Food and Agriculture Organization of the United Nations

The contribution of small-scale fisheries to healthy food systems and sustainable livelihoods in Uganda

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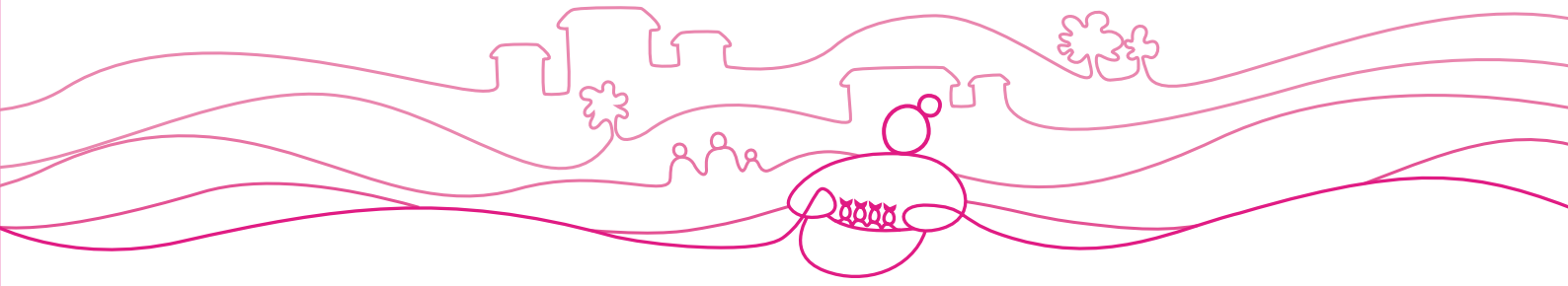

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Contents

Abbreviations and acronyms

BMU

Beach management unit

FAO

Food and Agriculture Organization of the United Nations

LSMS-ISA

Living Standards Measurement Surveys and Integrated Surveys on Agriculture

NDP III

National Development Plan (III)

SDG

Sustainable Development Goal

SSF Guidelines

Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication

Acknowledgements

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1

Introduction

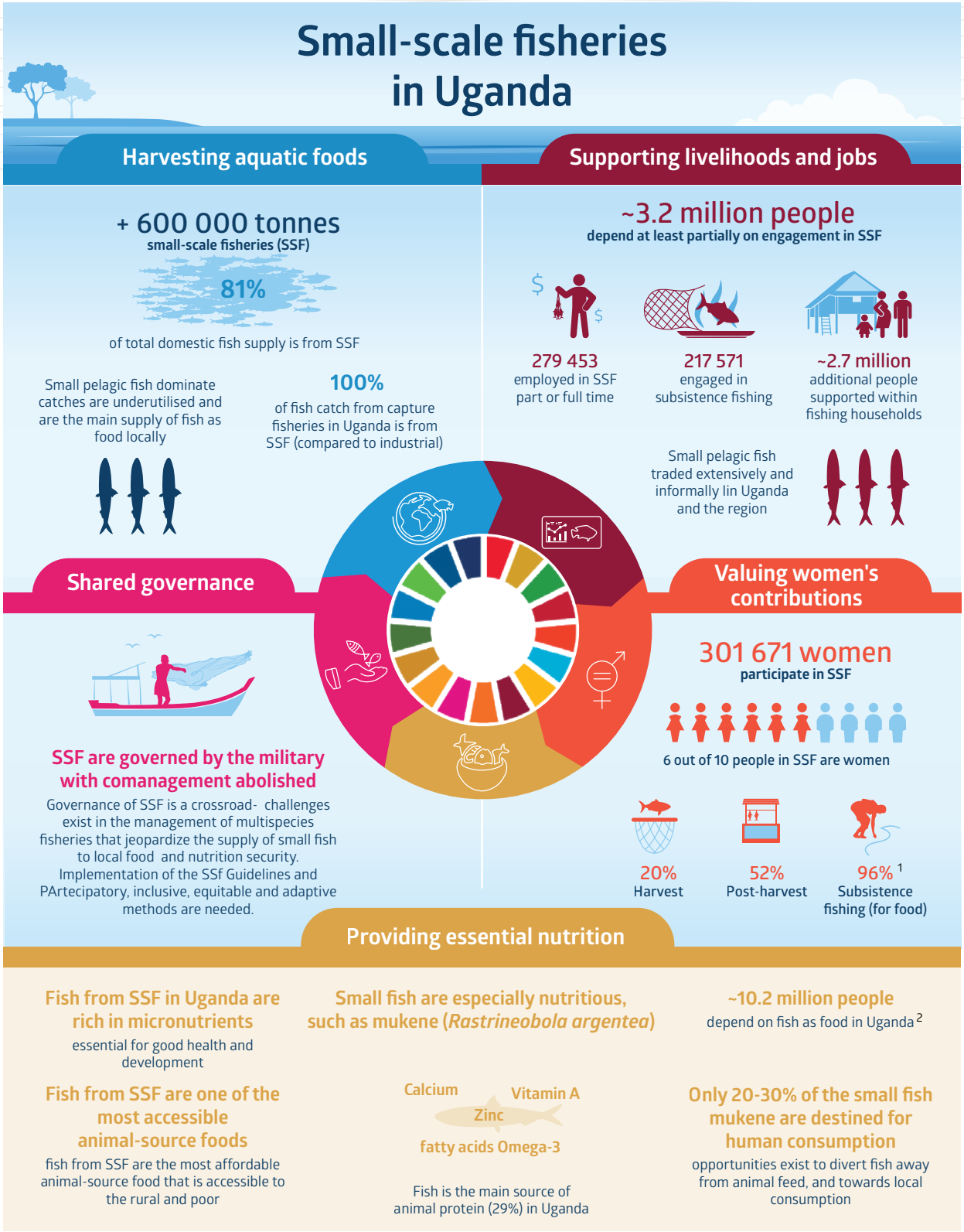
Uganda is a landlocked country in Eastern Africa with rich aquatic resources, comprising 41 743 km^2 of lakes, rivers, wetlands and swamps that cover almost one-fifth of the country's surface area (Nsubuga *et al*., 2014). Uganda's rich aquatic resources support abundant inland capture fisheries, with the reported catches forming the largest of any landlocked country globally and the largest in Africa (Funge-Smith, 2018). Inland capture fisheries are dominated by small-scale operators, whose reported catches, amounting to over 600 000 tonnes, provide 81 percent of the fish consumed by Uganda's population.

The small-scale fisheries sector lies at the basis of immense ecological, social, economic and cultural values that underpin the foundation of sustainable development in Uganda and progress towards the Sustainable Development Goals (SDGs) (Figure 1). In Uganda, small-scale fisheries nourish at least one-third of the population – over 10.2 million people (Simmance *et al*., 2022) through the provision of a low-cost, nutrient-dense and accessible source of food that contributes to addressing malnutrition. In addition, small-scale fisheries support at least 3.2 million people who depend at least partially on fish-related livelihoods (FAO *et al*., 2023). This figure includes women, who represent two-thirds of those involved in value chains. Fisheries-related employment and income drive rural economies and contribute towards preventing income poverty.

The sector has an essential role in transforming Uganda's food system by contributing to healthy and sustainable diets, equitable livelihoods and leaving no one behind in the fight against hunger and poverty. However, it faces multiple threats and challenges, such as shocks (due for example to climate change or COVID-19) and poor governance, which undermine the potential benefits to Uganda's society and progress towards the SDGs. The neglect and loss of small-scale fisheries would be devastating for Uganda's society and environment, and jeopardize progress towards alleviating poverty (SDG1), ending hunger (SDG2), good health and wellbeing (SDG3), gender equality (SDG5), responsible consumption and production (SDG12), climate action (SDG13) and sustaining life below water (SDG14). Strengthening the commitment and implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) can help safeguard and enhance small-scale fisheries' contributions to sustainable development and food systems in Uganda. Strategies are needed to highlight the nutritional value of small, low-cost fish species and to address fish loss and waste across value chains, as well as to promote equitable trade, governance and utilization of fish as food.

