

# IMPROVING THE FISH VALUE CHAIN IN MALAWI



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# IMPROVING THE FISH VALUE CHAIN IN MALAWI

## Linking Stakeholders to Policy Makers and Donors

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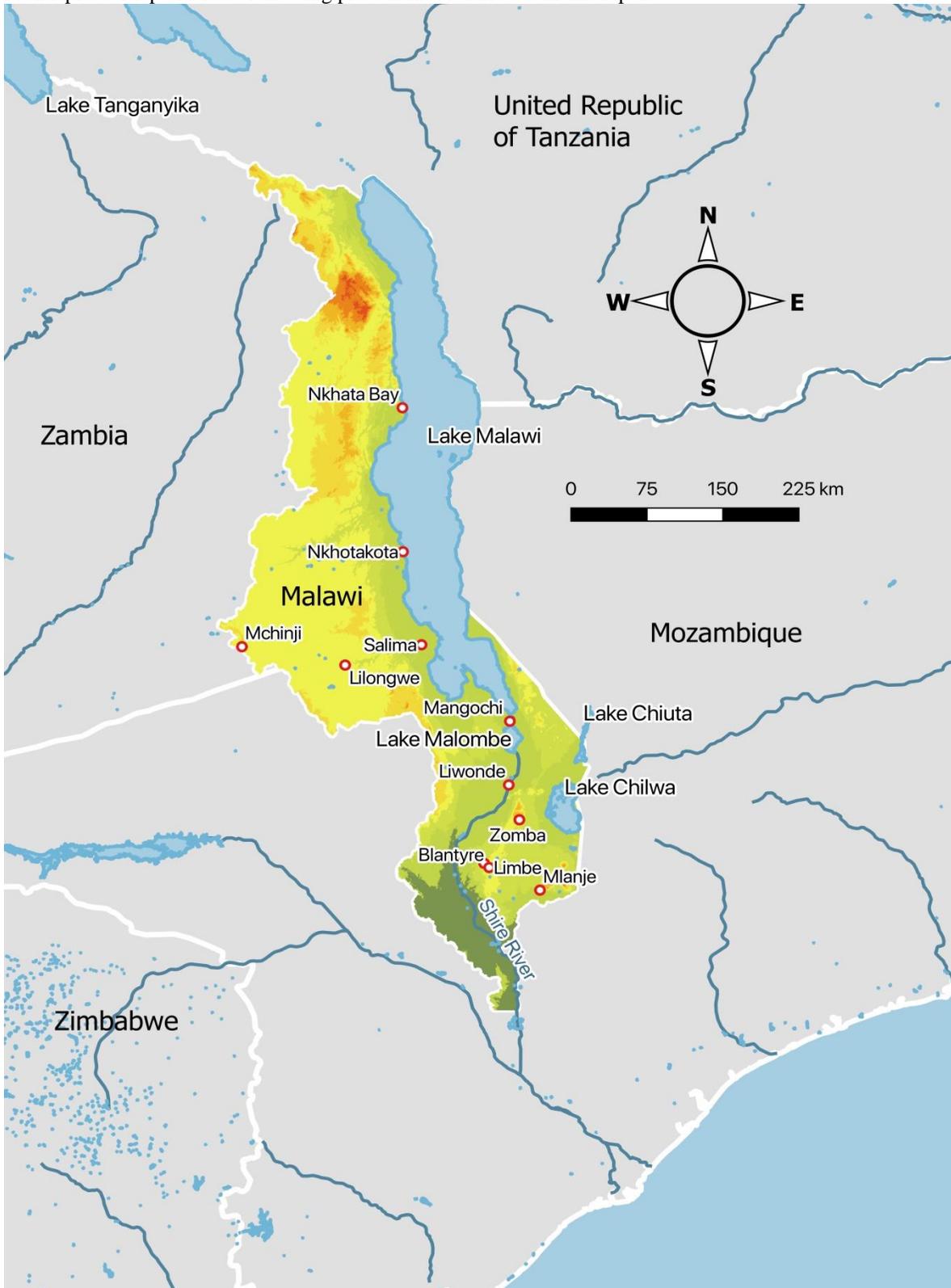
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Frontispiece. Map of Malawi showing place names referred to in this report.



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## INTRODUCTION

Malawi is fortunate to have rich inland fishery resources that represent globally significant biodiversity and that contribute substantially to national economic and food security. Yet Malawi is classified as a Low-Income Food-Deficit Country (LIFDC) and has been the recipient of numerous international development assistance projects. A stakeholders' workshop was held October 8-9, 2018, in Mangochi, Malawi, to consider why some development projects have not adequately addressed the needs of local stakeholders. Results of those development projects have not reached the intended beneficiaries, and gaps have been identified that past development projects have not addressed. The main objective of the stakeholders' workshop was to develop elements of a proposal for a Blue Growth Initiative (BGI) project (<http://www.fao.org/policy-support/policy-themes/blue-growth/en/>) to improve the fish value chain in the Lake Malawi basin. This proposal would then be reviewed by the international donor community for feedback and refinement. Participants of the stakeholders' workshop included fishers, fish farmers, processors, marketers, government fishery officers, academia, and international research and development agencies. Through a series of presentations and plenary discussions, stakeholders developed elements of a proposal to improve the fish value chain in Lake Malawi.

The stakeholders' workshop was guided by the need for economic and environmental sustainability, practicality, and local capacity. This stakeholders' workshop was a first step in addressing the needs of fishers, fish workers, and other stakeholders in the fish value chain in Malawi. The output of the stakeholders' workshop was then presented in a dissemination workshop on October 11, 2018, in Lilongwe, Malawi. Results of the dissemination workshop will be circulated to donors and international and national development agencies in order to improve the livelihoods of people in the Lake Malawi basin while conserving globally significant biodiversity.

### **Background on the Important Fishery Resources in Malawi and Their Contribution to Food Security**

The majority of Malawi's fish harvest comes from Lake Malawi, with other water bodies contributing minor amounts. The harvest from Malawi's inland fisheries contributes to nutritional and food security, livelihoods, and economic growth to rural communities in Malawi and nearby countries. The fisheries sector in Malawi contributes approximately 4% to the national gross domestic product (GDP) and is a significant source of job creation by directly employing approximately 60,000 fishers and indirectly employing approximately 350,000 people involved in fish processing, fish marketing, net making, boat building, and engine repair. Trade in aquatic species is extremely important to local economies but is poorly documented.

Recently, valuable species such as Chambo<sup>4</sup> have declined; average per-capita fish consumption in Malawi has also declined. Overfishing, population increase, and habitat loss and degradation have been the main factors in decreasing fish availability and consumption. Malawi is classified as a LIFDC and is one of the world's poorest countries. However, there are opportunities to increase the supply of fish and fish products from Malawi's fresh waters through improvements in the fish value chain.

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<sup>4</sup>Chambo is a group of *Tilapia* indigenous to Malawi that includes *Oreochromis lidole*, *O. squamipinnis*, and *O. karongae*.

The fish value chain in Malawi is complex, diverse, fragile, and poorly understood. As a result, policies and practices could be formulated that would reduce post-harvest loss, improve product quality, improve fish-workers' health, and thereby improve the contribution of the fisheries to food and nutritional security in Malawi.

It is with this in mind that the dissemination workshop was convened.

## **The Dissemination Workshop**

The dissemination workshop was held October 11, 2018, in Lilongwe, Malawi, to review and refine the output from the stakeholders' workshop held earlier on October 8-9, 2018, in Mangochi, Malawi. The dissemination workshop was attended by government resource managers, international donor and development agencies, and national conservation and development groups. Introducing stakeholders' needs to the donor and development communities will facilitate the formulation and implementation of fish value-chain development projects in Malawi that are more effective, that will address actual needs, and that will have better buy-in from local communities.

## **Objectives of the Dissemination Workshop**

The objectives of the dissemination workshop (Appendix A) were to

- Review the findings of the stakeholders' workshop
- Advise on the general and specific content of elements of a proposal to improve the fish value chain
- Make specific recommendations on how to improve the elements of a proposal
- Identify specific donor organizations that might be interested in funding a proposal to improve the fish value chain
- Provide other commentary

## **Review of the Findings of the Stakeholders' Workshop**

The dissemination workshop participants (Appendix A) reviewed the output of the stakeholders' workshop (Appendix B). The general findings of the stakeholders' workshop were

- In spite of the declining numbers of large valuable species (e.g., Chambo) and the increase in landings of small but less-valuable pelagic species (e.g., Kambuzi (*Haplochromis similis*) and Usipa or Lake Malawi sardine (*Engraulicypris sardella*)), both small and large fish are important for food security and economic development in the Lake Malawi basin
- Efforts should continue to restore Chambo and other high-value species and see how they can be included in a fish value chain
- The fish value chain around the basin is fragile and diverse with multiple products and markets
- The fish value chain supports rural and fishing households that may be food insecure with limited income to buy high-value products
- Capture fisheries are associated with volatile prices and variable product quality; the type of fish and its quality determines consumers' willingness to buy
- There is limited easily accessible information on the state of fishery resources in the Lake Malawi basin

The stakeholders' workshop participants identified areas of strategic interventions (Table 1) that can be made to improve the fish value chain in Malawi that included

- Traceability, quality, and food-safety issues of dried and fresh fish
- Improvement of the nutritional value of fish and fish products
- Price, marketing, consumer, and modeling analyses
- Feasibility analyses of landing-site improvement, including storage, cold rooms, and strategic locations for landing sites
- Lessons learned from previous and ongoing projects to provide a strategy for the industry
- Gender equity and empowerment
- Aquaculture
- Governance, cooperation, and communication
- Capacity building

The species of primary interest were small pelagic species (e.g., Usipa), and larger higher-value species (e.g., Chambo). The dissemination workshop participants identified the main objective of the proposal to be improvement of the economic viability and sustainability of the fish value chain in the Lake Malawi basin through cost-effective interventions, improved communication among stakeholders, and ongoing monitoring. The project will employ informational, technical, and institutional interventions.

Table 1. Strategic interventions to improve the fish value chain in the Lake Malawi basin. I = informational intervention; T = technical intervention; G = institutional intervention.

General Topic	Suggested Specific Interventions
Traceability, quality, and food safety	<ul style="list-style-type: none"> <li>• Conduct fish-quality assessments (I) along the fish value chain and develop infrastructure (T) and capacity building (I,T)</li> <li>• Regularly monitor landing sites to ensure standards and quality are maintained (I,T)</li> </ul>
Improving nutritional value of poor- or low-quality fish	<ul style="list-style-type: none"> <li>• Develop a nutritional study of small and large species that will accompany a market study (I)</li> <li>• Improve cost-effective processing interventions (T)</li> <li>• Strategically assess landing sites and ice facilities and their economic viability (I)</li> </ul>
Pricing, economic, and market information	<ul style="list-style-type: none"> <li>• Compile or generate better pricing and market information (I)</li> <li>• Develop a communication plan to access market prices in major cities (I) involving SMS push messaging (T) and the Department of Fisheries (DoF) website (I)</li> <li>• Integrate traders and fisher associations into a private-sector stakeholders national body (G)</li> <li>• Create a forum to establish priorities and best practices (G,I)</li> <li>• Conduct feasibility analyses of landing-site improvement, including storage, cold rooms, and strategic locations for landing sites (I)</li> <li>• Conduct a market study to advise how best to engage the private sector and establish Private/Public Partnerships (PPPs) (I)</li> <li>• Develop pilot projects using PPPs developed for the appropriate interventions (T)</li> </ul>

General Topic	Suggested Specific Interventions
Gender equity and empowerment	<ul style="list-style-type: none"> <li>• Organize women into trading and savings groups (G)</li> <li>• Improve access to credit and financing (G)</li> <li>• Improve post-harvest methods to reduce smoke exposure (T)</li> <li>• Innovate post-harvest products (T)</li> <li>• Communicate nutritional information (I)</li> </ul>
Aquaculture	<ul style="list-style-type: none"> <li>• Link market and economic analyses and modeling aquaculture production with assessment of the state of the fishery resource (I)</li> <li>• Inform of the potential of aquaculture (I)</li> <li>• Strategically assess landing sites (I)</li> <li>• Study carrying capacity and zoning of Lake Malawi for cage culture (I)</li> </ul>
Policy coherence and governance	<ul style="list-style-type: none"> <li>• Collect and organize value-chain information into an accessible information platform or information system together with economic and market studies for PPPs (I,T)</li> <li>• Improve monitoring of the state of resources entering the fish value chain to inform policies about harvesting (T)</li> <li>• Facilitate policy coherence through the establishment of a forum for communication and coordination among ministries, academia, and non-governmental organizations (NGOs) (G)</li> </ul>
Capacity building	All aspects above (I,T)

## Deliberations of the Dissemination Workshop

The representative from the Ministry of Finance stated that the Government of Malawi (GoM) is recognizing the importance of its fishery resources and is seeking more investment in the sector through greater cooperation with partners. He further stated that the focus on the fish value chain, the elements identified by the stakeholders' workshop, and the emphasis on nutrition and employment were important and in line with the priorities of the GoM, as outlined in The Malawi Growth and Development Strategy (MGDS) 111 (GoM 2017).

The dissemination workshop participants were informed that governance of the fisheries sector is transitioning from the Ministry of Natural Resources to the Ministry of Agriculture. Although improving, there is still poor understanding that fisheries are an agricultural commodity and that the fish value chain responds the same as other agricultural value chains. Previously in Malawi, fisheries were only seen as a subsector of agriculture, and the full importance was not recognized. The representative from the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) stated that there were no activities for women in fisheries undertaken by UN Women. This lack of activities is in spite of the fact that the fishery post-harvest sector in Malawi and elsewhere is dominated by women.

The nutritional value of fish is critical, but the role of fish in the lives of Malawians is still poorly appreciated. Over 67% of the animal protein intake of Malawi is from fish; 40% of total protein intake is from fish. The nutritional perspective taken by the government in regards to fisheries is important because it represents a shift away from an earlier conservation perspective. Loss of fish or access to fish would precipitate a nutritional crisis in Malawi and, therefore, justifies greater investment in the sector.

The active support of the Malawi DoF is essential in order to lobby government ministries for policies and funding to develop, manage, and conserve fishery resources. Government knowledge of and support for the fisheries sector will also be essential to enact an enabling environment for fisheries and aquaculture (e.g., how to adjust the Farm Input Subsidy Programme to include fisheries). Lessons can be learned from the poultry sector that was successful in obtaining favorable government policies such as prohibiting the importation of poultry from outside the country. The representative of the DoF indicated that the National Aquaculture and Fisheries Policy was approved in 2016 (GoM 2016b) and provided priority areas of capacity building, value addition, and employment opportunities in the sector.

There is a small but important ornamental fish industry that collects and trades ornamental fish from Lake Malawi. The fish value chain for this commodity is different from that of the fish for food value chain. An important issue identified was the overfishing of edible cichlids for the ornamental fish trade.

Participants noted the lack of complete, accurate, and easily available information on fishery resources and the fish value chain and supported the idea of creating an information platform or information system. Several participants stated that government ministries need to be better informed about the value of fishery resources in Malawi.

Information on the export of fish and fish products from Malawi is incomplete. There is substantial informal trade into neighboring countries, primarily of small pelagic species in a variety of processed forms (e.g., smoked, dried, and fried). However, there is interest in and evidence of exporting larger higher-value species such as Chambo. Thus, restoring Chambo populations in the wild and developing aquaculture to produce Chambo for export is considered important.

