 (a & b) of the Fisheries Regulations of 2009, prospective investors are required to lodge applications to establish aquaculture projects in water body by filling Form No. 7 (First Schedule) and submitting it to the Director of Aquaculture Development for scrutiny. The Director of Aquaculture Development issues the said permit by completing Form 8 (Fifth Schedule) that is then issued it to the investor. In completing Form No. 7, non-nationals, however, are required to provide proof of an Investment Permit obtainable from the Tanzania Investment Centre and the mandatory EIA Report obtainable from National Environmental Management Council (NEMC), the environmental stalwart body. The EIA is an 8 step process that begins with the prospective investor registering and submitting to NEMC the preliminary Environmental Assessment Registration Form attached with a Project Brief. The minister responsible for the Environment will then approve or disapprove the application. If successful the Director of Aquaculture Development then issues the prospective investor a permit.

Emerging Environmental Issues & Perspectives

1. Fresh water cage-culture is conducted in the trans-boundary water bodies of Lakes Tanganyika and Victoria, each of which is in addition independently governed by their respective Protocols. The national laws and regulations with those of the trans-boundary lake protocols. Cage fish culture in these lakes is apparently a major policy issue although results from cage culture pilots that have been undertaken in Uganda, Kenya and Zambia are available to inform science for management.
2. National and Regional Bio-security and Cage Fish Farming Guidelines are needed.
3. Fish introductions as a result of natural causes such as El Nino and the deliberate introductions continue by individuals continues to happen due to constraints affecting national enforcement capabilities.
4. There is inadequate scientific information to inform policy and environmental managers. There is reason for example to understand why Oreochromis niloticus has not yet established itself along the shores and deep parts of Lakes Tanganyika and Nyassa (or Lake Niassa, Lake Malawi) as opposed to Lake Victoria.

5. Selection of branding or flagship species. Why not Oreochromis tanganicae in Lake Tanganyika and its basin? The need to incorporate endemicity and taste in aquaculture development. Culture of Dagaa, Omena or Kamongo (Rastrineobola argentea) etc. should be investigated.
6. Questions such as on the use of Gift Tilapia which is not a Genetically Modified Organism (GMO) are frequently asked by stakeholders. What is the GMO verdict in the EAC?

5.3.3.3. Legal and Legislative Framework for Environmental Sustainability in Aquaculture Sector Kenya (by S. Macharia, Ministry of Agriculture, Livestock and Fisheries and S. Kauta, NEMA, Kenya).

Current legislature on fisheries management in Kenya covers aspects of environmental conservation. The major fisheries regulations are: (i) Fisheries Act CAP 378 of 2012, (ii) Fisheries Management Bill 2014 (iii) MSOPs 2014 (iv) Guidelines and legislations 2014.

Comprehensive guidelines to address environmental management for aquaculture are yet to be developed. However, according to Kenya's Environment Act and the EMCA Wetlands, Riverbank, Lake and Sea Shore Management Regulations of 2009, small scale fish farming is permitted and is not subject to regulation. Medium and large scale commercial projects are however regulated and proponents of such projects must prepare and submit EIA reports to NEMA for approval. Annual environment audits and regular inspections are carried out in accordance to the Act. The Water Act and EMCA Water Quality regulations set stringent standards for discharge of effluents into aquatic environments that include constructed wetlands. The regulations prohibit discharge of any poison, toxic or radioactive waste into water meant for fisheries. Section 25, 26 and 57 of the Fisheries Act CAP 378 of 2012 deals with restrictions of live fish import and export and the introduction of fish into Kenyan waters which restricted and based upon independent ecological zones. Section 59 declares aquatic environment and ecology pollution prevention zones in all Kenya fishery waters.

Under the Fisheries Management Bill of 2014, the following are proposed:

1. Pollution of the Kenya Fishery Waters (Section 52)
2. Introductions of deleterious articles
3. Introduction of exotic fish species and new strains – section 54, 57, 58 & 69
4. Ecologically sustainable aquaculture development in the Kenya – Section 66
5. Fish escape to the wild and genetically modified species - Section 72 & 74
6. Use of drugs, pharmaceutical, antibiotic & other chemicals for diseases treatment - section 73
7. Trans-boundary aquatic ecosystem – section 76

5.3.3.4. An Overview of National Environmental Policies and their Status and Implementation in Ethiopia (by Zenebe Tadesse Seifu, National Fisheries and Aquatic Life Research Center, Ethiopia)

Environmental management in Ethiopia is broadly governed by the country's Environmental Policy. Specific environmental policy for some sectors is more advanced compared to that of aquaculture. The government in collaboration with the other sectors is committed to environmental protection and management. The Development Bank of Ethiopia for example, has made an EIA approval a requirement for credit purposes. The Ethiopian Floriculture Association has developed a Code of Conduct that requires EIA for the purpose of accessing the EU market successfully.

The table 3 below summarizes that status of implementation of Ethiopia's environmental policy:

Table 3: *Summary of the Implementation Status of Ethiopia's Environmental Policy*

Enabling legislation:	Yes, 1995
Specific legislation/ regulations :	Yes, 2002(Proclamation)
General and specific guidelines:	Yes, 2002
Formal provisions for public participation:	yes
Main administrative body/bodies: Environmental Protection Authority and Regional Bureaus,	yes

There are however, still some challenges the most notable of which include lack of awareness, inadequate human resource capacity, weak effective mechanisms to implement the EIA process, lack of legal and institutional arrangements for effective coordination and communication between the different regional and sectoral offices. The latter has caused confusion between the different entities in the EIA process implementation.

5.3.3.5. Overview of Sudan Environmental Management System & EIA Practice *(by A. Kahlifa, Ministry of Environment, Natural Resources and Physical Development and N. Karoum, Ministry of livestock, Fisheries and Rangelands, Sudan)*

Sudan comprises largely arid and semi-arid ecosystems. The east and west have more rainfall than the rest of the country. Sudan's major environmental problems are summarized in Table 4 below.

Table 4: *Sudan's Major Environmental Problems*

No	Problems	Status
1.	Climate Change and Desertification	Effected food security and water, rise temperature, Shortage Loss of fertile land and productivity. Loss of vegetation cover,.
2.	Bad Management of Water Resources	Silt accumulation at tanks, irrigation canals. Loss of water and increase in water related diseases.
3.	Diminishing of vegetation cover (tree)	Loss of forest areas
4.	Degradation of Natural Pastures	Overgrazing and loss of grazing land.
5.	Degradation of Wildlife	Degradation of wildlife habitat, loss of wildlife and animal resources.
6.	Red Sea Pollution	Pollution at coastal areas of red sea, loss of marine habitat and resources.
7.	Increase in use of pesticides	Agricultural habitat pollution, storage and disposal hazards, health and hygiene risk
8.	Urban habitat degradation	Increase of immigrants and competition on resources and degradation of services.
9.	Legislative and constitutional weakness	Institutional breakdown in application and enforcement of regulations and acts.
10.	Environmental awareness	At local level as well as governmental and decision making level. Affecting participation and local involvement in rehabilitation programs

There are about 150 Sudanese environmental legislations governing a wide range of sectors and aspects such as forestry, pesticides, wildlife and oil exploration. The environmental policy in Sudan was adopted in 1990. Its main areas of focus are (i) the development of policies, plans, programs and legislation on environmental issues, (ii) rationalization of land use to halt environmental degradation, drought and desertification control, (iii) coordination between national and state authorities in the areas of environment and forests, (iv) development of policies, plans, programs and legislation to preserve the health and purity of the environment, and (v) promotion of international and regional cooperation in the fields of natural resource management.

