POLICY BRIEF

TRANSFORMING MALAWI AQUACULTURE FOR POVERTY REDUCTION, MITIGATION AND ADAPTATION TO CLIMATE CHANGE

KEY MESSAGES

Aquaculture in Malawi is relatively undeveloped, dominated by smallholder farmers (SHFs) who are largely non-market oriented and semi-commercial, yet facing numerous challenges that lead to low productivity. The use of poor-quality feed, scarcity of fingerlings, limited technical and business skills, lack of financial services, low interest among investors, environmental and climate change risks – all these factors frustrate the sector's growth for global competitiveness. This brief engages potential investors, government and SHFs as part of the transformation process of the sector.

Commercial Aquaculture for Smallholder and Agribusiness (CASA) for Malawi envisions huge investment into the sector to stimulate Malawi's economic growth and poverty reduction. CASA is strategically relevant to the policy dilemmas mentioned above, but questions the sector's potential contribution to greenhouse gas (GHG) emissions, the benefit of the most vulnerable, especially women, and the sector's vulnerability and the need for adaptation to climate change call for attention. The UNDP, FAO and Government of Malawi have shown interest in Climate Smart Aquaculture (CSA) as a model to deal with both poverty and environmental concerns associated with the sector but requires creating the right enabling conditions and, as appropriate, setting direction to unlock it.

Investments into CSA hold promises to increase positive impacts on nutrition and food security, and in the end, contribute to government's agenda on poverty reduction among the most vulnerable groups. Farmers adopting fish-livestock-crop integrated systems, deeper fishpond construction, and acquiring necessary business and technical skills have successfully overcome some of the farming barriers and are making economic returns. For example, two case studies – one from Mzuzu and another from Bunda Area in Lilongwe show that the aquaculture business is profitable despite the challenges SHFs face. However, the scale of adoption is limited to make the much-needed transformation. If the aquaculture sector in Malawi is to adapt through diversification by introducing alien fish species, guiding principles have been provided to comply to.

The use of sinking feed and chemical fertilizers is integral to production which if not properly managed are potential sources of pollution in freshwater bodies, a threat to biodiversity and sources of GHGs. Mitigation technologies and practices which can be useful in the the removal of barriers to increasing productivity were observed in the field. For example, some farmers recycle fishpond wastewater for crop production. Others use feed pens in fishponds to reduce the proportion of sinking feed which reduces wastage and the level of biochemical processes. Other farmers use fully dried maize bran which reduces the proportion of sinking feed. Chambo Fisheries operate with self-recycling systems designed for ammonium removal. These practices are useful in emission reduction, but they are not widely adopted due to limited policy support leading to the absence of financing mechanisms, limited technical skills and lack of supportive extension services. The sector should strengthen extension service delivery while lobbying financial institutions to invest through various arrangements with smallholder farmers, especially women.

Observation in the field noted some maladaptation practices calling for policy attention. Identified practices included: (i) the use of aquatic weeds to protect fish from predators, which results in the invasion of the water surfaces (ii) and the use of exotic but invasive alien fish species threatening local biodiversity. For example, example, one farmer reported having introduced the mirror carp which was eventually confiscated.

Another, option to increase volumes of production is to explore investment in suitable sites on large water bodies such as Lake Malawi. Cage farming technology involving the installation of cages – would be a more effective adaptation measure to low average rainfall as well as the negative impacts heavy floods but this option requires thorough prior Strategic Environmental Assessments (SEA) to guide potential investors.

Women in the aquaculture sector are demonstrating how transformative leadership is critical in resolution of social conflicts arising from climate change. The demand for water among different users has resulted into conflicts in some catchments e.g. scramble for water between irrigation farmers and fish farmers. At Mkawa Fish Club in Mangochi, the chairlady has initiated a Water Users Association with established local rules governing competing users, thereby resolving conflicts. Ecosystem-Based Adaptation should be promoted to strengthen all adaptation efforts at farm scale.

Policy Actions

(a) Strengthen resilience of the aquaculture sector through upscaling proven climate adaptation practices accounting for site-specific climate risks and local socio-economic contexts through capacity building.

(b) Promote environmentally friendly technologies for both adaptation and mitigation to increase productivity and SHFs household incomes.

(c) Promote financing mechanisms through partnerships between SMFs, financial institutions and the private sector.

(d) Address input market and regulatory failures to create the right enabling conditions for climate smart inputs such as the supply of floating feed to reduce GHG emissions in the sector.

