Food and Agriculture Organization of the United Nations

Promoting sustainable aquaculture for food security and economic development

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Purpose

This brief provides a snapshot of aquaculture development in the Southern African Development Community (SADC) region, discusses the main constraints to aquaculture development, highlights success stories and key success factors, and provides SADC Member States with key recommendations for achieving sustainable aquaculture growth through value chain progression.

Key messages

- Given increasing demand for aquatic food, and stagnating and/or declining supply from capture fisheries both regionally and globally, there is significant potential for further growth of the SADC aquaculture sector.

- To significantly increase aquaculture commodity supply, there is a need to enhance growth of regional aquaculture value chains and promote the commercialisation of smallholder aquaculture in the target countries by establishing enabling regulatory, production and investment platforms.

- Strengthening governance of the sector and creating an enabling environment for investment, improving primary and secondary infrastructure, ensuring access to inputs such as seed and feed, greater research and development (R&D) efforts, capacity building and skills development, and expanding market demand.

Preamble

In the Southern African Development Community (SADC) region, it is estimated that around 100 million people eat fish and other aquatic foods (molluscs, crustacea) regularly. Aquatic foods are generally the most affordable source of dietary animal protein containing essential fatty acids and micronutrients and are therefore of overwhelming importance for food and nutrition security, particularly for poorer segments of the population, and for sustaining livelihoods and driving economic development (de Graaf and Garibaldi, 2014). However, per capita consumption of aquatic foods in SADC (2015) at 11.3 kg/yr is 79 percent lower than the global average of 20.2 kg/yr (FAO, 2021); moreover, the high consumption rates in some of the island and coastal States mask the very low consumption rates of around 5 kg/capita/yr in the rest of the region. With rapid population growth, the gap between supply and demand of aquatic foods in most SADC countries continues to increase. Taking only fish into account, it is predicted that SADC Member States will collectively have a supply deficit by the mid-2020s of around 570 000 MT per year (Cai and Leung, 2017) (Figure 1).

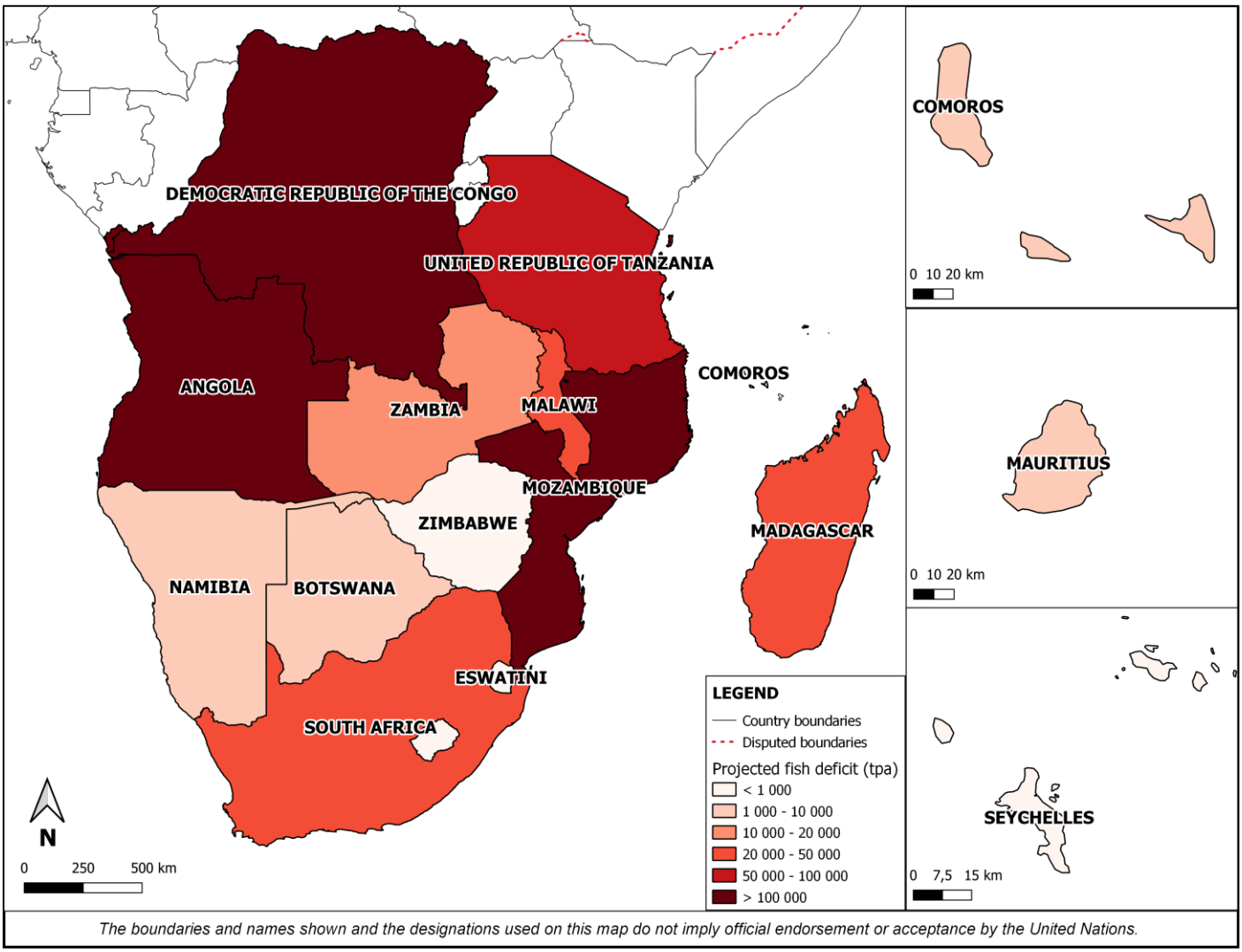


Figure 1: Projected fish supply deficits in SADC Member States.
Source: **Cai, J. & Leung, P.** 2017. *Short-term projection of global fish demand and supply gaps*. FAO Fisheries and Aquaculture Technical Paper No. 607. Rome, FAO. 128 pp.

It is now widely-recognized that matching increasing demand for aquatic foods in the SADC region will require further development of the aquaculture sector. Many SADC Member States are endowed with abundant natural resources including land and water, which are conducive to inland and marine aquaculture development. Moreover, all Member States have identified aquaculture in various national planning, policy and priority-setting documents (for example, poverty reduction strategies and country profile frameworks) as a vehicle that can contribute meaningfully to national food and nutrition security, reduce poverty, and enhance rural development and standard of living (FAO, 2020). During the last decade, output from commercial aquaculture in the SADC region has grown rapidly by an average of 8.5 percent per annum (FAO, 2020).

