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GUIDELINES TO SUPPORT THE IMPLEMENTATION OF THE REGIONAL FRAMEWORKS ON ENVIRONMENTAL MANAGEMENT FOR SUSTAINABLE AQUACULTURE DEVELOPMENT IN AFRICA

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GUIDELINES TO SUPPORT THE IMPLEMENTATION OF THE REGIONAL FRAMEWORKS ON ENVIRONMENTAL MANAGEMENT FOR SUSTAINABLE AQUACULTURE DEVELOPMENT IN AFRICA

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Foreword

Africa's total fish production does not meet the Continents food fish requirements. Africa has an estimated population of 1.6 billion people. The continents current food fish supply is estimated at about 9 kg per capita per annum while the global average has risen to approximately 20 kg capita per annum (FAO, 2016). The likelihood that capture fishery production can significantly be increased over the next 20 years to meet demand is low because most of the commercially important fish stocks are reported to be fully exploited or overexploited (FAO 2009). It is not a surprise therefore that over past five years Africa has become a net importer of fish.

Aquaculture currently provides the most sustainable option for the continent to expand is fish production. This recognition stems from Africa's natural resource potential for aquaculture and the rapidly increasing demand for fish amid declining fishery yields. Global aquaculture production now exceeds production from capture fisheries. However, despite growth in the sector, African aquaculture only contributes to 2% of global aquaculture production. The Joint Conference of Africa ministers of agriculture, rural development and fisheries and aquaculture in 2014 recognized the potential of the aquaculture sector to generate wealth, social benefits and contribute to the development of the African economy and contribute to global Sustainable Development Goals.

However there are still challenges to be surmounted to meet the benchmarks for commercial aquaculture for increased sustainable contribution to fish supplies and socio-economic development. Consequently, The Policy Reform Strategy for Fisheries and Aquaculture (PFRS), Africa's blue print for the sector, aims to create an enabling environment that shall lead to the transformation Africa's aquaculture into a sustainable market-oriented private-sector led commercial agricultural activity that can meet the CAADP objectives.

Actions are however required to make to transform this blue-print into reality for the benefit of the peoples of Africa. This Continental Action Plan that was developed by through the collaborative effort of aquaculture stakeholders across the continent was carved out of the PFRS Strategic Objectives and Actions to support the practical implementation of the PFRS towards the achievement of the expected PFRS outcomes. This Continental Action Plan is therefore a companion document to support the implementation of the PFRS within Regional Economic Communities and Member States by both the public and private sectors.

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Acronyms

AAH	Aquatic Animal Health
ADP	Aquaculture Development Plan
ADS	Aquaculture Development Scheme
AEMF	Aquaculture Environment Management Framework
AFRM	African Fisheries Reform Mechanism
AU-IBAR	African Union – Inter-African Bureau for Animal Resources
AZS	Aquaculture Zoning Strategy
BAP	Best Aquaculture Practice
BMP	Best Manufacturing Practice
CAADP	Comprehensive Africa Agriculture Development Programme
CAAM	Competent Authority for Aquaculture Management
CBO	Community Based Organisation
DP	Development Partner
EIA	Environmental Impact Assessment
EU	European Union
FAO	Food and Agricultural Organisation
GIS	Geographic Information System
MS	Member State
NGO	Non-Governmental Organisation
NSA	Non State Actor
OIE	Office International des Epizooties
PFRS	Policy Framework and Reform Strategy
PPP	Public-Private Partnership
REC	Regional Economic Community
RFB	Regional Fishery Body
SEA	Strategic Environment Assessment
SME	Small & Medium Enterprises

1.0. Background

The Conference of African Ministers of Fisheries and Aquaculture (CAMFA – 2014) endorsed the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa1 (PFRS) as Africa's blue print to support the transformation of Africa's fisheries and aquaculture towards the Comprehensive Africa Agriculture Development Program2 (CAADP). For aquaculture, the PFRS aims to create an enabling environment that shall lead to the transformation of Africa's aquaculture into a sustainable market-oriented private-sector led commercial agricultural activity that can meet the CAADP objectives.

A continental consultative process to internalise the PFRS with the view to actualise its policy and strategic objectives for aquaculture was subsequently undertaken within the scope of the African Fisheries Reform Mechanism (AFRM). The outcome of this process was The African Union Ten years Aquaculture Action Plan for Africa 2016 – 20253, a companion document to support the implementation of the PFRS within Regional Economic Communities (RECs) and Member States (MS) by both the public and private sectors. The consultative processes on environmental management for sustainable aquaculture provided input into the development of this action plan and consequent regional environment management frameworks.

1.1. Purpose of the Regional Environment Management Frameworks for Sustainable Aquaculture Development

The policy objective of the PFRS is to create a conducive environment to support private-sector led market- oriented sustainable aquaculture development. This therefore calls for the active involvement of the private-sector as pillars of the industry with a view to increasing fish production and supply, employment and socio-economic development.

For sustainable aquaculture development, supply of aquatic ecosystem goods and services, ecosystem health and biosecurity is essential. It is recognised that where market-forces are the key drivers of industry, there often will be a tendency to underplay the value safeguarding environmental resources in favour of short-term socio-economic gains. The status of an aquatic ecosystem's health and the environmental goods and services consequently derived thereof (such as water, seed, etc.) are principle determinants for aquatic animal production, productivity and consequently the viability of these production systems. The rational management and utilisation of aquatic ecosystems is therefore among the foundation blocks

for ensuring Africa's long-term goals to mitigate its shortfalls in fish supply through sustainable commercial aquaculture are achieved.