The specific environmental management instruments that have been put in place since 1990 are:

1. Decentralization of Natural Resources Management Policy 1991.
2. The National Comprehensive Strategy (NCS) 1992-2002.
3. Comprehensive Strategic Plan 2002 - 2027
4. The Five-Year National Strategic Plan (NSP) (2007-2011).
5. Draft National Water Policy (1999 amended in 2006).
6. The National Water Supply and Sanitation Policy (2009)
7. Draft National Environmental Management Plan 2009 (NEMP).

Weak environmental management is widely recognized as a contributing factor to poverty and conflict in Sudan, especially in areas where livelihoods are highly dependent on the direct utilization of natural resources. However, whilst the environmental policy is in place, several challenges have affected its full implementation. The following are among the major challenges:

1. Legislative complexity and overlap
2. Overlap of institutions structure
3. Weak of enforcement laws
4. Lack of Capacity to implement
5. Mismanagement of Environmental data
6. Lack of Coordination
7. The NEMP has not yet been approved.

Environmental management of aquaculture is undertaken within the broad framework of the country's Environmental Policy and Environmental Act of 2001. In addition to the above, the following major challenges are stretching the systems of environmental governance which also have a bearing on environmental management for aquaculture:

1. Deforestation and loss of biodiversity
2. Climate change
3. Drought and flood disasters
4. Environmental pollution and contamination of water and soil resources resulting from the uncontrolled use of chemicals, and
5. The environmental impacts of the oil industry. Increased levels of heavy metals have been found in fish in areas close to the oil industry.
6. Degradation of marine ecosystems resulting from increased marine activities, overexploitation of fish resources and oil pollution
7. Rapid Population growth
8. Conflict on Natural Resources.

5.3.3.6. An Overview of National Environmental Management Policies and Status of Implementation, Republic of Somalia *(by Mr. A. Iman and F. Farah, Ministry of Fisheries and Marine Resources, Somalia)*

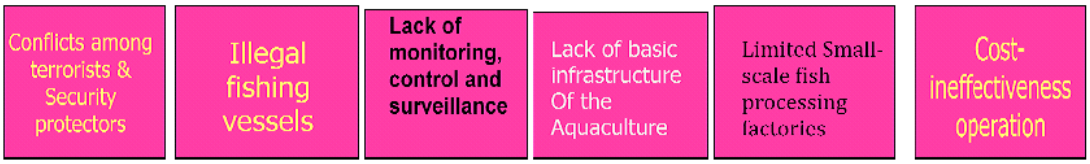
Introduction:

Somalia has a longest coast in Africa for about (3,333km) excluding the small islands, it also has a largely untapped Exclusive Economic Zone (EEZ) 200nm and Continental Shelf 150nm and areas have a significant potential for offshore fisheries development. There are Marine resources include seabirds, whales, sharks, dolphins, tuna fish, shrimps, lobsters and turtle species. There are a variety of coral fringe reefs found in many places in both south-central and northern-east coastline on Gulf of Aden.

Fishery Role of Somalia:

Fisheries in Somalia currently seem to play a middle role in national food security, as we see in 12 coastal regions of the 18 regions of Somalia and several major fishing towns along the Somali coast, from Raskamboni border of Somalia to neighboring boarder Kenya and to Zaila the border of Somalia at the neighboring Djibouti. Based on FAO Food Balance Sheets, fishery products accounted for 3.1% and 10,67 % for Fishery and Business where the factors are Agriculture and Livestock. but Somalia have 7 different coastal fishery development zones.

Fishery Challenges are as follows:



Environmental Background:

Somalia is an arid and semi-arid country which has fragile ecosystems, subjecting it to harsh weather conditions, erratic and scarce amount of rainfall, making these areas susceptible to environmental degradation. Somalia is a one of the biodiversity-rich countries in the Horn of Africa with high level of aquatic species.

For Environment the Somalia Constitution said:

Every person has the right to an environment that is not harmful to his/her health and well being, and to be protected from pollution and harmful materials; and also every person has the right to have a share of the natural resources of the country.

The Environmental Status of Somalia in International Conventions and protocols:

- Somalia become seventy-third signatory of the Nagoya Protocol;
- United Nations Convention to Combat Desertification (UNCCD);
- United Nations Framework Convention on Climate Change (UNFCCC);
- Convention of Biological Diversity (CBD);
- Kyoto Protocol to the UNFCCC;

- Protocol on Bio-Safety (Cartagena Protocol);
- Convention on the Control of Tran boundary Movements of Hazardous Waste and their Disposal;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- Stockholm Convention on Persistent Organic Pollutants (POPs);
- UN Convention to Combat Desertification (UNCCD);
- Protocol on substances that Deplete the Ozone Layer (Montreal Protocol);
- Convention for the protection of the Ozone layer (Vienna Convention;
- Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African.

The Marine ecosystem Environmental effects:

- Destruction of the Coastal ecosystem
- Losses of sea grass and mangroves;
- Destruction of nursery, breeding and feeding ground as well as habitats;
- Loss of biodiversity of flora and fauna;
- Erosion and smothering of coral reefs and fish live;
- Created incurable diseases;
- The environment haphazard become global issue since Somali marine resources is freely shared by many nations in the world.

National Environmental Management Policy, to ensure sustainable management of fisheries and marine resources with the uncertainty of climate change:

- Promote integrated fisheries and marine resources management and Encourage any other approach that leads to sustainable management and utilization of fisheries;
- Strengthen and encourage integrated coastal zone management plans for the protection of Marine life, Establishing and empowering fish marketing cooperatives and promoting community based services from a country-wide network of fishing services;
- Reactivation of the coastal development authority as a vital for improving support services to fishing communities, especially the isolated fishery groups and Assistance to artisanal fisheries in coastal communities;
- To initiate, encourage and expand fresh water fishing activities as aquaculture as an important complementing sources of food security and additional sources of income in Somalia.

Environmental Management Strategies of Somalia:

- Climate Change adaptation and mitigation is important and the public/private sectors can play a role in starting and raising funds, the development and transfer of technology for climate change adaptation and mitigation as well as capacity building for climate change.
- Environment and natural resource management issues are multi-sectoral in nature and require positive interactions with both national and international partners on involvement for all stakeholders in the implementation of the National Strategic Plan.

5.3.3.7. An Overview of National Environnemental Management Policies and Status of Implementation, Burundi (by L. Nzeyimana, Fisheries and Aquaculture Ministry of Agriculture and Livestock, Burundi)

Burundi is a hilly country comprising 1,000 hills. It is a densely populated country of 27,834 km2 and a population of 10 million. The country has a favorable environment for aquaculture. Lake Tanganyika and eight other lakes in northern part of the country offer favorable conditions for cage aquaculture. Small holder pond aquaculture is also practiced.

While there is a National Aquaculture Development Strategy that has been existence since 2010, no action plans have yet been developed. An Act on fishery and aquaculture has been revised and is currently in Parliament for enactment. A regional Memorandum of Aquaculture is yet to be adopted. The EAC SPS measures for Fisheries and Fishery products exists (Burundi is a member of the EAC). Under the Ministry of Water and Environment, a system is in place for undertaking of EIA's.

The major challenges associated with the environmental management for aquaculture are:
1. The Law on Fishery and Aquaculture not yet enacted.
2. The regional protocol on Aquaculture not yet adopted.
3. The harmonization of policies and legislations at the EAC not yet realized.
4. Lack of funding to support the subsector.

Despite these challenges, the outlook for the sustainable development in the sector is positive. The key points of action for the development of a framework for sustainable aquaculture development and environmental management for aquaculture will entail the development of an aquaculture development action plan, mobilization of resources and increasing awareness on the value of aquaculture among decision makers and other stakeholders, capacity building and aligning the country to the LVFO process.

5.3.3.8. An Overview of National Environnemental Management Policies and Status of Implementation in Rwanda (by Wilson Rutaganira, Ministry of Agriculture and Animal Resources, Rwanda)

Rwanda is a hilly landlocked country with a surface area of 26,338 km2 with a population of nearly 11 million people. Nearly 7% of the country is covered by water resources in the form of lakes, rivers and marshlands. The physical features of Rwanda make her prone to environmental degradation and therefore the Government of Rwanda takes environmental protection very seriously. Significant steps to ensure a balance between economic development and environmental protection have also been taken.