Nevertheless, it is generally recognized that the full potential of aquaculture in the region is still to be realized and has been restrained by constraints including, among others, institutional (e.g. inadequate or absent policy, legislation and/or regulatory frameworks, lack of cooperation between the public and private sector), availability of and access to inputs (e.g. seed and feed, extension services, good genetics), scientific (e.g. inadequate research and development support structures), human capital (e.g. shortage of core skills, inadequate training), market (e.g. poor market access, market volatility) and financial (e.g. access to credit, lack of financing mechanisms, lack of awareness of and support for aquaculture from financial services sector) constraints (SADC, 2016; FAO, 2020).

In 2016, the SADC regional Aquaculture Strategy and Action Plan (RASAP) (2016–2026) was developed, which provides strategic direction for the rapid development of aquaculture in SADC Member States, while simultaneously safeguarding the ecological integrity of aquatic ecosystems, conserving common genetic resources and supporting the maintenance of regional aquatic biosecurity. The overall goal of the RASAP is to increase the contribution by aquaculture to local, national and regional economic growth and trade.

Following a SADC and FAO Subregional Office for Southern Africa (SFS) Technical Cooperation Project (TCP), "Strengthening Capacity of SADC Secretariat in implementing the SADC Fisheries Programme", FAO-SFS and SADC have signed a Memorandum of Understanding (MoU) with an action plan affirming a continued collaboration. As part of the TCP, a comprehensive needs assessment for aquaculture in SADC Member States was conducted. In support of, and based on, this needs assessment, this policy brief summarizes the current state of play in SADC aquaculture, provides case studies, highlights major successes and constraints, and makes recommendations to further develop and manage aquaculture in the region.

Overview of aquaculture in the SADC Region

Currently, aquaculture in the SADC region is dichotomous and comprises:

1. Smallholder aquaculture
2. Commercial aquaculture

Smallholder aquaculture (not to be confused with commercially oriented, market-led small, medium and micro enterprise (SMME) aquaculture undertaken in Nigeria, Egypt, Ghana, Uganda, and Kenya, for example) has a long history (over 60 years) and has been championed by donors and development partners as a means of reducing poverty, creating livelihoods and improving food and nutritional security (Brummett and Noble, 1995). It is typically practiced in rural areas using simple production technologies (Figure 2). Production levels are low and many operations have failed due to a myriad of issues including access to and quality of inputs (e.g. seed, feed, extension services), a lack of human capital and funding, and poor primary and secondary infrastructure (Hecht, 2006). Broadly speaking, these interventionist approaches propelled by donors have failed to increase national fish supply, generate wealth, and reduce poverty in rural areas (Brummett, 2008; Jamu *et al*., 2012).

Figure 2: Typical examples of smallholder pond operations in Zambia (left) and Malawi (right).

On the other hand, commercial aquaculture is market-led and private-sector driven with the aim of generating profit (Jamu *et al*., 2012). Operations are undertaken at far greater scales than smallholder aquaculture (500 to 20 000 tonnes per annum [tpa]) using imported technologies and expert managerial resources, and activities are frequently vertically integrated along the value chain (Figure 3). Commercial aquaculture has grown rapidly in several SADC Member States with benefits including enhanced food security, job creation, income generation and other associated benefits. It is now recognized that the major aquaculture successes in Africa, and in the SADC region, have been achieved by private sector-driven, commercial aquaculture ventures (Hecht, 2006; Brummett, 2008; Jamu *et al*., 2012; Hlatshwayo, 2017).

Figure 3: Commercial abalone operations in South Africa (left), rainbow trout operation in Lesotho (right).

Total aquaculture production of food fish in SADC Member States increased from 21 466 tonnes in 2001 to 114 758 tonnes in 2020, a growth rate of approximately 9 percent per year (Figure 4) (FAO, 2022). In 2020, the majority (88 percent) of aquaculture production of food fish was comprised of freshwater finfish (Nile tilapia *Oreochromis niloticus*, rainbow trout *Oncorhynchus mykiss* and common carp *Cyprinus carpio*), followed by crustaceans (4.7 percent) (prawn species) and smaller volumes of bivalves (2.5 percent) (Mediterranean mussels *Mytilus galloprovincialis*, Pacific oysters *Crassostrea gigas*), gastropods (abalone *Haliotis midae*) (1.7 percent) and marine finfish (3 percent) (Figure 4) (FAO, 2022).

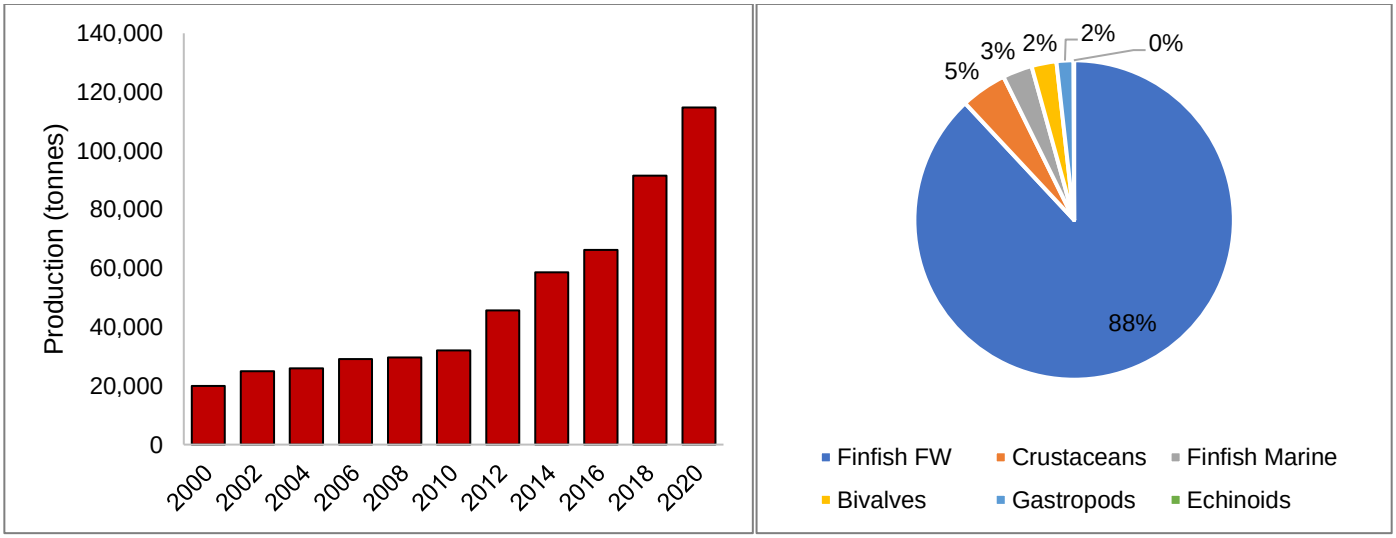


Figure 4: Aquaculture production in SADC, 2000-2020 (left); contribution of major species groups to total aquaculture production in SADC in 2020.