Another characteristic of Africa's aquatic ecosystems is their trans-boundary nature. This applies to both the inland and marine ecosystems where aquaculture can be practiced. The trans-boundary nature of Africa's aquatic ecosystems is such that they flow through different territorial borders, geographic and climatic zones. In so doing, they support the different riparian states and societies each with different cultural, socio-economic and political characteristics (Box 1). Thus right from the source, during the course of flow the aquatic environment becomes subject to the impacts of different land and water-use patterns (notably pollution, abstraction) and climate change. As a result, the governance of trans-boundary aquatic natural resources between riparian Member States needs to be harmonised for their sustainable utilisation and management. The level of regional cooperation in Integrated Water Resources Management (IWRM) and aquatic ecosystem management is another key determinant for the realisation of the long-term goals from sustainable aquaculture development.

Box 1: The Nile River Basin, a typical example of the trans-boundary nature and multiple uses of Africa's watersheds

The Nile River Basin for example:

- The River Nile is the longest in the world
- Its basin covers approximately one tenth of Africa with a catchment area of over 3 million km^2
- 300,000,000 people live within the 10 riparian countries that include the streams and rivers that feed the Nile River as well as the countries through which the Blue and White Nile flow.
- The river flows through Africa's equatorial, savannah and hot desert belts
- An estimated 160,000,000 people live within the boundaries of the basin
- The different land use practices along the course of the river impact on the River Nile's water quality, volume, and flow rates.
- Waters of the Nile River system are used for agriculture, power, navigation, city water supply
- Approximately 74% of Africa's freshwater aquaculture is produced in the Nile River Basin
- Rich extremely diverse history and culture from the Mediterranean in North Africa to the Great Lakes Region of Eastern Africa and the Ethiopian Highlands.

The Regional Environment Management Frameworks for Sustainable Aquaculture Development4 were therefore developed to strengthen capacity for environmental monitoring, habitat and ecosystem preservation among riparian states and institutions in support of Africa's sustainable aquaculture development goals. The frameworks seek to:

1. Provide a set of guiding principles within which regional collaboration can be undertaken for the rational management and utilisation of aquatic resources, aquatic ecosystem health and to ensure the supply of aquatic goods and services for sustainable aquaculture development.
2. Mitigate against potential negative impacts of aquaculture on the environment as well as to foster biosecurity, food-safety and access to markets for aquaculture produce and products.
3. Safeguard the interests and rights of other aquatic resource users while at the same time mitigating against the negative impacts of other users on aquatic ecosystems in as far as aquaculture is concerned.

In view of the multiplicity of domains and actors influencing the supply, utilisation and management of aquatic resources, the regional environment management frameworks for aquaculture have integrated the requisite broad range of global and regional norms that attest to best-practices for trans-boundary aquatic resource management for equitable socio-economic development (see figure 1). These guidelines additionally give guidance on the scope of partnerships and linkages that would need to be made if the Regional Environment Management Frameworks for Sustainable Aquaculture Development are to be comprehensively implemented.

These norms have been cascaded down to the local context within each of the regional frameworks, taking into account the policy, institutional and sectoral variances that occur between riparian Member States, Regional Economic Communities, Regional Fisheries Bodies and Water Commissions (see Box 2). The complexity of this interplay warranted the development of simple guidelines to effectively communicate the environmental management requirements for sustainable aquaculture development to the wide-array of independent multi-sectoral stakeholders. This was seen as being necessary to facilitate the interpretation and implementation of the frameworks by all relevant stakeholders down to the local actors. They will also enable stakeholder's appreciation of the technical requirements for implementation and capacity development.

