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POLICY NOTE

REGIONAL ENVIRONMENTAL AND BIOSECURITY FRAMEWORKS FOR SUSTAINABLE AQUACULTURE DEVELOPMENT FOR EAST AFRICA

Executive Summary

Sustainable aquaculture develop¬ment is key in the Regional Framework on Environmental Management and Sustainable Aquaculture Development in Eastern Africa and the Great Lakes Region. Stemming from the Comprehensive African Development Programme (CAADP) and Council of African Ministers on Fisheries and Aquaculture (CAMFA), the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa (PFRS) also recognizes the need for sustainable aquaculture and therefore advocates for the sustainable management of aquatic resources. In addition to that, the Continental Aquaculture Development Action Plan 2016–2025 was developed through a multi-stakeholder consultative process to actualize the PFRS. AU-IBAR facilitated consultations in East Africa which led to the development of the regional framework which is a support tool to the PFRS from which this policy note is drawn. The policy note seeks to support the aquaculture and fisheries sector achieve its full potential while maintain¬ing biological diversity and protecting ecosystems function.

Five key themes reflect the main challenges that face the industry: P = Increasing fisheries and aquaculture productivity, E = Improving profitability of fish enterprises, I = Enhancing inclusive sustainability, W = Wealth generation, S = Social welfare, nutrition and food security and T = Trans-boundary collaborative management. These themes relate to the Eastern Africa and Great Lakes Region's five strategic objectives of: Profitable, Inclusive, Healthy, Smart and Green. Therefore, within the policy note, objectives, indicators, mitigation measures and monitoring of performance standards are intimated. The notes also provide a decision support tool from project level to sector level, for the planning of land-based and marine aquaculture and for Environmental Assessment. The legal frameworks, conventions and policies that contribute to proper planning of aquaculture as well as recommendations on policy for sustainable management of aquaculture in the region are also presented.

FISHGOV PROJECT
"Fish for posterity"

Strengthening Institution Capacity to Enhance Governance of the Fisheries Sector in Africa

Introduction and Background

An overview of aquaculture in the Eastern and Great Lakes region

Fish farming offers opportunities through employment creation, revenue and general contribution to socio-economic growth and development of the countries in East Africa. The sector has expanded in the Eastern and Great Lakes region of Africa (AU-IBAR, 2015) registering an increase and continuous growth in production hitting about 388,860 tonnes in 2015 (Figure 1).

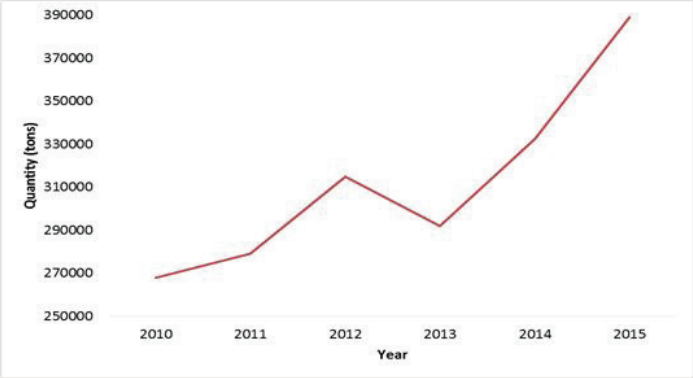

Figure 1: *Aquaculture production in East Africa*

In terms of contribution of individual countries, Uganda is leading with a production of 117,590 tonnes in 2015 followed by Kenya (18,658) (Figure 2).