Source: **FAO.** 2022. Fishery and Aquaculture Statistics. Global capture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2022. www.fao.org/fishery/statistics/software/fishstatj/en.

In 2020, freshwater fish production was dominated by Zambia (45 670 tonnes), Zimbabwe (15 425 tonnes) and Malawi (9 393 tonnes) (FAO, 2022) and this can largely be attributed to the growth of commercial cage culture of Nile tilapia on Lake Kariba (Zambia and Zimbabwe) and *O. shiranus* in Lake Malawi/Niassa/Nyasa

(Malawi), as well as commercial, semi-intensive pond farming of Nile tilapia and other tilapias such as *O. andersonii*, *O. mossambicus* and *Coptodon rendalli*. Lesotho and South Africa are the most important producers of rainbow trout (Table 1).

Table 1: Aquaculture production of major species groups by SADC Member States in 2020.

Country	Production by species group (tonnes)						
	Finfish Freshwater	Finfish Marine	Crustaceans	Bivalves	Gastropods	Echinoids/Sea Cucumbers	Seaweeds (wet weight)
Angola	2 062						
Botswana	146						
Democratic Republic of the Congo	3 590						
eSwatini	100						
Lesotho	2600						
Madagascar	143		5272.97			50	8 084.51
Malawi	9 393						
Mauritius	19.4	3 260	2.6	16			
Mozambique	3162						
Namibia	37.16			283.55	0.01		
Seychelles				<1			
South Africa	1 461	7.02		2 594	1976.56		3 715.00
United Republic of Tanzania	17 233	170.45	73.56			10	91 081
Zambia	45 670						
Zimbabwe	15 425						
Total (tonnes)	**101 041**	**3 437**	**5 349**	**2 893**	**1 977**	**60**	**102 881**
% Composition	**46.43%**	**1.58%**	**2.46%**	**1.33%**	**0.91%**	**0.03%**	**47.27%**

Source: **FAO.** 2022. Fishery and Aquaculture Statistics. Global capture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2022. www.fao.org/fishery/statistics/software/fishstatj/en.

Marine finfish culture, on the other hand, is still largely nascent despite developments in Mauritius (cage culture of red drum *Scieanops ocellatus*), United Republic of Tanzania (URT) (pond farming of milkfish *Chanos chanos*, mullet *Mugil cephalus* and pompano *Trachinotus blochii*) and South Africa (land-based pilot-stage RAS production of yellowtail *Seriola lalandi* and dusky kob *Argyrosomus japonicus*) and imminent commercial-scale developments in Seychelles. Madagascar, and to a lesser extent URT (Mafia Island), dominated production of crustaceans (black tiger prawns *Penaeus monodon* and fattening of mud crabs *Scylla serrata*). Prawn production in Madagascar and Mozambique was curtailed by white spot syndrome virus (WSSV) (Tang *et al*., 2013), but has made a comeback in Madagascar and, recently, in Mozambique. Bivalve production (Mediterranean mussels and Pacific oysters) is limited to South Africa and Namibia, while Seychelles produces black pearls using black-lipped pearl oysters *Pinctada margaritifera*. Gastropod (abalone) production is limited to South Africa and Namibia. URT (Zanzibar) is the region's major seaweed (*Eucheuma denticulatum* and *Kappaphycus alvarezii*) producer. More recently, seaweed production has intensified in Madagascar.

Figure 5: Aquaculture in SADC is diverse: a range of different candidate species are produced using a number of production systems.

In summary, aquaculture production in the SADC region has increased significantly over the last 15 years; a range of different candidate species are produced using a number of production systems that require different levels of expertise and technology (Figure 5).

The major successes in African aquaculture, including the SADC region, have been achieved through private-sector driven, market-led, commercial aquaculture ventures (Brummett, 2008; Jamu *et al*., 2012). Whereas smallholder aquaculture has largely failed and does not significantly contribute to the value chains in the region as yet, there is an urgent need by Member States to transform this sector into commercially focused and market-driven professional players that have driven the rapid growth of the aquaculture sector in other African countries including Nigeria and Egypt, achieved through clusters or aquaculture organizations (see Box 1) (Hecht *et al*., 2019).

Box 1: The Egyptian Nile tilapia industry: key success factors and lessons learnt

Egypt is a good example of the role of governance in promoting rapid but sustainable growth of aquaculture. Prior to the 1980s, aquaculture production in Egypt was insignificant and characterized by large extensive to semi-intensive ponds, with low yields (250-400 kg/ha) (Soliman and Yacout, 2017). In the mid-1980s, the Egyptian government prioritized the aquaculture sector through a number of interventions including spatial planning, allocating large tracts of land specifically for aquaculture development, establishing support services in the form of feed mills, hatcheries, research farms, aquaculture training initiatives including commercial aquaculture training and business management, and developing an enabling, commercially-focused institutional framework (El-Gayar, 2003; Dickson *et al*., 2016). These activities set a solid platform where, following public-sector interventions in the 1980s, aquaculture production by commercial smallholders has reached massive volumes in comparison to the rest of Africa (see Figure below). The expansion of the Egyptian aquaculture industry, and supporting industries (most notably those relating to aquafeed inputs), has benefited the country's economy, and provided food security and employment for a growing population. Key lessons from the Egyptian experience include (1) Designation of land for the purposes of aquaculture, (2) Establishing comprehensive public sector support services and infrastructure including feed mills and hatcheries, (3) Capacity building and training of subsistence farmers in business management, and (4) Creation of an enabling, supportive and commercially-focused environment.

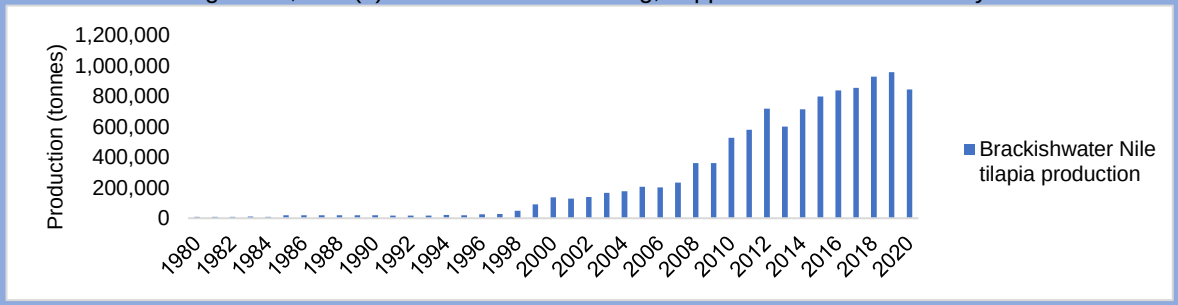


Figure: The rapid expansion of tilapia aquaculture in Egypt was achieved through good governance and enabling platforms

Source: **FAO.** 2022. Fishery and Aquaculture Statistics. Global capture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2022. www.fao.org/fishery/statistics/software/fishstatj/en.