Policies and Laws: There exist different policies and laws governing the environmental management in Rwanda. The 2003 Environmental Policy highlights the protection and management of environment as among the pillars for the country's Vision 2020. A major objective for Rwanda's Vision 2020 is to build a nation in which pressure on natural resources (particularly on land, water, biomass and biodiversity) will have significantly been reduced and the management and protection of the these resources and the environment shall be more rational and well regulated. A sectoral policy on water and sanitation of 2004 that recognizes the importance of water and sanitation for the improvement of the living conditions for the population has also been developed.

Among the laws that assist in enforcing environmental management is the Organic Law N° 04/2005 of 08/04/2005 which determines the modalities for the protection, conservation and promotion of environmental management in Rwanda. There also exist Ministerial Decrees among which is the Ministerial Decree N°007/16.01 of 15/07/2010 that determines the length of land on shores of lakes and rivers transferred to public property, Ministerial Decree of 2008 relating to the requirements and procedure for environmental impact assessment and the Ministerial Order N°004/2008 of 15/08/2008 on establishing the list of works, activities and projects that have to be undertake in an environmental impact assessment.

Projects that require an EIA: These are projects with identified adverse impacts on environment mainly construction and repair of international and national roads, large bridges, industries, factories, etc. It has been emphasized that acquisition of aquaculture concessions in lakes also requires EIA.

Status and Stakeholders: Rwanda has tried to comply with most of the above (Polythene bags, lakes and rivers protected areas. In fact no single project is implemented without an EIA certificate clearance including putting up cages in lake Kivu. The major Stakeholders are MINIRENA as the Ministry responsible for Policy regulations, REMA as the authority for regulating, follow up and control, RNRA, RDB. Other Ministries would really depend on particular activity or Project (MINAGRI, MINALOC, MININFRA, RAB, etc)

5.3.3.9. Status of EIAA Practice in Uganda (by A. Alio, Ministry of Agriculture, Animal Industries and Fisheries, Uganda)

Fish has always had a prominent position in Uganda, providing employment principally in the lake fisheries and supplying markets where fish is in demand. It forms an important component for livelihoods and food security for Uganda. Currently there are a number of new initiatives being implemented and further growth can be anticipated. As government puts efforts to develop aquaculture, improve the infrastructure for the export of fish products to premium markets and investors increased interest in tapping this market, there has been an increased use of inputs and environmental issues. Environmental management for aquaculture has therefore become an important concern.

There are increased prospects for growth in production seen by the increase in the number of requests for the establishment of large commercial farms from industrial/commercial investors who additionally seek to take advantage of Uganda's fish-exporting infrastructure. There is a gradual but steady shift from the more traditional extensive methods of fish farming towards more intensified systems of production, such as cage culture in the lakes. This trend raises questions for aquaculture's future in relation to environmental management.

In Uganda, the media, environmental NGOs, national and local politicians have a much greater engagement on environmental issues as is demonstrated by popular debates. The heightened concerns of civil society are reflected in the introduction of a comprehensive new legal framework and the development of new institutional initiatives over the past few years.

The current framework for environmental management came into existence with the Environmental Management Act of 1995, which created the National Environmental Management Authority (NEMA) - an institution with responsibility for coordinating environmental interventions in Uganda. Subsequent statutes have been passed to complete the framework with the necessary tools, including the use of EIA:

1. The Environmental Management Act (Uganda, 1995/2000)
2. The Environmental Impact Assessment Regulations (Uganda, 1998)
3. The National Environment (Conduct and Certification of Environment Practitioners) Regulations 2003

Environmental management for aquaculture is governed under this framework. No aquaculture policy yet but its development under process. However, specifically for aquaculture the following are in place:

1. Aquaculture strategy and development plan in place
2. Aquaculture Park Investment Plan
3. Aquaculture Rules 2003(Draft 2015)
4. Guidelines are being developed especially for cage establishments

Challenges: There are too many documents involved. The Aquaculture rules impose permits for different aquaculture related activities. However these were reviewed in Aquaculture 2013 version. There are also too many institutions involved. NEMA as an independent agency has had difficulties coordinating

environmental interventions in a climate of inter-sectoral "competition", and has been perceived as intervening on an ad hoc basis motivated by political agenda.

In summary the status of application of EIAA in Uganda is:
1. EIAA frame work in place - Yes
2. EIAA implementation - Yes
3. EIAA regulations - Yes
4. EIAA application - Yes for large holders and no for small holders.

5.3.3.10. Status of EIAA Implementation in South Sudan (by S. Ojja, Ministry of Livestock and Fisheries Industry, South Sudan)

South Sudan has a high natural potential (land, water and climate) for developing fish culture. The States with suitable areas for aquaculture in the South Sudan are the Central Equatoria State, the Eastern Equatoria State, the Western Bahr Ghazal State and the Western Equatoria State suitable areas. From the supply side, very little aquaculture production techniques have been developed and the practice of aquaculture has been limited to pond fish farming and stocking of small water bodies.

The Environmental Bill of 2012 stipulates the need for EIA for aquaculture development. Issues of pollution from oil and floods are major challenges. An Aquaculture Strategy has been developed that provides a comprehensive framework for the development of a sustainable market-responsive aquaculture industry over the next twenty years. Under this strategy it is proposed that the aquaculture industry in South Sudan be modelled upon the Egyptian aquaculture sector. Other challenges are associated with land ownership. Currently, land belongs to the community.

Status of EIAA in South Sudan.

There is no EIAA implementation for aquaculture in the country due to the absence of the above framework. EIAA regulations and implementation guidelines have not yet been developed. Consequently there are no EIAA guidelines and manuals. Furthermore, aquaculture strategic plans for South Sudan have not yet been developed.

The steps being undertaken to address the above status of environmental management for aquaculture in the country include:
1. Develop EIAA framework for adoption and follow up process for implementation.
2. Conduct TOT EIAA training for staffs as awareness raising measures.
3. Collect data on EIAA
4. Monitor the on-going process and implementation with ministry of environment and partners.

The partners involved in this process include:
1. The Ministry of Environment in collaboration with the Ministry of Agriculture, livestock and Fisheries Industry, Fisheries and Aquaculture development.
2. Partners dealing with environment like the United Nation Environment Protection (UNEP), FAO (in training), SMARTFISH and higher institutions of learning (Universities) in South Sudan.

Recommendations

The steps South Sudan seeks to undertake to address this above situation on environmental management for aquaculture and establish sustainable market-led aquaculture include:

Develop the aquaculture strategy for South Sudan (FAO was contacted for support) to include issues of land management based upon an Egyptian model project.

1. Enhance and strengthen coordination between the Ministry of Environment and Aquaculture Department.
2. Conduct TOT for aquaculture staff on EIAA.
3. Incorporate EIAA into integrated aquaculture management strategies.

The fisheries and aquaculture sector, can be an important contributor to the Gross Domestic Product (GDP), and provide livelihoods to a large population of South Sudanese. However without a comprehensive policy and strategies, to give guidance and direction on sustainable development and utilization of the fisheries resources, there would be no guarantee that these resources can be conserved for the benefit of the present and future generations.

6.0. Group Discussions

Participants were divided into two groups. Group one discussed the environmental and technical issues whereas group two discussed the socio-economic issues associated with the aquaculture ecosystem. The discussions were based upon the ultimate goal of the CAADP and PFRS which is to expand aquaculture production three fold based upon the development of a sustainable commercial aquaculture sector. Consideration was therefore given to likely future scenarios such as the existence of larger cluster of farms, expansive areas of aquaculture and a wider array of more intensive production systems in operation notably intensive ponds, cage and tank culture.