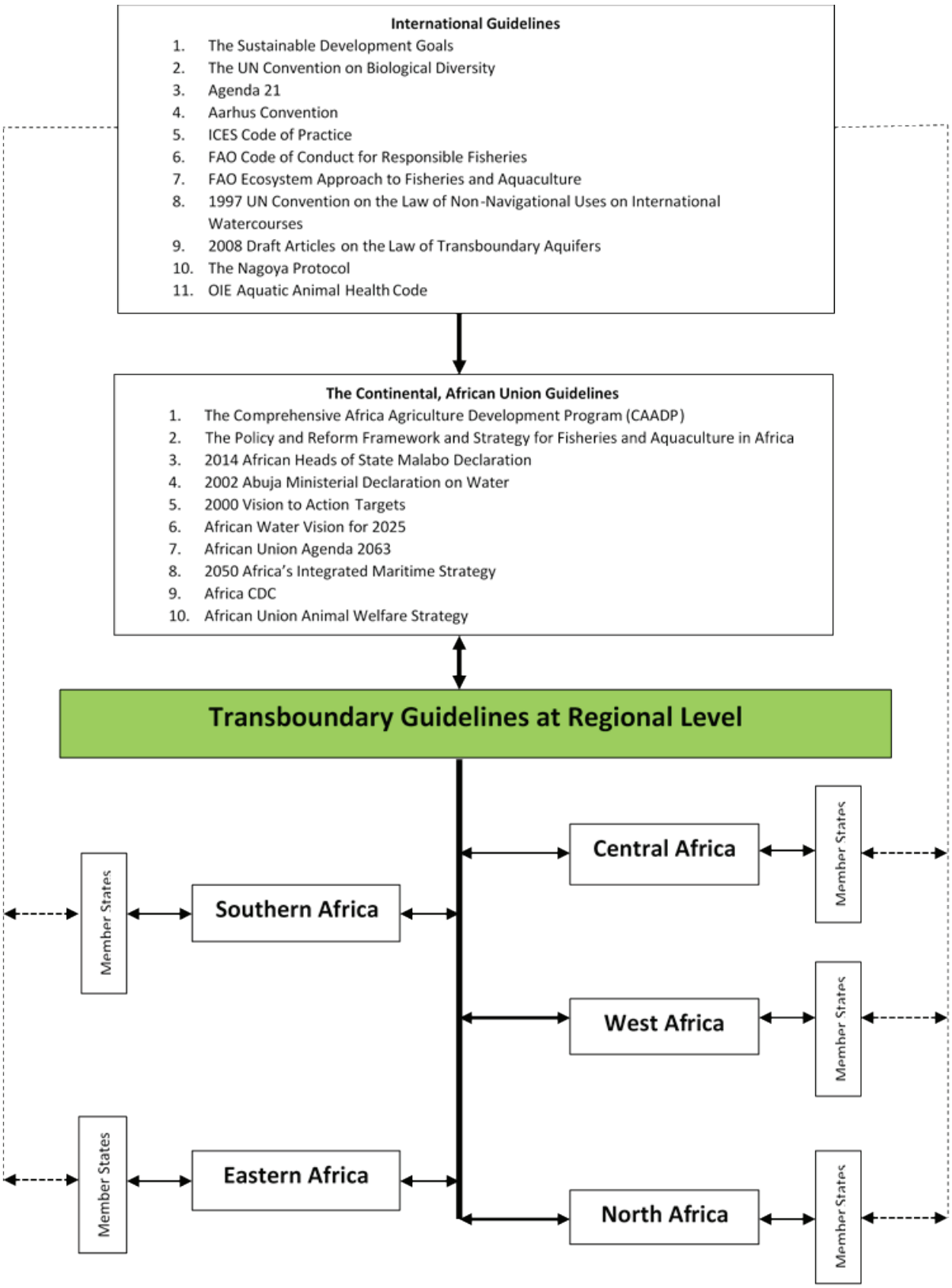

Figure 1. *An Illustration of the Interplay of the Principles and Norms Guiding Access to and the Management and Utilization of Aquatic Resources for Sustainable Commercial Aquaculture Development in the various Regions of Africa*

**There are several additional continental and regional policies and guidelines that would apply respectively given specific contexts. In addition, policies, guidelines and regulations are continuously being developed and/or updated at all levels. Thus it's important that when applying these guidelines, updated information on policy is referred to.*

Box 2. *Illustration of some of the regional guidelines that influence sustainable aquaculture development*

Transboundary Guidelines at Regional Level

Central Africa

1. Charter of the Waters of the Lake Chad Basin

Other Guidance Documents

1. Regional Framework on Environmental Management for Sustainable Aquaculture Development in Africa – Central Africa Region.

West Africa

1. Regional agricultural Policy for West Africa (ECOWAP)
2. ECOWAS Environmental Policy (2008)
3. ECOWAS Integrated Maritime Strategy

Other Guidance Documents

1. Regional Framework on Environmental Management for Sustainable Aquaculture Development in Africa – West Africa

**There are several additional continental and regional policies and guidelines that would apply respectively given specific contexts. In addition, policies, guidelines and regulations are continuously being developed and/or updated at all levels. Thus it's important that when applying these guidelines, updated information on policy is referred to.*

Box 2: continued. Illustration of some of the regional guidelines that influence sustainable aquaculture development

Transboundary Guidelines at Regional Level

Eastern Africa and Great Lakes Region

1. EAC Development Strategy 2011 to 2016
2. EAC Protocol on Environmental and Natural Resources Management
3. LVFO Convention
4. LVFO Strategic Vision (1999-2015)
5. Fisheries Management Plan for Lake Victoria (2009-2015)
6. EAC Regional Strategy and Implementation Plan for Sustainable Aquaculture (2015-2020)
7. EAC Food Security Action Plan (2011-2015)
8. IGAD Regional Environment Policy,
9. IGAD Environment and Natural Resources Strategy;
10. Indian Ocean Commission's Regional Fisheries and Aquaculture Strategy (2015 – 2025)

Other Guidance Documents

1. Regional Framework on Environmental Management for Sustainable Aquaculture Development in Africa – Eastern Africa and Great Lakes Region.

North Africa

Other Guidance Documents

1. Regional Framework on Environmental Management for Sustainable Aquaculture Development in Africa – North Africa Region.

Southern Africa Development Community (SADC)

1. 1992 SADC Treaty
2. SADC Regional Water Policy
3. SADC Protocol on Fisheries 2001
4. SADC Aquaculture Strategy and Action Plan
5. SADC Regional Strategic Action Plan
6. The SADC Fisheries Program (2015-2020)
7. SADC Guidelines for Strengthening River Basin Organizations: Environmental Management
8. Regional Framework on Environmental Management for Sustainable Aquaculture Development in the Southern African Region.
9. Indian Ocean Commission's Regional Fisheries and Aquaculture Strategy (2015 – 2025)

**There are several additional continental and regional policies and guidelines that would apply respectively given specific contexts. In addition, policies, guidelines and regulations are continuously being developed and/or updated at all levels. Thus it's important that when applying these guidelines, updated information on policy is referred to.*

2.0. The Guidelines

The general conceptual framework for the application of the Regional Environment Management Frameworks for Sustainable Aquaculture Developments is illustrated and described in figures 2 and 3 below. This broad conceptual framework may be altered to accommodate specific regional needs. Table 1 below provides a description of the envisaged technical requirements for implementation roles indicating prospective roles of the different stakeholders for implementation.