A recent and comprehensive study of aquaculture value chains in the SADC predicted that, if appropriate interventions were made, aquaculture production in the SADC region could increase from its current level of 189 000 tpa to approximately 355 000 tpa by 2030, with total nominal values of USD 655 million in farmgate sales and USD 924 million in retail sales (Advance Africa Management Services, 2020). The study outlined a suite of interventions as part of a priority action roadmap that would have to be implemented to achieve this target. Some of these interventions are discussed in more detail below.

The need for strong governance and institutions to create an enabling environment

The productivity and long-term growth of aquaculture in SADC is dependent on strong and robust governance with institutional frameworks that provide an enabling environment for aquaculture to prosper while reducing the social, environmental, and ecological risks associated with development. Sustainable expansion can only be achieved through a public-sector directed policy, strategy and development plan (Master Plan) at both regional and, in particular, country-levels. Other necessary measures include, among others, structuring institutional roles and responsibilities to improve efficiency and reduce confusion, capacity building of stakeholders at all levels from communities to high-level decision-makers, harmonizing management and investment regulations, creating fiscal incentives for investors, designating land specifically for aquaculture, and allocating funding for supporting early-stage infrastructure and R&D.

Managing environmental impacts

In SADC, there are examples of how aquaculture development has led to loss of biodiversity and habitat degradation, e.g., mangrove deforestation, escapees from aquaculture leading to hybridisation with wild species (ASCLME, 2012; Barange *et al.*, 2018). This has contributed to the negative perception of aquaculture in some countries and, in some cases, vociferous opposition from conservation NGOs and local communities (e.g., Mauritius). FAO, in collaboration with the SADC Secretariat, recently developed Best Practice Aquaculture Management (BPAM) guidelines completely aligned with the FAO Ecosystem Approach to Aquaculture (EAA) that provide the framework within which the environmental impacts of aquaculture can be monitored and controlled. The guidelines were adopted by the SADC Secretariat in 2019. The guidelines should be promoted and adopted throughout the SADC region to ensure that the expansion of aquaculture is undertaken in an environmentally responsible and sustainable manner.

Box 2: The SADC Best Practice Aquaculture Management Guidelines

Best Practice Aquaculture Management Guidelines (BPAM) were developed between 2018 and 2019 by FAO and the SADC Secretariat to provide guidance on how the sector should be developed in a responsible and sustainable manner. The purpose of the BPAM Guidelines is to provide SADC Member States with a set of guidelines for aquaculture management that:

- recognize the key environmental and social impacts arising from aquaculture activities as outlined in the FAO Ecosystems Approach to Aquaculture (EAA) and international Best Management Practices (BMPs);
- comprise a set of guidelines with requirements that minimize or eliminate environmental and social impacts of aquaculture while promoting improved management;
- are fully aligned with the FAO Ecosystems Approach to Fisheries (EAF) and, and recognize global BMPs for aquaculture implemented in other regions;
- recognize the diversity of aquaculture environments, candidate aquaculture species and production systems in the SADC region;
- provide a framework for individual member states to draft more specific guidelines, indicators and criteria applicable to their environment, candidate species, and production systems.

The guidelines apply to all areas in the SADC region and cover the following areas:

(i) legal and Regulatory Matters,
(ii) environmental Considerations and Interactions,
(iii) social and Labour Concerns,
(iv) considerations for Fish Health and Welfare, and Food Safety and Quality,
(v) farm Setup and Operational Aspects.

Subsequently, a BPAM Monitoring Tool (see Figure below) was developed for Member States to assess their progress in implementing the BPAM Guidelines, and the guidelines are now being applied by several Member States in their aquaculture development planning.

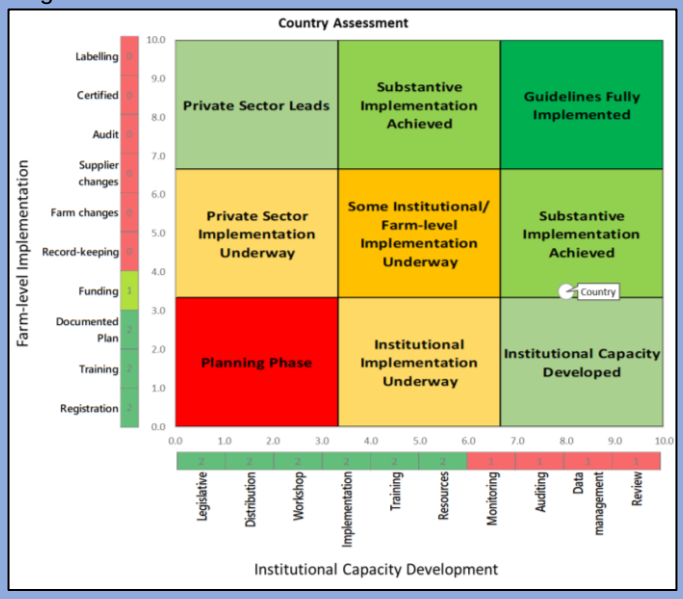


Figure: FAO developed a tool to monitor the implementation of best practice aquaculture management guidelines in SADC Member States.

Source: **SADC Secretariat.** 2019. *User Manual for the Monitoring Tool*. Implementation of the SADC Best Practice Guidelines for Aquaculture Management (BPAM Guidelines). 17 pp.

Addressing the inputs challenge

The availability and accessibility of inputs for aquaculture is arguably the major driver of success and, historically, has been the number one constraint for aquaculturists in the SADC region. The ability of aquaculture operations to run efficiently and match the quality and pricing of competitor products from outside SADC is fundamentally positioned on the region's ability to produce high-quality, cost-effective inputs including starting stock, feed, hatchery and grow-out technologies and processing equipment. This could be addressed through a number of interventions, including:

- assess strategically identified locations for feed production to take place and develop a set of incentives to attract private sector investment to build feed production capacity;

- assess the status of SADC region public sector hatcheries and identify and implement interventions to improve their capacity for quality seed supply to the region;
- cluster the activities of input manufacturing to allow for the benefits of scale economies (Figure 6).

Figure 6: The Siavonga Feed Cluster: Established feed mills in Siavonga at Lake Kariba, with a production capacity of 35 000 tonnes per annum and 50 000 tonnes per annum, respectively.