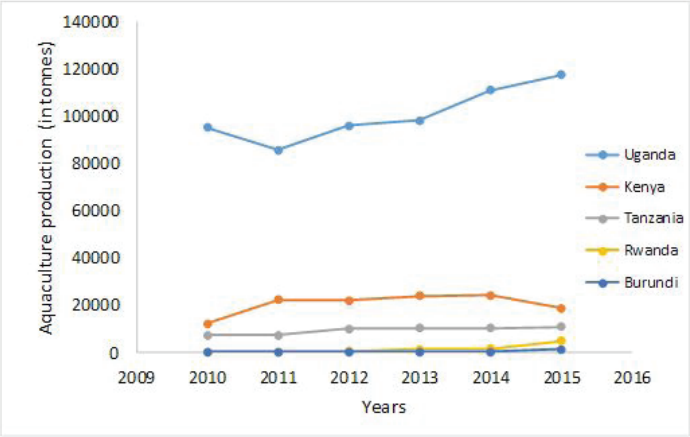

Figure 2: *Aquaculture production in East Africa*

Aquaculture plays an important role in the economic and social development many countries. For instance in Kenya, it supports over one million people and provides livelihoods to many other Kenyans. There exists a big untapped market creating an opportunity for commercial aquaculture in the region. Other opportunities include: the production of live fish food e.g. Artemia, daphnia and rotifers, investments in the fish feed industry, existence of aquaculture research centres and training facilities, availability of fingerling sources and feed for fish farmers, availability of commercial feeds, availability of hatchery-produced and affordable seeds, quality and affordable fish feeds, storage and processing facilities and existence of extension services and credit facilities.

Despite the many opportunities, East African aquaculture sector has on the other hand lagged behind in its contribution to livelihoods and food security due to various reasons:

- Limited knowledge of modern aquaculture technology
- Incomprehensive aquaculture policy
- Low funding for research in aquaculture
- Inadequate extension officers
- Unreliable markets (particularly for seaweeds)
- Poor fish farming traditions
- Use of inappropriate technologies
- Poor transport infrastructure
- Limited coordination between research and development sector
- Limited internal demand for other countries (due to cultural beliefs)
- Lack of legal and institutional arrangements for effective coordination and communication among the regional and sectoral offices
- Lack of data to prove aquaculture as a priority in national economies
- Increased prices of inputs (Seed and Feed)
- Lack of skilled expertise
- Lack of regional aquaculture regulatory frameworks especially in shared waters

Overall, the key challenge across the fisheries management spectrum is the lack of policy coherence and coordination in the management of the fisheries and aquaculture resources which results to inadequate utilization of management techniques by other potential countries. These challenges have highly influenced the current aquaculture development trends which for many countries have stagnated over the years in the region.

Through the FishGov project, AU-IBAR isolated issues in relation to aquaculture planning and management that affect sustainability of the sector as listed in the Table 1.

Table 1: *Key FishGov trans-boundary aquaculture issues*

Key issues in Planning	Key issues in Management
• Export production • Import substitution • Registration and licensing • Site locations and zoning • Indigenous species and limited fry inputs • Industry investments • Impact assessments and risk analyses: • Environmental impacts • Social impacts • Vulnerability assessments • Market research	• Regulations • Food safety (Residue testing, disease monitoring and controls) • Farm stock escape into the wild • Support Organisation of aquaculture business operators • Research and knowledge sharing platform

The vision for the region for aquaculture development The vision of the region is that the "Eastern Africa and the Great Lakes Region will have a sustainable, diverse, inclusive, competitive, highly productive, economically viable and environmentally sensitive aquaculture industry, of which its people can be justifiably proud. It will deliver high quality, healthy food to consumers at home and abroad, and contribute to social and economic benefits to communities, particularly in rural and remote areas. It will operate responsibly, working within the carrying capacity of the environment, both locally, regionally and nationally and throughout its value chain".

Challenges in relation environmental and biosecurity issues in sustainable aquaculture development

There are several factors that affect aquaculture as the sector increases its intensity and productivity in East Africa region. Environmental issues relate to water quality as a result of nutrient loading from effluent into the water system which lead to eutrophication as well as increase in fish disease that comes with intensive culture systems. Natural waters possible for accommodating cage culture are also affected by issues of nutrient loading. Eutrophication for example is reported to have occurred in Lake Victoria due to loss of trophically diverse group of fishes. This demonstrates that the biodiversity vulnerability is not only a function of eutrophication and pollution but also depends on the hydrology of the water body. In the region, burning, deforestation and increased agricultural activities are all results of increased population density, which have negative impacts in the East-African Great Lakes region.