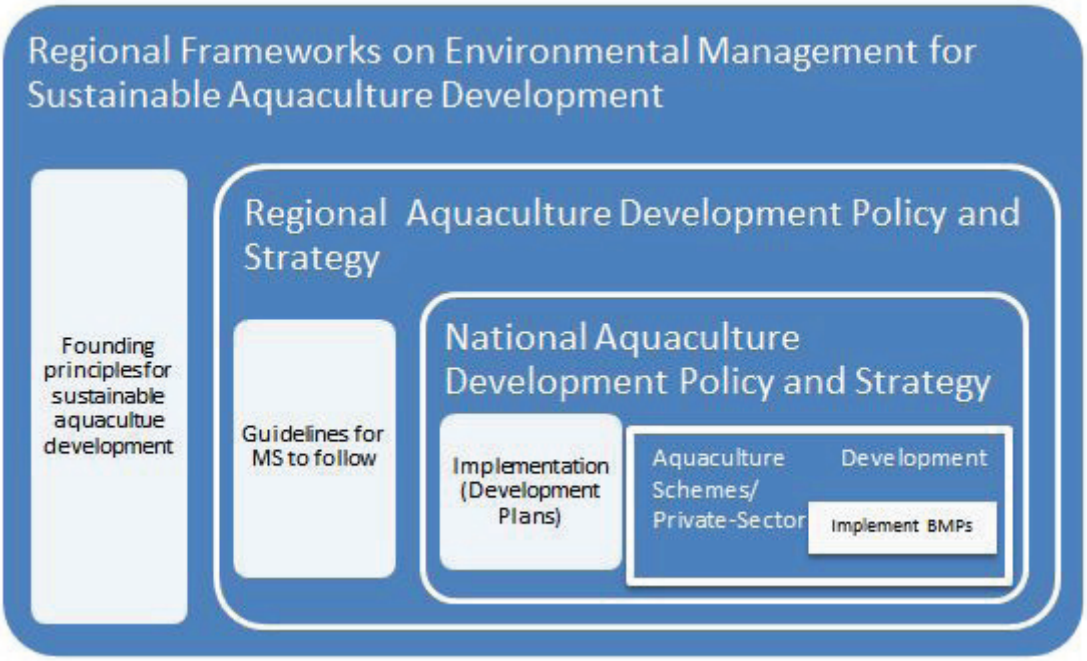

Figure 2: *The Conceptual framework for the application and implementation of the Regional Framework for Environment Management for Sustainable Aquaculture Development.*