Fish quality and health issues of fish workers, fishers, and consumers are considered essential elements of the fish value chain. There was anecdotal evidence that unapproved and harmful methods and materials are used during processing and marketing. Additionally, bilharzia (also known as schistosomiasis or snail fever) is found in Lake Malawi. Also, firewood-based processing methods are linked to possible health problems such as eye problems. Interventions that help ensure fish quality through testing and capacity building and that reduce the exposure of fishers, fish workers, and consumers to harmful substances will be essential in any project to improve the fish value chain.

Participants realized that in order to have a sustainable fish value chain there must be a sustainable resource base. The current proposal, which involves institutional strengthening, data collection, analyses, and modeling, will model the impacts of unsustainable fishing on the economic performance of the fishery sector. This model will link the biological status of the fishery to its economic and food-security status and help demonstrate to fishers, resource managers, and policy makers that better fishery management will lead to higher fish production, higher economic value, and improved food security.

The dissemination workshop participants recognized that convincing fishers and fish workers to change established practices will be challenging. Past studies have shown an unequal distribution of benefits along the fish value chain. However, the links of the fish value chain are all connected, and any project should address the complete chain in order to ensure fair and equitable distribution of benefits along the chain. For example, participants learned that solar dryers can improve the market value of dried fish by approximately 100%; therefore, processors using solar dryers should be prepared to pay fishers more for their catch. In this way, benefits are better shared along the fish value chain.

## **Recommendations of the Dissemination Workshop**

The dissemination workshop participants, most importantly representatives of the GoM, found all of the elements of a proposal from the stakeholders' workshop interesting and recommended further development. Additional recommendations were

- Identify a strong national institutional champion for the project
- Include better information, communication, and promotion of the sector
- Involve more ministries, especially those associated with trade, to reinforce the need for government knowledge
- Lobby other ministries by the DoF about the importance of fish in national policy and practice
- Create short policy briefs using graphics and persuasive text to promote the proposal to the government and donors
- Organize fishers and fish workers into associations for better access to donor and government support
- Document lessons learned from previous projects where goals and objectives were never fully achieved
- Use scenarios in policy briefs to convince other stakeholders (e.g., what would happen if...?)
- Incorporate modeling and scenarios of a changing resource base and its impact on the fish value chain and consumers
- Highlight nutritional, gender, and economic issues in the proposal
- Study previous projects to identify gaps and lessons learned, especially the failure of some previous projects that attempted landing-site improvements
- Highlight successes so that investors know there is a good possibility for return on their investment
- Acknowledge private industry and external support as essential due to limited government resources

## **Next Steps**

The Lilongwe University of Agriculture and Natural Resources (LUANAR) and Michigan State University (MSU) will disseminate the results of the stakeholders' and dissemination workshops to participants and other interested groups (e.g., International Studies Program at MSU, Fisheries and Aquaculture Department, and the Partnership Programme at the Food Agriculture Organization (FAO)). LUANAR and MSU, with input from the FAO will produce a short informational policy brief that highlights key issues and outlines a general funding proposal for distribution to participants, donors, relevant government ministries, and other key funding agencies. It is hoped that this distribution of a report and policy brief will start a dialogue among LUANAR, MSU, FAO, the GoM, development partners (e.g., WorldFish), and the donor community that will result in funding all or part of the proposal.

## **Acknowledgements**

We gratefully acknowledge Dr. D. Buhler of Ag Bio Research and Dr. S. Hanson of the International Studies Program at Michigan State University for financially supporting these workshops.

## APPENDICES

### Appendix A: Dissemination Workshop

#### Objectives/Agenda

##### Professor Emmanuel Kaunda, Chair

<b>8:30-9:00</b>	Registration	Secretariat
<b>9:00-9:30</b>	Opening and welcome	Austin Mtethiwa, LUANAR; Bill Taylor, MSU; Simon Funge-Smith, FAO Rome; Nations Msowoya, Ministry of Finance, Malawi; and Maurice Makuwira, DoF
<b>9:30-9:45</b>	Introduction	All
<b>9:45-10:00</b>	Agenda, plan of work, and objectives of the workshop	Bill Taylor
<b>10:00-10:30</b>	Presentation of results from the stakeholders' workshop	Devin Bartley
<b>10:30-11:00</b>	Break	
<b>11:00-12:00</b>	Facilitated discussion to identify key donor issues and possible funding approaches	Devin Bartley
<b>12:00-12:30</b>	Donor feedback synthesized into a proposal for future funding	Emmanuel Kaunda, Bill Taylor, and Devin Bartley
<b>12:30</b>	Closing	LUANAR, MSU, DoF Malawi
<b>12:30-14:00</b>	Lunch and end of workshop	

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## Appendix B: Stakeholders' Workshop Report

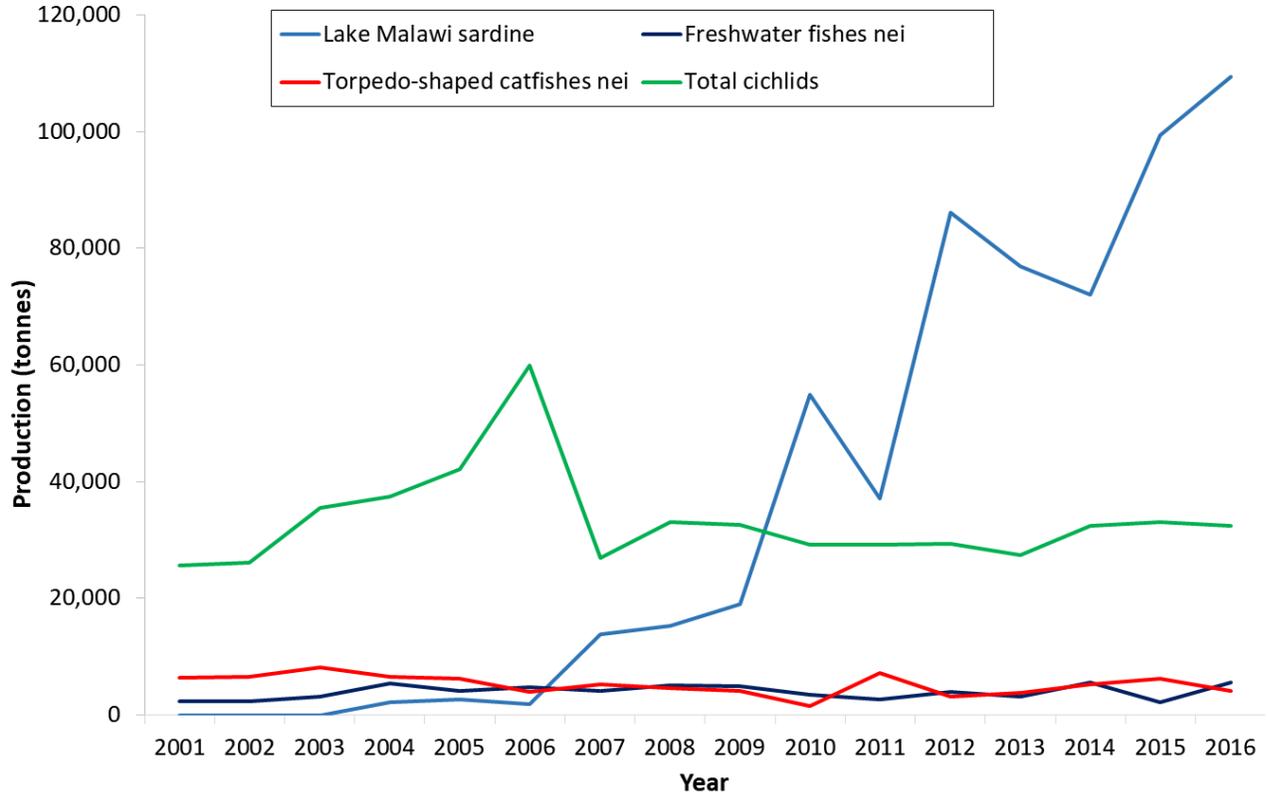
### Background

Communities around Lake Malawi depend on fishery resources for nutrition, livelihoods, and economic growth. In Malawi, the fisheries sector contributes approximately 4% to the national GDP and is a significant source of job creation by directly employing approximately 60,000 fishers and indirectly employing approximately 350,000 people involved in fish processing, fish marketing, net making, boat building, and engine repair. Trade in aquatic species is extremely important to local economies, but the fish value chain is poorly documented. The fisheries play an important role in ensuring food security for rural populations, especially for women, with the very poor depending on fisheries resources for food and livelihoods. These valuable resources are under threat from overfishing, habitat loss, and pollution. Valuable species such as Chambo have declined whereas species of less economic value but high food-security value fish such as Usipa (Lake Malawi sardine) have increased (Fig. B1). Changes in abundance of the fishery resources have direct consequences on stakeholders (e.g., fishers, fish processors, and vendors) involved in the fish value chain.

Despite the importance of the fisheries in delivering social and economic benefits, the fish value chain and the trade of fish and fish products in the Lake Malawi basin are poorly understood. Due to the lack of initial involvement of local stakeholders during the early stages of research and development, research questions have often not addressed local stakeholder concerns, and the benefits of development assistance sometimes have not been realized at the local level. For example, it has been noted that some of international assistance to Lake Victoria did not reach beneficiaries at the fisher or fish-worker level. In discussions with NGOs in the Lake Victoria basin, it became clear that the outcomes of some projects were not realized at the grassroots level because of inadequate stakeholder participation during project formulation and execution and poor communication among development agencies, national governments, and stakeholders.

The BGI is a FAO flagship initiative that supports more-productive, responsible, and sustainable fisheries and aquaculture sectors by improving the governance and management of aquatic ecosystems, by conserving biodiversity and habitats, and by empowering communities. The BGI provides a backdrop for project development that minimizes environmental degradation, biodiversity loss and unsustainable use of living aquatic resources, and maximizes economic and social benefits.

Fig. B1. Fishery production in Malawi by major species groups. Lake Malawi sardine = *Usipa (Engraulicypris sardella)*; torpedo-shaped catfishes (*Clarias* spp.); nei = not included elsewhere and not identified to species); total cichlids includes Chambo and other species (<http://www.fao.org/fishery/statistics/software/FishStatJ/en>).



International development projects around Lake Malawi seek to improve fishery management, increase aquaculture production, and improve the fish value chain, all in efforts to conserve aquatic biodiversity and improve livelihoods in the lake basin. With increased attention to developing fishery resources and trade in fish and fish products in the area, it will be increasingly important to include important stakeholders in project development. Especially important will be women stakeholders, as they make up the majority of the processing and post-harvest workforce. It is for this reason that a stakeholders’ workshop was organized that included relevant stakeholders in the fish value chain in the Lake Malawi basin, MSU, the Food and Agriculture Organization of the United Nations (UN) and relevant dissemination agencies. This workshop involved stakeholders at ground level to provide information about the fish value chain that will be crucial for future projects on value chains to ensure that benefits reach stakeholders on the ground.

## **Objectives**

The objective of the stakeholders' workshop was to engage key local stakeholders from the Lake Malawi basin, academia, international development agencies, and international donors in order to develop a proposal for future funding to understand and improve the fish value chain in the Lake Malawi basin (Appendix B). Specifically, the workshop sought to

- Exchange ideas about the fish value chain among key stakeholders from the Lake Malawi basin involved in the fish value chain
- Obtain detailed descriptions and maps of markets and marketing infrastructure for fish and fish products to understand the routes for fish and fish products
- Identify specific risks along the fish value chain and how to manage them
- Evaluate constraints and opportunities for improved monitoring and control of the fish trade to ensure product quality and reduce poaching and trade in undersized fish
- Evaluate the potential for sustainable expansion of aquaculture and the extent to which this would complement or conflict with the existing small pelagic fisheries
- Elaborate on specific research questions
- Empower stakeholders to engage better with international donors
- Incorporate the above into a proposal for funding by the international development community

## **Opening**

The stakeholders' workshop was opened with statements from the following representatives

- Reverend Moses Chimphepo, Mangochi District Commissioner, Guest of Honor
- Dr. Austin Mtethiwa, Head of Department of Aquaculture and Fisheries, LUANAR
- Mr. Maurice Makuwira, Acting Director, DoF
- Professor Kelly Millenbah, Associate Dean, MSU
- Simon Funge-Smith, Senior Fishery Officer, FAO, Rome
- Sultan Chowe, Traditional Authority

## Deliberations

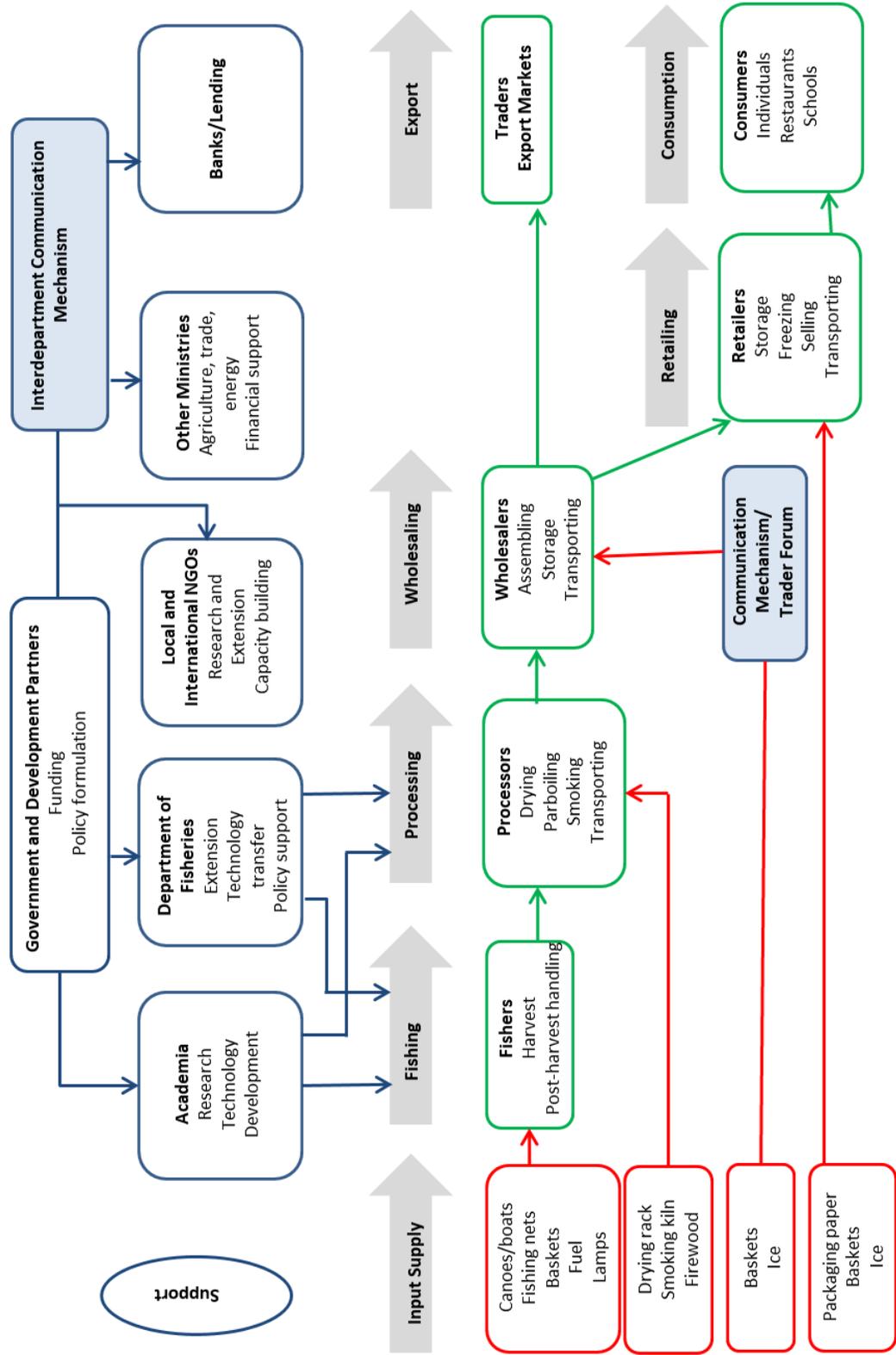
The stakeholders' workshop participants (Appendix B) reviewed information in the background paper (Appendix C) and the technical presentations (Appendix B) and developed a comprehensive diagram of the fish value chain (Fig. B2). In an effort to define elements of a proposal for future funding, stakeholders' workshop participants considered general aspects of the fish value chain that included