Box 3: The Rapid Growth of Aquaculture in Zambia

Aquaculture in Zambia is developing at a rapid rate, with increasing public and private investment and a market-driven approach. Aquaculture production increased from approximately 4 520 tonnes in 2001 to 36 171 tonnes in 2019; Zambia is currently the biggest producer of tilapia in the SADC region, and the sixth largest producer of farmed fish in Africa (FAO, 2022). Several interventions and initiatives have contributed towards the success of the industry:

- **Innovative financing mechanisms and strong government facilitation**: The Government of Zambia received financing from the African Development Bank (AfDB) for the implementation of the Zambia Aquaculture Enterprise Development Project (ZAEDP), a five-year program 2017–2022 aimed at promoting aquaculture as a viable and inclusive business opportunity. In addition, the Ministry of Fisheries and Livestock in Zambia has set aside USD 29 million for the implementation of the Aquaculture Seed Fund (ASF) under the ZAEDP. The ASF is administered by the Citizens Economic Empowerment Commission (CEEC), targeting more than 3 000 beneficiaries along the whole fish value chain in all the ten provinces of Zambia. This includes, inter alia, genetic improvement of fish, capacitation of finance institutions, feed quality assurance, food safety, aquatic animal health management, and statistics projects.
- **The sector actors are well-organized and with strong private-sector leadership:** The Aquaculture Development Association of Zambia (ADAZ) represents the interests of fish farmers at all levels, fish feed and seed producers, processors, marketers, service providers, research and learning institutions, local and international partners and government agencies. Among other activities, ADAZ delivers on the following services: (i) identifying interventions and mitigation for the wellbeing of all players in the aquaculture sector; (ii) carries out needs assessments of persons involved in the aquaculture sector; (iii) promoting international best practices; and (iv) fostering the contribution of aquaculture to food security and poverty alleviation.
- **The availability of consistent supplies of high-quality feed**: Three large internationally linked feed companies are currently providing 15 000 tonnes of feed to the cage culture operations on Lake Kariba and elsewhere.

Other key success factors include (1) access to capital, (2) enabling regulatory framework, (3) fiscal incentives and institutional flexibility, (4) human capacity, and (5) implementing best management practices.

Promoting R&D in alignment with the needs of aquaculture innovation

As the aquaculture sector in SADC Member States develops and streamlines, the necessity for the sector to be strongly underpinned by R&D becomes more apparent. A process of developing focused R&D programmes and the facilities to accommodate them is necessary and facility capacities must be developed to undertake the programmes accordingly. There are several aquaculture R&D facilities in SADC Member States, many of which are no longer scaled or equipped for the task of hosting the R&D programmes that support the SADC Vision for Aquaculture (Figure 7).

Figure 7: The Sea Urchin Research Facility in Mahé, Seychelles is conducting trials to prove the business case for commercial farming.

Box 4: The SADC-WorldFish-FAO Platform for Genetic Improvement and Biodiversity Management

The SADC-WorldFish-FAO *Platform for Genetics and Biodiversity Management in Aquaculture* was established with the aim of leading and developing a set of protocols to guide sustainable genetic improvement research and development programme. Subsequently, FAO has provided countries with guidelines on the minimum requirements for sustainable management, development, conservation and use of aquatic genetic resources entitled "Development of aquatic genetic resources: a framework of essential criteria". The framework was developed and promoted through a series of regional workshops with member countries of the SADC and the East African Community (EAC). The framework covers, inter alia, application of, and access to, biotechnologies and capacity building in their use, including biotechnologies used for genetic characterization, pedigree management, traceability, conservation (including gamete cryopreservation) and genetic improvement.

Figure: Participants at the SADC-WorldFish-FAO Platform for Genetics and Biodiversity Management in Aquaculture workshop, in Lilongwe, Malawi.

The programme is currently focused on genetic improvements of three common tilapia species in the region:

1. *Oreochromis andersonii* in Zambia since 2017
2. *O. shiranus* in Malawi since 2018
3. *O. mossambicus* in Mozambique and South Africa

It is necessary that those facilities in strategic locations are identified and upgraded to ensure their meaningful contribution to the R&D Strategy. In particular, there is a need for focused research into improved genetics. Advances made by focused breeding and selection have contributed significantly to faster growth, improved feed conversion ratios (FCRs) and more climatically adapted fish. If SADC Member States are to achieve a competitive position in global aquaculture, effort will be required to develop and improve native species.

Transitioning from small-scale operations to professional players

The transformation of suitable smallholder aquaculture farms into productive and profitable is critically important if SADC is to address the widening aquatic food deficit. Historically, smallholder farmers have failed to contribute any significant volumes to SADC production levels. For existing smallholder projects to

independently survive, they must become professional players at which they can be brought into play economically. To achieve this will require, among other things:

1. innovative ways of securing funding that allows existing smallholder aquaculture farms to expand to professional production. Many smallholders in aquaculture are unable to access development capital due to a lack of awareness and understanding of the sector in financial institutions;
2. there is a need to educate financial institutions to make them aware of aquaculture and to provide them with documentation that assists with the assessment of risk and viability in projects. This could be in the form of an information document pack and programmes to enhance the capacity of local financial institutions in assessing aqua-project proposals (train them and disseminate FAO Aqua-Investment Tool developed for this purpose);
3. developing business and managerial skills of small and medium-scale farmers and other value chain stakeholders to secure funding to establish or expand their professional activities in aqua-businesses. Without a clear idea as to the performance of their operations, communities will never progress from "kilos to tonnes";
4. providing smallholder farmers with access to proper inputs, such as good quality feed and seed, and promoting skills development in commercial aquaculture.

Box 5: "Small businesses fuel Zambia's aquaculture sector" – The WorldFish and Musika initiative

In Zambia, large private corporations involved in the aquaculture sector, including fish feed and fish fingerling producers, are based in Lusaka and Siavonga. The long distance from these urban areas to remote northern provinces, coupled with farmers' low use of commercial feed, leads to a lack of interest in major corporate investment along smallholder value chains.

Seeking innovative solutions, WorldFish researchers found small- and medium-sized enterprises (SMEs) to be a suitable vehicle for market linkages and knowledge and skills transfer. WorldFish partnered with Musika, a non-profit working in agricultural markets, to link smallholder fish farmers in the Northern Province of Zambia to local SMEs that provide them with the necessary inputs and expertise. Researchers utilized private sector investment to further develop aquatic food value chains and fill the identified gaps in resource availability.

WorldFish provided SME business operators with technical expertise on site selection, pond preparation, fish stocking, and business management. The business operators then applied their newly acquired knowledge to train rural farmers and provide them with operational inputs, offering adequate supplies of quality fish feed and fingerlings. In under a year, WorldFish and partners have developed the capacity of three catfish and tilapia SMEs: Kasakalabwe Multipurpose Cooperative, Triple Blessings, and Hopeways.

Figure: Smallholder farmers in Northern Province, Zambia. Through capacity building and value chain interventions, these operations have been transformed into SMMEs.