Lambu fish landing site on Lake Victoria

FIGURE 1. Summary of the contributions of small-scale fisheries in Uganda to sustainable development



Sources: FAO. 2021. Fishery and Aquaculture Statistics. Global production by production source 1950-2019 (FishstatJ). In: *FAO*. [Cited 18 September 2023]. fao.org/fishery/statistics/software/fishstatj/en; Kolding, J., van Zwieten, P., Marttin, F., Funge-Smith, S. & Poulain, F. 2019. *Freshwater small pelagic fish and their fisheries in the major African lakes and reservoirs in relation to food security and nutrition*. FAO Fisheries and Aquaculture Technical Paper No. 642. doi.org/10.4060/ca0843en; National Environment Management Authority. 2019. *National State of Environment Report 2018-2019.* National Environment Management Authority of the Republic of Uganda. http://nema.go.ug/; FAO, Duke University & WorldFish. 2023. *Illuminating Hidden Harvests – The contributions of small-scalefisheries to sustainable development*. Rome. https://doi.org/10.4060/cc4576en; Simmance, F.A., Nico, G., Funge-Smith, S., Basurto, X., Franz, N., Teoh, S. J., Byrd, K.A. et al. 2022. *Proximity to small-scale inland and coastal fisheries is associated with improved income and food security.* Communications Earth & Environment, 3(1): 174. doi.org/10.1038/s43247-022-00496-5; Masette, M. & Kwetegyeka, J. 2013. *The effect of artisanal preservation methods on nutritional security of "Mukene" Rastrineobola argentea caught from Lakes Victoria and Kyoga in Uganda.* Uganda Journal of Agricultural Sciences, 14(2): 95–107; Mpomwenda, V., Kristófersson, D.M., Taabu-Munyaho, A., Tómasson, T. & Pétursson, J.G. 2021. *Fisheries management on Lake Victoria at a crossroads: Assessing fishers' perceptions on future management options in Uganda*. Fisheries Management and Ecology, 29(2): 196–211.

[1] Percentages refer to the total number of people reported to engage in small-scale fisheries and the share who are women.
[2] Those people classified as dependent on fish as food were those reported to consume fish as part of their diet.

2

Small-scale fisheries' contributions to sustainable development in Uganda

2.1 Production and utilization of small-scale fisheries

- SSF Guidelines: sustainable resource management
- Uganda's 2040 Vision, National Development Plan III
- Fisheries and Aquaculture Policy 2017

FIGURE 2. Uganda's major lakes and river basins

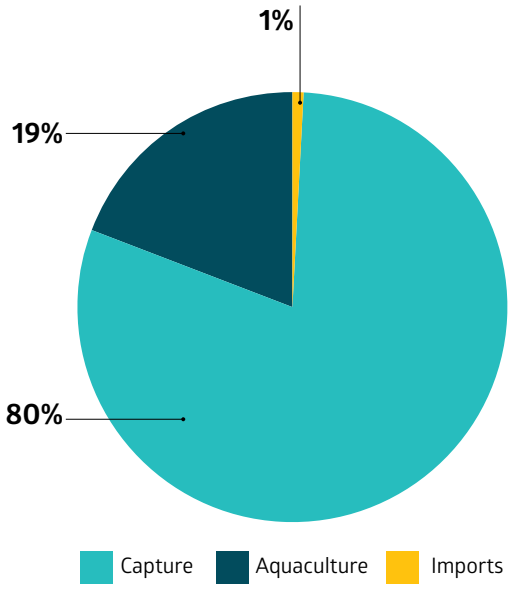
Source: United Nations Geospatial. 2020. Map geodata [shapefiles]. New York, USA, United Nations, modified by the author.

Catches of fish from small-scale fisheries

Uganda's vast freshwater bodies lie within the African Great Lakes Region and include major lakes – Lakes Victoria, Kyoga, Albert, Edward and George – as well as over 149 small lakes, the River Nile, other smaller rivers, and wetlands **(**Figure 2) (Nsubuga *et al*., 2014). It is reported that 99 percent of fish supply in Uganda is from domestic sources (Figure 3) (FAO, 2021b). The inland capture fisheries sector in Uganda provides the largest supply of fish in the country, representing 81 percent (439 354 tonnes) of total reported domestic fish supply in comparison to aquaculture (19 percent, or 103 737 tonnes) in 2018 (Figure 3), with catches at 603 000 tonnes in 2019 (FAO, 2021b). All capture fisheries in Uganda are small-scale (FAO *et al*., 2023). Broadly, small-scale fisheries are defined as fishers that use small capital investment, low-technology gear and vessels such as canoes (often non-motorized), and who catch fish for subsistence or local or regional markets (FAO, 2020). However, the Nile perch fisheries in Lakes Victoria, Kyoga and Albert are highly commercial export fisheries, making the second highest contribution to the gross domestic product in 2018 (National Environment Management Authority, 2019).

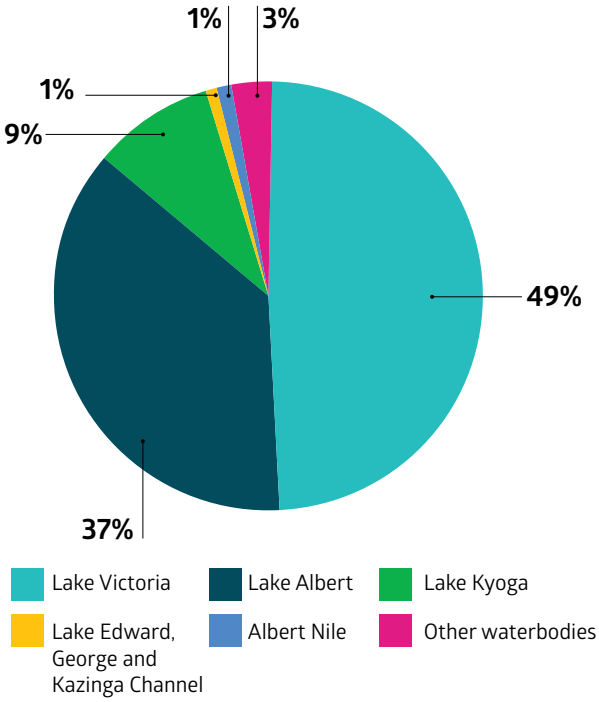
On average, from 2012–2018, half of all reported fish catches were from Lake Victoria (49 percent), followed by Lake Albert (37 percent), Lake Kyoga (9 percent) and other water bodies (Figure 4) (FAO *et al*., 2023). Lake Victoria is the world's largest tropical lake. It is shared between Uganda (45 percent), the United Republic of Tanzania (49 percent) and Kenya (6 percent). It is relatively shallow and highly productive, with a total annual catch of almost 1 million tonnes. Unfortunately, no catch assessment surveys have been conducted since 2014, although it is perceived that the catches of the commercially important Nile perch are decreasing due to overfishing. However, juvenile Nile perch constitutes the second largest stock in the lake (Natugonza *et al*., 2016), and annual acoustic surveys conducted between 2015 and 2020 show fluctuations but overall stable trends in the standing biomass. Fish catches in Uganda are dominated by small pelagic fish species, which are regarded as underutilized (Kolding *et al*., 2019). In Lake Victoria, the endemic small fish *Rastrineobola argentea* (locally known as mukene) dominates catches (60 percent), while in Lake Albert, catches are dominated by small fish species (80 percent) of *Brycinus nurse* (known locally