- Both small and large fish are important for food security and economic development in the Lake Malawi basin in spite of declining numbers of large valuable species (e.g., Chambo) and an increase in landings of small but less-valuable pelagic species (e.g., Kambuzi (*Haplochromis similis*) and Usipa or Lake Malawi sardine)
- Efforts should continue to restore Chambo and other high-value species and see how they can be included in a fish value chain
- The fish value chain around the basin is fragile and diverse with multiple products and markets
- The fish value chain supports rural and fishing households that may be food insecure with limited income to buy high-value products
- Capture fisheries are associated with volatile prices and variable product quality; the types of fish and their quality determine consumers' willingness to pay
- Easily accessible information is limited about the state of fishery resources in the Lake Malawi basin

The stakeholders' workshop participants stated that there are interventions that can improve the fish value chain in Malawi

- Traceability, quality, and food-safety issues of dried and fresh fish
- Improvement in nutritional value of fish and fish products
- Price, marketing, consumer, and modeling analyses
- Feasibility analyses of landing-site improvement, including storage, cold rooms and strategic locations for landing sites
- Lessons learned from previous and ongoing projects to provide a strategy for the industry
- Gender equity and empowerment
- Aquaculture
- Governance, cooperation, and communication
- Capacity building

Fig. B2. Fish value-chain map for Lake Malawi capture fisheries (Nankwenya et al. 2017).



## Objectives and Elements of the Proposal

### Objectives of the Proposal

The objective of the proposal is to improve the economic viability and sustainability of the fish value chain in the Lake Malawi basin through cost-effective interventions, improved communication among stakeholders, and monitoring. The project will employ informational, technical, and institutional interventions. These interventions include

- Economic and marketing analyses and modeling
- Fish-quality assessments
- Nutritional analysis
- Incorporation of improved communication technologies at ground level
- Policy coherence and communication mechanisms

Capacity building and gender issues will be addressed in all interventions.

### Elements of the Proposal

The stakeholders' workshop participants developed the following specific elements of a proposal for a BGI project to improve the fish value chain in the Lake Malawi basin.

Species of interest: The project will address (a) small pelagics for economic gain and food-security purposes and (b) how restoration of larger high-value species for economic value, including possible exportation, could be incorporated into the fish value chain.

Rationale: Looking at the fish value-chain linkages, issues, and opportunities, it appears that small pelagic species are the most highly traded species, and they present the greatest issues for the fish value chain at present. Chambo and other higher-value fish seem to be traded with ease and often traded fresh (partly because they are fewer and because of their higher value).

Fish value-chain issues that confront small pelagic species (oversupply, inability to process in a timely way, spoilage, hygiene, price fluctuations, long-distance trading, and export) are often not as relevant for Chambo.

Improving the nutritional value of poor or low-quality fish: The project will propose a nutritional study of small and large species that will accompany a market study. Improved and cost-effective processing interventions will be proposed.

Rationale: Better processing and storage will improve the fish and fish products in terms of nutritional quality and market value and will reduce loss estimated to be approximately 40%. Market analysis will inform how this is to be done with little increase in price to consumers, and analysis will examine the possibility of finding new fish products.

Landing sites and boat maintenance facilities:	The project will propose a strategic assessment of landing sites and ice facilities with their economic viability.
Rationale:	Fish are often landed in good condition, but fish quality deteriorates (sometimes on the boats and after landings). There is strong interest from the stakeholders in constructing and promoting fish-landing facilities. However, issues of whether to include ice plants at the fish-landing facilities or at other locations with some means of transporting and storing ice need to be addressed after a strategic assessment. Strategic markets would be identified (e.g., Blantyre, Zomba, Limbe, and Lilongwe) to possibly provide cool rooms as part of the fish value chain. Cost recovery of the expense of the landing sites and ice plants will be included. The involvement of the private sector for sustainability will be explored extensively.
Better pricing and market information:	The project will explore modern and cost-effective communication devices to access real-time market information and, at the same time, support traders, processors, and fishers as part of the communication group.
Rationale:	Fishers and processors need to know in which markets to sell fish and understand prices offered. An understanding of demand (quantity and form of fish) in the markets in which they plan to sell fish is also needed. Changes in selling price begin before fish reach land, prices change again on the beach, and then there are additional price changes at a variety of prices and places in the final market. Currently, fishers and traders have limited access to pricing and market demand. Cell phones and other modern communication methods would allow fishers to determine prices before they land or transport the catch, thus saving time and money. This communication would further allow for organized traders to produce quality certified products or direct marketing to order. Promoting the integration of traders and fisher associations into a private-sector stakeholders' national body would provide a forum to meet to establish priorities and best practices.
Traceability and food quality:	The project will propose fish-quality assessments along the fish value chain as well as infrastructure and capacity building to conduct assessments. These assessments will also include regular monitoring of landing sites to ensure standards and quality are maintained.
Rationale:	Traceability and food-quality assurance are emerging issues. There have been anecdotal reports of adulteration of (fresh) fish products and other health threats for poor hygiene and contamination. Testing facilities with trained staff and standardized approaches to monitor the entire fish value chain would increase confidence in the fish value chain and open up additional markets. The Malawi Bureau of Standards (MBS) is at present the responsible authority; however, the Department of Nutrition in conjunction with the Nutrition Council could be partners.

Sustainable financing:	The project will conduct economic (financing) and a market study to advise on how best to engage the private sector and establish PPPs. Pilot projects using PPPs will be developed for appropriate interventions.
Rationale:	<p>For sustainability of the project, there is a need to involve both the public and private sectors. For the private sector to be involved, there needs to be good business opportunities and assured returns on investment. In many instances, PPPs have developed because the public sector has provided resources and helped assume some of the risks of business startup. Some of the post-harvest interventions proposed (e.g., solar dryers, landing-site improvements, ice supply, and modern fishing vessels to meet safety standards) need access to financing, and micro-financing institutions will be explored. Care will be taken to develop only viable pilot business proposals and build capacity of the people involved to avoid collapse of the market and create unfair competition.</p> <p>The market study will aim to provide a clear understanding of consumer demands, purchasing power, and demographics to inform fish value-chain interventions.</p>
Policy coherence— aquaculture development:	The project will include market and economic analyses and modeling with an assessment of the state of the fishery resource to provide information on the potential of aquaculture. Additionally, in conjunction with a strategic assessment of landing sites, a study of carrying capacity and zoning of Lake Malawi for cage culture will be included.
Rationale:	Although aquaculture production is much less than capture-fishery production, there exists a strong interest in developing the aquaculture sector. There are components of the value chain that are unique for aquaculture; fish feed; supply of eggs, fingerlings and broodstock; and investment in infrastructure. There is currently no local production of fish feed in Malawi, and imported feed from Zambia is costly. Economic analyses and associated modeling will provide information about the potential for establishing a feed-supply sector in Malawi. Additionally, analyses and modeling will help aquaculturists decide which species and markets will be most appropriate for expansion. For example, aquaculture could be a viable option for Chambo and torpedo-shaped catfishes because these commodities are declining in the fisheries.
Policy coherence— communication between ministries and departments:	Together with economic and market studies for PPPs, the project will collect and organize value-chain information into an accessible information platform or information system. To facilitate policy coherence, the project will propose to establish a forum for communication and coordination among ministries, academia, and NGOs.
Rationale:	The World Bank, AfDB, and other financing institutions have an interest in improving agricultural value chains to support agricultural commercialization. This improvement often involves moving away from subsistence activities towards consolidation/industrialization and prioritization of the various food-producing sectors. Some policy forums in the past have neglected capture fisheries. The establishment of an information system with value-chain data held currently in different locations and formats would greatly facilitate national decision making. The multi-sectoral forum would have easy access to these data for decision making and communication with the business and donor communities.

Policy coherence—  
economic  
development and  
food and nutrition  
security: The project will focus on economic development of the fish value chain and will conduct market, economic, and food-consumption analyses and modeling to assess the impacts of economic development on food and nutrition security of fishing and rural communities.

Rationale: Promoting better quality and, therefore, higher value of small pelagic species may make them less affordable to poor consumers. The project will assess how much of landed fish is consumed by fishing communities and neighboring communities. It is unclear if the gains from increases in the value of fish will be passed down to fishers; it may make some traders and processors richer but put others out of business. The market study will provide information about this balance. Other aspects of the analyses and modeling for policy decisions will focus on the desire to export fish and fish products, how to maintain affordable fish for food, and whether to use fish for human consumption or feed for aquaculture/livestock.

Policy coherence—  
clear objectives of  
development: The project will monitor the state of the resources that enter the fish value chain so that informed policies on the harvests of various species can be made.

Rationale: Understanding fishery-management objectives is an important issue because there could be multiple beneficiaries depending on management objectives. Information of the state of fishery resources will be essential for informed policy decisions and a well-functioning fish value chain. A reduction in the catches of small pelagic species will have an impact on the affordability and availability of fish for poor consumers. The recovery of Chambo will not result in reduction of small species but should add more product to the fish value chain.

These elements of a proposal were submitted during the dissemination workshop on October 11, 2018, in Lilongwe, Malawi.

## Agenda

### Day 1: Monday, October 8, 2018

#### Morning Session: Professor Emmanuel Kaunda, Chair

<b>8:30-9:00</b>	Registration	
<b>9:00-9:20</b>	Opening and welcome	Professor Emmanuel Kaunda, LUANAR; Professor Kelly Millenbah, MSU; Simon Funge-Smith, FAO Rome; Dr. Austin Mtethiwa, LUANAR; and Maurice Makuwira, DoF
<b>9:20-9:30</b>	Official opening by the guest of honor	Reverend Moses Chimphepo, Mangochi District Commissioner
<b>9:30-9:45</b>	Self-introductions	All
<b>9:45-10:00</b>	Agenda, plan of work, and objectives of the workshop	Emmanuel Kaunda, Bill Taylor, Devin Bartley
<b>10:00-10:30</b>	Presentation of the background paper	Emmanuel Kaunda, Devin Bartley
<b>10:30-11:00</b>	Group photo and health break	

#### Dr. Francis Maguza Tembo, Chair

<b>11:00-11:15</b>	The socioeconomic status of the Lake Malombe and Lake Malawi fisheries communities	Edith Gondwe
<b>11:15-11:30</b>	The status of fish processing in Lake Malawi and Lake Malombe: challenges and opportunities	Zione Makawa, James Banda
<b>11:30-11:45</b>	The Malawi fish value chain and post-harvest loss assessment	Dr. Daniel Jamu
<b>11:45-12:00</b>	Solar-dried fish processing in Lake Malawi and Lake Chilwa	Dr. Joseph Nagoli
<b>12:00-12:15</b>	Fish processing and marketing—challenges and opportunities	Hamisi Nyampesi
<b>12:15-12:30</b>	General status of commercial fisheries and challenges in the fish value chain	Martin Banda
<b>12:30-13:00</b>	The status and challenges of small-scale fisheries	Esso Chirwa, Bernard Gulo
<b>13:00-14:30</b>	Lunch	

**Afternoon Session: Maurice Makuwira, Chair**

<b>14:30-14:45</b>	The upcoming fish value-chain/aquaculture study	Dr. Flora Nankhuni
<b>14:45-15:00</b>	Perspective of a fish trader	Jane Smart
<b>15:00-15:15</b>	Approaches to evaluating and enhancing fish value chains: lessons from Lakes Victoria and Tanganyika	Grant Merrick
<b>15:15-15:30</b>	Summary recap of the stakeholders' presentations	Sultan Chowe
<b>15:30-15:45</b>	Health break	
<b>15:45-16:00</b>	Facilitated discussion to identify key issues	Devin Bartley
<b>16:00-17:30</b>	Establish working groups based on key issues	MSU, LUANAR, DoF, FAO

**End of Day 1**

**Day 2: Monday, October 9, 2018**

**Morning Session: Dr. Austin Mtethiwa, Chair**

<b>8:30-9:30</b>	Working groups continue	
<b>9:30-10:30</b>	Working groups report to plenary	Rapporteur/chair of working group
<b>10:30-11:00</b>	Health break	
<b>11:00-12:30</b>	Working groups reconvene to formulate the recommendations for the proposal	
<b>12:30-14:00</b>	Lunch	

**Afternoon Session: Dr. Austin Mtethiwa, Chair**

<b>14:00-15:30</b>	Working-group report to plenary for establishing priority recommendations for the proposal	Rapporteur/chair of working group
<b>15:30-16:00</b>	Health break	
<b>16:00-17:00</b>	Synthesis of recommendations for the proposal	MSU, LUANAR, DoF, FAO
<b>17:00-17:30</b>	Closing	

**End of Workshop**

## Participant List

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## Technical Presentations

### **The Socioeconomic Status of the Lake Malombe and Lake Malawi Fisheries Communities**

*Edith Gondwe (LUANAR)*

The presentation reviewed the findings of the socioeconomic baseline study of the fisheries sector in the southern part of Lake Malawi and Lake Malombe.

There is a significant and growing price difference between Chambo and small pelagic species (Usipa, Kambuzi, and Utaka (*Haplochromis* spp.)).

The fish value chains shown demonstrate the flow of fish into the export value chains. Importantly, fish are carried by traders from Malawi as far as South Africa.

The studied food shortages indicate that woman-headed households and households with sufficient household labor tend to be more food secure.

In the fishery, crew members are predominantly male, and traders are predominantly female.

The potential of communities to benefit from improvement initiatives includes the availability of infrastructure as well as natural resources such as firewood.

Lack of access to financial services is identified as a constraint, although woman-based local financial services are growing.

The conclusion of the study is that diversification should build on those activities that are already engaged in by households. Two areas to focus on are irrigated farming and non-farm income-generating activities.

### **The Status of Fish Processing in Lake Malawi and Lake Malombe: Challenges and Opportunities**

*Zione Makawa (LUANAR) and James Banda (Fisheries Research Unit)*

The presentation described a baseline study of fish processing in Lake Malombe focusing on loss, wood use, and opportunities for improvements.

There is high loss in sun-dried products (up to 75% in the wet season) but no use of firewood. Despite the fact that sun drying is associated with high fish losses (up to 75%) especially during the rainy season, the method is advantageous because it does not require use of firewood hence having minimal contribution to climate change related impacts.

Hygiene is an issue with sun-dried products. Sanitary conditions at the fishery are poor and are reflected in high microbial counts, especially *E. coli*.