Integrating women and young people into the aquaculture sector

One of the RASAP objectives is to increase the number of women, youth and vulnerable groups involved in aquaculture in the SADC region. Expansion of aquaculture has the potential to contribute significantly to improved socioeconomic conditions for women, youth, and vulnerable groups in the region, and improve well-being and equity for all relevant stakeholders according to the principles of the FAO EAA. However, the potential of women to contribute to the growth of the aquaculture sector is limited by restricted market opportunities, lack of access to education, and by inequalities in economic participation and decision-making power.

In terms of youth, it is critical that the youth participate in the socioeconomic development of the aquaculture sector, to ensure its sustainability. To achieve this objective, and for the benefits of SADC aquaculture expansion to be felt by these groups, it is important that the interventions for achieving aquaculture expansion focus on gender equality and the creation of employment and entrepreneurship opportunities for these groups, and on attracting these groups to the aquaculture sector. Among others, suitable and accessible training and capacity building opportunities should be provided for these groups, including in the technical, business management and entrepreneurship aspects of aquaculture, and it should be ensured that they have equitable access to credit and financing. National aquaculture policy, planning and legislation should incorporate the promotion of these groups' participation in aquaculture. Socio Sustainable Development Goals economic indicators that may be used to measure the success of these interventions in promoting equity include employment indicators, disaggregated by sector, age, gender and other vulnerable minority groups, specifically unemployment rates, and types of employment and salary distribution.

Box 6: Integrating women and young people into the aquaculture sector

In the URT, women account for around 84 percent of seaweed farmers. Seaweed farming has provided them with stable incomes and financial and social independence. In addition, it has elevated the standard of living of women and their families by enabling them to provide their children with schooling, receive medical care, access improved housing, and have access to assets (Msuya and Hurtado, 2017) (see Figure below). Growth of the SADC aquaculture sector has significant potential to create and enhance employment and entrepreneurship for women, young people and vulnerable groups, allowing these groups to realize these and other benefits, such as food and nutrition security.

Figure: Seaweed farming in the URT; women are the primary actors in this value chain.

In Zambia, through a loan from the African Development Bank (AfDB), Government has made a credit facility available through the Zambia Aquaculture Development Enterprise Project (ZAEDP) with a special allocation for women and youth. Special calls for proposals have also been made for graduating incubation programs for women and youth.

Roles of the SADC and FAO in promoting sustainable aquaculture development in southern Africa

In 2016, the SADC RASAP (2016–2026) was developed to provide strategic direction for the rapid and environmentally-responsible development of aquaculture in SADC Member States, while simultaneously safeguarding the ecological integrity of aquatic ecosystems, conserving common genetic resources and supporting the maintenance of regional aquatic biosecurity (Figure 8). The responsibility for the implementation of the RASAP sits with the SADC Secretariat, in collaboration with the institutions/structures responsible for aquaculture in Member States, as well as regional and international partners. FAO-SFS plays an important role through a MoU signed with the SADC, to provide technical assistance to the SADC Secretariat in aquaculture development and management aligned to the objectives of the RASAP. Other roles include identifying management interventions and the development of proposals for these interventions that can be used to apply for external funding consideration.

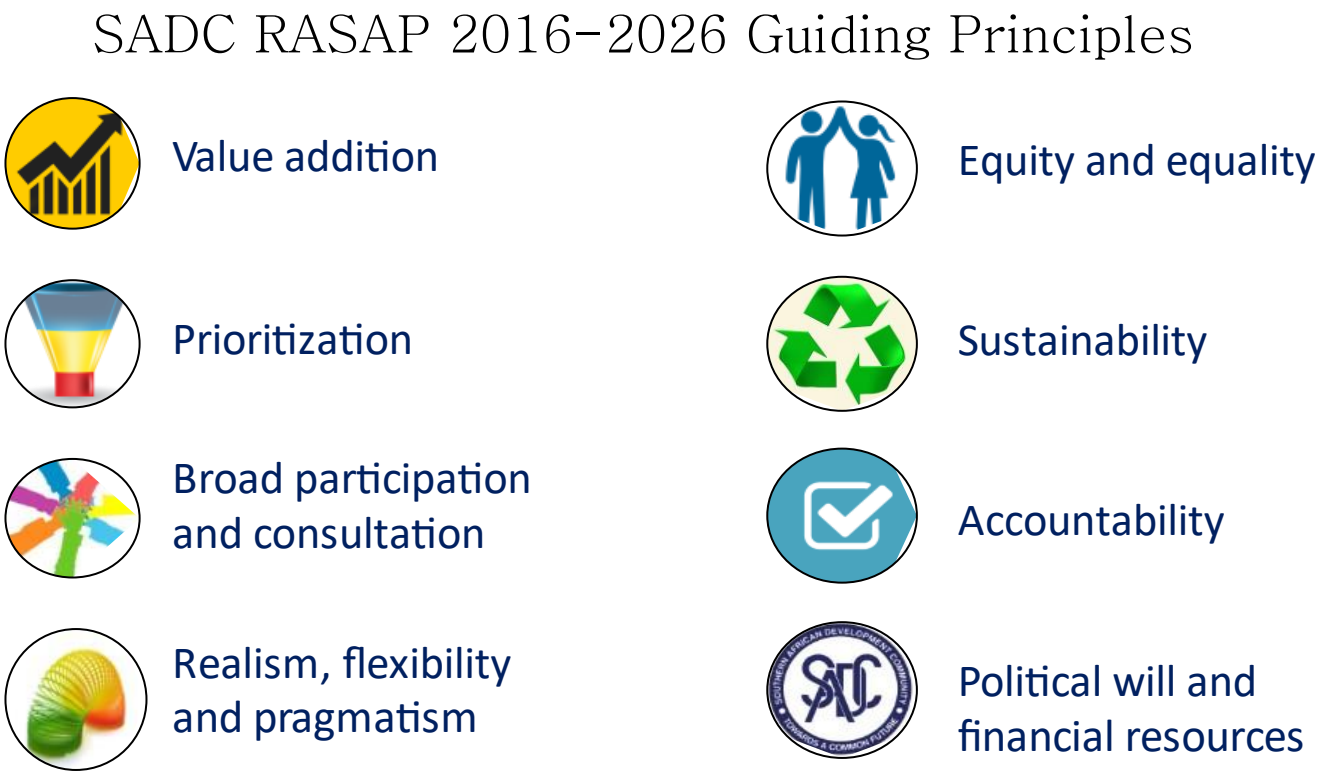


Figure 8: Guiding Principles of the SADC Regional Aquaculture Strategy and Action Plan (RASAP) (2016-2026).

