



Annual Report 2014/2015

To reduce poverty and hunger by improving fisheries and aquaculture



Today, fish is recognized as a global superfood. Fish provides nutrients and micronutrients that are essential to cognitive and physical development, especially in children, and is an important part of a healthy diet.

Globally, 3 billion people rely on fish for almost 20% of their animal protein. And demand for fish is increasing. Projections suggest that we will have a 68–78 million metric ton shortfall of fish by 2030. This shortfall will be especially acute in sub-Saharan Africa, where aquaculture has yet to fully develop and where fish consumption is projected to decline to only 5.6 kilograms per person, far below the global level of 18.2 kilograms per person.

In addition to contributing to food and nutrition security, fisheries and aquaculture provide employment for approximately 800 million people. In Africa, Asia and the Pacific in particular, many of the most resource-poor rely on fishing as a primary source of income, and are therefore particularly vulnerable to decline in fish stocks.

Securing and increasing the supply of fish for resource-poor consumers and improving the lives of resource-poor women and men producers are the goals of our research.

For this annual report, we have focused on our work in a few key areas:

- Developing **aquaculture** technologies and supporting **sustainable fisheries management** to meet the challenge of producing enough fish;
- Ensuring that fish is an affordable food for resource-poor and vulnerable consumers to meet the challenge of **nutrition** security;
- Promoting **gender equity** to enhance agricultural productivity, increase food security and incomes for resource-poor smallholders;
- Investing in fish **value chain development** to meet the challenge of equitably distributing the economic benefits of aquatic agricultural systems.

Through our work in these areas and across the rest of our research agenda, we aim to improve the lives of more than 27 million resource-poor and vulnerable people by 2024. To reach this goal, we are deeply reliant on our network of **partners** who work with us at local to global scales.

Fortunately, we have been able to pursue our work in a positive financial climate. During the past year, we saw revenue increase by 15% from USD 35.9 million to USD 41.1 million. Increased revenue has also allowed us to enhance our focus on gender and increase our research capacity.

This positive climate has been due, in part, to our participation in the CGIAR Research Program on Aquatic Agricultural Systems (AAS), which we have led for the past 4 years. In partnership with communities in Africa, Asia and the Pacific, this program has allowed us to refine our approaches for working with communities, has identified areas where new research is needed, and has helped bring tested technologies and policies to scale. As AAS entered its final year in 2015, we look forward to building on lessons learned from AAS in the next phase of CGIAR research program development.

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WorldFish at a glance

7.3M
Direct
beneficiaries

Impact

By 2025, WorldFish will have improved the food security and incomes of millions of resource-poor people through fisheries and aquaculture.

20.4M
Indirect
beneficiaries

Where we work



17
Countries in which WorldFish
conducts research

WorldFish works in Africa, Asia and the Pacific with an extensive network of partners to create change for the millions who depend on fish in the developing world.

Partnerships



229
WorldFish partners with substantial
program engagement

WorldFish works with an extensive network of partners. Partnerships are essential to bringing technologies and innovations to scale and achieving development impact.

Organization



411
Total staff



35%
Percent of women on staff



62%
Percent of staff directly
working in research

Publications

106
Total
publications



49
Peer-reviewed

57
Working papers,
reports and
briefs

Communications

182M
Total media
reach



2K
Twitter
followers

262K
Website visits

Aquaculture

Aquaculture is the world's fastest-growing food production sector. WorldFish research focuses on sustainable intensification of aquaculture.



Training on improved technologies helps Bangladeshi *gher* farmers maximize their production

Two United States Agency for International Development (USAID)-funded projects in Bangladesh are training *gher* farmers on good management practices to sustainably boost the productivity and profitability of their farms

The vast floodplains of southern Bangladesh have been transformed over centuries into a patchwork of rice fields and aquaculture ponds.

To increase the food production from this challenging landscape, farmers have developed a unique agricultural system called a *gher*. A pond is dug into the rice field, and the excavated mud is piled up around the banks to create both a footpath to navigate the expansive grid and cultivable land for growing vegetables.

While this method of cultivation has been used for generations, WorldFish's adaptive research on improved *gher* farming technologies has increased the productivity of these systems by 30%.

In Bagerhat District, the Aquaculture for Income and Nutrition (AIN) project has provided training on good management practices for shrimp, fish and vegetable *gher* farming to 19,479 farmers since 2012, 28% of whom are women.

The practical sessions cover the whole aquaculture process, including pond preparation, polyculture technologies for fish and shrimp, the correct stocking densities, feeding regimes, harvest techniques, vegetable cultivation, nutrition, and more.

AIN also focuses on educating farmers on the importance of sourcing and using good-quality polymerase chain reaction (PCR)-tested shrimp postlarvae that are free of white spot syndrome virus to reduce disease outbreak, along with connecting farmers with postlarvae suppliers.

"Earlier, my harvest was not good because I did not have the required knowledge about how to release the fry, feed them or use fertilizers,"

recalls mother of two Sabita Odhikari, who has been brackish-water *gher* farming for 26 years in her village of Rai, Bagerhat.