## **The Malawi Fish Value Chain and Post-Harvest Loss Assessment**

*Daniel Jamu, Deputy Chief of Party, USAID/Malawi FISH Project*

The presentation described post-harvest loss in the lake fisheries, including studies of the total value of the fishery and its related fish value chain and how the situation might be improved.

The studies described a transition from large to small fish, high-value to low-value fish, requirements to catch a higher volume of fish to maintain profits, and higher post-harvest loss of low-value species.

The change in ratio between large and small species shifted from 50:50 in 1987 to 9:91 in 2017. Post-harvest loss was last assessed in 1987 with little differentiation in whether this was in value or physical quantity. The fishery is valued at the point of landing, but there is additional value in the fish value chain.

Quality loss translates into nutritional loss.

There are seasonal variations in price, but these are not considerable.

There are price differences according to the quality of fish, and these differences occur at the beach and market levels. There is a lower differential at the market level (17%) compared with the beach level (51%), mainly because there is mixing of good- and poor-quality fish.

The estimated total loss is approximately 50 million US dollars (USD)<sup>5</sup> at the beach level and approximately 12 million USD at the market level, with 4 million USD from direct-marketed fish. However, by the time fish reach the market, there is only a total economic loss of approximately 8% due to product mixing and sales strategies of traders that ensure poor-quality fish are not sold. This total value is still significantly higher than officially reported.

The total value of the sector is still approximately 4% of the total GDP.

Advice for improvements includes improved onboard handling and use of plastic crates to prevent damage and improve hygiene.

## **Solar-Dried Fish Processing in Lake Malawi and Lake Chilwa**

*Joseph Nagoli, WorldFish*

The presentation described how small pelagic species might be of low value economically but are valuable contributors to nutrition.

Drying fish in racks during the rainy season results in problems with preservation and insect infestation, microbial contamination, and rotting. The smoking technology also has health implications in addition to requiring firewood.

The feasibility of solar dryers for small pelagic species has been investigated, and drying efficiency and economic viability have been tested.

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<sup>5</sup>In October 2018, 1 USD = 1728.78652 Malawian Kwacha (MWK).

A pilot solar dryer was efficient and resulted in a product that has a longer shelf life and is of superior quality (especially regarding hygiene but also other factors). The estimate of willingness to pay also indicated that processors would be willing to invest. The current demand by supermarkets and weekly supply is 5 tonnes per week to five supermarkets.

### **Fish Processing and Marketing: Challenges and Opportunities**

*Hamisi Nyampesi, Fish Processor*

The presentation described the experience of this entrepreneur fish processor.

Processing prevents loss from spoilage, which is a serious issue due to lack of icing. Processing also improves taste and enables easier transportation. There are six processing methods: sun drying, parboiling, smoking, pan roasting, frying, and solar-tent drying, but the presenter uses only the solar-tent drying method.

Challenges faced include unreliable fish supply and poor-quality fish landed by fishers. Beach locations lack suitable fish-processing facilities and poor transportation methods. Another challenge includes the high cost of firewood for smoking.

Solar tents have challenges, including the high cost of construction, vandalism by community members, and destruction of the structures by storms or strong winds. There is also a long process for MBS certification (up to one year) to be able to sell to supermarkets. Packaging materials and sealing machines also increase the cost of the product. The fish-processing operation employs local women and youth.

### **General Status of Commercial Fisheries and Challenges in the Fish Value Chain**

*Martin Banda, Commercial Fisheries Association*

The fishery is currently experiencing very low catches. These low catches are linked to climate change, inappropriate fishing gear, and agricultural runoff. An increase in the human population is also increasing pressure on the fishery due to new entrants.

In terms of opportunities, the fundamental role of fish in nutrition exists as a vital national resource for nutrition and an export income opportunity. The poorest members of society can access fish (as animal protein in their diet). The fisher is also an employer: the commercial sector employs crews with associated buyers, processors, and firewood sellers.

Challenges include an increase in human population and the entry of fishers into restricted areas. Those who enter restricted areas are commercial fishers, but they are not licensed and are not members of an association. The non-legal, non-registered commercial sector is also the least compliant.

The lack of facilities for landing and processing prevents provision of quality products along the fish value chain. There is also no ice available to preserve fish to maintain freshness for urban markets.

Boat design (e.g., stern trawlers and pair trawlers) is probably obsolete (using an old FAO design from the 1960s) and can be improved.

## **Perspectives from Small-Scale Fishery Sector Representatives**

*Pena Degura, Bernard Gulo and Ezzo Chirwa, Lake Malawi Fisheries Association*

The presentation described how fish landed on beach sites were sold to traders, and how most fish were subjected to processing rather than sold fresh.

Fish packaging is now in cartons and sacks, and the fish are sent to Zomba, Blantyre, and Lilongwe. The challenge at landing sites is that there may be large landings that cannot be processed in time, leading to loss of product and low market value.

In order to undertake fishing operations, it is important to discuss how crews are financed and provided with equipment and fuel by fishing boat owners. Crews are expected to clean fish on a plastic sheet using water to remove sand. The fish are then air dried. The fish may also be smoked after this stage. There is interest in solar dryers, but it is felt that costs are unrealistically expensive. An energy-efficient smoking kiln that uses less firewood has been piloted. Product handling after processing is an issue because transport to market may not be hygienic.

Some key issues for Lake Malombe include immature harvested fish (reducing the catch); smaller fish species suffer from rapid spoilage; sun drying and frying are the most-common methods of fish preservation but sun drying is a major challenge during the rainy season, and, in the dry season, over-drying is a problem; the oil used for frying may be of poor quality (which leads to a poor-quality product); most fishers have limited awareness of demands at the beach landing site (landings are sometimes too great, leading to excess fish and spoilage). Improved preservation, icing, or even cold storage would help alleviate some issues.

## **The Upcoming Fish Value-Chain/Aquaculture Study**

*Dr. Flora Nankhuni, NAPAS*

The presentation introduced the upcoming planned fish value-chain study.

There are a number of existing studies to draw upon, and questions remain about the fish value chain for fishery and aquaculture products.

## **Perspective of a Fish Trader**

*Jane Smart, Fish Trader*

The presentation described the experience of this fish trader.

This trader buys fish in bulk and sells in markets on a wholesale basis. Processing could be sun drying, smoking, and parboiling for some species.

Challenges include no stable fish pricing and volatile and unpredictable prices that can result in loss of profits. The availability of storage facilities to keep the product safe and in good condition would improve this situation and limit the requirement to sell when prices are low.

There is a firewood scarcity for smoking fish. Smoked fish is more valuable than sun-dried fish but, without wood, there is no way to produce smoked fish.

Transportation from the beach to upland markets is an issue because traders do not accompany the product to market, resulting in theft or loss.

### **Approaches to Evaluating and Enhancing Fish Value Chains: Lessons from Lakes Victoria and Tanganyika**

*Grant Merrick, Advance Africa*

The presentation reviewed a fish value-chain study and lessons learned, specifically the market dynamics and relevance to infrastructure (the review was in support of a possible infrastructure development project). A variety of fish value chains were presented, including both large Nile Perch (*Lates niloticus*), cichlids, and small pelagic species. The fish value chain ranges from most basic (e.g., selling unprocessed fish to local merchants) to sophisticated (e.g., using Hazard Analysis and Critical Control Points (HACCP) to control exports to the European Union (EU)). Priority landing sites were reviewed with the intent to identify improvements in infrastructure.

Lessons learned are

- A holistic understanding is needed of the state of the resource, the objectives and goals for sustainability, and how to proceed
- An understanding is needed of what the fishery can sustain in terms of production exists
- Formulation of a fishery-management plan is required to frame the activities to be undertaken and how to resource them
- Consensus is needed on the development of aquaculture and its likely sustainability, profitability, and equitability
- Scenarios for different outcomes should be created: sustainable harvests under a strong fishery-management program, empty-nets overfishing, alternative livelihoods, and lost opportunities (there is a range of production scenarios between 600,000 tonnes to more than 1 million tonnes)
- A clear development paradigm is needed
- A rush to industrialize may have short-term negative social and economic outcomes
- The fishery and fish value chains are not sufficiently developed or robust enough to withstand a push to consolidate and industrialize in most cases; equally, legislation and enforcement, and the means to buffer social impacts are not in place

Barriers to development are

- Limited trust in market chains with transporters cheating traders (theft of products)
- Reconciliation of national food security with aspirations for increasing economic returns, especially from exports
- Land issues, tenure, and access: infrastructure development to support fishing is pushing out fish-landing and processing sites and undermining the use of these areas by small-scale enterprises
- Enforcement of fishery-management plans if alternatives to fishing are not available
- The illegal or migratory status of many fishers
- Lack of formal organization of fishers, processors, and traders limits effective dialogue and development of solutions
- The fishery sector is not necessarily profitable or economically important enough to warrant large infrastructure projects—justification for such projects needs to be clear

The roles of the private and public sectors are

- The private sector needs certain guarantees and some support from the public sector to reduce investment risks, including regulations, incentives and access to markets, support for research and development, physical infrastructure, and environmental safeguards
- The public sector is not prepared or able to provide sufficient guarantees to persuade private-sector investors to come into the sector

The key steps to move forward are to conduct a resource audit, to formulate a macro strategy, to engage stakeholders, to implement a plan, and to find fund solutions.

### **Summary Recap on the Stakeholders' Presentations**

*Sultan Chowe, Traditional Authority*

There is no doubt that the fisheries of the lakes are in decline. This decline can be attributed to the fact that fishing has been uncontrolled. The changes in catch are also reflected in what people will eat, with small pelagic species as the main source of fish in lakeside villages. As a community leader, it is appreciated that fish contributes to economic growth and nutrition. There is some hope or expectation that aquaculture may provide a way forward to replace lost fishery catches. Also, hopefully, enforcement will help to move management of the fishery forward in conjunction with a prolonged closed season.

## **Appendix C: Background Paper**

Fish Value Chain in the Lake Malawi Basin: Status and Opportunities

Prepared by

D.M. Bartley (MSU), B. Nankwenya (LUANAR), and E. Kaunda (LUANAR)

### **Abstract**

The fish value chain in the Lake Malawi basin contributes to nutritional and food security, livelihoods, and economic growth in rural communities of Malawi and nearby countries. The fisheries sector in Malawi contributes approximately 4% to the national GDP and is a significant source of job creation by directly employing approximately 60,000 fishers and indirectly employing approximately 350,000 people involved in fish processing, fish marketing, net making, boat building, and engine repair. Trade in aquatic species is extremely important to local economies but is poorly documented.

Recently, valuable species such as Chambo have declined; average per-capita fish consumption in Malawi has also declined. Overfishing, population increase, and habitat loss and degradation have been the main factors in decreasing fish availability and consumption. Malawi is classified as a LIFDC and is one of the world's poorest countries. However, there are opportunities to increase the supply of fish and fish products from Malawi's fresh waters through improvements in the fish value chain. Information about and major issues of the fish value chain in Malawi are presented with the aim of developing a viable research and development proposal for future funding.

### **Guidance Sought**

Stakeholders' workshop participants are invited to review this document and provide guidance on the following

- What are the key components of a strengths, weaknesses, opportunities, and threats (SWOT) analysis?
- What part or parts of the fish value chain has/have the greatest need for improvement in an economically viable manner?
- What investment and strategic interventions can be made?
- What information is needed—does it exist, or does it need to be collected?
- What research questions will inform the investment?
- Are there specific risks along the fish value chain, and how should they be managed?
- What are the constraints and opportunities for improved monitoring and control of the fish trade to ensure product quality and reduce poaching and trade in undersized fish?
- What are some real possibilities for the sustainable expansion of aquaculture and to what extent would they complement or conflict with existing small-scale fisheries?
- What should be the scope of the project (e.g., Lake Malawi and/or other water bodies)?
- Is a project to improve the fish value chain a priority for Malawi and stakeholders?
- Are there any other comments?

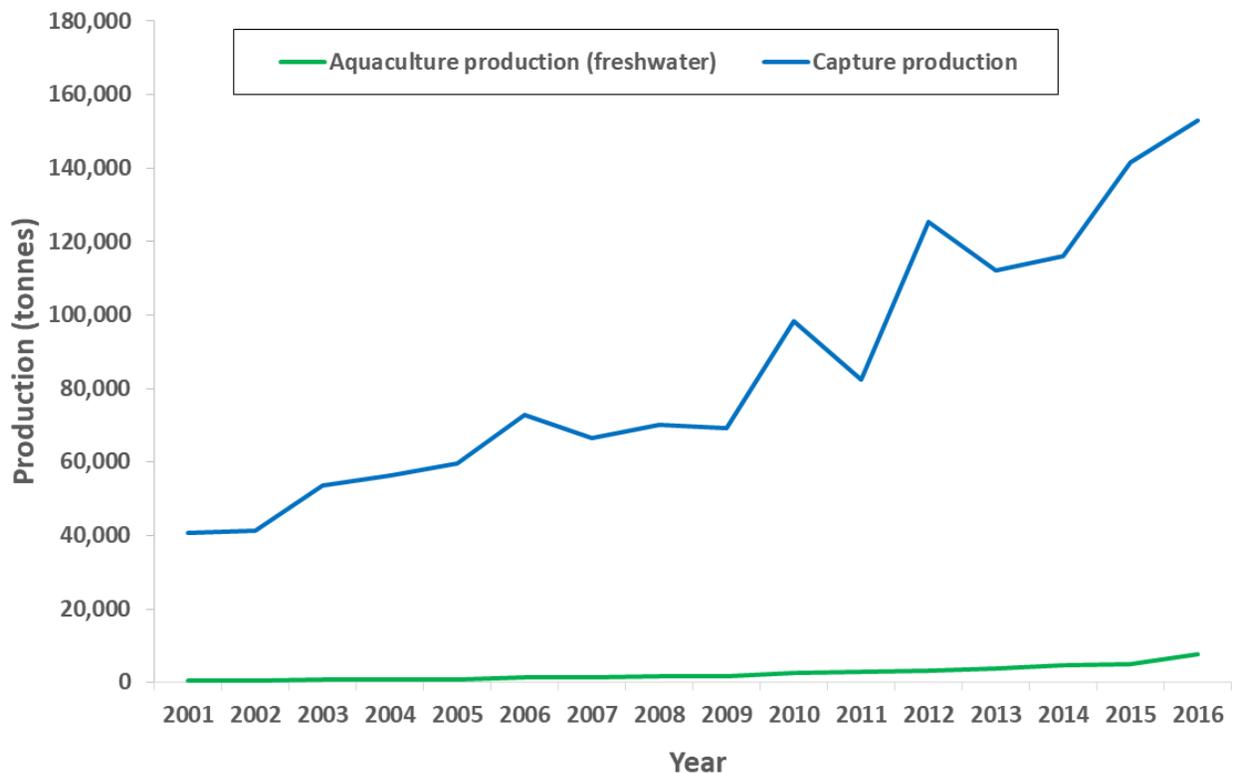
## Introduction

### ***Background***

The global population is predicted to increase in numbers and in consumption of fish and fish products with the average consumption of seafood also predicted to increase. However, the global picture masks the fact that, in many African countries, average fish consumption has declined and is expected to decline further (OECD/FAO 2018). Fish is an important part of African nutrition and livelihoods, but population increase, loss of wetlands, and post-harvest loss have led to decreased fish availability in Africa. Although per-capita fish consumption has decreased in Africa, fish provide the highest percentage of animal protein in Africa (OECD 2018). Thus, when fish supplies are endangered, communities may have little access to other sources of high-quality protein. Increasing fish supplies would improve protein availability and overall nutrition, as called for in the UN Sustainable Development Goals (SDGs), specifically SDG 2 to “End hunger, achieve food security and improved nutrition and promote sustainable agriculture” (<https://sustainabledevelopment.un.org/sdg2>).