FIGURE 3. Uganda's reported fish supply (tonnes) in 2018



Note: The domestic fish supply accounts for fish landings from aquaculture (dark blue) and capture fisheries (light blue). Recorded catches do not include subsistence landings or exports.
Source: In: FAO. 2021. *Fishery and Aquaculture Statistics. Global production by production source 1950-2019 (FishstatJ)*. FAO Fisheries Division. Rome. fao.org/fishery/statistics/software/fishstatj/en

FIGURE 4. Proportion of fish catch from capture fisheries by water body in Uganda (average 2012–2018)



Source: Adapted from,FAO, Duke University & WorldFish. 2023. *Illuminating Hidden Harvests – The contributions of small-scalefisheries to sustainable development*. Rome. https://doi.org/10.4060/cc4576en

Small fish being sun-dried on the ground at the shores of Lake Victoria in Uganda.

as *ragoogi*) and *Engraricypris bredoi* (*muziri*) (Kolding *et al*., 2019). According to the latest catch assessment survey held in Lake Albert (NELSAP, 2019), the average Ugandan catch rates of *muziri* is 380 kg per hectare per year, the highest capture rate recorded from any African lake and illustrates the high productivity of small pelagic species.

Utilization of fish from small-scale fisheries

Although small-scale fisheries in Uganda have the potential to supply Uganda's population with 10.3 kg of fish per person per year, as based on figures for the 2018 catch (Funge-Smith, 2018), trade-offs exist in the utilization of small fish as animal feed and export trade versus its use for local food and nutrition security. In Uganda, small fish are more available and accessible (affordable) to local populations compared to larger fish species such as Nile perch. However, it is reported that up to 70–80 percent of small fish catches are utilized for animal feed production – for example being exported to Kenya for the animal feed industry – instead of for human consumption (Kolding *et al*., 2019; Masette and Kwetegyeka, 2013). Not all small fish are deemed to be of sufficient quality for human consumption, due to spoilage and food safety concerns in handling, storage and processing practices (Thiao and Bunting, 2021). For example, *dagaa* from the landing sites and markets around Lake Victoria contain high levels of aflatoxins and degraded fats, leading to reduced quality and nutritive value (Kigozi *et al*., 2020). In addition, there are socioeconomic drivers relating to the capacity to handle and process small fish, as well as economic incentives that prevent small fish being used for human consumption (Thiao and Bunting, 2021). Small fish that reach markets for human consumption are also traded across informal supply chains, where high post-harvest waste and loss occurs. There is occasionally high loss (estimated to reach up to 45 percent) in small fish value chains, particularly from rotting or spoilage due to delayed landing of catch and on-board handling, as well as from poor drying practices (LVFO, 2016). Therefore, opportunities exist to increase the availability of good-quality small fish for local food and nutrition security, which could address the large inequalities in access to fish by vulnerable populations (Simmance *et al*., 2022). Improved quality assurance, access to credits and hygienic infrastructure, and capacity building among fish actors (particularly women) are needed to address food safety concerns, low capacity and high fish waste and loss, in order to increase the utilization of small fish for local food and nutrition security in Uganda (LVFO, 2016). At the same time, efforts are needed to increase the use of small fish as a local nutritious food source, such as via nutrition awareness campaigns and development of alternative sources of animal feed.

2.2 Governance and management of small-scale fisheries

- SSF Guidelines: responsible governance of tenure, sustainable resource management, gender equality and human rights.
- Uganda's 2040 Vision, National Development Plan III
- Fisheries and Aquaculture Policy 2017

In Uganda, a co-management fisheries governance regime was introduced in the early 2000s as part of a wider approach for integrated lake management. In particular, the purpose was to tackle perceived overexploitation and the failures of a top-down approach (Nunan, 2006). The regime involved the devolution of enforcement powers from governments to local management levels, and engagement of fishers through beach management units (BMUs) to co-manage fisheries access and regulations (Nunan, 2006). The primary aim of the management regime was to increase productivity of the fisheries through controlled access and regulation of fishing practices (Nunan, 2006). However, challenges existed due to an uneven power balance, different objectives (Kateka *et al*., 2010), inadequate involvement of communities, inequalities in the engagement of women, and lack of economic empowerment (Nunan, 2006). In 2015, the Government abolished co-management and BMUs in Uganda in response to the decline of the Nile perch fishery in Lake Victoria due to perceived overexploitation and the inability of the BMUs to enforce the legislation (Mpomwenda *et al*., 2021). Since 2017, the Government has temporarily introduced a military body (the Uganda Peoples' Defence Force-Fisheries Protection Force [UPDF-FPF]) in the management of fisheries and enforcement of regulations involving requirements to have fishing licences and use restricted mesh sizes in fishing gears (Mpomwenda *et al*., 2021). Unfortunately, the military interventions have largely prioritized protection of the commercially valuable Nile perch export fishery. Such interventions have entailed massive confiscations of boats and illegal gears (small-meshed nets), thereby jeopardizing the livelihoods of small-scale fishers and the potential of small pelagic fisheries such as the mukene fishery (Mpomwenda *et al.,* 2021) which are regarded as sustainable and underexploited (Jul-Larsen *et al*., 2003; Kolding *et al*., 2019). Management of these multispecies fisheries in Uganda is therefore at a crossroads, with the rights, livelihoods, safety and food security of small-scale fishers on the line (Mpomwenda *et al*., 2021). Participatory, inclusive, equitable, self-regulated and adaptive methods may contribute to more effective co-managed governance that is needed to address the unique characteristics of inland fisheries and to ensure the supply of small pelagic fish for local food and nutrition security (Jul-Larsen *et al*., 2003; Kolding *et al*., 2019). In addition, governance institutions need to be strengthened so that they have the capacity to function and govern fisheries effectively.

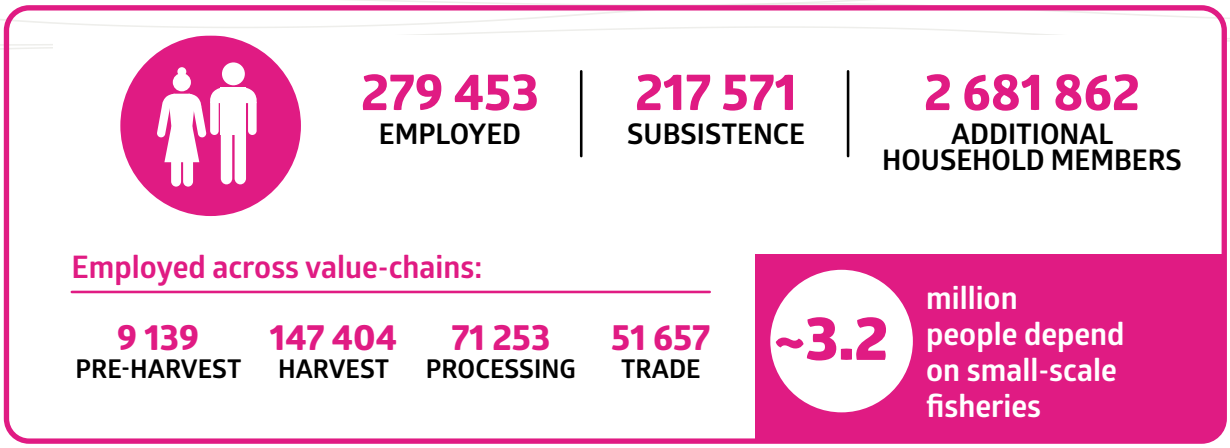
2.3 Economic benefits across small-scale fisheries value-chains

- SSSF Guidelines: social development, employment, and decent work
- Uganda's 2040 Vision, National Development Plan III

Employment in small-scale fisheries

Small-scale fisheries provide livelihoods to men and women across value chains: from pre-harvest activities (e.g. boat and gear making), harvesting (direct catch of fish), processing (e.g. cleaning, drying and smoking fish) to trading to local and distant markets. The catches, as well as the number of people who engage in small-scale fisheries, are known to be underreported globally as they are often not fully represented in data collection efforts (Fluet-Chouinard *et al*., 2018). The sector is often informal, where engagement can be full- or part-time, seasonal or occasional for subsistence. In addition, due to its often remote location, monitoring of employment is difficult and limited to larger fisheries and landing sites. The Government of Uganda concentrates on collecting information on men and women engaged in harvesting activities within the major lakes of Uganda. However, routinely collected national household income and expenditure surveys can provide information on livelihoods that is more representative than that available via employment

FIGURE 5. Estimated number of people depending at least partially on small-scale fisheries livelihoods in Uganda.