To operationalize the RASAP, the SADC Secretariat with the technical assistance of the FAO, Advance Africa Management Services, the LUANAR Aquafish Centre of Excellence in Malawi and other partners, supported the SADC Member States in the domestication of their regional Fisheries Protocol including a capacity building programme aligned with the RASAP that has been planned for the next five years. The programme aims to develop the skills of the public sector, the private sector and other important stakeholders to enable and ensure that aquaculture continues to play an important role in economic development and job creation. Currently, the FAO and SADC are engaged in implementing joint work plans, including:

- promotion, implementation, and monitoring of the SADC protocol on fisheries, SADC RASAP and other instruments;
- encouraging and assisting SADC member states to develop national and regional instruments and plans that will coordinate sector development, and create enabling environments and facilitate private sector investment;
- strengthening institutional capacity and ensuring coordination of existing aquaculture institutions in the countries;

- developing and implementing comprehensive aquaculture sector development processes, with programmes targeted at capacity building and imparting of skills that support the growth of aquaculture.

Why has the sector not been able to develop more in the SADC region?

As part of the TCP between SADC and FAO-SFS, a needs assessment was conducted to identify key needs and constraints facing the aquaculture sectors of all 16 SADC Member States. The needs assessment was conducted through a combination of approaches. First, a desktop-based literature review was undertaken to assess the *status quo* of the aquaculture sector in SADC Member States. A questionnaire was distributed to country focal points, to gain further inputs on the constraints to, and needs of, the aquaculture sector of Member States. The results of the literature review and questionnaire responses were presented to SADC Member State representatives in Harare, Zimbabwe where further inputs for the needs assessment were obtained (Figure 9).

Figure 9: Delegates from SADC Member States, the SADC Secretariat, and FAO-SFS at a workshop in Harare, Zimbabwe (2019).

The needs assessment (Figure 10) outlined the following major constraints to sector development:

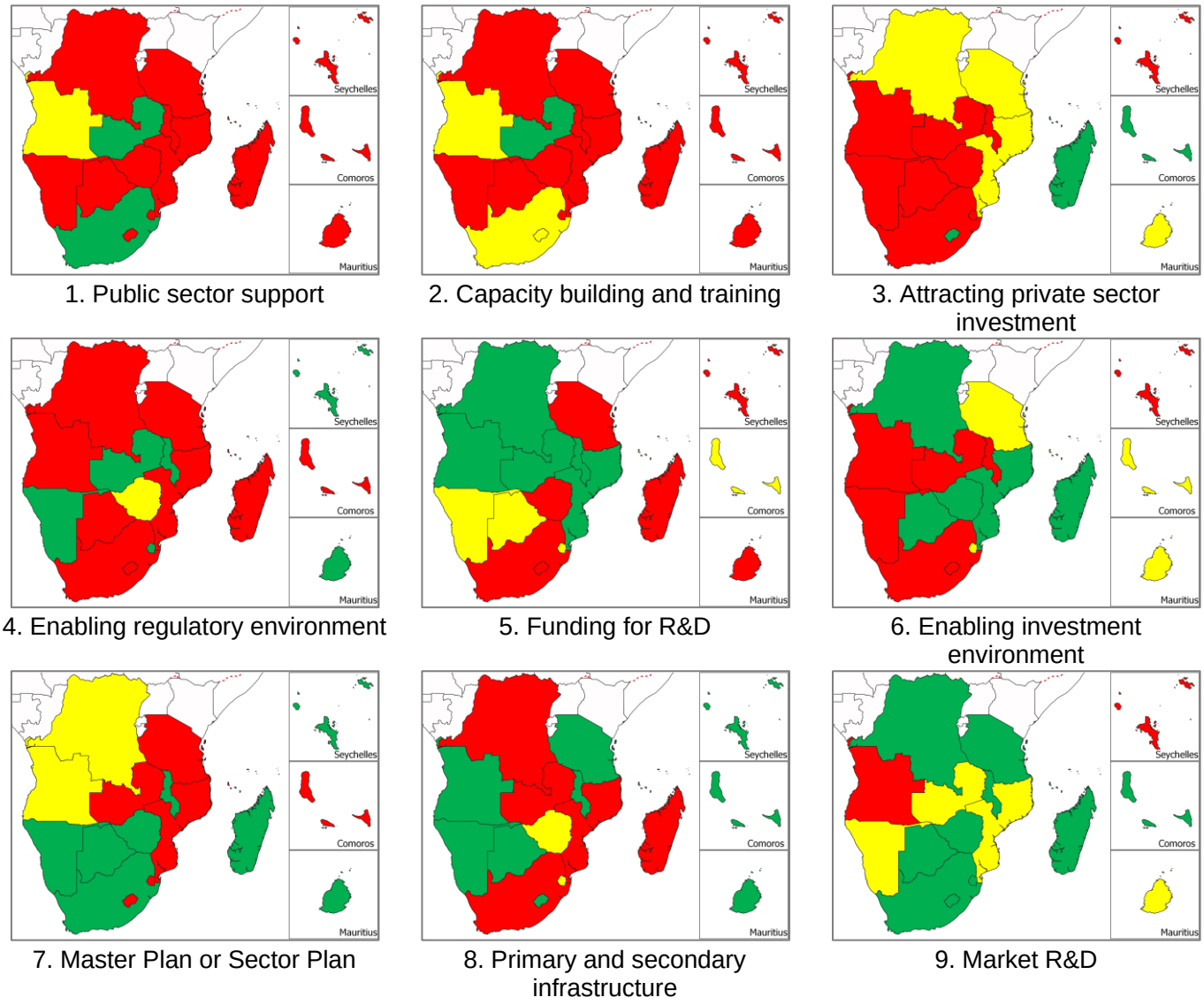
1. **public sector support** – A lack of state and private sector hatcheries to ensure consistent supply of high-quality, affordable seed, a lack of feed mills (industrial and farm-made feeds) and/or inadequate feed import strategies e.g. tariff reductions, to make high-quality feed available for improved production;

2. **capacity building and training** – Technical and entrepreneurial experience and skills are lacking and there is insufficient capacity at institutional level;

3. **attracting private sector investment** – There is a lack of an enabling regulatory environment, institutional support, access to finance and credit. Banks and other financial institutions and private investors in the region have little understanding of aquaculture products; making it difficult for aquaculture start-ups to get backing from appropriately qualified/experienced professionals to secure credit facilities and to attract investment from institutions or individuals.

4. **enabling legislative and regulatory environment** – The attractiveness of the SADC aquaculture sector to the private sector is currently constrained, in many countries, by absent, outdated and/or disjunct aquaculture-specific policy, legislation, and regulations. In many SADC countries, the policies and frameworks put in place with the intent to promote commercial aquaculture are not yet conducive to aquaculture development;

5. **research and Development (R&D)** – There are several Aquaculture R&D Facilities in SADC Member States but several of these are no longer scaled or equipped for the task of hosting the R&D Programmes that support market-led aquaculture expansion. R&D institutions are frequently under-resourced and programmes are underfunded and uncoordinated between Member States;



1. Public sector support
2. Capacity building and training
3. Attracting private sector investment
4. Enabling regulatory environment
5. Funding for R&D
6. Enabling investment environment
7. Master Plan or Sector Plan
8. Primary and secondary infrastructure
9. Market R&D

Red = Short-term needs; Yellow = Medium-term needs; Green = Long-term needs

Figure 10: Findings of the SADC aquaculture sector needs assessment.