INTRODUCTION

Malawi's aquaculture is dominated by smallholder farmers, largely non-market oriented, facing numerous challenges that lead to low production volumes and minimal productivity, negatively affecting their economic returns. Poor quality feed, scarcity of fingerlings, limited access to financial services, low interest among investors, and climate change – call for strategic transformation of the sector. The transformation must satisfy the growing demand for quality animal proteins, create employment and reduce poverty levels among the most vulnerable in the society – women and the youths being the target. The risks associated with aquaculture production and fragmentation of the sector – among smallholder farmers – limit the appetite for large scale investors. Many Climate Smart Aquaculture opportunities have a sound underlying profitability but require efforts to promote practice in compliance with Malawi's Intended National Determined Contribution (INDC); the Climate Change Management Policy; the associated Climate Change Investment Plan and the National Fisheries and Aquaculture Policy. This policy brief informs policymakers to address market and regulatory failures to create the right enabling conditions for the transition towards CSA. Development of Climate Smart Aquaculture toolkit will guide future investment in, or financing of aquaculture development for increased adaptation, mitigation and increased productivity and incomes. This policy brief is an extract of a synthesis report which was produced through a review of literature and stakeholder consultations in the field. Smallholder farmers and companies in the aquaculture industry in the country were interviews for their perspective and experiences to inform the report.

KEY FINDINGS

The aquaculture industry in Malawi is growing but faces multiple challenges. Potential solutions rest in commitment to the transformation of the sector to embrace a more holistic approach to the aquaculture business. A review of the recent CASA strategic report identified numerous problems, at all stages of the value chain, that impede the participation of actors in the market system, particularly small-scale players. The aquaculture value chain in the country is characterized by (i) low production volumes below market demand (ii) use of low-quality inputs by small-scale producers (iii) lack of product aggregation arrangements to support viable investment in value addition through processing, distribution and marketing (iv) lack of knowledge and skills in fish processing for value addition (iv) limited access to finance for investment in downstream functions of the value chains.

At the production level, field consultations revealed that low production volumes are a result of several factors including a small number of large investors (mostly Chambo Fisheries and MALDECO), and a small number of local fish farmers with limited investment capital. Climate change is another risk limiting productivity. Climate change has manifested with increased temperatures, decreased water availability, below average rainfall, drought, flooding, storms and flush floods. The Chambo Farm Limited had in 2015 the worst experience of extreme cold weather conditions which affected fish growth and fingerling production. In some parts of the country such as Chikwawa and Nsanje floods destroy fish farms.

Adaptation Measures adopted by Smallholder Farmers (SHFs) are insufficient to match the magnitude of the impacts although some farmers are increasingly benefiting. For production, adaptation practices include (i) deep pond construction to retain water for longer periods before the next onset of rainfall (ii) early harvesting of the stock before the water levels rescind (iii) sexual segregation for fast growth. The CASA report suggests that Cage farming technology involving the installation of cages – probably on Lake Malawi – would be a more effective adaptation to low average rainfall as well as flood but requires thorough prior assessments to identify the potential environmental impacts of possible changes in water quality parameters.

Degradation of the watershed is ongoing as climate changes are emerging, competition for uses of the watershed also increases. Crop farming is expanding into riverbanks for winter cropping and grazing livestock use the same area. Eventually, vegetation cover is reduced which impacts infiltration thereby reducing the water table in the watershed. These observations entail that, the reduction of vulnerability of the aquaculture sector will depend on broader adaptation measures beyond the aquaculture sector and there is a strong need to integrate aquaculture management and adaptation into watershed and lakeshore management.

At the farm level, observation during field visits revealed that some farmers are adapting to the impacts of climate change, although many adaptation measures operate on a small spatial scale. For example, well-designed and well-built ponds with banana fields have helped farmers mitigate against some of the adverse effects of climate change. Deeper ponds, for example, provide a thermal refuge and greater DO reserves for fish, while raised pond embankments have helped prevent fish escapes and dyke destruction during floods and serve as water storage during droughts. Thus, a well-conceived facility can sustain multiple purposes beside aquaculture. Some farmers face the challenge of predators. One farmer introduced an aquatic weed to conceal fish from predators. Unfortunately, the weed is invasive creating yet another management problem.

At the production level, access to quality feed and fingerlings, especially among smallholder farmers remains one of the key factors impacting productivity besides that the feed used has the potential to increase greenhouse gas (GHG) emissions. Some farmers are using maize bran, a large proportion of which sinks and decomposes. The system employed by the Mzuzu of using feeding pans has the potential to reduce wastage thereby increasing the efficacy of feeding. In addition, the practice will eventually reduce the potential GHG emissions. Access to fast-growing species such as the mirror carp has been throttled by the current policy of banning the introduction of exotic species. Fast growing species would provide farmers with the opportunity to increase production. This and the preceding discussion pinpoint that, specific measures to reduce aquaculture vulnerability in accordance with the ecosystem approach to aquaculture include:

- Improved management of farms and choice of farmed species;
- Improved spatial planning of farms taking into account climate-related risks and compatibility with other land uses;
- Improved local, coordination of prevention and mitigation actions.
- Capacity building is necessary to address vulnerability and improve adaptation to climate change, especially among smallholder fish farmers. An investment in capacity building especially in the fish business is an investment that more than pays for itself.