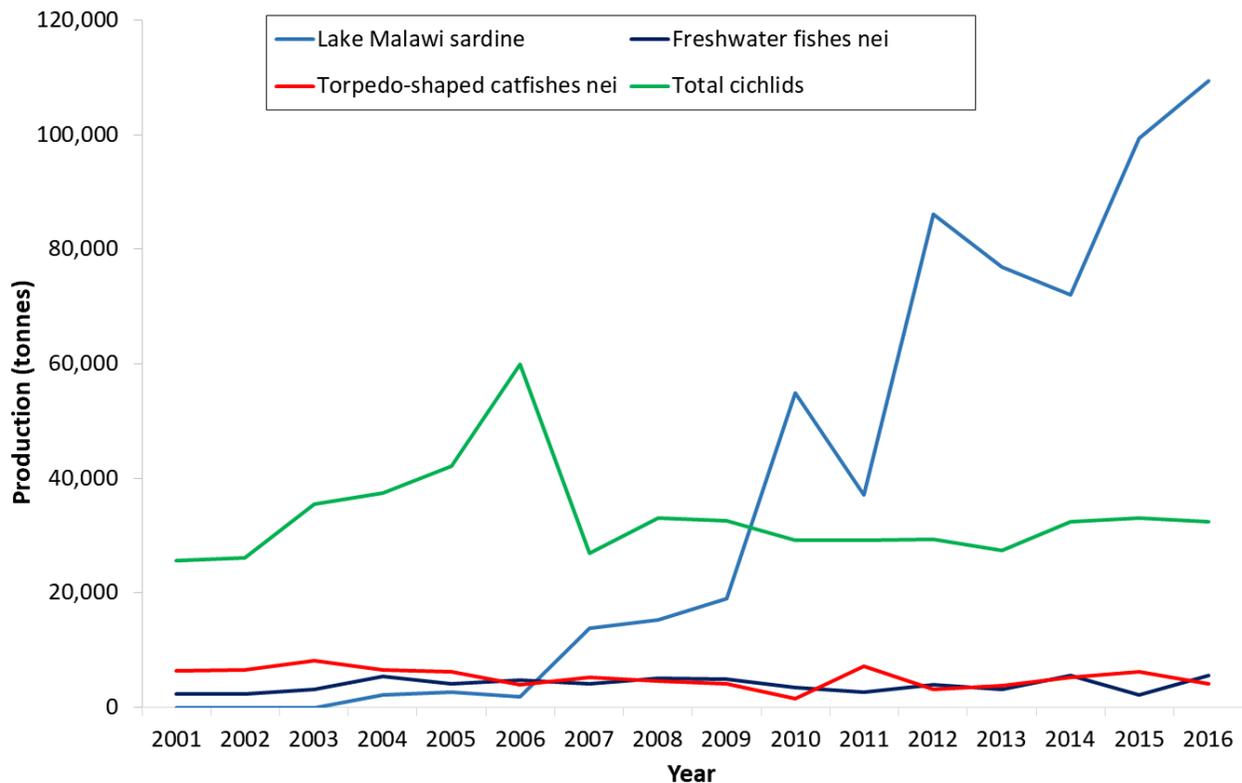
The fisheries of Lake Malawi produce just over 150,000 tonnes of fish per year (Fig. C1).

Fig. C1. Total fish production in Malawi (<http://www.fao.org/fishery/statistics/software/FishStatJ/en>).



Historically, the dominant and most-valuable species are the Chambo, a group of two species of Tilapia (*Oreochromis* spp.), and Usipa, a small pelagic species. The maximum recorded fish production was in 2012, which was due mainly to a strong increase in production of Usipa. Usipa harvest has increased as Chambo fisheries have stagnated or collapsed in many areas (Fig. C2).

Fig. C2. Malawi capture-fishery production by major species groups. Lake Malawi sardine = Usipa (*Engraulicypris sardella*); torpedo-shaped catfishes (*Clarias* spp.); nei = not included elsewhere and not identified to species); total cichlids includes Chambo and other species (<http://www.fao.org/fishery/statistics/software/FishStatJ/en>).



Communities around the lake in Malawi depend on fishery resources for nutrition, livelihoods, and economic growth. Malawi is classified as a LIFDC and is one of the world’s poorest countries. In Malawi, the fisheries sector contributes approximately 4% to the national GDP and is a significant source of job creation by directly employing approximately 60,000 fishers and indirectly employing approximately 350,000 people involved in fish processing, fish marketing, net making, boat building, and engine repair. Trade in aquatic species is extremely important to local economies but is poorly documented. Fisheries play an important role in ensuring food security for rural populations, especially for women, with the poorest of the poor depending on fisheries resources for food and livelihoods.

Aquaculture is being developed both in and around the lake, but production is limited. However, aquaculture is a part of several development and poverty-reduction strategies in southern Africa.

It is clear that numerous stakeholders are involved in catching, processing, transporting, selling, and consuming fish. The concept of a sustainable food value chain has been adopted by the FAO among others and stresses the importance of three elements (1) fish value chains are dynamic, market-driven systems in which vertical coordination (governance) is the central dimension; (2) the concept is applied in a broad way, typically covering a country's entire product subsector, and (3) value added and sustainability are explicit, multidimensional performance measures, assessed at the aggregated level (FAO 2014).

In recent years, Chambo catch has decreased due to overfishing and habitat degradation. The decline of the contribution of cichlids and Tilapia can be estimated at approximately 50% compared to the peak catch from the mid-1980s to the mid-1990s. However, the catch of Usipa has increased (Fig. C2). It is unclear if Usipa has actually increased in abundance or it has become more targeted by fishers because of the decreased abundance of Chambo (e.g., Usipa may be more prevalent in the catch than in the lake).

International development projects around the lake seek to improve fishery management, increase aquaculture production, and improve the fish value chain, all in efforts to conserve aquatic biodiversity and improve livelihoods in the lake basin. With increased attention to developing fishery resources and trade of fish and fish products in the area, it will be increasingly important to include important stakeholders in project development. For example, some of the international assistance to Lake Victoria did not benefit fishers or fish workers. In discussions with NGOs in the Lake Victoria basin, it became clear that the outcomes of some projects were not realized at the grassroots level because of inadequate stakeholder participation during project formulation and execution and poor communication among development agencies, national governments, and stakeholders. In fact, some of the interventions adversely impacted women and other workers in the fish value chain (Shipton and Hecht 2009).

### ***Objectives and Approach***

The FAO of the UN and other international agencies are adopting blue growth in order to promote economic activities in the world's water bodies that are socially and environmentally responsible and sustainable (Menezes et al. 2018).

*The BGI is an FAO flagship initiative that aims at supporting more productive, responsible and sustainable fisheries and aquaculture sectors by improving the governance and management of the aquatic ecosystems, by conserving biodiversity and habitats, and by empowering communities.*

The BGI provides the backdrop for project development to “minimize environmental degradation, biodiversity loss and unsustainable use of living aquatic resources, whilst maximizing economic, cultural and social benefits” (Menezes et al. 2018). Additionally, the recent session of the FAO's Committee on Fisheries called for the development of guidance to help countries adopt socially responsible fish value chains (<http://www.fao.org/3/MX179EN/mx179en.pdf>).

MSU and LUANAR in collaboration with the FAO and the Malawi Department of Fisheries are assembling key stakeholders in the fish value chain of the Lake Malawi basin and relevant donors in order to assess opportunities to improve profitability and sustainability of the fish value chain. The output of the meetings will be a detailed prospectus or proposal to improve the fish value chain in the basin following the principles of blue growth. The proposal will address strategic funding interventions as well as key research and development opportunities. Important to the success of the workshops is donor participation in order to develop a practical and fundable proposal. Additionally, interactions among stakeholders and donors will increase the capacity to understand everyone’s needs and concerns.

### **Review of Past and Ongoing Assistance**

Previous interventions in the Lake Malawi basin are briefly summarized in Table C1. Difficulties with enforcement of policies and regulations prevented some projects from delivering all of the expected benefits.

Table C1: Projects supporting the fisheries in the Lake Malawi basin.

<b>Project</b>	<b>Intervention</b>	<b>Results/Comments</b>
Pact FISH	<p>The Pact FISH project (<a href="https://www.pactworld.org/library/fish-project">https://www.pactworld.org/library/fish-project</a>) supports GoM efforts in fisheries biodiversity conservation and climate change adaptation, working closely with the DoF of the Ministry of Agriculture, Irrigation and Water Development. Pact has a five-year cooperative agreement with USAID from September 2014 to September 2019, valued at 13.9 million USD, and Pact leads a consortium of eight partners. The project aim is to instill sustainable economic growth in threatened freshwater ecosystems and increase social, ecological, and economic resilience. The project scope includes working with communities within a 10 km radius around four key lakes (the southeast arm of Lake Malawi and Lakes Malombe, Chiuta, and Chilwa). Studies include (a) identification of hotspots of anthropogenic threats to biodiversity, (b) vulnerabilities to climate change, (c) factors attributed to declining fisheries resources, and (d) factors affecting fish value chains.</p> <p>USAID and its partner, Emmanuel International, support the Lake Malombe fish value chain through promotion of artificial reefs (e.g., brush parks as sanctuaries for increased fish production) and the fish value chain through construction of energy-efficient fish-processing facilities (Singini 2017) and modern smoking kilns.</p>	Not yet evaluated.
FAO-GEF Climate Change Resilience	<p>The Malawi: Building Climate Change Resilience in the Fisheries Sector in Malawi project (<a href="https://www.thegef.org/project/building-climate-change-resilience-fisheries-sector-malawi">https://www.thegef.org/project/building-climate-change-resilience-fisheries-sector-malawi</a>) is designed to improve the resilience of fishing communities around Lake Malombe to the effects of climate change.</p>	Ongoing; not yet evaluated.

Project	Intervention	Results/Comments
Artisanal Fisheries Development Project Malawi	The project is designed to increase capacity for offshore fishing to leave inshore areas for artisanal fishers. ( <a href="https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Malawi_-_Lake_Malawi_Artisanal_Fisheries_Development_Project_-_Appraisal_Report.pdf">https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Malawi - Lake Malawi Artisanal Fisheries Development Project - Appraisal Report.pdf</a> )	Increased capacity led to overfishing of inshore areas as enforcement of regulations was difficult.
National Aquatic Resources Management Program	The National Aquatic Resources Management Program funded by GIZ is a small-scale fish-farming and cage-culture project also funded by Germany and the Government of Malaysia. Three projects funded by JICA include aquaculture research and technical development of Malawian indigenous species, development of aquaculture training at Banda College of Agriculture, and a joint research project on the comprehensive study of Lake Malawi for sustainable utilization.	Training and technology transfer completed.
Fisheries Development Project	The project (co-financed by the World Bank, Nordic Development Fund, and the Icelandic International Development Agency) is designed “to realize the potential contribution of fisheries to the economy on a sustainable basis through (a) increasing fish production to improve nutrition; (b) generating additional off-farm employment to reduce poverty among the rural population, particularly women; (c) conserving the natural resources base of Malawi's water bodies and preventing environmental degradation through better management; and (d) improving institutional capacity in the fisheries subsector by strengthening the planning, implementation, and management capacity of the Fisheries Department” ( <a href="https://documents.worldbank.org/en/publication/documents-reports/documentdetail/154631468280138513/malawi-fisheries-development-project">https://documents.worldbank.org/en/publication/documents-reports/documentdetail/154631468280138513/malawi-fisheries-development-project</a> ).	The project performance report indicated that failure to meet some core objectives was linked largely to the stoppage of support services provided by the GoM (e.g., boatyard repairs, ice-making facilities, fuel, and repair shops).
Chambo Restoration Strategic Plan (CRSP) of 2003	The CRSP of 2003 project developed a specific strategy to save the endangered Chambo ( <a href="http://pubs.iclarm.net/Pubs/Chambo/Chambo_Restoration.pdf">http://pubs.iclarm.net/Pubs/Chambo/Chambo_Restoration.pdf</a> ). The plan aimed to restore the Chambo fishery of Lakes Malawi and Malombe to their maximum sustainable yield by 2015 and supplement fishery production by enhancing Chambo production through aquaculture.	Financial constraints prevented full implementation, and the Chambo fishery continued to decline.

Project	Intervention	Results/Comments
National Programme For Managing Climate Change in Malawi	<p>The primary aim was to mainstream climate change issues into the broad national development agenda and sectoral policies and programmes. This process was expected to raise the national capacity to anticipate and deal with these issues. The program was supported by a set of collaborating partners (Department for International Development, Japan, and Norway) (<a href="https://erc.undp.org/evaluation/evaluations/detail/5823">https://erc.undp.org/evaluation/evaluations/detail/5823</a>). The two constituent components of the program were the National Programme for Managing Climate Change in Malawi (CCP) and Building Capacity for Integrated and Comprehensive Approaches to Climate Change Adaptation in Malawi, which was the national component of the multi-country Africa Adaptation Programme (AAP). The Ministry of Economic Planning and Development provided national coordination of the program with technical management by the Environmental Affairs Department, while a broad range of line ministries and departments participated in implementation.</p>	<p>The program (CCP and AAP) was moderately effective. There were many deliverables and a partially effective coordination system. Efficiency was maintained in terms of use of financial resources, but timing of the programme showed a lag of nearly 60% over the intended two-year duration. Sustainability of the benefits attained is not yet secure.</p>
Cultivate Africa's Future (CultiAF) Project	<p>The project (<a href="https://www.idrc.ca/en/research-in-action/improving-fish-post-harvest-management-and-marketing-malawi-and-zambia">https://www.idrc.ca/en/research-in-action/improving-fish-post-harvest-management-and-marketing-malawi-and-zambia</a>) is a partnership between the Australian Centre for International Agricultural Research, the Australian International Food Security Center, and the International Development Research Centre, together with Chancellor College of the University of Malawi, WorldFish, the DoF Fisheries Research Unit, and the Peoples Trading Centre. The objective is to improve food security in eastern and southern Africa by funding applied research in agricultural development. In Malawi, the funds support two projects: Nsomba N'chuma and Improved Processing and Marketing of Healthy Fish Products in Inland Fisheries in Malawi.</p>	<ul style="list-style-type: none"> <li>• Reduced fish and nutrient losses during fish processing and marketing</li> <li>• Increased use of improved fish-handling and processing methods</li> <li>• Increased incomes for men, women, and youth within the fish value chain</li> <li>• Fairer sharing of benefits among men and women in the project sites</li> <li>• Increased awareness at the local and national levels of improved fish-processing technologies</li> </ul>
Ecosystem Approach to Fisheries and Aquaculture (EAFA) by GoM/FAO	<p>To develop an EAFA plan for Mangochi fisheries.</p>	<p>Plan developed but not implemented.</p>

## **The Fish Value Chain in Malawi**

### **General Overview of the Importance of the Fisheries in Malawi**

Fisheries activities in Malawi are not only concentrated around Lake Malawi but also take place in Lakes Malombe, Chiuta, and Chilwa, and the Shire River. Fishing is the major socioeconomic occupation in the communities surrounding Lake Malombe. The fisheries sector contributes to increased food security by employing people directly through fishing and indirectly through other activities within the fish value chain. In Malawi, the fisheries sector contributes 4% to national GDP and employs more than 350,000 people. The Malawi National Fisheries and Aquaculture Policy (GoM 2016b) indicates that more than 500 tonnes of fish are exported annually. Fish in Malawi provides more than 70% of total animal protein (GoM 2018). Malawi is one of the countries with the highest dependency on fish for animal protein in southern Africa. This dependency is particularly true for poorer Malawians for whom fish may be the only regularly available source of animal protein. Since fish is widely distributed and consumed in both rural and urban areas, fish contributes significantly to daily nutritional requirements for some vulnerable groups (e.g., those with HIV/AIDS, orphans, and the poor). Small pelagic fish are especially important for human nutrition in Malawi.