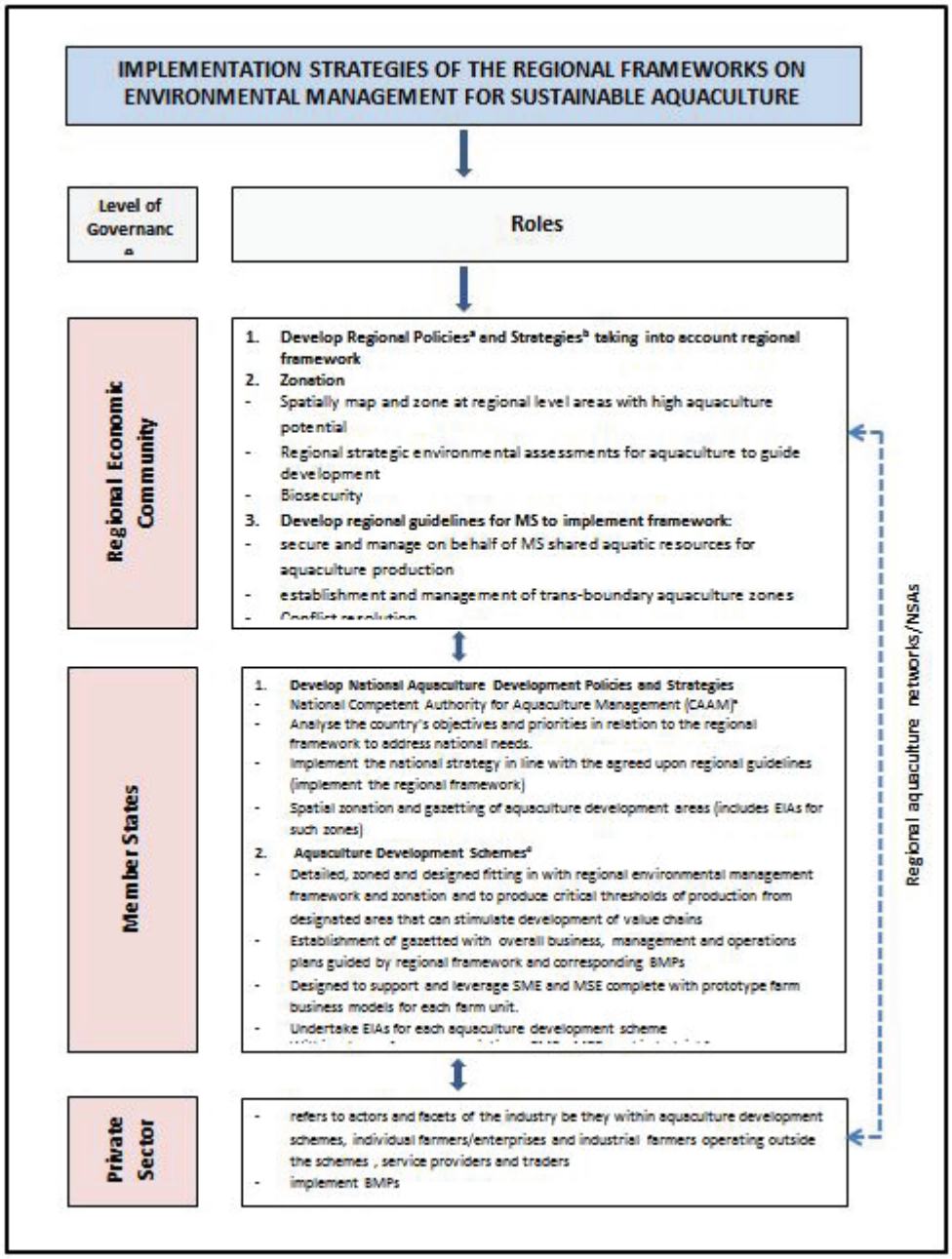

Figure 3: *Implementation of the Regional Frameworks: Elements and Scope*

Definitions and Notes:

[a]***Policies.*** *A government policy is a rule or principle that hopefully better guides decisions, resulting in positive outcomes that enhance the community or unit. Government policies contain the reasons things are to be done in a certain way and why. This leads to the development of procedures and protocols to see that policies are conducted in an appropriate manner .*

[b]***Strategies.*** *A government strategy sets out the plan to deliver the policy goals. It sets out the procedures and protocols that dictate the "how," "where," and "when" of how policies will be executed1.*

Competent Authority for Aquaculture Management (CAAM)[c]. *The equivalent of National departments currently responsible for overseeing aquaculture development within the MS. Each country has a different name, hence this general term2.*

[d]**Aquaculture Development Schemes.** *An Aquaculture Development Scheme (ADS) is a gazetted area for undertaking aquaculture. Its designation, and zoning are based upon agreement with all stakeholders including environmental departments, knowledge of what the production possibilities for the selected area based upon the regional and knowledge of maximum potential production for the area is based upon the regional SEA and an Environment Impact Assessment (EIA) for each selected area respectively. The general objective of the schemes is to achieve the critical thresholds of production and economies of scale from a concentrated area that can stimulate development of viable aquaculture value chains and to create an environment conducive to leveraging the transformation of typical smallholder production into SMEs and MSEs. The ADS serve as spring boards through which national objectives for fish production, livelihoods and socio-economic development from aquaculture can more rapidly be realised. The operations and management of the scheme as well as of individual farm units within the scheme shall be based upon aquaculture, business and environmental BMPs for all the value-chain segments operating within the ADS to ensure economic sustainability, biosecurity and access to markets. The agreed ADS are gazetted so that the use of the land and water resources cannot be changed for other uses other than for aquaculture and aquaculture related activities. The schemes shall operate under the National Competent Authority for Aquaculture Management (CAAM) (Such a system is working well in Morocco) .*

Table 1: Guidelines for the Implementation of Africa's Regional Environment Management Frameworks for Sustainable Aquaculture Development

ACTION	WHY	HOW	WHO			Potential Implementation Challenges
			Regional level	National Level	Private-Sector/ Practitioners	
1. Ascertain the scope and carrying Capacity for Aquaculture in the regional watersheds: Zonation for aquaculture	(i) Identify suitable areas for production (ii) Assess carrying capacity of trans-boundary watersheds and other aquatic resources within the region. (iii) Provide a baseline of aquatic environmental goods and services: a-species biodiversity, b- ground and surface water supply and characteristics - hydrology	(i) Undertake Strategic Environmental Resource Assessments for Aquaculture (SEAs)	(i) spatial assessments and zonation for aquaculture within context of other ecosystem uses (RECs, RFBs, RWO, environmental and other entities) -assessment of potential water availability and supply (RWO, REC, etc.) (ii) Build and maintain a database of aquatic species biodiversity (REC, RFBs, IUCN, WWF)	(i) identifying and demarcating high potential areas and zones for aquaculture (CAAM, NEMA, WRM, NSAs) (ii) selection and development of species for commercial aquaculture (CAAM, NEMA, Private Sector) (iii) Undertake technical and infrastructural designs designated aquaculture development zones (ADZ)	(i) provide information and/ or undertake evaluations on market potential for potential candidates (private sector) (ii) evaluation and selection of production system developments (CAAM, R&D institutions, Private sector) (iii) Farm siting and development (Private sector, CAAM, NEMA). Baseline information would be based upon identified high potential areas and/or ADZ.	(i) Need to get agreement among all the RECs, MS, RFBs, RWO, meteorology, environmental agencies and other agencies to share information (ii) Investment costs into undertaking the spatial analysis (e.g. GIS) and for equipment for continued monitoring. (iii) Obtaining agreements between MS and regional agencies to respect results e.g. quotas for cage culture in portions within their territories, requirements for pollution control, etc. (iv) Level of scientific and socio-economic baseline information required to undertake technical designs for national ADS. This partly would be generated from SEAs (v) Capital costs associated with establishing ADZs. (vi) Establishing viable PPPs to operate ADZ, as well as ensuring smallholders and disadvantaged groups are able to participate and benefits from such schemes.