Source: Hecht, T., Merrick, G., McCafferty, J. & Mullins, R. 2019. *Final Report: Needs Assessment for Fisheries and Aquaculture Support for SADC Member States*. FAO Contract No. SFSD/020/2019. Support to Aquaculture Management, Strategy, Visibility, Planning and Project Formulation. 12 December 2019. 107 pp.

6. **enabling investment environment** – There are a number of issues that currently constrain private sector investment including poor legislation, weak R&D, a lack of market intelligence, a lack of fiscal incentives, a difficult business environment, and insufficient public sector capacity. Private sector investment at the scale required to successfully establish a robust aquaculture sector in SADC demands that these are addressed to mitigate risks as far as possible, secure long-term investment and provide returns that are commensurate with the early-stage and high-risk nature of the investments;

7. **masterplan or sector plan** – Aquaculture development in SADC was and still is characterised by random developments and initiatives by NGOs and donors, which do not form part of a holistic and well-orchestrated drive to establish a private sector led, sustainable and environmentally responsible industry. In the absence of a cohesive master/sector development plan, it will be very difficult to attract private sector investors;

8. **primary and secondary infrastructure** – The Southern African region possesses unutilised natural water resources and land which are biophysically suitable for sustainable aquaculture development. One of the reasons why there are no successful aquaculture projects in these areas is that the primary (e.g., roads, electricity supply, port capacity) and secondary infrastructure (e.g., holding facilities, pilot projects, laboratories) that would allow for an aquaculture operation is unavailable. Regional markets and international markets are constrained by costs (tariffs, duties, or quotas) as well as logistical and infrastructure challenges in terms of the time it takes to cross borders and access markets via regional road and other transport networks. Eased trade would allow goods and services to flow across borders with minimal extra costs;

9. **market R&D** – A major constraint to marketing of aquaculture products in the region is the competition of these products with imports and harvest fisheries; a significant effort will be required to drastically expand market demand in the regional and international market.

Key points of SADC Member States' approach required to achieve sustainable aquaculture growth (Figure 11):

1. **governance**: create robust and enabling legislative and regulatory foundation and appropriate economic and regulatory policies commercial aquaculture in SADC Member States;

2. **infrastructure and inputs**: upgrade key infrastructure, allocate areas for aquaculture development, develop and expand local production of seed and feed including private and certified hatcheries and feed mills;

3. **R&D**: ensure a strategically-aligned and co-ordinated approach to aquaculture R&D in the region by upgrading R&D facilities and aligning R&D programmes, and diversifying culture environments and culture species;

4. **human capital development**: promote, resource and provide support for appropriate aquaculture training, education and skills transfer programmes from farming to business management and entrepreneurship;

5. **funding and investment**: secure sources of investment capital to fund the development and expansion of aquaculture by engaging with global investors, creating fiscal incentives, and sensitising financial institutions;

6. **market**: expand market demand in regional and international markets through harmonised duties and tariffs, certification schemes, value addition, and market intelligence.

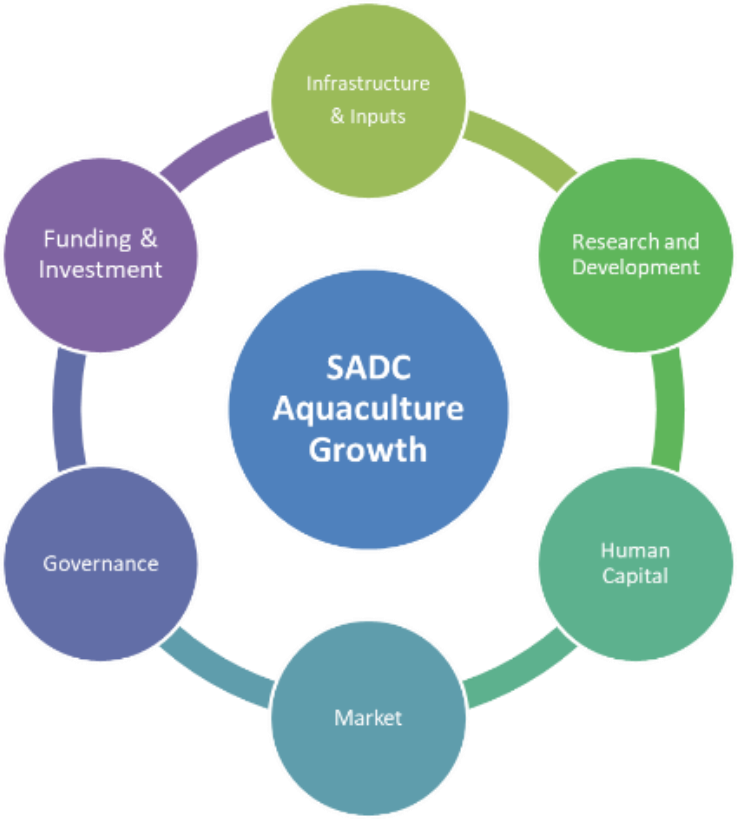


Figure 11: Six key pillars for achieving aquaculture growth in the SADC Region.

Conclusion

Aquaculture in SADC comprises a diversity of species, environments, technologies, markets and consumers. As such, aquaculture in SADC presents a regional opportunity where the synergies of multiple production locations, expansive markets and diverse species offer the critical mass to attract public sector support, private sector development capital and deliver results in line with SADC strategic objectives. However, there is still much to be done if the full social and economic potential of the SADC aquaculture sector is to be realized. In general, there is a widespread lack of financing for aquaculture investments. The aquaculture sector is still associated with high levels of investment risk. There are a number of reasons for this including inadequate, incoherent legislation and regulations that set out the 'rules of the game' and bring clarity for investors on key issues that define risk and opportunity in the sector. As such, there is confusion on the part of potential investors as to how they can establish or grow their businesses. To significantly increase aquaculture commodity supply, there is a need to strengthen governance of the sector and create an enabling environment for investment, improve primary and secondary infrastructure, ensure access to inputs such as seed and feed, enhance R&D efforts, undertake comprehensive capacity building and skills development, and expand market demand.

Finally, it is critical that SADC Member States continue to work together in a collaborative manner with the SADC Secretariat, the FAO SFS, and other regional and international partners.

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About SFS-CUFA: The objective of the SFS Fisheries and Aquaculture Coordination Unit (SFS-CUFA) is to coordinate technical support to countries in Southern Africa to optimize positive development impacts on the fisheries and aquaculture sectors as well as the wider blue economy.

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