CASA further identified lack of product aggregation arrangements to support viable investment in downstream functions as one of the barriers to value addition in the sector. The driving factors include:

- Weak market signals to provide incentives to agribusinesses to invest in downstream functions of the value chain and low production volumes that are sparsely located.
- Lack of knowledge and skills in basic processing of fish for value addition by SHFs.
- Limited access to finance for investment downstream in the value chain.
- Low fish supply to support downstream investment.

CONCLUSIONS AND RECOMMENDATIONS

Climate smart aquaculture can help address current barriers to increasing productivity by promoting adaptation to the impacts of climate change, food security and mitigation. CSA is a pragmatic approach to protecting the environment through adequate market pricing for natural resources through commercialization. The development of a CSA toolkit will need alignment with CASA's initiative to strengthen not only[1] the environmental and social sustainability of the strategy but contribute to the commercial viability of small and medium-sized (SME) agribusinesses with significant smallholder supply chains and attract more investment into these businesses. CASA has emphatically recognized that, at the production level, commercialisation is being held back because of very weak access to quality inputs. This is consequential for a sector that is significantly inputs driven and results in low profitability. FAO (2010) recognizes that Climate Smart Aquaculture emphasizes on the role of markets and trade that may help buffer the impact of changes in production that affect food security, consumer prices and supply-demand gaps. However, the implications of climate change impacts and climate change policies on the entire supply and value chain need to be better understood. CASA acknowledged that it is ordinarily concerned with output markets and that it is necessary for the aquaculture sector to integrate support for potential feed manufacturers to prepare for and access investment in local feed production. Key players who can make this possible by providing solutions to support and scale climate smart aquaculture include fish farmers, fish-feed producers, processors, traders, and transporters. Investors have a vital role to play through their power to reallocate funds away from unsustainable forms of aquaculture. This means avoiding businesses which are using fishmeal from juvenile fish or illegal bycatch, making heavy use of antibiotics in their fish stocks or creating significant wastewater discharges that threaten biodiversity.

Recommendation 1 – Strengthen resilience of SHFs aquaculture systems through upscaling proven climate adaptation practices based on site-specific requirements and local socio-economic contexts.

The opportunity to transform the sector through CSA is inherently immense but needs capacity for adoption and upscaling. First, the Ecosystem Approach to Aquaculture (EAA) outlines principles and practices that are central to ensuring the sustainability of the sector. However, the adoption of such principles and approaches is not keeping pace with the increasing need for their implementation. While there are traditional adaptation practices, their adoption too is limited by the lack of tools to upscale them for wider and long-term impact. In addition, those responsible for extension delivery are not adequately equipped in knowledge and practice to deal with climate change adaptation and mitigation. The aquaculture industry in Malawi faces is faced with weak extension support for smallholder fishers due to low numbers of qualified government extension workers. Productivity for most smallholder farmers is low, averaging about 1 metric tonne per hectare compared to a potential of 6 tonnes per hectare. This ultimately inhibits the profitability of the sector and holds back commercialisation. Adoption of Climate Smart Aquaculture needs to be supported by demonstrating its potential for profitability to contribute to household incomes. The toolkit will provide a technical guide besides case studies to demonstrate this potential for attraction of investors and vulnerable communities.

(a) If the aquaculture sector in Malawi is to adapt through diversification by way of the introduction of alien fish species, the following principles should be complied to[2].

- Diversification demands information. Identify knowledge gaps and seek expert advice.
- Diversification should anticipate, adapt to and mitigate the effects of climate change.

1 The CASA programme makes the commercial and development case for investing in agribusinesses that source produce from smallholders. It does this by demonstrating how this can be done effectively, by bridging evidence gaps and by ensuring investors and policymakers have access to the right information and people to make inclusive agribusiness models succeed.
By showcasing successful models for businesses that source produce from smallholders and pulling together the evidence base supporting the commercial and development impact of their business models, CASA will attract more investment into the sector, boosting economic growth and raising demand for smallholder produce but the toolkit focuses on the striking balance between environmental, economic and social sustainability.

2 Harvey, B., Soto, D., Carolsfeld, J., Beveridge, M. & Bartley, D.M., eds. 2017. Planning for aquaculture diversification: the importance of climate change and other drivers. FAO Technical Workshop, 23–25 June 2016, FAO Rome. FAO Fisheries and Aquaculture Proceedings No. 47. Rome, FAO. 166 pp.