Lake Malawi is of significant importance to Malawi's economy in terms of its fisheries productivity and, to some extent, as a tourist destination. Notable facts about the fisheries are that more than 70% of Malawi's population depends on Lake Malawi and its catchment for daily survival needs and livelihoods (Chafota et al. 2005). The Lake Malawi-Shire River water system is a strategic water resource for hydro-electric power generation, irrigated agriculture, navigation, and the fisheries (Chidammodzi 2016). Other important lakes include Lake Chilwa (Zomba district) and Lake Malombe.

Lake Chilwa supplies, on average, approximately 20% of total fish landings in Malawi, reaching 27% in some years (GoM 2005). The fishery is also important to sustain the livelihoods of many people living outside the basin. The lake fishery and the whole of the Chilwa plains are an important economic system.

Lake Malombe is another important lake in Malawi. More than 4,000 fishers are dependent on the fisheries, and 409,000 people living in 48 villages near the lakeshore depend directly on food from the lake (GEF 2014). "Lake Malombe is highly productive because the water column mixes freely and nutrients are easily recycled from the bottom" (Donda 2011). Lake Malombe once produced approximately 17% (15,500 tonnes) of Malawi's total fish catch, but catches decreased dramatically following depletion of local Tilapia. Fish exploitation technology in Lake Malombe is at the artisanal level, although it is used for both subsistence and commercial purposes.

Women are particularly important at all stages of the fish value chain in Malawi. Women play key roles in the fish and aquaculture value chains. While approximately 80% of the community gets its livelihood from fishing and related professions, the fishing professions, especially on the lakes, are largely male dominated. Women are actively involved in post-harvest activities such as sun drying, smoking, and parboiling the fish. Women reportedly make up the greater population of traders in the Mangochi area. Women are involved in many complex networks and alliances that enable them to negotiate access to fish and market them successfully (FISH 2015). For example, Usipa marketing in Lake Malawi and many fisheries throughout the western Africa region are pre-financed by women who often control the processing and marketing sectors (Chiwaula et al. 2012).

## **General Issues Facing the Fisheries and Aquaculture Sector**

Fishery management in Lake Malawi: For any fish value chain to be sustainable, the source of fish must be responsibly and sustainably managed. At this point, commercially valuable fish species in shallow inshore waters are considered fully exploited or overexploited, and no further increase in yield from these fisheries can be expected without changes in fishery management. Management of the capture fisheries of Lake Malawi has been challenging due to population increase, conflicts between industrial and artisanal fishers, habitat degradation, water abstraction, and climate change. Several other great lakes of the world (e.g., the North American Great Lakes, Lake Victoria, and Lake Tanganyika) have international fishery-management organizations. However, Lake Malawi at present does not have such an international management body—each riparian country in the Lake Malawi basin manages its portion of the lake independently of the other countries. For donors to invest in a fish supply chain, a reliable source of fish needs to be ensured.

In Lake Malombe, Singini et al. (2017) noted that the fishery was unsustainable due to illegal and harmful fishing practices. The authors recommended that a first step in improving the fish value chain is to use community organizations to manage the fishery.

Accurate information: Information about the amount and movement of fish and fish products from the Lake Malawi area exists, but it is incomplete and often not reliable (Table C2). Any project to improve the fish value chain in Malawi needs to be based on the most current and accurate information available. If essential information is not available, the project should endeavor to collect it.

The FAO and others have noted the challenges in getting accurate information about the production and trade of inland fish and fish products (Bartley et al. 2015; Funge-Smith 2018). As a means to assess better production data from inland fisheries, Fluet-Chouinard et al. (2018) compared household consumption surveys with reported production data submitted to the FAO. The results for Malawi revealed significantly more fish were consumed than could be accounted for in official production reports. Thus, there must be more production than reported or significant amounts of fish and fish products are being imported into Malawi. Zambia, one of Malawi's trading partners, was also identified as consuming much more fish than could be accounted for by national production (Fluet-Chouinard et al. 2018). The authors' explanation for the discrepancy was unreported production from Malawi's and Zambia's inland fisheries rather than unreported importation of fish and fish products. The unreported production is part of some fish value chain, if only a very short one, and should be considered in efforts to improve the fish value chain.

The fish value chain in Malawi is diverse and is of different complexities, and presents different challenges and opportunities. The prices for different fish commodities also vary considerably (Table C3) from the extremely low value of 0.03/kg USD of fish for informal trade between Malawi and Zambia to 6.15/kg USD for smoked Usipa exported to South Africa. Smoked and dried fish, although fetching high prices, may not be the most-valuable product after allowances are made for loss of water during processing. For example, dried Chambo needs to be sold at approximately 10/kg USD to be of equivalent value to fresh Chambo traded at 3.14/kg USD (assuming approximately 70% loss of water content when drying but not counting the cost of labor and drying materials).

Table C2: Data about the amount and movement of fish and fish products from the Lake Malawi area based on the fish value chain in Fig. C5. N/A = not available.

<b>Data Item</b>	<b>Do Data Exist ?</b>	<b>Source</b>	<b>Responsible Group for Data Collection</b>	<b>Are Data Reliable?</b>	<b>Need to Set Up Data Collection/ Data Archiving System?</b>
Fishers (canoes, boats)	Yes	Frame survey	Fisheries Department	Yes	Yes
Processors	No	N/A	N/A	N/A	Yes
Wholesalers	No	N/A	N/A	N/A	Yes
Retailers	No	N/A	N/A	N/A	Yes
<b>Fishing:</b>					
Catch data	Yes	Frame survey, National Statistical Office (NSO), FAO FishStat	Fisheries Department, NSO, internet	Yes	No
Number of fishers	Yes	Frame survey	Fisheries Department	Yes	Yes
Landing sites	Yes	Frame survey	Fisheries Department	Yes	Yes
Market value	Yes	Frame survey, market survey, NSO	Fisheries Department, NSO	No	Yes
<b>Processors:</b>					
Number of processors	Yes	Frame survey, market survey	Fisheries Department	No	Yes
Processing technologies	Yes	WorldFish	WorldFish Center Malawi	No	Yes
<b>Number of wholesalers</b>	Yes	Market survey	Fisheries Department	No	Yes
<b>Number of retailers</b>	Yes	Market survey	Fisheries Department	No	Yes
<b>Trade data (exports and imports)</b>	Yes	International Trade Center (Trade Map), FAO FishStat, NSO, Ministry of Trade Automated System for Customs Data (ASYCUDA)	Internet, NSO, Malawi Ministry of Trade (ASYCUDA)	Yes	Yes <sup>6</sup>
<b>Fish consumers</b>	Yes	Project reports, International Food Policy Research Institute (IFPRI)	IFPRI, USAID/Malawi FISH Project	Yes	Yes

<sup>6</sup>For informal trade data.

Table C3: Indicative production and value of Malawi inland capture-fisheries commodities. t = tonnes; USD = US dollars; N/A = not available.

Years	Commodity	Amount (t)	Value USD <sup>7</sup>	Value/kg USD
2015-2016	Fish informally traded between Zambia and neighbors at four border posts (Mussa et al. 2017)	102,263.90	3,300,000	0.03
2015-2016	Informal trade, Lake Malawi Usipa only exported to three neighboring countries (Mussa et al. 2017)	20,923.84	37,900,000	1.80
2015-2016	Informally traded fish between Zambia and Malawi (Mussa et al. 2017)	45,285.50	82,140,000	1.80
2015-2016	Malawi exported fish to three neighboring countries (Mussa et al. 2017)	24,115.68	41,600,000	1.73
2016	Lake Malombe Chambo (Singini 2017)	10.00	23,688,793	3.24
	Lake Malombe Kambuzi	3,317.00	1,153,391,968	0.49
	Sun-dried fish from Lake Malombe:			
	At Mangochi turn-off	N/A	N/A	0.84
	In farther away markets	N/A	N/A	1.40
	Smoked fish from Lake Malombe:			N/A
	At Mangochi turn-off	N/A	N/A	1.12
	In Blantyre and Limbe	N/A	N/A	1.82
	Chambo	N/A	N/A	3.50
	Deep-fried fish from Lake Malombe:			
	N/A	N/A	N/A	1.26
	N/A	N/A	N/A	1.82

<sup>7</sup>In October 2018, 1 USD = 1728.78652 Malawian Kwacha (MWK).

Local vs. foreign markets:	Because Malawi is a landlocked country, access to export ports and, therefore international markets, is limited. Freight costs are approximately 60/tonne USD. According to a recent market analysis (DFID 2017), investment in the fish value chain might be best considered in the domestic and sub-regional markets. Foreign competition would be limited because of the same economic concerns. Furthermore, unlike Lake Victoria that exports Nile Perch to Europe, Lake Malawi does not have a unique fish product that is accepted in Europe, Asia, or North America. Tilapia is accepted, but foreign markets have ready access to Tilapia from a variety of other sources. However, there is movement of small amounts of processed fish from Lake Malombe to foreign markets (Table C3). Although the quantity exported is small, the sale price is often higher than in local markets.
Special considerations for the aquaculture value chain:	Aquaculture requires good-quality feed and is dependent on importing feed from abroad (recently, a feed mill in Zambia has been providing improved feed) and local manufacturing from crop inputs. Improving the aquaculture value chain could also include improvements to the production and distribution of feed.
Food safety and certification to access more markets:	<p>Malawi has standards for fishery products that guide certification. However, Malawi made limited effort to support the safety of fisheries products. Although most fish products do not have standards, general standards are available and are used for certification. However, the standards lack cutoff points for chemical parameters that relate to product quality. There are no systems in place at either the city assemblies or the MBS to inspect some of the products (Kapute 2010). Lack of inspection systems has posed a threat on food safety for fish products that are not certified.</p> <p>In a 2017 study conducted on Lake Malombe during a FAO-Technical Cooperation Project (TCP) baseline study, it was found that of all the processing methods used, sun drying has a higher risk of fish-quality loss when compared with smoking and frying (Makawa et al. 2017). The sun-drying procedure contributes to loss. During sun drying, fish are spread on open drying racks to expose them to the sun. While the fish are exposed, they remain unprotected from dirt and microbes before they dry, thereby reducing the quality of the fish. Most drying racks are open to be fully exposed to the sun. During the rainy season, fish are removed from the racks when raining and put back on the racks to continue drying when the rain stops. Removing and replacing the fish prolong the drying process, thereby contributing to loss. At times, fish are lost to dogs, cats, and thieves when left unguarded resulting in large losses. Most processing methods result in loss during inclement weather. Inefficiency during processing, high firewood use, and low profits are also associated with most fish-processing methods in Malawi.</p> <p>Lack of properly certified products restricts access to global markets. Consumers demand food-safety standards throughout the global supply chain; certified products have a competitive advantage. Traders with uncertified products are limited to selling their products in local markets.</p>

Special role of women in the fish value chain: Globally, women have been engaged in the fish value chain as a means to support their households; approximately half of the global fishery workforce is female. Interventions in the fish value chain must take into account the role of women so as not to adversely impact this important group of stakeholders. Interventions on improvements in technology have limited women's roles, particularly in the production side, as women are excluded (Bjorndal et al. 2014). However, better technology has allowed women to increase their engagement in fishing operations in some developed countries (e.g., Japan and Canada). Furthermore, interventions in training have increased women's capacity on aspects of quality control, management, product development, and marketing (Bjorndal et al. 2014). In Malawi, women are more involved in post-harvest activities than actual fishing.

### **End Market and Market Trends**

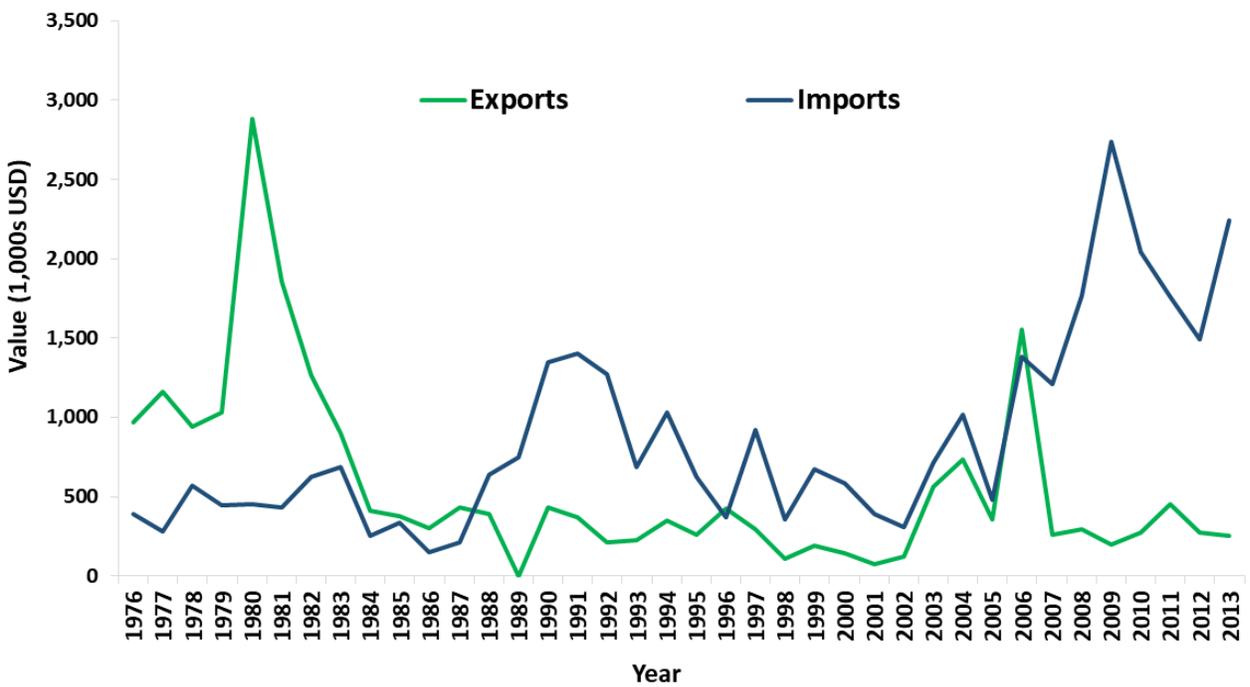
Main consumption and production markets and market trends: Fish is one of the cheapest sources of animal protein and its consumption and demand are on the increase particularly in Africa because of the high level of poverty. Per-capita fish consumption in Malawi has subsequently fallen by more than 60%, from 14 kg per person per year during the 1970s to approximately 8 kg per person in 2015 due to a decrease in the fish supply and a rapid increase in the population (GoM 2016a). An estimated 90% of fish caught in Malawi is processed into various products, and various fish-processing methods are used.