Group 1 discussed the ecosystem/environment aspects. The following are among the key questions they addressed:

1. What production systems are in use/likely to be used?
2. What are issues/ likely issues associated with water availability and quality for aquaculture and other users?
3. Land characteristics and its availability for aquaculture?
4. Possible production systems?
5. What are/likely to be the shared resources (water, watersheds)?
6. What are the inputs required and their usage?

Group 2 discussed socio-economic issues and issues likely to arise within the ecosystem. The questions discussed included:

1. Development objectives of the various MS and regional bodies?
2. Who were/are potential stakeholders – primary and secondary?
3. Who were/are likely to be the other resource users?
4. What are/likely to be the possible sources of conflict (conflicting users)?
5. What elements that should be considered within the regional framework?
6. What were the current/likely access rights challenges for aquaculture and other users?
7. What were likely to be the potential challenges of implementing a regional framework?

Aquaculture Stakeholders were defined based upon The World Bank (1996) as:

1. Primary stakeholders who are directly affected (positively or negatively)
2. Secondary stakeholders who are indirectly affected Secondary stakeholders include those who have technical expertise and/or links to primary stakeholders, e.g. non-governmental organizations (NGOs),

various intermediary or representative organizations and technical and professional bodies. They often represent public interests.

6.1. Summary of Group Discussions

6.1.2. Group One: Ecosystem Aspects

The table below summarises the discussion and proposed actions from group 1.

Table 5: *Environmental and Technical Issues and Proposed Strategic Actions*

POLICY AREA	IDENTIFIED ISSUES	STRATEGIC ACTIONS
PRODUCTION SYSTEMS		
Extensive system		
The inputs are seed and fertilisers (in most cases are organic manure)	• Quality of seeds and fertilisers used	• Monitor and evaluate the quality of seed at stocking and fertilisers used
Semi-intensive System		
Can be land based with occasional water-based practices	• Land Ownership • Competition with other land and water uses • Land and water use conflict	• Facilitate land availability for specific enterprises • Mapping of suitability areas • Carry out Strategic Environmental Assessment (SEA) • Develop Land-use Master Plans • Zonation of water-based practices
Characterised by fertilisation	• Excessive use of fertilisers can lead to pollution of water bodies	• Develop, implement, enforce and review Standard Operating Procedures(SOP) and Best Management Practices (BMPs) • Capacity building of end users
Supplementary feeding, in most cases farm-made feeds	• Negative effects of left-over feeds on water quality in ponds, cages	• Ensure correct quality and quantity of feeds are used (BMPs) • Monitor and manage water quality
Integrated system can also be categorised under this.	• Proliferation of zoonotic diseases • Excess use of fertilisers can lead to pollution	• Quarantine • Capacity building to end users • Certification of the enterprises
Intensive Systems		
High stocking density	• High frequency of diseases • Water quality problems	• Aeration of the system • Right treatment • Water quality control • High quality feeds • Awareness creation for end users and managers • BMPs
Mainly flow through system	• Pollution of natural water bodies	• Need for treatment of water before release in to environment • BMPs
Intensive Systems		
Complete feeding is necessary	• Increase pressure on biodiversity of capture fisheries	• Identify alternative sources of protein for fish feeds
Water quality management	• Water pollution due to inputs (Increased use of chemicals, antibiotics, hormones etc. with consequences on environment)	• Set water quality standards and indicators • Use of Standard Operating Procedures (SOPs) • Undertake SEA • Development of water quality policy • Put in place facilities for treatment of water and effluents (Biological treatment: biological ponds, aquaponics, constructed wetlands)

POLICY AREA	IDENTIFIED ISSUES	STRATEGIC ACTIONS
High stocking density	• Diseases	• Best Management Practices (BMPs) • Certification of input sources and users
	• Accumulation of waste products from fish	• BMPs • Frequent water exchange
Good quality fingerlings		
All-male or sex-reversed fingerlings (use of hormones)	• Release of hormones to the environment	• Use of constructed wetlands to biodegrade the active hormones • BMPs
Genetic pollution of indigenous/native fish		
Selectively bred fingerlings	• Genetic/biodiversity erosion • Escape of hybrids to the wild	• Establish Gene banks and Brood Stock banks • Put in place mechanisms to control escapees from aquaculture establishments to the wild • Need for breeding programs in the region to supply fingerlings to farmers • Support the establishment of fish seed multiplication centers
Introduction of GMOs/super breeds	• Genetic/biodiversity erosion • Escape of hybrids to the wild leading to erosion of biodiversity – food web	• Regulate importation and exportation of GMOs/super breeds • Establish certification schemes for aquaculture establishments • BMPs • Put in place mechanisms for controlling escapees from aquaculture establishments
Intensive Systems		
Capacity of human resources and institutions	• Inadequate skills • Lack of working tools	• Develop appropriate training programs for skills to practitioners and managers who undertake environmental management and mitigation of risks • Institutional strengthening to handle aquaculture and environmental issues • Harmonize existing or develop curriculum for aquaculture • Establish a professional standards body for aquaculture development • Promotion of knowledge management • Provision of basic kits to practitioners and managers • Research, Development and Extension
Super Intensive		
Automated systems	• Use of inadequate sustainable energy sources	• Promote adoption of sustainable energy sources. • Establish mechanisms that facilitates adoption of sustainable energy sources and systems
Very high stocking density	• Need for high performing fingerlings (super fingerlings)	• Regulate importation and exportation of GMOs/super breeds • Certification schemes • BMPs

POLICY AREA	IDENTIFIED ISSUES	STRATEGIC ACTIONS
		• Put in place mechanisms for controlling escapees from aquaculture establishments
Complete feeds	• Increase pressure on biodiversity of capture fisheries	• Identify alternative sources of protein for fish feeds
Automated control of physico-chemical parameters	• Risk associated with failure of the systems leading to mass mortalities	• Risk mitigation measures • Develop human and physical capacities to handle emergencies • Use of liquid oxygen at some points
High tech Biosecurity control	• Risk of escapees to the environment	• Develop Quarantine procedures and facilities • Develop Protocols that govern fish movements • Develop guidelines on handling of aquaculture equipment in the establishments
High Re-circulatory systems	• Use of inadequate sustainable energy sources	• Promote adoption of sustainable energy sources. • Establish mechanisms that facilitates adoption of sustainable energy sources and systems
High value fishes	• Will require exotic species which could affect biodiversity	• Regulate importation and exportation of GMOs/super breeds • Certification schemes • BMPs • Put in place mechanisms for controlling escapees from aquaculture establishments
Water-based Systems		
Fresh water issues	• Low water retention in some places e.g. Kenya	• Use of dam liners and concrete ponds to reduce leakage
	• Use of dam liners which in some cases are not easily biodegradable	• Develop guidelines on proper use and disposal of dam liners
	• Heavy soil erosion which affects transparency of water e.g. in Ethiopia	• Control soil erosion through IWRM in watershed management • Proper site selection for aquaculture establishments
	• Accumulation of methanogens that can result in greenhouse gases emission	• Carry out Life Cycle Assessment (LCA) of aquaculture systems • Ensure that the water column is well oxygenated to enhance oxidation
Marine-based Issues (environmental)	• Reduced sea level leading to change in culture practices e.g. seaweed farming in Tanzania presently done in deeper waters (use of rafts instead of sticks)	• Climate change mitigation measure should be adopted (to reduce CO_2 emission) • Adaptation of appropriate technologies and practices
	• Heavy soil erosion which leads to siltation of mangrove areas which are nursery grounds for prawns and fish	• Adopt Integrated Watershed Management strategies
	• Use of wild seeds impacting negatively on ecosystem	• Need for stock assessment • Establish hatcheries in the region • Zoning • Legislation to regulate wild seed harvesting

POLICY AREA	IDENTIFIED ISSUES	STRATEGIC ACTIONS
Shared Water Bodies		
	• Discharge of water/effluents into the watershed from aquaculture establishments • Conflicting water uses	• Manage the quantity/total water discharged into the watersheds • Regulate the quality of water released into these shared water bodies • Countries sharing the transboundary water bodies should come together and harmonise positions • Develop agreed regional regulations for managing the transboundary water bodies • Countries sharing the water bodies e.g. Lakes Kivu, Albert, Turkana, Edward, Indian ocean, Red Sea, Shabele and Juba Rivers, should form joint management mechanisms
	• Down-stream-up-steam linkages and trade-offs	• Ensure equitable sharing of water resources • Establish regional regulations and • Adopt IWRM

6.2. Group 2. Socio-Economic Aspects

The presentation from group two was done in two parts:

i. Identification of key issues to be addressed
ii. Proposed Guidelines to address Key Issues identified.