Source: Adapted from, FAO, Duke University & WorldFish. 2023. *Illuminating Hidden Harvests – The contributions of small-scalefisheries to sustainable development.* Rome. https://doi.org/10.4060/cc4576en

surveys, in terms of national coverage and inclusivity of activities (harvesting, processing and trade). Analyses of Uganda's Living Standards Measurement Survey and Integrated Surveys on Agriculture (LSMS-ISA) (National Panel Survey 2010–2011) reveal that approximately half a million people (497 024) are reported to depend on small-scale fisheries for their livelihoods, either as directly employed (279 453) or as subsistence fishers (217 571), who harvest fish for food only (Figure 5) (FAO *et al*., 2023). When accounting for fishers' household members, an additional 2.7 million people, approximately, derive support from small-scale fisheries livelihoods in Uganda. Of those directly employed, most are reported to engage in fish harvesting activities (53 percent), followed by broader value chain activities: processing (25 percent), trade (18 percent) and pre-harvest (3 percent) (Figure 5). The low number of people employed in the post-harvest sector in Uganda could be due to occupation multiplicity along the small-scale fisheries value chain: many harvesters also engaged in post-harvest small-scale fisheries, even if the time devoted to post-harvest activities was found to be lower compared to harvesting activities. Women also account for 60 percent (92 955) of people directly employed in small-scale fisheries, and 96 percent (208 715) of those engaged for subsistence (FAO, 2023). Although national household surveys can provide the most representative data sets on fisheries-related livelihoods, they too can underestimate small-scale fisheries due to challenges in accessing remote rural locations where small-scale fisherfolk often reside, and due to the structure of questions that may omit occasional fishers.

Trade of fish from small-scale fisheries

In 2018, a total of 24 584 tonnes of Nile perch were formally reported to be exported, representing approximately 5 percent of domestic fish supply (FAO, 2021b). In 2018, it was reported that 5 805 tonnes were imported into Uganda, which accounts for just 1 percent of total supply (FAO, 2021b) (Figure 3). Generally, in the region, domestic fish of high economic value is exported, such as Nile perch, while lower-value fish such as small pelagic fish are imported from the region (Simmance *et al.*, 2021). Large fish species, such as Nile perch, are regarded as a high-economic-value species and are mainly exported internationally, such as to European markets (FAO, 2022). In 2018, fisheries was the second largest export industry in Uganda, valued at USD 169 million (Government of Uganda, 2018). However, profits are often skewed towards industrial processing industries rather than small-scale fish harvesters. Small pelagic fish, mainly *mukene*, as well as muziri and ragoogi, on the other hand, are often more available for local consumption and contribute to food security and income generation for the rural poor (Funge-Smith, 2018; Kolding *et al*., 2019). Small fish are traded informally across Uganda and in Eastern and Southern Africa (LVFO, 2016), making important contributions to regional food and nutrition security (Funge-Smith, 2018; Mussa *et al*., 2017).

Small fish being sold at Kiyindi landing site on Lake Victoria in Uganda.

2.3 The contribution of small-scale fisheries to food and nutrition security

- SSF Guidelines: food security and nutrition.
- Uganda's 2040 Vision, National Development Plan III
- Food and Nutrition Policy 2003 and Nutrition Action Plan

The nutrient contributions of Uganda's small-scale fisheries

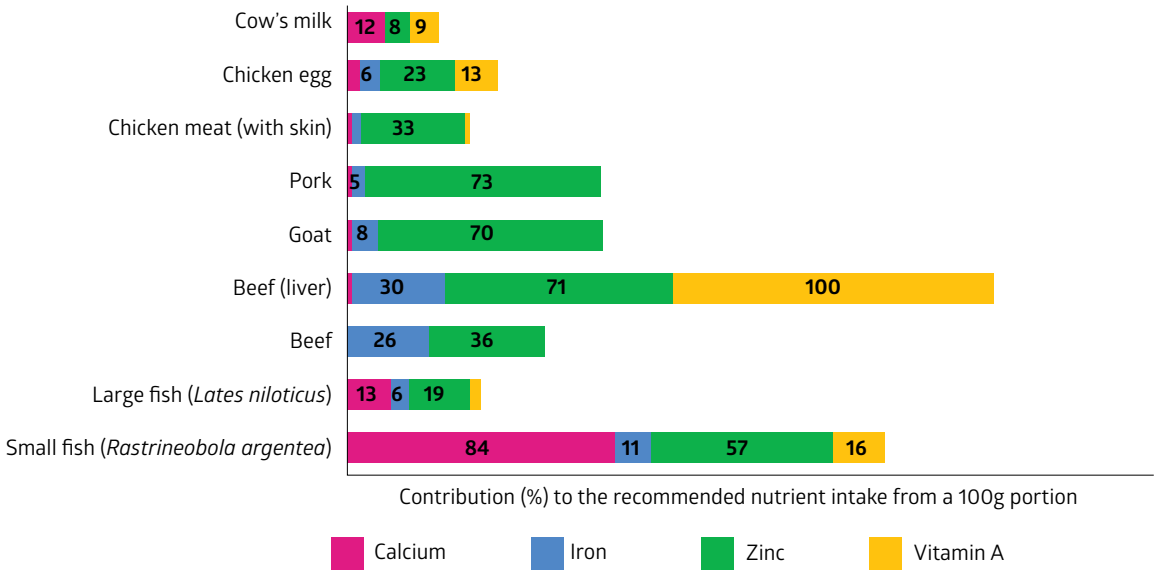
Fish are essential to healthy and sustainable diets and can address many of the nutrient deficiencies and health problems experienced by people in Uganda (Ahern *et al*., 2021). Uganda has some of the highest rates of food insecurity and malnutrition in the world and in Africa (FAO, 2021a). Approximately two-thirds of the Ugandan population experience moderate or severe food insecurity, one-third of children have stunted growth, and one-third of women of reproductive age suffer from anaemia (FAO, 2021a). According to the 2016 Uganda Demographic Health Survey, 29 percent of children under the age of five are stunted, 4 percent are wasted and 11 percent are underweight. Stunting is greater among children aged 18–35 months (37 percent), and in rural areas (30 percent) than urban areas (24 percent) with some regional variations (UBOS and ICF, 2018).