A large amount of the fish sold in markets near water bodies is usually in fresh form (e.g., Mangochi, Salima, Nkhotakota, and Nkhata Bay). Markets that are far from water bodies (e.g., Zomba, Blantyre, Lilongwe, and Mchinji) sold mostly dried fish. In a Youth for Fish Program study, it was observed that prices of fish were lower in the production districts of Salima, Nkhata Bay, and Mangochi. These districts are the major sources of most fish sold in Malawi. On the other hand, Mchinji records the highest fish prices because of its proximity to Zambia, which is one of the destinations of most fish from Malawi through the informal cross-border fish trade. Most traders from Mangochi take their fish to Lilongwe and Blantyre, with Lilongwe also receiving fish from Salima and Nkhata Bay. Salima and Nkhata Bay are two major fish markets in Malawi due to their higher populations and rapid urbanization. As a result, there is a large supply of fish in these two districts.

Not all fish produced domestically is consumed domestically. Fish trade takes place between Malawi and several other countries. Both formal and informal fish trade takes place with neighboring countries. Malawi's fish imports have increased over the past few years to meet the increased demand for fish. Fish imports are from countries such as Zimbabwe, South Africa, Tanzania, Mozambique, Namibia, and Swaziland (Russell 2008). Formal fish exports are limited to aquarium fish with major markets in Europe, Asia, and within Africa (GoM 2011). In 2014, Malawi exported live ornamental fish internationally, including Canada, China, Denmark, France, Germany, Hong Kong, Sweden, South Africa, United Kingdom, and the United States (US). A total of 38,522 live fish were exported generating a total income of approximately 200,000 USD (FISH 2015).

Export and import of fish and fish products between Malawi and other African countries show a negative trade balance over the years (Fig. C3). However, informal fish and fish products traded between Malawi and its neighboring countries vary widely, ranging from small pelagic fish and high-value freshwater fish species to marine fish products. According to Mussa et al. (2017), Usipa from Lake Malawi is the most-traded fish species with 32 tonnes exported informally to neighboring countries (Mozambique, Zambia, and Tanzania). This phenomenon corresponds to production levels for Usipa, which accounts for 70% of the catch from the lake. Even though Usipa is the most-traded fish species, not all exported fish is used for human consumption; fish is also used in production of fish meal in Zambia.

Fig. C3. Value of fish exports and imports in Malawi. 1 USD = 1728.78652 Malawian Kwacha (MWK) (<http://www.fao.org/fishery/statistics/software/FishStatJ/en>).



Competition,  
market  
prospects,  
and  
challenges:

Fish remains a key food item in the diet of most Malawians. The demand for fish in Malawi is high such that almost all fish caught is consumed locally. As a result, fish is one of the expensive food items. However, Nankwenya et al. (2017) noted that consumption of various fish products is less sensitive to price changes. The authors noted that, with the current low supply of fish, consumer purchases of fish products do not change much with an increase in price. This situation shows the importance of fish as an important source of animal protein in Malawi. Also noted is that fish processing is limited in Malawi such that most preferred fish products (fresh fish and canned fish) are in low supply. Recently, the quality of processed fish has been seen as one of the factors affecting demand for fish. There is growing interest for improved fish processing in Malawi to address the challenge of high post-harvest loss. Post-harvest loss is a major concern and occurs in most fish distribution chains throughout the world, including Malawi, resulting in revenue loss for producers along the fish value chain with the potential for reduced economic growth of the country (Russell 2008).

Recently, there has been an increase in the informal cross-border fish trade (Table C3). This trade, although very important, is neglected in national policies. As a result, there is under-estimation of the economic importance of fish and fisheries products to the national economy. In a study by Mussa et al. (2017) on the drivers of informal fish trade between Malawi and its neighboring countries (Zambia, Tanzania, and Mozambique), it was discovered that fish traders use informal trade channels due to the demand for a sanitary certificate and export/import permit, double taxation at borders, and corruption. The informal cross-border fish trade plays a major role in the livelihoods of small-scale, capital-constrained traders, and low-income households, necessitating government support to enhance the capacity of fish processors so their products are competitive.

Other challenges facing the fishery sector in Malawi include the effects of climate change, overfishing, high post-harvest loss, and other tariff and non-tariff barriers to trade. Malawi, like most African countries, continues to face challenges to penetrate high-value international markets in the EU and US due to Non-Tariff Trade Barriers (NTBs). NTBs include strict sanitary and phytosanitary (SPS) measures, certification measures, HACCP systems, and product traceability. The quality of processed fish products for the domestic market is also very low, making it more challenging for processors to access international markets. For instance, a study conducted by Makawa et al. (2017) under TCP/MLW/3504 found high total viable counts of pathogenic microbes such as *Salmonella*, *Shigella*, *E. coli*, and *Staphylococcus*, for sun-dried, smoked, and deep-fried Kambuzi, Utaka, and Usipa, respectively, from Lake Malombe. The presence of higher pathogenic microbes indicates that sanitation during post-harvest processing at Lake Malombe is compromised. This consumer safety hazard is of great concern to the artisanal fisheries industry in Malawi.

## **Production and Price Trends in Malawi**

Production/ value by production source: The main fishing areas in the country include Lake Malawi with a surface area of 29,000 km<sup>2</sup>, Lake Chilwa (2,000 km<sup>2</sup>, depending on the season), Lake Malombe (390 km<sup>2</sup>), Lake Chiuta (approximately 200 km<sup>2</sup>), and the lower Shire River system. Fish production varies annually. The catch and effort data-collection system established and introduced into Malawi by the FAO shows that a production of less than 15,000 tonnes was recorded between 1964 and 1974. The catch increased to approximately 80,000 tonnes in the 1980s and then declined to less than 40,000 tonnes in the mid-1990s. However, dominance of the Usipa catch (estimated to account for more than 60% of the catch) has been observed from 2000 to 2013. In 2014, approximately 116,128 tonnes of fish were produced throughout the country (GoM 2015). Lake Malawi alone had a total production of 107,739 tonnes from both artisanal and commercial fisheries, which contributed 105,284 and 2,455 tonnes, respectively (Table C4). The catch contribution by water body in 2014 indicates that approximately 92.8% of the catch originated from Lake Malawi, 3.6% from Lake Malombe, 2.5% from Lake Chilwa, and 0.9% from the Shire River.

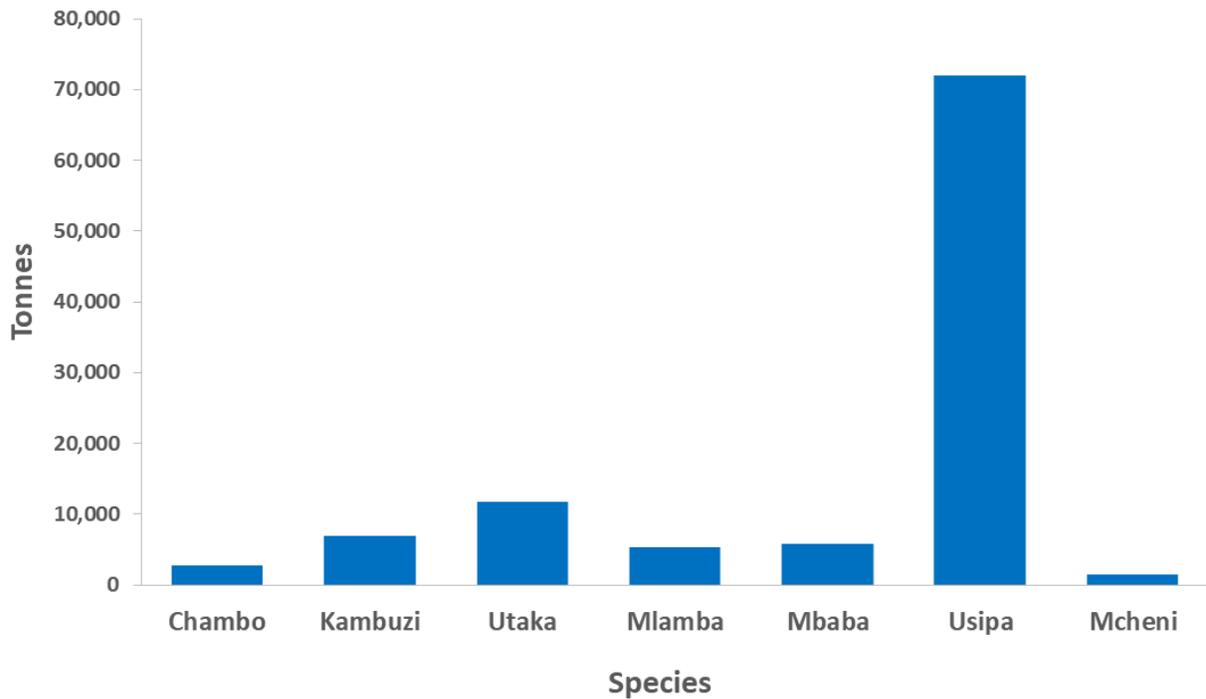
Table C4: Volume of fish catch by water body, land value, and beach price, 2004-2014 (GoM 2015). t = tonnes; USD = US dollars.

<b>Year</b>	<b>Lake Malawi Artisanal (t)</b>	<b>Lake Malawi Commercial (t)</b>	<b>Lake Malombe (t)</b>	<b>Lake Chilwa (t)</b>	<b>Lake Chiuta (t)</b>	<b>Shire River (t)</b>	<b>Total (t)</b>	<b>Landed Value (USD '000)</b>	<b>Beach Price (USD/kg)</b>
2004	36,610	3,391	510	7,155	791	2,292	50,749	2820.65	0.06
2005	58,859	4,225	649	5,822	975	3,032	73,562	4,133.23	0.06
2006	51,796	4,413	780	4,350	1,085	3,840	66,264	3,939.37	0.06
2007	50,527	4,102	530	5,904	1,024	3,643	65,730	4,374.86	0.07
2008	56,846	3,597	671	6,006	1,018	3,128	71,266	5,482.68	0.08
2009	56,850	3,752	590	5,879	1,034	3,184	71,289	9,773.04	0.14
2010	80,623	3,470	3,336	8,019	2,549	1,197	99,194	11,510.96	0.12
2011	56,923	1,296	4,109	16,960	2,627	451	82,366	10,958.08	0.13
2012	106,769	2,367	1,608	7,993	1,322	269	120,328	20,768.09	0.17
2013	102,097	1,867	1,847	2,982	290	823	109,906	30,323.33	0.28
2014	105,284	2,455	4,170	2,889	293	1,037	116,128	42,997.02	0.37

Production/  
value by  
species:

The traditional catch on Lake Malawi is composed of 18 main species or groups of species. Usipa and Utaka are the two dominant species with an average total contribution of 70% and 9%, respectively (GoM 2016a). Other important species in 2015 include Kambuzi, Chambo, Mbaba (*Haplochromiskirkii*), and catfishes (Figs. C2, C4). Kambuzi and Chambo constitute most catches on Lake Malombe (Singini et al. 2017). The Malawi fisheries policy (GoM 2012) lists Chambo, Kambuzi, Utaka, Mbaba, Mcheni (*Ramphochromis* spp.), Usipa, Mlamba (*Clarias gariepinus*), and Matamba (*Barbus paludinosus* and relatives) as some of the commonly marketed fish species in Malawi. According to FISH (2015), for the artisanal fisheries, Usipa, Utaka, Kambuzi, Mbaba, Mlamba, and Chambo are the six dominant fish catches in 2015, with an average total contribution of 70%, 10%, 6%, 5%, 5%, and 2%, respectively (Fig. C4). In the last 10-15 years, the fishery in Malawi has changed substantially. The catch species composition has shifted from large cichlids, catfishes, and cyprinids to small prey-fish species such as Usipa, Kambuzi, and Matamba (*Barbus* spp.).

Fig. C4: Fish catches on Lake Malawi in 2015 (FISH 2015).



## **Detailed Description of the Fish Value Chain**

Mapping the fish value chain—functions and participants and their roles:

An accurate understanding of the fish value chain is essential to develop a viable project. The capture-fish value chain is very complex whereas the aquaculture value chain is relatively simple and includes aquafeed as an imported or locally produced commodity. Bjorndal et al. (2014) stated that, relative to other players in the fish value chain, small-scale fishers and fish farmers receive the smallest economic benefit from their products. Processors and retail markets receive more of the distributional benefits due to their stronger bargaining power. The authors made policy recommendations that “aim to safeguard the interests of small-scale fishers and fish farmers by enabling them to obtain prices and margins that let them achieve long-term sustainability from an economic, social and biological resource perspective” (Bjorndal et al. 2014). Singini (2017) reported a similar result in Lake Malombe, a small shallow-water lake connected to the southern part of Lake Malawi by the Shire River. Good economic benefits were seen for fresh-fish and processed-fish traders because the capital costs they incurred were low. Prices of fish at retail markets were high, which resulted in profits.

Each stage, or fishing node, of the fish value chain is comprised of various fish value-chain participants who collaborate to improve the overall competitiveness of the final product. These participants have different functions and roles in the fish value chain. The participants are either directly involved in transacting fish business or are indirectly involved through facilitation of fish business transactions. A detailed fish value-chain map for Malawi’s fisheries sector is presented in Fig. C5.

Fishing node: The fishing node includes four key participants: gear owners, crew members, porters, and auctioneers. Gear owners normally do not go fishing with the rest of the crew members but entrust the management to the head of the fishing crew. Some crews include a signer (locally known as a *signalala*), who is a fish spotter when using *chilimira* fishing gear. For *Mkacha* fishing gear, a diver is required. All craft need a water remover locally known as a *chingubidi*. While a fishing crew operates from the lake to the beach, porters and auctioneers operate at the beach. Porters are responsible for bringing fish from the craft to the beach, and they also transport fish from the beach to the processing site. Auctioneers facilitate fish sales at the beach. At the fishing level, the participants are assisted by gear suppliers, gear maintainers, restaurants, and rest houses.

Processing node: The processing node includes activities after fish reach the beach, where fish need to be preserved to maintain form and taste. Fish is either sold fresh or processed to the final consumer: both require at least some processing. The most-common processing methods are sun drying, parboiling, smoking, and frying. Apart from labor, the processing node also requires racks, firewood, processing houses, rest houses, and groceries. One problem affecting current processing technology is the quality of processed fish as a result of unhygienic handling and technologies in which fish is dried or smoked. Smoking and parboiling processing is dominated by use of a traditional open fire using firewood, resulting in high levels of smoke deposits on the fish and inhalation by processors.

Trading node: The trading node includes three key participants: wholesalers, retailers, and home vendors. Trading takes place at beach markets, open markets, and supermarkets. Traders are assisted by bench owners, local councils, and auctioneers. Fish from Lake Malawi and Lake Malombe are mainly sold in Blantyre and Lilongwe and other major towns across the country. The major wholesale markets are the Limbe, Lilongwe, and Liwonde (Mangochi turn-off) markets and other weekly markets across the country in central and southern Malawi.

Fish value-chain performance:

Chiwaula et al. (2012) did a value-chain analysis of the Lake Chilwa fishery. The authors found fishing along the Lake Chilwa to be profitable, with fishers obtaining an average marketing margin of approximately 280/month USD. The study also found that fishers who own fishing equipment and fishers who sell their fish by auction obtain higher marketing margins than other fishers. Phiri et al. (2013) conducted a value-chain analysis of Lake Malawi fish specifically focusing on Chambo. The study used different analytical techniques, including profitability analysis for the various fish value-chain participants, calculation of marketing margins, marketing efficiency, and the distribution of income among participants in the Chambo fish value chain using the Gini coefficient. The study found that high costs incurred by fishers had a significant impact on their profits while retailers incurred less cost and had a larger market share than other participants.