Other biosecurity issues that have affected the region include escapees of exotic fish from fish farms into the natural water bodies, thereby introducing diseases which cause disruption of the ecosystems leading to reduced productivity of natural systems, loss of local livelihoods and threats to local or national economies. Genetic contamination in culture system can also have disastrous effects. All these call for tight biosecurity programmes to prevent control and manage biological risk factors. Biosecurity management also aims to protect against acts of bioterrorism and to prevent adverse biosecurity events as well as offering advice on appropriate interventions and political and social changes that should be adopted by government regulatory agencies. This also promotes increased economic benefits from aquaculture as it prevents outbreaks that results to losses. Asia, for example, reported outbreaks which were believed to be due to lack in biosecurity. The outbreaks later crossed over to Mexico, Brazil and Australia and resulted to loss of USD 1.2 Billion in one year. Serious environmental challenges that exist in the Eastern and Great Lakes region of Africa have emerged due to:

- Weak effective mechanisms for the Environmental Impact Assessment (EIA) processes
- Absence of the law on fishery and aquaculture

- Non adoption of regional protocol on Aquaculture
- Unharmonized policies and legislations at the EAC level
- Limited funding to support the sector

Addressing the above challenges will not only establish a productive aquaculture industry in the Eastern and Great Lakes region of Africa, but will also help improve profitability and sustainability of operations.

The Regional Framework on Environmental Management

The framework has five key themes thus inclusive, profitable, healthy, smart and green that relate to the Eastern Africa and Great Lakes Region's five strategic objectives. The key themes reflect the main challenges facing the industry with each theme having an agreed overarching desired outcome: P = Increasing fisheries and aquaculture productivity, E = Improving profitability of fish enterprises, I = Enhancing inclusive sustainability, W = Wealth generation, S = Social welfare, nutrition and food security,) and T = Trans-boundary collaborative management. Implementation of this framework will assist to make more realistic and appropriate aquaculture development plans, hence making the approval of appropriate projects and institution of environmental management assessments more effective. Table 2 summarizes the framework:

The Eastern Africa and Great Lakes Region's Aquaculture is aligned to other policies and legislations including the Sustainable Development Goals (SDGs) where the sustainable aquaculture is to contribute directly to addressing 7 out of the 17 SDGs:

1. End poverty in all its forms everywhere
2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
3. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
4. Ensure availability and sustainable management of water and sanitation for all
5. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
6. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
7. Promote peaceful and inclusive societies for sustainable development, access to justice for all and effective, accountable and inclusive institutions at all levels

Some of the policies and legislations include:

- The FAO Code of Conduct for Responsible Fisheries
- Comprehensive Africa Agriculture Development Programme (CAADP)
- The Malabo Declaration

In addition to the polies above, the region is also mandated to play its part in rising to the global challenge of climate change and ensure that the aquaculture industry must incorporate the potential impacts of a changing climate into planning and development to reduce its contribution, vulnerability and to capitalise on potential opportunities offered by renewable energy solutions.

Tools and Resources for Sustainable Development and Management

Application of various planning and management tools that address bio-security issues; food safety and quality controls; environmental and socio-economic considerations; and animal husbandry standards are key towards achievement of sustainable aquaculture. As Members States move forward, aquaculture planning and management tools have to be developed and be consistently applied throughout the East African and Great Lakes region to address these considerations. Member States within the region are encouraged to adopt the regional framework as a guide for the development and implementation of more realistic, pragmatic and harmonised regional and national policies, strategies and investments both at sectoral level and farm level and ensure safety of products, bio-security and ecosystem health. Figure 3 is the proposed implementation tools framework for an aquaculture supply chain for the East African region and the great lakes.