The nutrient value of fish varies substantially between species (Byrd *et al*., 2020, 2021), and based on processing and consumption practices (HLPE, 2014). Small fish from small-scale fisheries in Uganda and the region are rich in multiple nutrients – including calcium, zinc, iron, selenium, and omega-3 fatty acids – relative to larger fish species and other animal source foods (Appendix A), and are often consumed whole, increasing utilization of nutrients (FAO *et al*., 2023). A standard daily portion (50g serving) of mukene can meet 25 percent of the daily recommended nutrient intake for adult women for calcium, zinc and omega-3 fatty acids (Figure 6 and Appendix A) (Byrd et al., 2020). Consumption of fish could help address micronutrient deficiencies in Uganda and the region (e.g. relating to zinc and calcium) (Nölle *et al*., 2020; White *et al*., 2021) and contribute towards improved health (Bogard et al., 2017; HLPE, 2014). Small-scale fisheries directly contribute to food security and increased micronutrient intake, even in relatively small amounts, as they provide the largest supply of fish in Uganda (81 percent). In addition, small-scale fisheries increasingly target small fish, which are nutrient-rich. For example, a study that analysed fish powder made from 10g of dried small fish from northern Zambia found that the micronutrient concentrations were similar to a commercially made product designed to prevent micronutrient deficiencies (Byrd *et al*., 2021). Promoting small fish consumption in target populations that suffer high rates of micronutrient deficiencies could work synergistically with other solutions, such as biofortification of staple crops, to make real progress on SDG 2: Zero Hunger.

Access to fish as food in Uganda

Analyses of Uganda's LSMS-ISA revealed that in 2011, 33 percent of households nationally (approximately 10.2 million people) depend on fish for consumption (Simmance *et al*., 2022). Large inequalities exist subnationally in access to fish as food. A higher share of wealthy (36 percent) and urban (40 percent) households consumed fish, compared to rural (31 percent) and poor (24 percent) households (Simmance *et al*., 2022). However, fish was the most accessible animal-source food for the rural and poor

FIGURE 6. Contribution of fish from small-scale fisheries in Uganda and other animal-source foods to the recommended daily intake of nutrients for adult women.

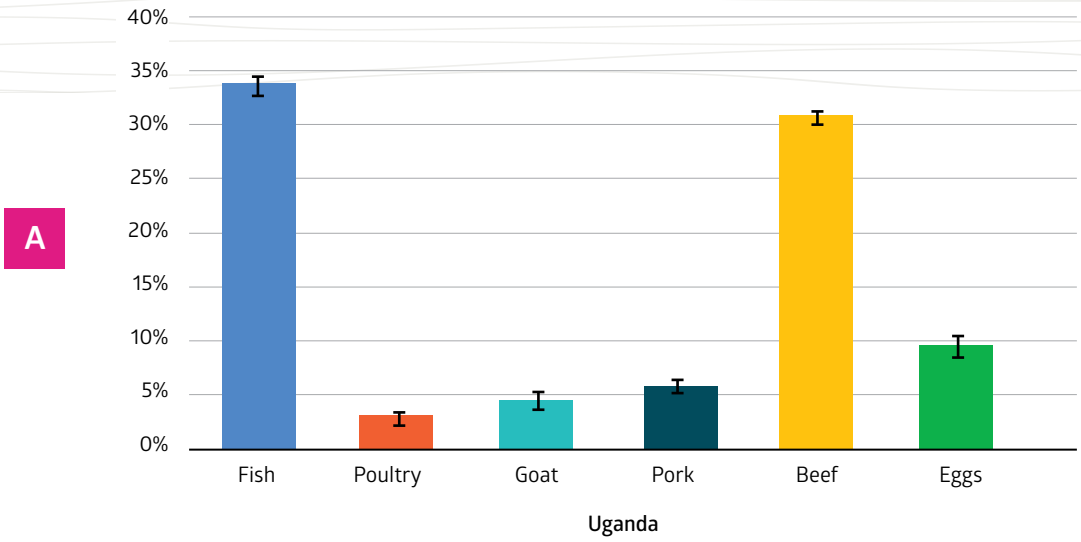


Source: Adapted from, FAO, Duke University & WorldFish. 2023. *Illuminating Hidden Harvests – The contributions of small-scalefisheries to sustainable development*. Rome. https://doi.org/10.4060/cc4576en

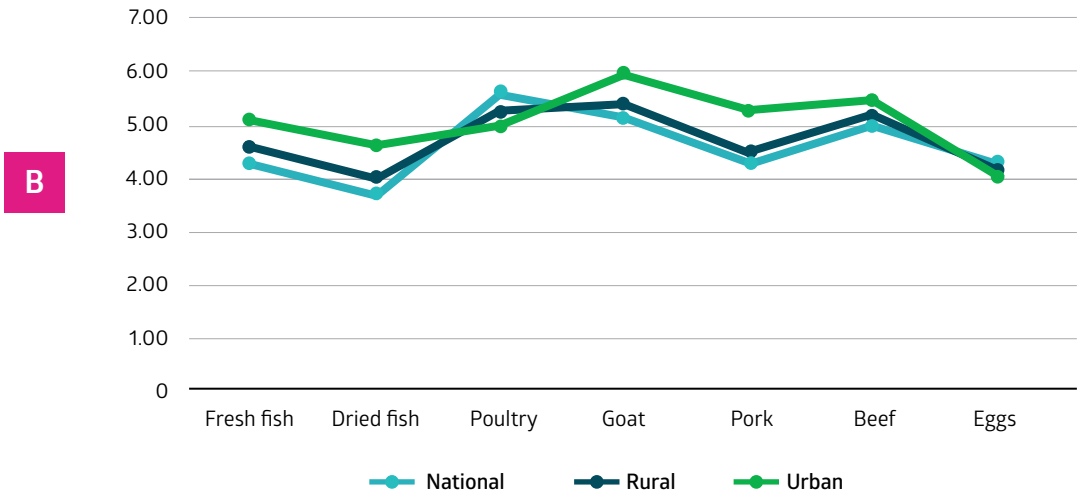
in Uganda, being proportionately more consumed in their diets compared to other animal source foods (Simmance *et al*., 2022). Fish, particularly dried small fish, is the most affordable animal-source food, compared to beef, chicken, goat and pork in the country (Figure 7), and can add diversity and nutrients to often poor-quality diets that are dominated by plant-based staple crops, such as with maize (*ugali* and *posho* local dishes), with few nutrient-rich foods. Dried fish was found to be the dominant form consumed by households compared to fresh fish, particularly among households living far from fisheries (by 1.8 times, in terms of the share of households) (Simmance *et al*., 2022). Small fish from small-scale fisheries therefore play a particularly important role in low-cost diets in Uganda and can be a vital source of multiple nutrients for poor and remote rural populations (Byrd *et al*., 2021; Genschick *et al*., 2018; Mussa *et al*., 2017).

There is little evidence on the contribution of Uganda's small-scale fisheries to food and nutrition security. In 2018, based on the national-level fish supply, it was estimated that 12.2 kg of fish was available for consumption per person in Uganda (FAO, 2021a). However, as mentioned earlier, large inequalities exist subnationally in access to fish as food. A recent study has illuminated where and for whom fish from small-scale fisheries is important for food and nutrition security (Simmance *et al*., 2022). In Uganda, living in proximity to small-scale fisheries was associated with a higher percentage of households consuming fish (by 50 percent) more frequently (twice as often), compared to those living far away (Simmance *et al*., 2022) (Figure 8). Rural households living far from fisheries had the lowest share of fish consumption (29 percent), which could be a result of limitations in fish trade and access to fish as food, as well as sociocultural factors such as food norms and traditions. In addition, proximity to small-scale fisheries was positively associated with food security: households living close to small-scale fisheries had more adequate food consumption profiles (as measured by the food consumption score) (Simmance *et al*., 2022). Fishing livelihoods have often been associated with higher wealth and food security in the African Great Lakes region, particularly for processing and trading (Béné *et al*., 2016; Simmance *et al*., 2021). However, in Uganda, households that engaged in the harvesting of fish were found to be more income-poor and food-insecure compared to agriculture households (Simmance *et al*., 2022). This

FIGURE 7. A. Share of households (% of total) consuming animal source foods in Uganda.