ACTION	WHY	HOW	WHO			Potential Implementation Challenges
			Regional level	National Level	Private-Sector/ Practitioners	
2. Develop and Strengthen regional and national sustainable commercial aquaculture development policies, legislative and institutional frameworks	(i) Ensure: a-sustainable utilisation and management of aquatic resources to support aquaculture development, ensure ecosystem health and biosecurity; b-safeguard interests of other users; c-ensure equitable benefits and access for producers including disadvantaged groups; d-biosafety and access to markets for aquaculture produce products, inputs and services e-climate change; f-biodiversity conservation; g-ensure sustainability of PFRS outcomes (ii) Ensure aquaculture development policies, plans and actions become more realistic based on evidence of what the actual natural resource and other constraints are.	(i) Revise national and regional policies, strategies and plans in line with outputs of SEA's above. (ii) Strengthen aquaculture, water resource, land-use, environmental management and other relevant multi-sectoral and socio-economic policies and legislature to reflect the resource needs and industry requirements for sustainable commercial aquaculture development. (iii) establish and maintain regional and national aquaculture sector databases to support evidence-based policy and decision making at all levels	(i) Revise and strengthen regional policies, strategies and plans (RECs, MS, NSAs) based on data (ii) Strengthen regional institutions to support sustainable aquaculture development (RECs, MS, RFBs, RWO, etc.) Guide and support MS harmonise national policies and implement. (iii) Establish mechanisms for conflict resolution in shared water bodies	(i) Develop evidence-based aquaculture sector policies, and institutional arrangements that are regional approaches yet cater for national needs (MS, CAAM, NEMA, WRM, NSAs and other entities) (ii) Develop guidelines (Best Practices) for producers and other sector player at enterprise level (R&D, NSAs, CAAM, etc.) (iii) Build national and stakeholder capacity to implement recommendations and best practices. (iv) Establish harmonised mechanism for conflict resolution between aquatic resource stakeholders	(i) Application of BMPs in their operations (private sector) (ii) Develop and implement Sector Standard Operating Procedures (SOPs)	(i) Developing a mutually agreed and respected regional policy, legislative and institutional framework given the multiplicity of regional and national stakeholders and institutions that have a bearing on the sustainability and expansion of aquaculture as a commercial practice. (ii) Establishing cooperation and collaboration between the different MS and entities for the effective implementation policies and efficient cost-effective provision of services. (iii)Ensuring the effective participation of disadvantaged groups in decision making, implementation and benefit sharing. (iv) Obtaining and appreciating the need for strong environmental laws, independence of roles and responsibilities of respective entities (e.g. NEMA, judiciary) while at the same time not impeding development and expansion of the aquaculture sector.
						(v) Create a conducive environment that encourages and supports private-sector led entrepreneurship, innovativeness and aquaculture value-chains expand and diversify for all-scales across the board.

ACTION	WHY	HOW	WHO			Potential Implementation Challenges
			Regional level	National Level	Private-Sector/ Practitioners	
3. Establish an inventory of aquaculture establishments	There is need to have full knowledge of the status of the sectors utilisation and management requirements of ecosystem and other resources to support sustainable aquaculture development. Notable of which are the location and size of establishments, species used, productions systems used . Data will help guide policy, sectoral guidelines and investments.	Develop an aquaculture sector database, data collection protocols and data management and information relay system	(i) Develop regional template, collate and maintain regional database (ii) Data analysis to monitor utilisation and management of trans-boundary aquatic resources in line with regional policies. (iii) Undertake regional early warning and risk analysis using regional environmental, sectoral and meteorological data.	(i) Harmonise national statistics protocols (ii) Collect, collate and relay relevant information to the designated regional entity (iii) Register farms and maintain a national inventory of aquaculture establishments (iv)Assess status and trends and use information to prioritise, streamline and/ or improve national policies and development actions (v) Publish sector status reports to help guide investments and operations of private and public sector practitioners	(i) Register establishment (ii) Record keeping (iii) Set-up and maintain producer association database that additionally factor in national guidelines. (iv) Up-date CAAM unit with the required relevant information.	(i) Initial investment in terms resources, equipment and time to develop system, train staff and producers, and undertake initial surveys. (ii) Develop and effective implementation modalities and secure resources to maintain the system e.g. collection and proper utilisation of license fees to support this service, development of mobile Apps to reduce costs collecting and relaying data, etc. (iii) Obtaining trust from the different entities on purpose/ use of data, confidentiality, (iv) Ensuring feedback of and accessibility/ dissemination of derived relevant information to the different contributors of the database.
4. Develop commensurate aquaculture development strategies, programs, plans and projects.	(i) Guide and orient development actions in line with policy objectives. (ii) Establish human, financial, and institutional (i.e. technical, human natural) capacity for effective implementation of regional, national policy and sectoral objectives as well as producer objectives (iii) Establish modalities for implementation	(i) Develop and implement evidence-based regional programs and projects in support of sustainable aquaculture that factor in the regional outlook (i.e. 1, 2 and 3 above) (ii) Develop and implement evidence-based national sectoral programs plans, and projects	(i) Develop, coordinate and supervise implementation regional strategies, programs and projects to harness, maintain supply and manage sustainably trans-boundary aquatic and other natural resources for aquaculture (RECs, MS, RFBs, RWOs,)	(i) Develop and implement national aquaculture sectoral strategies, programs, plans and projects that are in harmony with regional outlook (CAAM and all relevant stakeholders) to ensure access and sustainable management of aquatic and other natural resources for aquaculture development	(i) Develop, invest and operate various projects and/or enterprises in line with BMPs and sector SOPs (Private sector, NSAs) and enterprise objectives. (ii) Establish and run sector NSAs for exchange of information, facilitate trade and advocacy.	(i) Obtaining mutual cooperation from riparian MS and stakeholders where production quotas and other limits need to be set for the rational utilisation and management of shared aquatic resources.