Table 2: Regional Framework on Environmental Management for Sustainable Aquaculture

KEY REGIONAL THEMES	The Eastern Africa and Great Lakes Regional Framework on Environmental Management for Sustainable Aquaculture Objectives					Desired Outcomes
	PROFITABLE	INCLUSIVE	HEALTHY	SMART	GREEN	
Increasing fisheries and aquaculture productivity (P)	Maximising profitability by promoting a positive image of the industry, making best use of the region's quality brands to secure markets home and abroad and retain and attract the best people and innovators	Protecting valuable assets by high standards of husbandry and bio-security to benefit all sectors and surrounding communities	Producing healthy high quality, safe farmed fish and shellfish backed by a modern effective food safety regime	Develop plans and spatial zoning to make optimal use of the space available to grow fish and shellfish through open and transparent processes	Sites located to ensure optimum production of high quality, safe farmed fish and shellfish	Grow Aquaculture to supply the additional animal protein needed by 2050, employ millions more people than today and generate billions of dollars in additional income
Improving profitability of fish enterprises (E)	Strong industry with a strong brand through well-established markets and developing new markets for higher value and niche products and retaining stock within farm premises to increase profitability whilst preventing conflict with others' interests	Solving these multi-layered problems through a viable approach that begins with tailoring these schemes to the needs of important stakeholders especially smallholders who potentially have the most to gain	Promoting the health and nutritional benefits of farmed fish and shellfish	Ensure favourable conditions for both commodity and niche market production, better integration with transport and processing infrastructure and improved staff training and development	Enhancing the industry's reputation for respecting the environment through adoption of best practice and greener technologies and reducing the impact on wild fisheries by increasing use of alternative feed sources and minimising the pressure on wild stocks	Maximised profitability for commodity and niche market producers by promotion of a positive image of the industry and making best use of national and regional quality brands to secure markets at home, regionally and abroad and provide sustainable employment opportunities
Enhancing inclusive sustainability (I)	Develop a climate to improve investor confidence, supporting and underpinning the long-term future and competitiveness of the sector	The different member states and markets have their own unique strengths and weaknesses, and each will require a hybrid governance model that embraces both the private and public sectors to deliver the objectives and make things work.	Developing both species-specific and generic multispecies unified certification standards. Avail government oversight and scope so that take all of the externalities of their activities into account when applying for sustainable certification	Establish standards that cover many species, and take the farmers themselves into account and facilitate best use of technology and resources to make aquaculture attractive to investors	All major schemes consider the environmental costs of production, transportation and distribution.	Development programs that fully incorporate women and marginalized groups into program design and implementation. Strong broader government regulation since no single unified scheme will ever fully satisfy the needs of all stakeholders, but that doesn't mean that a unified approach to tackling these related issues couldn't work

KEY REGIONAL THEMES	The Eastern Africa and Great Lakes Regional Framework on Environmental Management for Sustainable Aquaculture Objectives					Desired Outcomes
	PROFITABLE	INCLUSIVE	HEALTHY	SMART	GREEN	
Wealth generation (W)	Ensure favourable conditions for both commodity and niche market production, better integration with transport and processing infrastructure and improved staff training and development	Break language barriers, cost, and time constraints for farmers that are often unable to participate in most of programs. Ensure deplorable working conditions farms are addressed by the standards. Certainty and clarity going forward, underpinning downstream activities and benefits to local and upstream communities	Protecting valuable assets by high standards of husbandry and bio-security to benefit all sectors	Ensure large stakeholders and smallholders are equally comply with strict national food and safety standards, and ensure that they are in a prime position to take advantage of the schemes already in place.	Enhancing the industry's reputation for respecting the environment through adoption of best practice and greener technologies and reducing the impact on wild fisheries by increasing use of alternative feed sources	Market-led aquaculture investments operating in all member states
Social welfare, nutrition and food security (S)	Develop schemes that take into considerations the working conditions of farmers and protect valuable assets by high standards of husbandry and bio-security to benefit all sectors	Break language barriers, cost, and time constraints for farmers that are often unable to participate in most of programs. Ensure the deplorable working conditions on farms are addressed by the standards	Promoting the health and nutritional benefits of aquaculture products and producing healthy high quality, safe farmed fish and shellfish backed by a modern effective food safety regime	Continual development of control strategies and making best use of available medicines as well as research and development into emerging diseases	Good strategies to help minimise discharge of medicine residues to the environment and the appropriate disposal of mortalities to limit disease spread	A secure long-term future for the industry by protecting the asset through adoption of disease and parasite-control strategies which also contribute to minimising impacts on the environment
Trans-boundary collaborative management (T)	Securing finance to support the long-term stability and development of the industry	Establish public consultation for multi-site certification methodology where stakeholders are invited to have their say during public comment periods that then feed into the regional forum and global decision and position on aquaculture	Adopt a scheme for accredited Certifiers and monitoring by an independent accreditation organisation for fish farms and fish product suppliers	Ensures the region's programs are robust, credible and meet best practice guidelines for standard-setting organizations as set out by FAO	Development of the right sites in the right places through transparent, streamlined and proportionate regulation and processes to minimise adverse impacts on other users of the marine and freshwater environment	Strengthening south-south cooperation as well as the "African Voice" on international policy dialogue with implications for African fisheries governance Transform aquaculture towards environmental sustainability and social responsibility using efficient market mechanisms that create value across the value chain.