B. Prices of animal-source foods purchased in Uganda at the national level and for rural and urban areas (average price per kilogram in international US$).

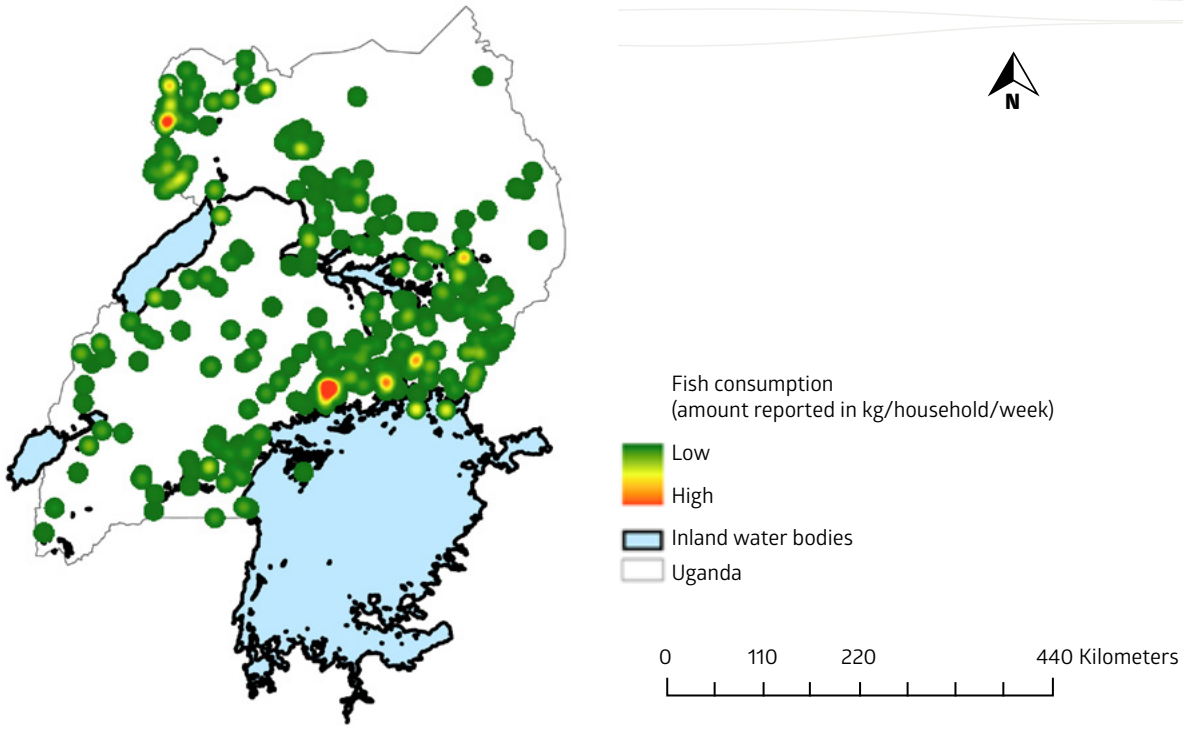


Note: A. Lines show 95 percent confidence interval (mean +/-1.96*standard error).
Source: Adapted from, Simmance, F.A., Nico, G., Funge-Smith, S., Basurto, X., Franz, N., Teoh, S. J., Byrd, K.A. et al. 2022. *Proximity to small-scale inland and coastal fisheries is associated with improved income and food security*. Communications Earth & Environment, 3(1): 174. doi.org/10.1038/s43247-022-00496-5

may be a result of export value chains driving inequity in the benefits retained for local fishing communities.

Small-scale fisheries can play a critical role in contributing to economic and physical access to food through providing a low-cost, highly traded, and accessible food source to vulnerable populations (Simmance *et al*., 2022). A recent study investigating the role of women in small-scale fisheries in Uganda also found that 59.3 percent of women in targeted fishing communities met the Minimum Dietary Diversity Score for Women (MDD-W), with fish being the most common animal source food consumed (Kadongola and Ahern, 2023). The study also found that women preferred small fish species, such as *mukene*, and consumed fish on average three times a week, throughout the year (Kadongola and Ahern, 2023).

FIGURE 8. Spatial distribution of households reporting fish consumption (green dots) by open inland water bodies (≥0.1 km²) (blue) for Uganda.



Source: Adapted from, FAO, Duke University & WorldFish. 2023. *Illuminating Hidden Harvests – The contributions of small-scalefisheries to sustainable development*. Rome. https://doi.org/10.4060/cc4576en; Simmance, F.A., Nico, G., Funge-Smith, S., Basurto, X., Franz, N., Teoh, S. J., Byrd, K.A. et al. 2022. *Proximity to small-scale inland and coastal fisheries is associated with improved income and food security. Communications Earth & Environment,* 3(1): 174. doi.org/10.1038/s43247-022-00496-5

Inequalities in access to fish as food by vulnerable groups

Uganda's Food and Nutrition Policy (2003) aims to secure the right to food for all in Uganda, in relation to an adequate supply of, and access to, good-quality food at all times (Rukondo *et al.,* 2014). Fish can serve as an accessible nutrient-rich food for all, including the vulnerable, in Uganda, helping to secure food and nutrition security. However, although fish consumption can be relatively high among fishing communities, large inequalities exist in access to fish as food for those living far from fisheries and within fishing households. High malnutrition rates have been found within agriculture-dominated and fisheries-scarce regions in Uganda (Kimere *et al*., 2022). In addition, on the shores of Lake Victoria, women fishers are often more vulnerable to inequalities in terms of the benefits obtained from fish-related activities compared to men, and are among the most food-insecure (Fiorella *et al*., 2014). Strategies to enhance the supply and trade of small fish from Uganda's small-scale fisheries could address these inequalities in access to fish and nutrient deficiencies in remote regions, and promote the equitable role of women in value chains and intra-household distribution of food (Isaacs, 2016; Kabahenda *et al*., 2011).

Food safety of fish from small-scale fisheries in Uganda

Food safety risks relate to all types of food. However, they are particularly relevant for perishable food items such as fish. In the small-scale fisheries sector, poor-quality infrastructure relating to processing, trade and markets can result in nutrient loss and contamination that pose a risk to human health. Poor post-harvest processing and handling practices, such as traditional methods of preserving fish, and conditions during transportation and at markets can expose fish to contaminants and undermine the nutrient potential of fish (Kigozi *et al*., 2020). For example, one study found that small fish in Uganda have aflatoxin contamination, which is related to child stunting when consumed (Kigozi *et al*., 2020). Improved post-harvest processing and handling practices (e.g. raised drying racks or cold storage) and market conditions (e.g. sanitization and raised tables) can improve the food safety of fish.

Women fish processing group

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3

Drivers of change in small-scale fisheries in Uganda

- SSF Guidelines: disaster risks and climate change
- Uganda's 2040 Vision and National Development Plan III

Statistics on the importance of the small-scale fisheries sector are likely underreported. Thus, the sector is greatly undervalued in Uganda and faces several threats (e.g. land use change, climate change) and challenges (equitable trade, post-harvest waste and loss, transboundary management, etc.). Most of Uganda's aquatic ecosystems are unprotected, with major declines and increased eutrophication (Kolding *et al*., 2008) in wetland areas over the past decade. These changes can be observed particularly around Lake Victoria and Kyoga, and are attributable to agriculture and urban expansion (Nsubuga *et al*., 2014). Many of these water bodies are also dependent on rainfall and are sensitive to climate variability, with periodic seasonal droughts in the region affecting lake levels and subsequently, fish catches (Kolding *et al*., 2016). Climate variability can bring positive changes, whereby water-level fluctuations increase fish productivity within freshwater bodies (Kolding *et al*., 2019). However, fishers can be vulnerable due to unpredictable catches caused by climate variability (Simmance *et al*., 2021) and can fall within a poverty trap due to exposure to multiple shocks (e.g. COVID-19) that disrupt their activities. Uganda's small-scale fisheries sector also faces some of the largest challenges in terms of inequalities and inefficiencies across its value chains in the region, with high fish loss undermining the flow of nutrition and economic benefits (Kakwasha *et al*., 2020; LVFO, 2016; Masette and Kwetegyeka, 2013; Simmance *et al*., 2021).