6.2.1. Issues Raised

1. **Socio-Economic Aquaculture Development Objectives.** The overall socio-economic goals of aquaculture upon which the discussion was based was ' sustainable aquaculture production to contribute towards poverty eradication'.

The specific socio-economic objectives considered were:

i. Aquaculture as a source of social security (employment, income generation etc.)
ii. Aquaculture as a source of nutrition and food security
iii. Rationale and sustainable use of shared water bodies for aquaculture development
iv. Increase aquaculture production and productivity
v. Achievement of SDG to improve livelihood

2. ***Stakeholders- primary and secondary.*** The following are the potential stakeholders identified that would be affected by the implementation of a regional environment management framework for aquaculture.

Table 6: *Identified Primary and Secondary Stakeholders*

Primary	Secondary
Local government	Tourist
Local communities	Regional/ International NGOs
Fishers/ fish farmers	Academic
Marketers/ Value chain	Parliament
Financers	
Sector ministries	
Investors	
Consumers	
Parliament	

The primary stakeholders were further divided into the following groups:

Table 7: *Sub-Categories of Primary Stakeholders in the Aquaculture Value Chain*

Upstream	Production	Downstream
Net and cage makers	Farmer	Fish brokers
Aquaculture engineering companies (pond construction, facility design and installation)	Farm employees	Fish wholesalers
Equipment suppliers	Absentee landlord	Fish Traders
Hatchery fry producers	Services	Ice suppliers
Nursery fry producers	Private service providers (consultants, advisers, insurance, finance)	Fish transporters
Feed manufacturers	Government service (environmental monitoring)	Exporters
Fertiliser suppliers	Academic service suppliers (research and training)	Fish processors

Other primary resource users whose interests would have to be protected were identified as:

1. Hydropower generators
2. Water transporters (ferries etc.)
3. Tourism
4. Labour support people (manpower)
5. Recreational fishing
6. Agriculture and livestock
7. Municipality
8. Drinking water
9. Oil and gas extraction
10. Minerals exploration

3. Possible sources of conflict (conflicting users). Conflicts were likely to arise from:

1. Polluters
2. Competition for space/area
3. Rights of ownership and access to resources.
4. Resource use conflict (water, land)
5. Market concerns
6. Conflicting policies

4. **Elements that should be considered in the environmental frameworks.** The following were considered being the major area in which the proposed framework would need to be put into context:

i. Social
ii. Economic
iii. Environment / Ecosystem (land based, water based (freshwater and marine)
iv. Existing policies
v. Transboundary issues

5. **Access rights.** The criteria for addressing access rights were identified as:

i. Open or limited access
ii. Legal frameworks for access
iii. Local community access rights

6. **Potential challenges of implementing regional frameworks.** The potential challenges perceived in the implementation of the framework and for which mitigating mechanisms therefore have to be incorporated into the proposed framework included:

i. Environmental degradation
ii. Existence/lack of different national law on shared transboundary resources
iii. Lack of enforcement mechanisms for regional frameworks
iv. Efficient management
v. Political conflicts on national resource use
vi. Limited capacity (financial, human and technical) at national and regional level to implement frameworks

6.2.2. Proposed Guidelines to Address Socio-Economic Issues Identified

The following are the recommended guidelines from Group Two's discussions.

Elements	Socio-economic issues identified	Environmental Strategic actions
	Access rights	• Develop legal framework
	Conflict of resource users	• Zonation/ mapping of aquaculture sites • Develop awareness creation programs • Develop conflict resolution mechanism • Capacity building programs
	Different policies and legal frameworks	• Develop, review, reform and harmonized policies and legal frameworks • Enhance environmental monitoring and audit
	Limited human and financial capacity	• Coordinated capacity building programs • Develop SOPs • Develop resource mobilization strategy • Develop mechanisms to share best practices
	Polluters	• Determine carrying capacity for pollutants based on threshold level, • Polluter pays principle, • develop standards and enforce the law

Elements	Socio-economic issues identified	Environmental Strategic actions
Water Based Operations Access rights	Market competition • Hormonal use	• Development of environmentally sound marketing policies • Certification of products • Develop and promote intra-regional trade and market information`
	EIA	• Harmonized guidelines for EIA • Conduct SEA
	Political conflicts/ interference	• Enhance coordination and cooperation • Develop awareness creation programs • Conduct regional/national environmental audits • Enhance advocacy by civil society groups and others relevant partners
	Border and territorial conflicts	• Conduct cross border meetings • Develop awareness creation programs
	Compliance mechanisms	• Bilateral and multilateral agreements • Coordination mechanism developed • Develop common regulatory frameworks
	Gender and youth	• Develop gender and youth based policy and long term program • Develop affirmative laws and actions to support gender and youth • Capacity building programs
	Inadequate data and information on socio-economic issues regarding environment and aquaculture development and contribution	• Evidence based policy and programs • Conduct surveys and studies including indigenous species • Documentation and dissemination of results • Conduct exchange visits/ study tours
	Institutional arrangement	• Develop institutional arrangements for enhancing collaboration and partnership
	Protection of Patents on aquaculture	• Adhere for protection of patents • Conservation of indigenous species
	Introduction of exotic species	• Develop legal framework
Land Based Operations Competition between land users	Competition between land users	• Zonation and land use planning • Develop, review, reform, align, enforce legal frameworks • Enforce good governance • Develop awareness creation programs
	Access and rights to land	• Develop enabling policies and guidelines • Develop awareness creation programs • Capacity building programs
	Access and rights to water	• Develop enabling policies • Develop awareness creation programs • Capacity building programs
	Polluters	• Polluter pays principle • Develop standards and enforce the law

Elements	Socio-economic issues identified	Environmental Strategic actions
	Climate change impact	• Develop climate smart aquaculture • Develop awareness creation programs • Capacity building programs
	Natural disasters (drought and flood)	• Develop insurance and early warning systems • Develop awareness creation programs • Capacity building programs
	Different policies and legal frameworks	• Develop, review, reform and harmonized policies and legal frameworks • Enhance environmental monitoring and audit
	Gender and youth	• Develop gender and youth based policy and long term programs • Develop affirmative laws and actions to support gender and youth • Capacity building programs
	Political conflicts/ interference	• Enhance coordination and cooperation • Develop awareness creation programs • Conduct regional/national environmental audits • Enhance advocacy by civil society groups and others relevant partners
	Border and territorial conflicts	• Conduct cross border meetings • Develop awareness creation programs
	Compliance mechanisms	• Bilateral and multilateral agreements • Coordination mechanism developed • Develop common regulatory frameworks
	Inadequate data and information on socio-economic issues regarding environment and aquaculture development and contribution	• Evidence based policy and programs • Conduct surveys and studies including indigenous species • Documentation and dissemination of results • Conduct exchange visits/ study tours
	Protection of Patents on aquaculture	• Adhere for protection of patents • Conservation of indigenous species
	Introduction of exotic species	• Develop legal framework

7.0. Field Trip

After the deliberations, on Sunday 30th August, 2015, the participants went on a field trip to two farms, Nola Fish Farm and Forestry Park in Wakiso district where the sites were used to illustrate the environment issues and benefits arising from aquaculture and changes in the environment discussed during the meeting.