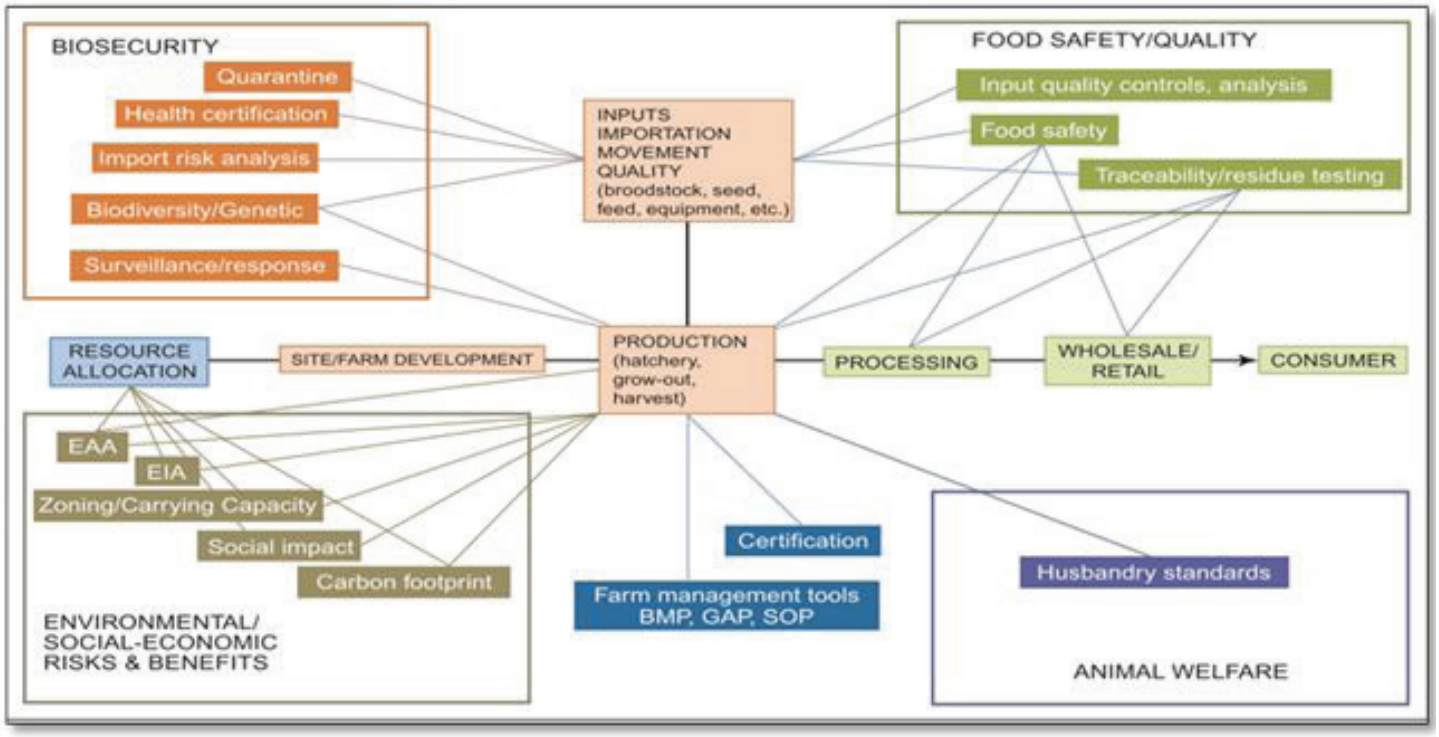

Figure 3: *Proposed implementation tools framework for an aquaculture supply chain (FAO's (2013))*

Approaches/tools/measures recommended in the Environmental Assessment framework for Environmental management to support sustainable aquaculture are as follows:

Governance instruments and controls over marine and land use

Location of production sites: Siting tends to be based upon the following factors: the species to be farmed, the technology and methods to be used, and the ecological and social interactions that occur within an ecosystem and in the surrounding environment. Aquaculture siting should also account for a location's physical, production, ecological and social carrying capacity.

Zoning: GIS has increasingly been used to facilitate commercial fishery zoning consultations in coastal areas where there are competing uses of water resources.

Registration and licensing: Registration involves recording an operator's location, activity, site area and/or fishing vessel in a database whilst licensing grants permission to operate. Governments use licenses as statutory instruments to regulate many matters, by issuing licenses for water usage, waste disposal and farming known invasive species.

Environmental Impacts Assessments (EIAs): these are tools that help identify and assess the potential effects of projects. EIAs outline: an environmental management plan that covers potential mitigation, management and monitoring strategies; and possible alternatives that can be undertaken. Most EIAs are undertaken as legal requirements of national governments in the region and are a key part of the registration and licensing system.

Social impacts: Social Impact Assessments (SIAs) generally involve the development and collection of baseline indicators/data; the monitoring and evaluation of indicators over a period of time; and the preparation of recommendations to reduce negative impacts or augment positive benefits. The purpose of pre-project SIAs is to predict social outcomes and either minimize the possible adverse or maximize the potential benefits of aquaculture operations.