4

Conclusion – safeguarding and enhancing small-scale fisheries contributions to sustainable development in Uganda

Small-scale fisheries have an essential role in transforming Uganda's food system towards healthy and sustainable diets. As Uganda's urban environments continue to grow and nutrition and health priorities evolve, small-scale fisheries will play a key role in contributing towards a low-cost, resilient and accessible diet for all, for decades to come (de Bruyn *et al*., 2021; Chan *et al*., 2019). At the same time, people will need to recognize the importance of fish from small-scale fisheries as a traditional food source, and its role in future diets. Small-scale fisheries represent Uganda's blue economy and are integral to Uganda's 2040 Vision and the National Development Plan (III) (NDP III) for increasing food security and transforming towards a modern and prosperous society.

Lack of support to small-scale fisheries would undermine progress towards Uganda's national development goals and many of the SDGs; alleviating poverty (SDG1), ending hunger (SDG2), good health and well-being (SDG3), gender equality (SDG5), responsible consumption and production (SDG12), climate action (SDG13) and sustaining life below water (SDG14).

The SSF Guidelines set out guidelines for action and policies to secure sustainable small-scale fisheries (FAO, 2015). Strengthening commitment to and implementation of the SSF guidelines can help harness the benefits of small-scale fisheries for sustainable development in Uganda.

Box 1 sets out some opportunities for strengthening the sector in Uganda, and Table 1 sets out key recommendations for Uganda's policies and plans that require change both within and outside the fisheries sector, as well as engagement with diverse actors. Action is pertinent now given the International Year of Artisanal Fisheries and Aquaculture 2022, which seeks to illuminate the valuable role of small-scale fisherfolk for food and nutrition security, livelihoods and employment, and environmental stewardship, as well as the final two decades towards Uganda's 2040 Vision.

BOX 1

Opportunities for safeguarding and enhancing the value of small-scale fisheries in Uganda

Harness the nutritional benefits of small-scale fisheries – reduce fish loss and promote consumption

In Uganda, small-scale fisheries will be the main supply of fish for decades to come. Small fish, such as mukene, are among the most nutrient-rich and affordable food sources in Uganda. However, the availability of fish for local consumption is undermined by high rates of fish loss (Up to 45 percent in some value-chains) across value chains, the utilization of fish as animal feed (70–80 percent) and lack of awareness of the nutritional value of fish among all consumer groups. Substantial nutrition gains can be made from improved post-harvest processing and handling practices (e.g. drying racks, solar dryers, cold storage), increased equitable trade initiatives that promote use of fish for local food and nutrition security, and integrating fish products into nutrition strategies that address malnutrition.

Enhance equitable and sustainable governance and management of small-scale fisheries

Inclusive and equitable governance of fisheries underpins the sustainability and future of small-scale fisheries and the provision of benefits for sustainable development in Uganda. Collaborative forms of management, specifically co-management of fisheries in a way that is gender-sensitive and inclusive, responsive to the needs of women and men fish actors, and adaptive to drivers of change, can help secure viable fisheries in Uganda in the future. Integrated conservation policies across water-land-fisheries-agriculture nexus are also needed to address ecosystem degradation and recognize and protect aquatic ecosystems.

Support actors, particularly women, in small-scale fisheries value chains

Women represent one in six fishers employed in small-scale fisheries. However, they are largely invisible in the sector and experience large inequalities and vulnerabilities. Increased recognition and support are needed to address these disadvantages and to promote fair treatment and equal opportunities. Fisherfolk across the sector also experience wider dimensions of poverty, such as marginalization from political decision making, lack of access to basic services (e.g. health) and increased vulnerability to diseases (e.g. water-borne and HIV/AIDS). Addressing the needs of fisherfolk is essential to secure the basic rights of fishers and the provision of benefits to society, such as via promoting access to health and financial services, technology and training on post-harvest practices.

Recognize and enhance the contribution of small-scale fisheries to Uganda's future food system

Recognizing the value of fish for sustainable and healthy food systems in Uganda will be critical for future sustainable development. Improved data management systems that collect not only fisheries data, but also information at representative scale on fisheries' diverse social, economic and cultural values is needed to monitor and recognize the role of fish and small-scale fisheries in local and regional food systems. Data routinely collected as part of national surveys – e.g. the Living Standard Measure Survey and its dedicated fishery module, and the Demographic and Health Survey – can address data gaps and can make information available through improved reporting on fish beyond production (e.g. value chain livelihoods, gender, consumption by species). Data can better inform integrated policies across food, climate, health and economics, in order to safeguard and enhance small-scale fisheries.

Source: Authors' own elaboration.

TABLE 1. National-level recommendations for Uganda's policies and plans, to better protect and enhance small-scale fisheries and their contribution to sustainable development.

National-level policy and plans	Contribution of small-scale fisheries and recommendations
2040 Vision	· To **recognize the value of the Blue Economy** in Uganda's transformation towards a modern and prosperous society by 2040. · To recognize **small-scale fisheries as central to a sustainable and healthy food system**; provide a nutrient-dense and healthy food source that is accessible to all; ensure a low environmental and water footprint; and provide employment and income in rural and urban environments. · Small-scale fisheries are often overlooked compared to aquaculture and agriculture. However, they will provide the main supply of fish in Uganda for decades to come. **There are enormous opportunities for value addition and waste and loss reduction in small-scale fisheries**. · Small-scale fisheries can contribute towards the goal of increasing incomes and local food security, and empowering disadvantaged groups. · Small-scale fisheries can enable realization of aspirations to be "part of a strong East African Federation" by promoting regional collaborative fisheries management and trade.
National Development Plan (NDP III) 2020/21 – 2024/25	· The NDP III aims to accelerate achievement of the SDGs and Uganda's Vision 2040. However, it overlooks the value of small-scale fisheries in reducing poverty and increasing food security. · It should be recognized that **small-scale fisheries underpin the achievement of many SDGs**. · It should also be recognized that **small-scale fisheries have a critical role in achieving the NDP III's goal of increasing food security**. However, trade-offs in fish exports need to be addressed to ensure national food security.
Fisheries and Aquaculture Policy 2018	· **To harmonize policies with the SSF Guidelines and adopt a people-centred, rights-based approach to fisheries policy and governance.** · To respect and promote the right to fish, right to adequate food, and equal access for women, with inclusive co-management implemented. · To integrate fisheries policies with other sectors: food and nutrition, development, the environment, etc. to safeguard and enhance small-scale fisheries. · To recognize the diverse values of small-scale fisheries as presented in this paper: nutrition, economic, sociocultural. · With regard to monitoring systems, to effectively utilize data within national surveys on fish consumption and fisheries, and report on disaggregated fish-related information. Data routinely collected as part of national surveys – e.g. the LSMS-ISA and its dedicated fishery module, and the Demographic and Health Survey – can address data gaps in fisheries and its nutrition and economic values.