- Diversification should be compatible with local ecosystems and not reduce aquatic biodiversity.
- Diversification should be compatible with other responsible food producing sectors.
- Diversification should comply with national and international laws, codes of conduct and conventions.
- Diversification should be planned in consultation with all stakeholders and be attractive to farmers.
- Diversification should minimize risks from pathogens and predators.
- Diversification should be profitable in domestic and/or export markets, taking account of the risks of market shifts.

(b) The aquaculture sector must respond to the coupled challenges of climate change and environmental degradation while at the same time taking an active role in reducing its own impacts on the environment. The Ecosystem-Based Approach which accounts for broader scale environmental issues should be promoted in the development a climate smart toolkit.

(c) The concept and approach of climate smart aquaculture is relatively new in the aquaculture sector, yet it subsumes the potential to improve adaptation, mitigation and increasing productivity of the fish farms. The department of fisheries and NGOs should promote integrated systems for adaptation of the farming system.

(d) The Policy environment is generally supportive although practices on the ground call for a revisit of the policy on introduction of exotic species. Government should use emerging evidence to reconsider the banned fish species which are preferred for fast growth which will boost the productivity of the industry and further help adapt to climate change.

Recommendation 2 – Improve Management of Aquaculture Business Risks through capacity building and partnerships.

(a) Aquaculture as a business suffers from low investment. Smallholder farmers lack business development and extension services to promote their business skills. As the Climate Smart aquaculture toolkit is developed these areas are critically important to consider.

(b) Fish farms individually owned by women are few, this is largely due to the high labor requirements and costs associated with construction of fishponds. The group owned fish farms, however, accommodate women but these farms are poorly performing. Financial support is required if women are to meaningfully participate in aquaculture development.

(c) As the aquaculture industry expands, climate smart aquaculture offers an opportunity for policymakers to collaborate with investors. Furthermore, there is a need for cooperation between different government departments (including business/industry, finance and environment) so that no new unintended policy barriers are created and – like the business solution – the policy response is designed to maximize system effectiveness. Other society stakeholders, including citizens and consumers, labour unions and environmental organizations, should also be engaged. Investors need to be guided in adaptation and environmental, and climate change mitigation measures.

(d) Lack of better performing indigenous fish species is integral to the barriers to efforts to increase the aquaculture productivity in the country. Prevailing rules and regulations prevent the introduction of exotic fast-growing species with higher weight. Government should initiate a revisit of the ban of exotic species which has recently become an issue of public debate. A comprehensive and integrated risk assessment of the likelihood of impact is required before lifting of the ban.

(e) The Department of Fisheries should facilitate collaborative arrangements between large scale private companies such as Chambo Fisheries Limited and MADECO, with smallholder farmers to accelerate the sector development.

Recommendation 3 – Enhance mitigation potential of the aquaculture sector through proven practices that have demonstrated to reduce wastage of feed under water which eventually induces emissions when decomposed.

The literature review established that aquaculture activities make a minor but still significant contribution to greenhouse gas (GHG) emissions during production operations and the transport, processing and storage of fish[3]. There are significant differences in the emissions associated with the sub-sectors and with the species targeted or cultured. The following are recommendations to enhance mitigation potentials:

(a) The use of sinking feed threatens the environmental sustainability of the aquaculture industry as the decomposing feed increase GHGs.

3 FAO (2009). Climate change implications for fisheries and aquaculture Overview of current scientific knowledge. FAO fisheries and aquaculture technical paper. 530 Rome

(b) The Department of Fisheries should liaise with the Environmental Affairs Department to develop general Strategic Environmental Assessments (SEA) for large scale aquaculture investments on Lakes and other large water bodies.

(c) Promote climate smart aquaculture technologies among smallholder farmers and large-scale investors to enhance GHG emission reduction.

Recommendation 4 – Promote environmentally friendly technologies for both adaptation and mitigation to increase productivity and household incomes

(a) Lack of better performing indigenous species is integral to the barriers to increasing aquaculture productivity. Prevailing rules and regulations prevent the introduction of exotic large and fast-growing species. Government should initiate a revisit of the ban of exotic species which has recently become an issue of public debate. A comprehensive and integrated risk assessment of likelihood impact is required.

(b) Fish-crop-livestock integrated farming is the most striking feature of farming observed in the field but practiced among few farmers. Based on the field observation, appropriate forms of integration and motivation and feasible systems of management suitable to different districts have to be developed through pilot operation.

European Union

Austrian Development Agency

Norwegian Ministry of Foreign Affairs

Swedish International Development Cooperation Agency

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