ACTION	WHY	HOW	WHO			Potential Implementation Challenges
			Regional level	National Level	Private-Sector/ Practitioners	
			(ii) Strengthen linkages and capacity for implementation among the various regional institutions – based on their specialists to support sustainable aquaculture development (RECs, RFBs, MS, RWO, NEMAs, NSAs, etc)	(ii) Develop human and institutional capacity within private and public sector for effective and sustainability of outputs and outcomes of development programs/plans (CAAM, NEMA, WRM, R&D, private sector, NSA and other stakeholders). (iii) Create fora that support effective participation and contribution of sector NSA's as one-voice at national level.		(ii) Support private-sector entrepreneurship, innovativeness and aquaculture value-chains diversification and expansion that are anchored onto the adoption of environmental and other sector Best Practices including in provision of environmental services.
5. Develop aquaculture investment plans and budgets	Secure financial and material resources for sustainable aquaculture development	(i) Assure the implementation of environmental management for sustainable aquaculture development actions. (ii) Investments for sustainable supply and improve access to water and other aquatic resources for aquaculture.	(i) Investment plans and budgets to harness and maintain supply and access to trans-boundary water and other natural resources for aquaculture (ii) Regional ecosystem environmental monitoring and mitigation programs (iii) Develop regional investment guidelines and plans for public and private sector investment for the establishment and operations of aquaculture development schemes/zones (iv) Mobilise resources for environmental management in aquaculture	(i) Include environmental management dimensions for sustainable aquaculture into NAIPs (ii) Secure financial resources to implement programs and plans to safeguard and ensure sustainable utilisation and management of aquatic resources for aquaculture and other resource users notably bulk harnessing and reticulation of water. (iii) Develop investment plans and financial arrangements to support development and operations of aquaculture schemes (iv) Mobilise resources for environmental management in aquaculture	(i) Develop and avail financial packages for entrepreneurs (financial institutions, private sector, NSAs) (ii) Mobilise resources for environmental management in aquaculture	(i) Aquaculture may not necessarily be a priority in all MS or RECs. (ii) Securing agreements and contributions from different MS and regional/ national sector and NSA entities towards the implementation and sustainability of regional programs for aquaculture. (iii) Establish and effectively manage innovative options to mobilise resources e.g. establishing viable PPP arrangements both at regional and national level. (iv) Capital and skills to establish and effectively manage credit, grant and/or cooperative schemes for aquaculture entrepreneurs and associations.

ACTION	WHY	HOW	WHO			Potential Implementation Challenges
			Regional level	National Level	Private-Sector/ Practitioners	
6. Ascertain and ensure access to natural resource goods and services for aquaculture, mitigate the impacts their use on ecosystem health and on access for other resource users.	The major natural resource goods and services for aquaculture are water, stocking material and fingerlings. Adequate volumes of the right quality water must be supplied, considerations need be taken on effluent management, impact of water quality and feed on food-safety; stock quality in terms genetic profiles bearing in mind need to safeguard the watershed's biodiversity, prevent invasive species and biosecurity. Additionally feed is the major potential pollutant from aquaculture; the volumes and quality of feed used are therefore key parameters for environmental management in aquaculture.	(i) Establish services to monitor and manage supply and access of the required volumes and quality of water to aquaculture facilities including of effluent. (ii) Establish regional guidelines and standards on aquatic animal seed and feed production and utilisation in line with regional environmental standards. (iii) Establish regional guidelines on aquatic animal disease control strategies in line with regional environmental standards.	(i) Establish regional guidelines in collaboration with MS and stakeholders. (ii) Build institutional support mechanisms to coordinate, guide and monitor implementation by MS and other stakeholders (iii) Develop and disseminate approved lists of inputs that meet regional environmental, biosecurity and food standards	(i) Harmonise regional guidelines and standards with national sector guidelines (iii) Develop guidelines (Best Practices) for use by the various sector practitioners (ii) Develop institutional and human resource capacity to implement stipulated guidelines, meet stipulated standards and undertake monitoring for relevant levels of private and public sector agencies and practitioners.	(i) Implement Best practices (ii) Develop sector Standard Operating Procedures	(i) Investment into the development standards, their production and distribution of guidelines, manuals and other information materials tailored to the needs of respective stakeholders. (ii) Encouraging voluntary adherence to standards and self-monitoring by all sector players. (iii) Improving access to aquaculture inputs, services, products and markets by streamlining and obtaining mutual cooperation from all stakeholders in harmonising enterprise and national standards with regional sector standards. (iv) Availability, cost and actual utilisation of approved inputs and services
7. Monitoring and Evaluation of Environmental Resources for Aquaculture	To ascertain the level of effectiveness of environmental management programs and practices in aquaculture, to help troubleshoot and address prospective challenges before they become catastrophies. Ensure the sustainability of commercial aquaculture as a practice.	Undertake regular sectoral environmental impact assessments and audits at the different levels of management (i.e. regional/ national level and at enterprise level e.g. at factory, farm, etc.)	(i) Establish regional database to collate profiles of national status reports (ii) Based on SEA and policies, develop regional guidelines on EIAA. (iii) Establish regional guidelines and protocols for monitoring of residues in aquaculture production systems	(i) Harmonise and implement EIAA guidelines and protocols for aquaculture (ii) Institutional and human resource capacity building (iii) Establish one-stop-shop to ease access to aquaculture environmental management services for practitioners.	(i) Follow Best practices and guidelines (ii) Implement EIAAs based upon gazetted guidelines as recommended by CAMP/NEMA	(i) High cost of undertaking EIAAs for entrepreneurs. (ii) Institutional capacity to maintain central databases and make this information accessible to users. (iii) Cooperation of stakeholders and public.