Climate change and vulnerability issues: Changes in climate will likely have a massive impact on the productivity of aquatic habitats in coming years.

The commercial context for tools application

Export Production: Bagumire et al. (2010) recommended that Africa's industry follow the latter's Hazard Analysis

and Critical Control Points (HACCP) inspection and certification approach to satisfy the stringent requirements of major importers. The Food and Drug Administration (FDA) developed this regulatory tool to ensure that any food products in the US meet its environmental and food safety standards. HACCP minimizes incidences of contamination along a supply chain of raw material production, procurement and handling, manufacturing and distribution by planning controls for 'biological, chemical, and physical hazards'.

Import substitution: Many Sub-Saharan nations adopted import substitution policies as a means to rapidly industrialize and strategically provide for their own citizens

Market research: Undertaking a market-driven approach to meeting demand at the onset of an aquaculture venture.

Research and knowledge sharing: FAO has collated an immense amount of information about the aquaculture industry throughout the globe to inform other countries.

Industry investments: Improved stock strains through selective breeding regional facilities should be established in the Eastern Africa and Great Lakes region, so that affected farmers in these countries can benefit from being provided more productive seeds.

Oversupply: Measures to avoid oversupply include developing production for export, substituting imports, and conducting informed market research.

General considerations for food safety

Contaminated surface water, fish inputs, fish infection and disease, use of genetically modified organisms and improper hygiene and husbandry practices can cause chemical and microbial food safety concerns in aquaculture. This should be monitored prior to export to avoid affecting other countries as well. HACCP inspection and certification approach was therefore recommended to satisfy the stringent food safety requirements of fish importers.