7.1. Nola Farm

Owners: Daniel Wallaba & Samuel Waladde
Location: Bira Lubanyi Kireka-Wakiso district
Distance from the city center: 6 miles from Kampala along Ssentema Road

Nola farm is a family catfish and tilapia hatchery operation of 8 ponds and a small hatchery building. Table fish is also produced for sale. The farm is located 6 miles from Kampala within a rapidly developing residential area. When the farm started there was hardly any development in the area. Housing structures now come right up to the perimeter of the farm. Table fish from the farm is sold within the neighbourhood and through the local farmer's association.

The farm is constructed in the wetland. Issues that may arise from aquaculture in such environments, particularly if there are several farms in close proximity would include habitat change, escape of farmed fish into the wild, bio-security concerns particularly where farm design does not manage and maintain the independence of water supply to individual production units and treatment of farm effluent prior to release. Public health hazards may also arise due to physical accidents and the propagation of water-borne conditions.

At the same time the sustainability of such a farm becomes increasingly questionable if the water resources and the natural functioning of the wetland are interfered with due to urbanisation and changes in upstream land use as the farm becomes susceptible to receiving water of lower water quality (higher levels of suspended solids, higher levels of heavy metals/faecal content in water, flooding, etc.) and greater seasonal variations in water supply. These changes would also make the farm an only source of food for other aquatic animals and bird life increasing predatory rates from wild animals.



Figure 14. *Location of Nola Farm within the overall wetland.*

Inset shows farm details of farm layout. The figure illustrates the level of urbanisation around the farm and wetland within which it is located.

The following series of pictures show the characteristics of the activities and environment around within the vicinity Nola farm.

Pictorial of Nola Farm



Farm owner, Mr. Wallaba discussing his farm with participants.



Screening to protect ponds from predation by birds



Proper construction techniques are a common challenge for farmers. Proper pond siting and construction safeguards against water seepage and would prevent the need to use sand bags to hold walls and prevent seepage.



Land use at the farm's perimeter.



Land use at the farms perimeter.

7.2. Forest Park, Wakiso

Owners: Mr. Bbosa Peter and family
Location: Buloba, along Mityana Road

This farm begun as a fish farm of 10 ponds. However, business did not do well and they were unable to breaking even. Consequently they decided to diversify the operation by adding new innovations notably combining several of the ponds into one big one (now the dam), boat cruising, sport fishing, picnics and entertainment shows, hotel accommodation for 8 guests per day. Fish harvested from the premises is served to the guests of the park which has become one the main attracting features for guests.

Forest park adds value to the urban environment by creating a water catchment area that can control flooding downstream and provides a natural setting for recreation and education.



Figure 15. *Forest Park and its Environment.*

Inset shows details of the Park's layout. Both Forest Park and Bola Farm are located in areas experiencing rapid urbanization.



Figure 16. *Overview of Forest Park.*

A dam has been built at Forest Park for recreation. The dam was stocked with Nile tilapia (Oreochromis niloticus) and African catfish (Clarias gariepinus). In addition to providing a relaxing environment for residents of the area, the park offers sport fishing, boat rides and fish feeding. The latter is very popular especially among children who become excited when they see the fish coming to fed. The neighbouring

Primary and Secondary schools now bring pupils for site visits as part of their geography and science lessons.

Both Nola Farm and Forest Park are within the hinterland of Kampala in rapidly growing residential areas. The environmental challenges they face by virtue of their location are associated with a reduction in water volume and quality of water supply to the farms due to urbanization that has led to changes in land use in the neighborhood. More of the wetlands are being taken up for housing and the likelihood of contamination of underground water resources from household sewage has become a real possibility. There is also more direct run off from the roads whose drains drain into the wetlands.

The need to appropriate environmental management policies for aquaculture even within countries became evident. The catchment within which these farms are located is not confined within the jurisdiction in which they are located. Integrated wetland management across the entire watershed becomes essential for the survival of these farms. In addition, in the urban setting, town councils need to have specific actions to support aquaculture activities as other urban agriculture options (such as directing drainage from roads away from farms, dealing with household garbage/sewage, planning land development to protect such establishments especially in cases where they were established prior to urbanization, etc.).

8.0. Outcomes of the Workshop

The main outcomes of the meetings were the:

1. Creation of awareness on evironmental impact assessment in aquaculture systems
2. Broadening participants understanding of the EAA and its relevance to sectoral planning.
3. Identification of the main ecosystems and biosecurity issues likely to arise as commercial aquaculture sector expands within the Eastern Africa and the Great Lakes Region
4. Identification of socio-economic issues (including policy and governance) relevant to aquaculture environmental management within Eastern Africa and the Great Lakes Region
5. Development of draft guidelines for environmental management framework for susitable aquaculture development Eastern Africa and the Great Lakes Region

From the presentations and discussions of this meeting the following key observations can be singled out:

1. There was clear indication that significant efforts have been made by regional bodies and member states to develop environmental management policies several of which also encompass aquaculture. However, the different countries and bodies are at different stages of policy formulation and implementation on environmental management for aquaculture. Furthermore, it was noted in most ot the Member States that incoherences eixted between the key sectoral policies that affected aquaculture.
2. The need to have a regional framework that would serve as a basis for policy formulation and formulation of governance mechanisms for member states as well as a reference point for harmonisation was evident.
3. The benefits of having such a framework for the region would include:
    a. Enable the development and implementation of more realistic, pragmatic and harmonised regional and national policies, strategies and investments both at sectoral level and farm level.
    b. Facilitate implementation of EIAA and lower cost for investors
    c. Improve productivity, profitability and sustainability of operations that follow guidelines.
    d. Facilitate the development and implementation of appropriate BMPs
    e. Reduced conflicts with other users
    f. Facilitate zoning of areas for aquaculture.

g. Facilitate and lower costs for eco-labelling and certification in zones areas that follow BMPs.
h. Helps ensure safety of products, biosecurity and ecosystem health.

9.0. Conclusions and Way Forward

Participants considered the workshop useful and the objectives met. The member states expressed their appreciation for the initaitive by AU-IBAR particluarly in view of the observation there was no regional framework for environmental management in place yet.

The following were particpants specific recommendations:

1. There was no private sector participation in the workshop. There participation as well as the inclusion of experiences from Asian and other African countries would have enriched the workshop. It was recommended that the other regional meetings should have private sector representation.
2. It was suggested that more time be given for guideline drafting and that the putting together of the components identified into a draft framework be done by a small team of expert(s) supported by AU-IBAR. After this the draft can be brought up for wider stakeholder consultation.
3. Parcipants urged AU-IBAR to hasten the formulation of the regional environmental management frameworks for aquaculture as they would have a positive impact on trends in aquaculture development and productivity within the region.
4. The participants strongly suggested gender and youth be given due attention within the regional frameworks.

10.0. ADNENDUM: Regional Aquaculture think Tank Discussion

A second discussion was undertaken during the meeting to identify regional issues participants thought were important for further discussion at the proposed aquaculture think tank. The specific objectives of the discussion were:

1. Needs assessment, gaps and action plan.
2. Setting priorities for the next actions

The areas considered priority were:

10.1. Regional Issues

The following were issues considered priority for the REC's:

IGAD

1. Move from subsistence to commercial aquaculture. IGAD would like to start with small and medium enterprises as a start up with some experiences from the region, eg. In Kenya there was cluster aquaculture program; Uganda has similar experience with fish farmers organising themselves into cooperative.
2. Critical shortage of skilled manpower. There were several well educated professors and specialists in aquaculture. What is lacking and has greatly affected the performance of the sector was that there are hardly any hands-on practical training programs. There was need to develop a centre of excellence within the region that could provide hands on practical or on-the-job training producing competent aquaculture practitioners (farmers, farm managers, artisans providing key services e.g. net making/mending, fabricating tools for aquaculture, live fish transporters, etc.). The training need not be MSc level, but rather vocational and practical. Such a program would also enrich academic training by providing internships for students. Such a centre should also be in position to provide quality

consultancy services. This needs to be included in regional planning with the development of an action and investment plan.