ACTION	WHY	HOW	WHO			Potential Implementation Challenges
			Regional level	National Level	Private-Sector/ Practitioners	
				(iv) Develop environmental baselines for aquaculture development schemes/parks assessments and identified high production areas. This will reduce costs of undertaking EIAA by individual operators. (iv) Motivate/ reward compliance (v) Develop and implement residual monitoring plan in line with regional guidelines		
8. Climate Change Mitigation	Establish early warning systems and risk mitigation strategies based	Establish and undertake regional early warning systems and risk analysis using regional environmental, sectoral and meteorological data. Communicate and advise to MS and other sector stakeholders	(i) Develop and maintain regional databases and monitoring systems	(i) harmonise data collection and management systems with regional guidelines (ii) Collect, analyse and relay appraise information to relevant stakeholders. (iii) Develop appropriate climate change risk reduction strategies and measures for the sector (including insurance mechanisms)	(i) Implement guidelines and best practices	(i) Appreciation of the implications and need to mitigate against climate change especially in areas where directs impacts of climate change are not yet obvious. (ii) Building capacity and cost of predicting and mitigating against potential climate change events and impacts for aquaculture in region and ADS's.
9. Access to Markets	The adoption and implementing sound environmental principles in aquaculture development and practice: (i) Opens up opportunities for accessing niche markets, makes it more feasible for producers meet environmental market certification and standards and lowers EIAA implementation costs.	(i) Adopt and/ or establish international and regional best practices on environmental management for aquaculture, biodiversity, disease control and food-safety. (ii) Develop and implement market standards	(i) Harmonise regional market access standards to international and regional best practices s (notably. Africa Ecolabelling mechanism, OIE, Codex Alimentarius (ii) Establishment of zoned aquaculture development schemes (iii) Zonation for aquatic animal disease surveillance and control.	(i) Harmonise national standards with regional standards (ii) Develop and support aquaculture development schemes (iii) Establish guidelines and provide technical support to strengthen capacity of sector actors to meet compliance requirements for regional and national environmental and product standards	(i) Adopt and implement guidelines and best practices (ii) Develop and implement sector Standard Operating Procedures	(i) Regional cooperation and capacity for effectively implementing and monitoring agreed upon regional frameworks and standards sustainably in collaboration with all respective stakeholders.

ACTION	WHY	HOW	WHO			Potential Implementation Challenges
			Regional level	National Level	Private-Sector/ Practitioners	
	(ii) The safety of aquaculture produce and products from implementing areas and enterprises is better assured. (iii) The health status of farmed and wild aquatic animals from such environments is safeguarded to a greater degree.					
10.Capacity Building	(i) Build institutional and technical capacity of stakeholder within both the public and private sector for effective implementation and monitoring of ecosystem habitats, and for the sustainable utilisation and management of these resources.	(i) Develop and strengthen current public and private sector institutional arrangements for aquatic ecosystem management and sustainable utilisation (ii) Establish/ strengthen infrastructure and facilities for the required service delivery (iii) Relevant training and information sharing of both public and private sector stakeholders (iv) Build capacity to develop and operate aquaculture development zones	(i) Establish and support regional reference centres and centres of excellence (ii) Strengthen collaboration between existing regional and national entities	(i) curricula development (ii) Professional training, refreshers and re-orientation courses for practitioners from both public and private sector to strengthen their capacity to implement stipulated recommendations, guidelines and standards (iii) Strengthen collaborative mechanisms between the different institutions	(i) Endeavour to remain up-to-date (ii) Establish self-supporting NSA professional or producer associations and guilds that are guided by the voluntary implementation professional SOPs respectively for the various cadres and disciplines.	(i) Obtaining agreements by all stakeholder to adopt and implement collaboratively regionally accepted curricula, accreditation processes and professional and guild standards. (ii) Mobilisation of adequate resources for implementation
11. Innovation, Research and Development	Improve and develop more cost-effective environment management systems for aquaculture	(i) Evaluation of data sets on trends (ii) Establish and support regional and national R&D programs	(i) Develop and coordinate regional R&D programs	(i)Develop and support national R&D programs and projects	(i) Contribute to and develop innovations	(i) Weak research capacity in private and often public spheres. (ii) Weak level of cooperation and collaboration between non-fisheries regional sector and fisheries related research institutions including to international non-fisheries related reference centres.

ACTION	WHY	HOW	WHO			Potential Implementation Challenges
			Regional level	National Level	Private-Sector/ Practitioners	
12. Public Awareness and Information Dissemination	(i) Ensure public is informed and aware of the value of aquatic environments and of adopting good environmental practices (ii) Disseminating and ensuring timely access to relevant information for the respective stakeholders	(i) Establishment of stakeholder platforms (ii) Disseminate information through media, and other channels. (iii) Incorporate aquatic ecosystem health and best practices for environmental management for sustainable aquaculture in curricula at all levels of learning	(i) Establishment and support to information units (ii) Production of communication material (iii) create and coordinate regional fora for information sharing	i) Establishment and support to information units (ii) Production and dissemination of communication material through media and other avenues (iii) Create and coordinate national fora and events for information sharing targeting all categories of stakeholders including school children.	(i) Create NSA platforms (e.g associations) to share information (ii) As part of cooperate responsibility professional associations could have public awareness events especially for the young, disadvantaged groups and smallholders.	(i) It is often costly to develop media programs like films suitable for the different respective age groups (ii) Great diversity in language, culture, educational and socio-economic background, including within countries. (iii) Accessibility to internet services especially in rural areas. (iv) Gender issues

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