Farm stock escape into the wild (bio-security)

Procedures have been provided to reduce impact of farm stock escape in the following documents:

- Protocol for introducing species, outlined in its CCRF (FAO, 2011)
- Management of invasive alien species (Wittenberg and Cock, 2001)
- Understanding and applying risk analysis in aquaculture (FAO's 2008)
- Invasive species management plans
- Invasive alien plants and their management in Africa
- Identification, risk analysis, capacity building, management and legislative tools and case studies (http://giasipartnership.myspecies.info/en).
- Tool prototype to aid the prevention, eradication and control of invasive species (GIASI, 2015)
- Management of Biological Invasions (http://www.reabic.net/journals/mbi/Default.aspx)

The Aquaculture Management Area concept

The concept proposes that farmers who share a water body or water source set-up either formal or informal aquaculture management areas (AMAs) where farmers can collectively access feed, seed, market and postharvest support from partners, as well as to encourage them to strategically work together to minimize their interconnected sites' environmental, social and biological health risks. The FAO and World Bank (2015) suggest that the boundaries of an AMA can be based upon Bio-physical factors and Socio-economic factors.

Policy Recommendations

The policy recommendations below outline Integrated Environmental Management Procedures that would facilitate sustainable aquaculture in the Eastern and Great Lakes region of Africa.

The Ecosystem Approach to Aquaculture

An ecosystem approach to aquaculture (EAA) is a strategy for the integration of the activity within the wider ecosystem. Countries in the region are required to apply EAA in their aquaculture activities such that it promotes sustainable development, equity and resilience of interlinked social-ecological systems.

Essential elements for the implementation of the EAA are spatial planning tools which include Geographic Information Systems (GIS), remote sensing and mapping for data management, analysis, modelling and decision-making. There are a number of key issues in the planning and implementation cycle of the ecosystem approach that require explicit consideration of spatial information about ecosystem components and properties. These can be in the development of aquaculture i.e. identification of suitable sites, zoning, allocation of space, EAA planning for development, aquaculture practice and management i.e. aquaculture impacts and inventory and multi-sectoral development i.e. trans-boundary issues and integration issues.

Strategic Environmental Assessment (SEA)

A Strategic Environmental Assessment (SEA) is defined as, a formalized, systematic and comprehensive process for evaluating the environmental effects of a policy, plan or program and its alternatives. The objective of a SEA is to mainstream environmental and social considerations into programmes, plans and policies, mitigate negative impacts and maximize potential positive synergies at the sector watershed/waterbody scale and/or sector scale. SEAs promote sustainable development by enhancing the integration of environmental concerns in policy and planning processes. The distinction between SEAs and project-level EIAs are that the SEA is broader in scope and is used as a strategic planning tool for development.

However, SEA does not replace project level Environmental Impact Assessment (EIA). EIA is the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals, prior to major decisions being taken and commitments made'. An EIA serves three main purposes namely:

1. To inform a consenting or licensing decision
2. To identify mitigation measures that will minimize any possible environmental impact and social impact
3. To generate a monitoring system and follow up mechanisms

Conclusion

Environmental and biosecurity issues have been reported to cause reduced productivity from aquaculture making it less/not sustainable. The document provides guidance on good governance principles considered as best practices in aquaculture management, tools and resources for sustainable development and management of aquaculture and all member countries in the region are advised to implement them in their countries. Implementation of the tools and policy recommendations will facilitate the development and implementation of appropriate best management practices (BMPs), reduced conflicts with other users, facilitate zoning of areas for aquaculture, facilitate and lower costs for eco-labelling and certification in zones areas that follow BMPs and therefore increase production from aquaculture for the region. Policy recommendations on Strategic Environmental Assessment (SEA) and Ecosystem Approach to Aquaculture have also been given for implementation by countries in East Africa region.

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Prepared by:
Professor Emmanuel Kaunda
Lilongwe University of Agriculture and Natural Resources (LUANAR)
P.O. Box 219, Lilongwe, Malawi
Email: ekaunda@bunda.luanar.mw

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