3. Attract investors in the region. Investors often have money but do not have the practical knowledge. IGAD raised the fact that there was need to establish business-to-business partnerships between north and south. This would help address issue of obtaining the level of finances required to invest into aquaculture operations of the appropriate scale capable of meeting production thresholds that trigger and sustain the development and expansion of commercial production and marketing value chains. The flower industry in Africa is a good example of the benefits of attracting direct foreign investment for new and emerging enterprises. The practice of floriculture has now taken up previous employees who based on the experience they have gained are increasingly investing direct or indirect into smallholder floriculture businesses. Floriculture can be used as a good development model for aquaculture in the region.

LVFO

1. Zoning for aquaculture. Private investors need to know which areas are appropriate and where they can establish facilities. Currently there are no regional guidelines and standards for them to follow.
2. Market. Once there is a good market, the private sector will work to feed that market. There is need for a better understanding of the markets, market linkages and requirements.
3. Intra-regional trade. Cross-border trade for aquaculture inputs and products should also be addressed and harmonised. Currently there as situations whereby one country produces a lot of something but the other does not. In Uganda for example, investors had wanted to invest into feeds but the question was would they be able to sell to the neighbouring countries in order to justify their level of investment?
4. Business platform. A business platform to promote the establishment of private sector led investments would be useful.

LTA

1. There are areas, especially remote areas around lakes where aquaculture can be practised and contribute to the fisheries and economy of the area. However, in such areas there are no hatcheries. Targeted hatcheries associated with identified/permitted species need be established in such areas. There is a critical need for marine hatcheries if marine aquaculture is to develop.

10.2. National Issues

1. Support (funding) for action oriented research. The funds researchers are often able to get are usually not targeted to meeting local needs. Funding is competed for from various institutions each of which has their own independent objectives. A funding mechanism that supports research and development that addresses local needs using locally available materials to be established. Member states should be in position to generate and adapt technologies in favour of t indigenous species. Findings from such research should ably inform practice and vice-versa.
2. Constraints in Capital. The ability of producers to transform their operations from subsistence to commercial operations is hindered by the lack of investment capital particularly for adopting appropriate technology and skills. The establishment of regional agricultural banks through which appropriate financing can be accessed would help alleviate this constraint.
3. Public awareness of the value and attributes of aquaculture by community and public at large needs to be improved.
4. Upscaling. The upscaling of projects/programs/systems should be based on full packages targeting different groups (small holders, etc.). Coordination between stakeholders is also important.

5. Development of indigenous species for aquaculture. There is need to develop hatcheries for indigenous species. Technology for O. niloticus is readily available. There are no hatcheries for potential indigenous species of commercial such as O. tanganyika for example.
6. Feeds. Most commercial fish farmers in the region now import feed from Mauritius and Israel. There is need to invest in feed production to cover the entire the whole range of stages of production in the region. Considering the cost of the investment and critical threshold for such an investment to become viable locally, regional cooperation will be necessary to address this issue. In so doing, the critical threshold to warrant the establishment of such an industry can be achieved.
7. Capacity Building for Personnel, Institutions, Infrastructure and Markets across the value chain and within the Public and Private Sectors. Development does not just happen because there are farmers. There must be deliberate efforts regional to find the finance provide a certified short-term practical training program of 6 months to 1 year to quickly build the pool of competent practitioners and technicians. Those who successfully complete the course should be given the tools to implement what they have learnt, as access to appropriate tools and equipment for aquaculture is a major challenge. This series of comprehensive specialised training need be geared towards providing services at all the different points along the value chain. Government can facilitate this as a component of the youth development programs. This would facilitate the private sector and help them move forward. The Development Approach should be proactive with interventions.
8. Aquaculture Engineering and Infrastructure. The design of facilities and quality of infrastructure for aquaculture needs addressing, particularly for the commercial level. Competent personnel to maintain the infrastructure and equipment will be necessary.
9. Disease control programs are a must.
10. Information Sharing. Sharing of experiences is important. Some countries are more advanced. Learning lessons and sharing knowledge between Member States will help bridge knowledge gaps.
11. Inspection and controls at the borders. Some countries do not have the facilities to allow for the exchange of products to occur.
12. Cooperatives. The majority of smallholder operators do not have access to inputs, cannot access loans and credit. Cooperatives would help smallholder operators mobilise of resources for production, service provision and marketing.

10.3. Summary

In summary it was suggested that there be:

1. Research and Knowledge Sharing platform
    a. Action research
    b. Basic research
    c. Research and knowledge platform
    d. Knowledge sharing

2. Seed, brood-stock and feed
    a. Define Roles and responsibilities of each institution. Government can own brood-stock hatchery, then private sector hatcheries for seed to stock production units.
    b. Capital/finance is a critical problem. It is difficult to set up new banks. Encourage banks to start lending for aquaculture – what needs to be done? What would be the most appropriate modes of sourcing investments for aquaculture? Who should finance what? Should PPP de developed? – If so, what kind of PPP arrangements should be made? Need to have good PPP models.

References

1. FAO 2008-2015. Fisheries and Aquaculture topics. The State of World Fisheries and Aquaculture (SOFIA). Topics Fact Sheets. Text by Jean- Francois Pulvenis. In: FAO Fisheries and Aquaculture Department [online]. Rome. Updated 19 May 2015. [Cited 19 November 2015]. http://www.fao.org/fishery/sofia/en

Appendices

Appendix 1. Workshop Program

DAY ONE – Thursday 27th August, 2015		
08.30	**REGISTRATION**	AU-IBAR
09.00-09:30	OFFICIAL OPENING Welcome statement by the Director of AU-IBAR Opening Minister of Environment or Fisheries (representative) Kenya	AU-IBAR
09.45–09.50	Brief background and objectives of workshop	AU-IBAR
09.45-10.00	PFRS -Policy areas on aquaculture	AU-IBAR
10:00-10:15	**Tea-Break**	
SESSION 1: AQUACULTURE - RESOURCE USE AND IMPACTS		
10:15-10:30	The Status of Aquaculture in the Region	M. Ssebisubi
10:30-10:45	Natural Resource Requirements for Aquaculture	AU-IBAR
10:45-11:00	The Regional Environmental Status and Implications for Aquaculture Development Potential.	B. Cheche
11:00-11:15	Case Study: Review of the ecosystem approach to aquaculture and implications for planning sustainable aquaculture development.	AU-IBAR
11:15-11:30	General discussion	
SESSION 2: STATUS OF ENVIRONMENTAL MANAGEMENT FOR AQUACULTURE IN THE REGION		
11:30-11:50	Overview of International Policies and Regulations on Environmental Management for Aquaculture/Fisheries	AU-IBAR
11:50-13:00	An Overview of Regional Environmental Management Strategies and their Status of Implementation. (Presentations by individual Regional and Water Body Organizations on status of regional EIAA frameworks, plans /programs or issues). **EAC, IGAD, LFVO and LTA,**	RECs/WB
13:00-14:00	**Lunch**	
14:00-15:00	An Overview of National Environmental Management Policies and their Status of Implementation in the IGAD Region. (Presentations by individual Member States on status of EIAA Practice in their countries). **Sudan, South Sudan, Ethiopia, Eritrea, Djibouti, Somalia**	IGAD
15:00-15:.30	An Overview of National Environmental Management Policies and their Status of Implementation in the EAC Region. (Presentations by individual Member States on status of EIAA Practice in their countries). **Kenya, Uganda, Tanzania, Rwanda, Burundi, DRC**	EAC
15:30-16:00	General Discussion: Status of environmental management and aquaculture development in Eastern Africa/Africa	IGAD and EAC
SESSION 3: OVERVIEW OF TRANSBOUNDARY ENVIRONMENTAL MANAGEMENT FOR AQUACULTURE		
16.00-16:30	Environmental impact assessment in aquaculture: components and process (Strategic EIA) including Site Selection and Carrying Capacity Estimation.	S. Ochola
16.30-17:00	Case Study: Developing Sectoral and Ecosystem Environmental Management Plan and Monitoring programs.	N. Isyagi
17.00-17:30	General discussion	FAO
DAY TWO – Friday 28th August, 2015		
SESSION 4: DEVELOPMENT OF REGIONAL FRAMEWORKS – Identification of Key Issues		
08.30-10.30	**Working Groups: Identify key components to develop and implement appropriate mechanisms.** Group 1 – Ecosystem and bio-security issues Group 2 – Socio-economic issues	Participants
10.30-11.00	Tea Break	
11.00-12.30	**Working Groups: Identify key components to develop and implement appropriate mechanisms** Group 1 – Ecosystem and bio-security issues Group 2 – Socio-economic issues	Participants