National-level policy and plans	Contribution of small-scale fisheries and recommendations
Food and Nutrition Policy 2003 (UFNP)	· **Small-scale fisheries are critical to the UFNP's overall goal of ensuring food security and adequate nutrition for all the people in Uganda.** · Small-scale fisheries contribute to Goal 3.1 – increase food supply and accessibility by provision of an affordable animal source food that is accessible to all and can contribute towards reduced malnutrition and improved health (e.g. reductions in risk of heart disease, diabetes, cholesterol and stunting). · Small-scale fisheries contributes to Goals 3.2 and 3.4 – on reducing reliance on food imports and promoting local produce as they provide the main fish supply in the country. · The policy recognizes the right to food and aims to ensure an adequate supply of, and access to, good-quality food at all times. Small-scale fisheries provide one of the most nutrient-rich and affordable food sources in the country that can be accessible to vulnerable populations. Thus, the policy can better support small-scale fisheries. · More efforts are needed to promote and add value to fish products, reduce waste and loss and to **ensure fish exports do not jeopardize national food security**.
Uganda's Nutrition Action Plan 2011-2016	· Fish are not mentioned in Uganda's Nutrition Action Plan due to inadequate data. This is despite its nutritional and health value and the fact that it is widely accessible to all. · **The Plan should recognize the value of fish from small-scale fisheries in food and nutrition security plans and programmes.** There are opportunities to promote fish products, particularly small fish from small-scale fisheries, and to integrate fish into programmes targeting vulnerable populations (such as school feeding programmes).

Source: Authors' own elaboration.

Appendix A

TABLE A1. Nutrient content of fish species from small-scale fisheries in Uganda and the region, and other animal source foods (per 100g raw edible parts).

Food name / Fish species (With local name)	Calcium (mg)	Iron (mg)	Selenium (mcg)	Zinc (mg)	Vitamin A (mcg, RAE)	Omega-3 (DHA+EPA) (g)	Protein (g)
Small* freshwater fish (fresh) in Uganda							
Rastrineobola argentea (Mukene)	836.85	3.37	32.25	2.78	82.22	0.59	18.03
Large* freshwater fish (fresh) in Uganda							
Lates niloticus (Nile perch, mputa)	133.57	1.74	195.52	0.94	13.86	0.29	20
Oreochromis niloticus (Nile tilapia, Engege)	25.93	1.79	74.22	1.91	3.77	0.41	17.34
Clarias gariepinus (Catfish, Male)	20.16	1.6	73.31	0.55	32.3	0.25	17.34
Small freshwater fish (fresh) traded in the region							
Stolothrissa tanganicae (Kapenta)	540.42	4.13	46.37	2.96	25.11	0.45	17.91
Copadichromis virginalis (Utaka)	246.02	1.66	45.69	2.5	59.27	0.39	17.99
Protomelas similis	226.11	2.02	52.24	3.08	24.39	0.3	17.61
Limnothrissa miodon (Kapenta)	309.78	4.57	51.9	2.8	10.39	0.51	18.09
Engraulicypris sardella (Usipa)	735.89	7.08	59.24	2.21	49.13	0.32	17.17
Small freshwater fish (dried) traded in the region							
Engraulicypris sardella (Usipa)	451	40.6	-	-	-	-	45.7
Engraulicypris breianalis (Usipa)	1453	6.2	-	25.4	66	-	67.2
Rhamphochromis esox (Mcheni)	1884	20.3	-	-	-	-	39.8
Copadichromis inornatus (Utaka)	451	40.6	-	-	-	-	45.7
Other animal-source foods							
Beef	1	7.5	-	1.77	-	-	20.5
Beef (liver)	7	8.8	-	3.5	4970	-	19.4
Goat	11	2.4	-	3.45	0	-	17.5
Pork	10	1.4	-	3.6	0	-	16.8
Chicken meat (with skin)	8	1	-	1.6	7	-	21.1
Chicken egg	39	1.8	-	1.15	67	-	12.6
Cow's milk	120	0.1	-	0.38	44	-	2.9

(cont.)

Note: Bold indicates the food items that contain the top three nutrient values for each nutrient, compared to other food items listed. Pink indicates the food items rich in multiple nutrients, where the food contributes to 25 percent of the recommended nutrient intake for adult women for a combination of at least three nutrients.

Freshwater fish species (small and large) are those most caught from small-scale fisheries in Uganda or traded in the region. They are defined as small (maximum length smaller than 25 cm) or large (maximum length greater than 25 cm). Their nutrient values are derived from FishBase and nutrient modelling as part of the Illuminating Hidden Harvests Initiative. The nutrient values of other animal-source foods are obtained from food composition in the region (Malawi). Due to the different data sources and methods used in calculating the nutritional value of dried fish compared to fresh fish, no direct comparisons can be made between the two.

Recommended nutrient intake for adult women (ages 19–50) for each nutrient: calcium (1000 mg), iron (29.4 mg), selenium (26 mcg), zinc (4.9 mg), vitamin A (500 mcg, retinol activity equivalents (RAE)), and omega-3 (1.1 g) (FAO *et al*., 2023).

Source: Adapted from FAO, Duke University & WorldFish. 2023. *Illuminating Hidden Harvests – The contributions of small-scalefisheries to sustainable development.* Rome. https://doi.org/10.4060/cc4576en

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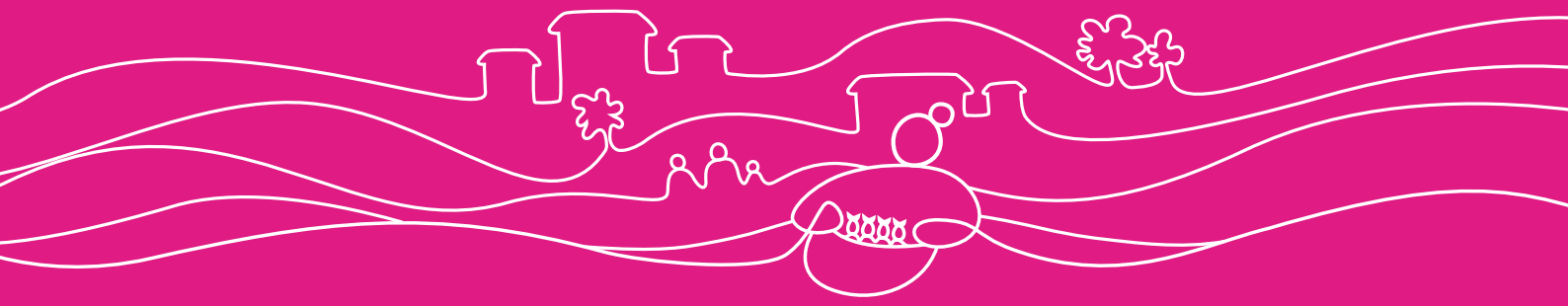
This Small-scale Fisheries Brief is tailored to provide insight into the contribution of small-scale fisheries to healthy food systems and sustainable livelihoods in Uganda. Over 10.2 million people are nourished from fish supplied from small-scale fisheries in Uganda, and at least 3.2 million people depend at least partially on small-scale fisheries livelihoods. The sector has an essential role in transforming Uganda's food system by contributing to healthy and sustainable diets, equitable livelihoods and leaving no one behind in the fight against hunger and poverty. However, it faces multiple threats and challenges, such as shocks (due for example to climate change or COVID-19) and poor governance, which undermine the potential benefits to Uganda's society and progress towards the SDGs. Strengthening the commitment and implementation of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) can help safeguard and enhance small-scale fisheries' contributions to sustainable development and food systems in Uganda. Strategies are needed to highlight the nutritional value of small, low-cost fish species and to address fish loss and waste across value chains, as well as to promote equitable trade, governance and utilization of fish as food.



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