While most studies found a positive net return for most fish value-chain participants, Nankwenya et al. (2017) found that Usipa processors in Malawi incurred loss. Coincidentally, women dominated the processing node in Malawi. According to FISH (2015), the main reason for negative returns among processors is increased post-harvest loss, which is a result of

- Overloaded processing capacity in peak fishing periods
- Drying difficulties during heavy rainfalls
- Spoilage from insect and microbial contamination
- Poor processing methods and facilities
- Over-frying and lack of ideal moisture-content measuring
- Bird and other vermin theft

Fish value-chain participants along the different stages of fish marketing face a number of challenges. Such challenges include lack of access to loans from banks and other lending agencies (possibly due to too much official paperwork and collateral requirements), poor infrastructure in the markets and poor transport systems that greatly affect fish handling at the markets, dwindling fish supply, and lack of advanced processing methods such as the use of solar dryers. Despite the challenges, consumers in Malawi demand increasingly a consistent supply of fish products year-round. Opportunities remain for fishers, processors, and traders to meet the ever increasing demand for fish and fish products through improved market and road infrastructure, modern fish-processing methods, and access to loans.

Margins and adding value:

Fish is highly perishable so it requires processing to maintain quality and taste. Several methods of fish preservation (sun drying, smoking, parboiling, and pan roasting), are used in Malawi (GoM 2012). Small fish are traditionally sun dried while large fish are mostly smoked (Kapute 2010). Fresh-iced fish is also common, especially in supermarkets. Preserving fish by smoking is one of the methods contributing to deforestation (GoM 2012). The use of kilns for smoking fish is common, and the high consumption of wood poses a considerable threat to environmental sustainability, affecting vegetation around the lake and contributing to soil erosion and siltation of fish nursery areas. Kilns contribute to respiratory illnesses from smoke exposure. Increasing prices for firewood affect fish prices and profit margins for fish processors and traders.

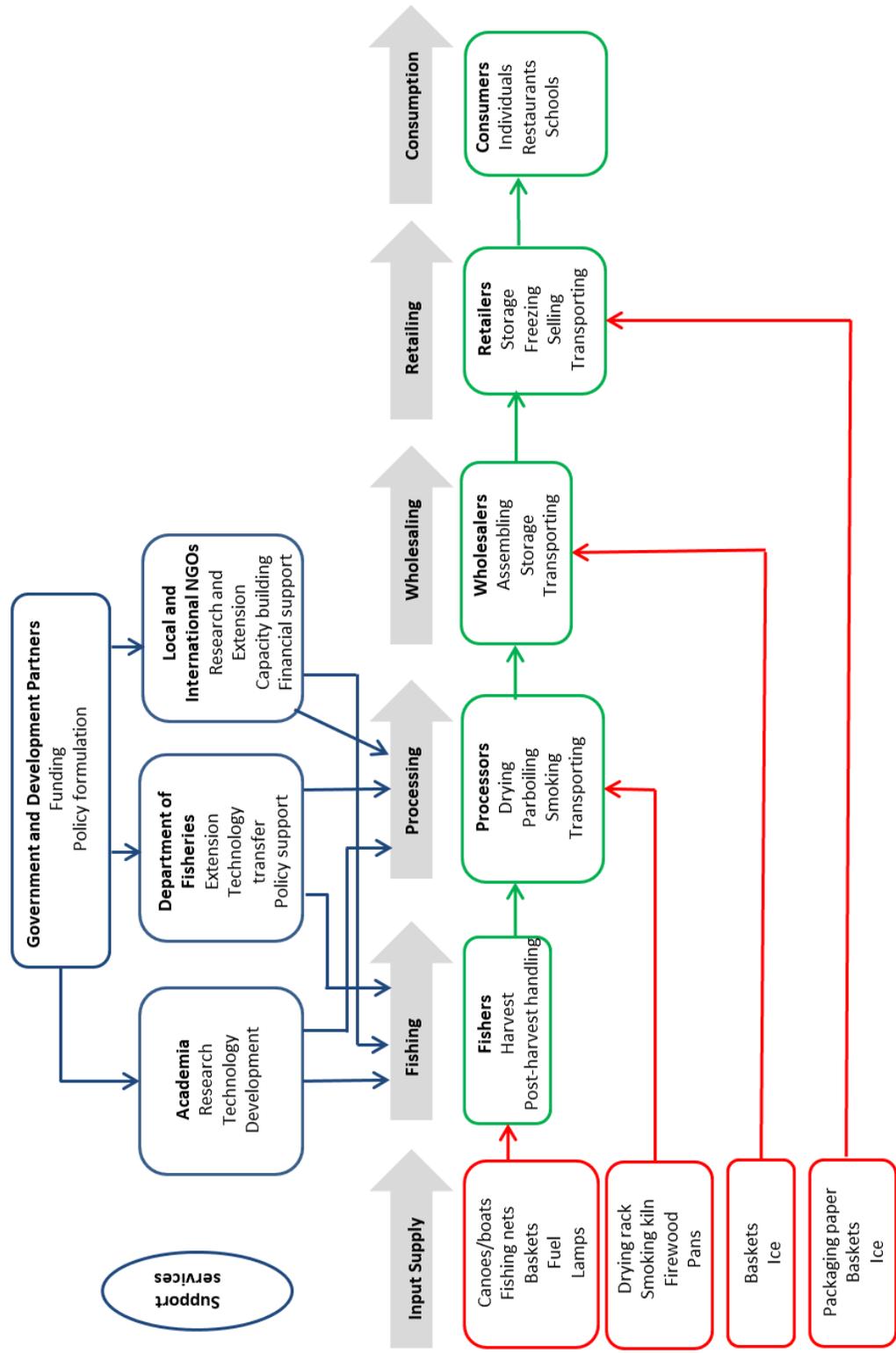
For some high-value species such as Chambo, after the fish is caught, it is taken straight to the beach for selling without any value addition. The situation, therefore, impacts wholesalers because they desperately need ways of preventing the fish from going bad. At this level, it is either the fisher or the wholesaler who takes the burden of adding value by smoking the fish. Chambo is mostly sold fresh because of demand. Chambo is rarely smoked. Mostly, smoked fish is targeted for upland markets because transportation of fresh fish is not feasible.

Small-scale fish activities are significant to the economy of Malawi; they are also profitable. In Lake Chilwa, Chiwaula et al. (2012) found that fishing is, on average, an activity that provides good nutrition and economic return. Fishers obtain average marketing margins of approximately 280/month USD. Disparities in the magnitude of marketing margins are observed among fishers with different resources and technology (e.g., artisanal and industrial fishers). Similarly, fish processors obtain higher marketing margins than wholesalers or retailers. The main reason for the disparity is that fish processors are involved in transforming the fish that adds significant value to the fish, unlike wholesalers and retailers who mainly buy fish from one point and sell it at another. In Lake Malawi, Phiri et al. (2013) found that the daily net incomes of retailers, fishers, and wholesalers were MK930.78 (USD 2.82), MK676.99 (USD 2.03), and MK485.40 (USD 1.46), respectively. Marketing margins were MK515.68 (USD 1.55), MK689.65 (USD 2.07), and MK1951.70 (USD 5.86) for fishers, wholesalers, and retailers, respectively<sup>8</sup>.

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<sup>8</sup>In March 2013, 1 Malawian Kwacha (MWK) = 0.003 USD (approximate).

Fig. C5. Fish value-chain map for Lake Malawi capture fisheries (Nankwenya et al. 2017).



## Governance of the Fish Value Chain

Substantial progress has been made to understand the social dimension of fisheries governance, including organizational and institutional flexibility for dealing with uncertainty and change. Governance of fisheries and other natural resources has taken a variety of forms: traditional, control from a central government, co-management, and combinations of these different forms (Njaya 2007).

Traditional governance embraces the use of customs, traditional beliefs, and social norms to manage access to natural resources. The current governance system evolved from the traditional to the centralized to the current co-management system. The key element in co-management governance is user-community participation in shared decision making for resource monitoring and control through the formulation and enforcement of fisheries regulations and bylaws. Therefore, the government's role in co-management is to create an enabling environment for the co-management partnership and participation of the user community.

Co-management governance arrangements started on a pilot scale on Lake Malombe in 1993 (Njaya 2002) in order to improve legitimacy, increase compliance with fishery-management rules, reduce illegal fishing, and reduce overfishing. Co-management later became part of the decentralization process, which started in 1998 with the Malawi Decentralization Policy (GoM 1998a) and the Local Government Act, 1998 (GoM 1998b). Beach Village Communities (BVCs) are part of the Village Development Committee (VDC) structure. VDCs are accountable to the traditional authority (TA) or chief through the Area Development Committee (ADC). ADCs are made up of village headmen. The TA/chief reports to the district government to whom power is devolved by the central government. The Fisheries Conservation and Management Regulations of 1999 ([https://malawilii.org/system/files/consolidatedlegislation/6605/fisheries\\_conservation\\_management\\_act\\_pdf\\_70735.pdf](https://malawilii.org/system/files/consolidatedlegislation/6605/fisheries_conservation_management_act_pdf_70735.pdf)) describe a fishing district and advocate for a higher level fishermen's association (FA) as the lobby group to represent the clustered BVCs that share the same fishery water body. FA members are elected by the BVC to perform a key role in fisheries development and management over larger areas of water bodies.

Key partners in co-management in Malawi (Table C5) include TAs, resource users (fishers and BVC and FA members), the DoF, the judiciary, and local government. The institutional arrangements for management and development of the fisheries sector include the relevant stakeholder institutions. The institutional structure comprises the Ministry of Agriculture and Food Security (at the central government level), the DoF, and the Fisheries Advisory Board (FAB) at the national level, local communities at the local level, and other relevant stakeholders. The ministry, through its DoF offices, directly controls operations of the sector, and the FAB advises the minister responsible for fisheries regarding various fisheries issues. Local communities, mainly BVCs, regulate fishing at the local level under the co-management arrangement.

Table C5. Co-management participants and their roles in Malawi (FISH 2015).

<b>Key Participants</b>	<b>Power Type</b>	<b>Tasks/Roles</b>	<b>Source of Power</b>
Traditional authorities	Adjudicate disputes, provide local law enforcement through traditional courts	<ul style="list-style-type: none"> <li>• Authorize use of beaches for fishing and landing</li> <li>• Resolve conflicts</li> <li>• Perform development work</li> <li>• Formulate rules, especially during recessions</li> </ul>	Customary, government
Local Fisheries Management Authority (LFMA) Beach Village Committees and Fisheries Association	Implement and ensure compliance	<ul style="list-style-type: none"> <li>• Formulate rules and regulations</li> <li>• Enforce regulations</li> <li>• Disseminate messages about fisheries management and health</li> <li>• Resolve conflicts</li> </ul>	Government, self-police
Beach chairpersons	Adjudicate disputes	<ul style="list-style-type: none"> <li>• Collect tributes</li> <li>• Resolve conflicts among fishers</li> </ul>	Traditional leader
Fishers	Abide by rules, bylaws, and laws	<ul style="list-style-type: none"> <li>• Participate in managing fisheries resources</li> </ul>	Self-police
Department of Fisheries (Ministry and Fisheries Advisory Board)	Create or review rules, make decisions about how a particular resource or opportunity is to be used, implement and ensure compliance	<ul style="list-style-type: none"> <li>• Manage resources</li> <li>• Formulate and enforce regulations</li> <li>• Conduct research</li> <li>• License fishing gears</li> <li>• Train the community</li> <li>• Resolve conflicts</li> </ul>	Government
Judiciary (Ministry of Justice)	Adjudicate disputes, draft laws	<ul style="list-style-type: none"> <li>• Sanction offenders</li> <li>• Draft laws</li> </ul>	Government
Local government/ district councils	Approve bylaws	<ul style="list-style-type: none"> <li>• Collect fish levies</li> <li>• Resolve transboundary conflicts</li> </ul>	Government

Recent broad-based co-management combined with the inclusion of the district assembly, judiciary, and other natural-resource-related departments at the district level has given an opportunity for formulation of bylaws that address issues of stakeholder participation—the roles of the TAs, the district assembly, the DoF, associations and BVCs; closed areas and seasons; minimum legal sizes of fish restrictions that are extended to fish species other than Chambo; and gear- and mesh-size restrictions. The composition of BVCs has also improved because BVCs are now composed of more resource users (Donda and Njaya 2007). The National Fisheries and Aquaculture Policy (GoM 2016b) highlights the need for establishing community-property organizations whereby empowered fishing communities and other stakeholders are responsible for the formulation of fisheries bylaws and developing management plans in a decentralized framework.

## **Objectives and Output of the Stakeholders’ Workshop**

The previous information will advise the workshop on how best to achieve the objectives of the stakeholders’ workshop, including

- Exchange ideas among key stakeholders from the Lake Malawi basin who are involved in the fish value chain
- Obtain a detailed description and map of markets and marketing infrastructure for fish and fish products
- Identify specific risks along the fish value chain and how to manage them
- Evaluate constraints and opportunities for improved monitoring and control of the fish trade to ensure product quality and reduce poaching and trade in undersized fish
- Evaluate potential for the sustainable expansion of aquaculture and the extent to which this would complement or conflict with the existing small pelagic fisheries
- Identify strategic interventions
- Elaborate on specific research questions
- Empower stakeholders to engage with international donors
- Incorporate the above into a proposal for funding by the international development community

The output of the stakeholders’ workshop will be a draft proposal for funding by the international development community.

## **SWOT Analysis and/or Analysis of Constraints**

The stakeholders’ workshop will conduct a SWOT analysis of the fish value chain in the Lake Malawi basin in order to develop a practical proposal (or proposals) that will be seen as positive to international donors and foundations. The proposal(s) should be in line with the FAO Code of Conduct for Responsible Fisheries (FAO 1995) and the BGI (<http://www.fao.org/policy-support/policy-themes/blue-growth/en/>).

## Policy Recommendations and Action Points

Stakeholders' workshop participants are invited to review this document and provide guidance on the following

- What are the key components of a SWOT analysis?
- What part/parts of the fish value chain has/have the greatest need for improvement in an economically viable manner?
- What investment and strategic interventions can be made?
- What information is needed—does it exist or does it need to be collected?
- What research questions help develop the investment strategy?
- Are there specific risks along the fish value chain and how should they be managed?
- What are the constraints and opportunities for improved monitoring and control of the fish trade to ensure product quality and reduce poaching and trade in undersized fish?
- What are some real possibilities for the sustainable expansion of aquaculture and to what extent would they complement or conflict with existing small-scale fisheries?
- What should be the scope of the project (e.g., Lake Malawi and/or other water bodies)?
- Is a project to improve the fish value chain a priority for Malawi and stakeholders?
- Are there any other comments?

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## **Fishery Management Documents**

- 2017-01 Fish community objectives for Lake Ontario. Thomas J. Stewart, Andy Todd, and Steven LaPan.
- 2020-01 Fish community objectives for the Lake Erie basin. James Francis, Travis Hartman, Kristopher Kuhn, Brian Locke, and Jason Robinson.

Cover photographs of Lake Malawi drying racks courtesy of Simon Funge-Smith (top) and Devin Bartley (bottom).