12.30-13.00	Plenary	AU-IBAR
13.00-14.00	Lunch	
SESSION 4: DEVELOPMENT OF REGIONAL FRAMEWORKS – Drafting Guidelines for Regional Frameworks		AU-IBAR/FAO
14.00-16.00	**Working Groups: Drafting guidelines for regional frameworks** Group 1 – Ecosystem and bio-security issues Group 2 – Socio-economic issues	Participants
16.00-16.30	**Tea Break**	
16.30-18.00	**Working Groups: Drafting guidelines for regional frameworks** Group 1 – Ecosystem and bio-security issues Group 2 – Socio-economic issues	
DAY THREE – Saturday 29th August, 2015		
SESSION 4: DEVELOPMENT OF REGIONAL FRAMEWORKS – Drafting Guidelines for Regional Frameworks		AU-IBAR/FAO
08.30-10.30	**Working Groups: Drafting guidelines for regional frameworks** Group 1 – Ecosystem and bio-security issues Group 2 – Socio-economic issues	Participants
10.30-11.00	**Tea Break**	
11.00-13.00	**Plenary: Drafting guidelines for regional frameworks** Group presentations and general discussions Compilation of framework components	
13.00-14.00	**Lunch Break**	
14.00-15.30	**Plenary: Drafting guidelines for regional frameworks** General discussion: Identification for actions and milestones for way forward	EAC
15.30-16.00	**Tea Break**	
16.00-17.30	**Plenary: Aquaculture Development in the Region: Prospects and Challenges**	AU-IBAR
17.30-18.00	Wrap up and closing	Comm. Fisheries, Uganda
DAY THREE – Sunday 30th August, 2015		
08.00-12.00	**SESSION 4: FIELD TRIP – Drafting Guidelines for Regional Frameworks**	Comm. Fisheries, Uganda / AU-IBAR

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Appendix 3. Speeches

The Hon. Minister of State for fisheries in Uganda
The Director of fisheries in Uganda
Representatives of AU member states
Representatives of Regional Economic Communities
Representatives of Regional Fisheries Bodies
Specialized institutions and Experts
Distinguished ladies and gentlemen

I have the utmost pleasure to welcome you to this very important workshop on "Aquaculture Environmental Management in Eastern Africa and the Greta Great Lakes Region'. It is my privilege to express my profound sense of appreciation for your display of magnanimity illustrated by your acceptance of the invitation to attend this meeting.

Before I proceed further, let me as an obligation, express the profound gratitude of the Chair of the African Union Commission, Dr. Nkosazana Clarice Dlamini Zuma and the Commissioner of Rural Economy and Agriculture of the African Union Commission, Mrs. Tumusiime Rhoda Peace, and on my own personal behalf, to the Government and People of the Republic of Uganda, for this opportunity to host this African Union organized event in Uganda for the second time within four months. Distinguished participants you may recall that the African Union was privileged to organize the consultative workshop on the formulation of criteria and indicators for alignment of pan African policy fisheries and aquaculture policy framework in May 2015, here in this beautiful city of Kampala. Without doubt this is the clear demonstration of the commitment of this great country, of Uganda to the fundamental ideals of the African Union – 'to promote sustainable development at the economic, social and cultural levels as well as the integration of African economies'.

Hon. Minister, Distinguished ladies and gentlemen,

The present workshop about on 'Aquaculture Environmental Management' is very important in the African context and very consistent with the objective of the most important pillars in the PFRS, which is sustainable aquaculture development.

The objective of this policy area is to 'Jumpstart market-led sustainable aquaculture through a variety of strategies and, where appropriate, support interventionist development approaches in aquaculture by strong strategic and implementation plans'. This calls for creating and significantly improving the enabling an environment for aquaculture investment and governance significantly improved in many countries continent-wide. Thus this workshop is premised on the observation that sound environmental management practical are critical to sustainable commercial aquaculture development. The overall focus of this workshop is tuned to strengthening the capacity of member states in aquaculture best practices. We recognized some of the participants have received semblance of related training in the past; thus this consultative workshop may be complementary to earlier efforts and would support reinforcing existing capacity in this region. based on the realization that environmental issues are typically transboundary and the ecosystems are shared, the ultimate outcome of the workshop is aimed at harvesting from distinguished participants the essential elements or ingredients for the formulation of 'environment management strategy for aquaculture development for Eastern Africa and the Great Lakes Region'

Hon. Minister, Distinguished ladies and gentlemen

Due to the threats faced by capture fisheries and the observed stagnation in global production from these fisheries, the sustainable development of aquaculture could provide a safety net for vast majority of Africans, especially in rural areas. You would agree with me aquaculture has an enormous potential for increased contribution food security, employment and income. This is been clearly manifested in Asian counties where aquaculture production constitutes a significant proportion of revenues from export. It is not gainsaying that the pre-requisites for sustainable commercial aquaculture development is the observance of best practices in environmental management. Whilst most regions of the world have made significant strides in observing these practices in their aquaculture ventures or enterprises, our continent is still yet to fully adopt these practices. Truth to be said some progress has been made in the growth of aquaculture on the continent, but must much still has to be done. We must knowledge that one of the key inhibitory factors to aquaculture development as business and realizing its full potential in Africa is the poor consideration for environmental management practices. We must strive to make sure that in every country and region, environmental management practices are implemented as a condition for commercial aquaculture development. This workshop is a foundation in support of realizing this objective.

Hon. Minister, Distinguished ladies and gentlemen

The purpose of our gathering here therefore demands us of our individual and collective expertise to ensure the objectives of the workshop are fully met. Considering the calibre of the galaxy of experts is assembled here, I have no doubt these objectives shall be achieved. In this vein, we have deliberately put together experts from member states and regional institutions to share their experiences; likewise academia to give us academic perspectives of the issues under consideration. This was intentional to ensure that practical experiences and theoretical knowledge overlay each other for us to obtain realistic outputs from the workshop.

Before concluding, I must again reiterate our appreciation particularly to the highly distinguished Hon. Minister for Fisheries under whose tenure AU has been honoured and privileged to organized two workshops in sequence in this beautiful country. Deep gratitude is also expressed to the European Union for provide support to AU Fisheries Governance and Aquaculture Programme under which this workshop is funded. The support of the Commissioner in Charge of Fisheries and Aquaculture, Mr. Lovelock Wadanya, in Uganda and his staff in facilitating both workshops have been very impressively and is duly appreciated.

Lastly, I wish to thank you all for your dedicated support and commitment to implementation of the policy framework and reform strategy for Africa in particular and to the African Union in general. I wish you fruitful deliberations and thank you for the kind attention.

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