"Now when I prepare the *gher*, I dry it, then apply lime, fill it up with water, add bleach, and only then release the fry. Earlier I wouldn't do all this," she adds.

The training sessions also teach participants how to culture vegetable crops around the banks of the *gher*, as well as the best varieties to plant during each season.

"After the training, I would share the knowledge with my husband or son, and they would all listen to me ... My fish and shrimp harvest is better, my family life has improved, and my children are happy," she says.

In neighboring Khulna District, the Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD) has also provided training on good management practices for freshwater and brackish-water *gher* farming to 5800 farmers since 2011.

The project is also conducting research in partnership with local farmers to identify the most effective and affordable fish feed for local growing conditions.

"My neighbors and I told our trainers that we have learned about fish farming, but if we could do something about the feed we could all benefit. We were using costly feed, but of low quality ... The trainers suggested we start doing research, and that is how I got involved," says Mahammad Harun Mollah, a freshwater fish and prawn *gher* farmer from Dhopakhola village, Khulna.

"We used four different types of feed for research last year, but one stood out. This year we are using the top two local feeds along with last year's pick, and researching these to find the best one. The improved feed was a big advantage. Now the fish grow twice as much with less disease, so the production is higher," explains Harun, who expects his yields and profit to further increase as the research continues.

In a country where more than 46 million people in rural areas are living in poverty, these projects are helping to provide increased incomes for around 680,000 small- and medium-scale farmers and their families.

"The success with *gher* farming has improved my income. Life has become so much better. I've gotten two more *ghers*, built a house and this year I got married! Life's good," smiles Harun.

Outcomes

- 19.5K** Farmers trained in *gher* farming technologies by AIN since 2012
- 20.7K** Farmers trained by CSISA-BD in *gher* farming technologies from 2011 to 2014
- 28%** The proportion of farmers trained by both projects who are women



Watch a video about how the training on improved technologies helps Bangladeshi *gher* farmers maximize their production.

Facts

Projects: Aquaculture for Income and Nutrition (AIN) and Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD)

Donor: United States Agency for International Development (USAID)

Partners: International Rice Research Institute (IRRI), International Maize and Wheat Improvement Center (CIMMYT), BRAC, Fisheries Faculty of Bangladesh Agricultural University and Mymensingh

Research program: CGIAR Research Program on Aquatic Agricultural Systems (AAS)



Improving incomes through aquaculture in Egypt

Egypt's aquaculture sector provides full-time employment for more than 140,000 people and is a critical source of fish that provides Egyptians with up to 38% of their animal protein intake. The Improving Employment and Income through Development of Egypt's Aquaculture Sector (IEIDEAS) project has helped to strengthen the aquaculture sector by improving the profitability of fish farms and securing employment for a range of value chain actors, including women fish retailers.

The project provided practical training on aquaculture best management practices to over 2000 fish farmers across five regions. The training focused on increasing the efficiency of farms through improved fish feed management, reduced stocking rates, improved water management and pond fertilization. Selected farmers, along with public and private sector hatcheries, were also supplied with the genetically improved Abbassa strain of Nile tilapia, which grows up to 30% faster than the country's next best commercial strain.

Farmers who received the training, the Abbassa strain, or both interventions are now earning around USD 18,000 more in annual profits than those who are yet to receive project support. This is equivalent to an increase in profitability from 12% for nonbeneficiaries to 30% for farmers assisted by the project. Optimizing the efficiency of the farms builds a solid base for further intensification, and increased profitability will attract further investment and employment in the sector.

Additionally, women fish retailers were assisted by the project to form retailers' associations to enable them to better control the prices for their fish and lobby for safer and cleaner marketplaces. The project also held interactive theater workshops for 900 women, where skills such as negotiation and problem solving were taught. These skills help the retailers overcome challenges such as harassment. As a result, fish retailers assisted by the project are now earning higher profits than similar fish retailers who have not yet been assisted.

Enhancing Cambodia's rice field fisheries

Cambodia's vast rice fields provide both this staple food to the country's population and a critical habitat for a diversity of fish species that inhabit the surrounding wetlands. During the wet season, fish and other aquatic animals move throughout the rice fields, where they are caught for consumption and sale by rural Cambodians. Fish are a source of income, food and nutrition, but stocks have dwindled in recent decades due to factors including habitat destruction and overfishing.

Recognizing the need to sustainably increase the productivity of these ecosystems, the Cambodian Fisheries Administration has constructed 896 community fish refuges throughout the country. Community fish refuges are demarcated wetland areas connected to rice fields. In these refuges, fishing is prohibited, providing a safe habitat for fish populations to replenish during the dry season when the water recedes from the rice fields.

Since 2012, the USAID-funded Rice Field Fisheries Enhancement Project and partners have worked with community fish refuge committees to improve the governance and management of the committees and support community and stakeholder participation in the development of rice field fisheries management plans. The project has also provided scientific knowledge and guidance on good management practices for fish refuges and rice field fisheries, raised awareness about the importance of these resources, supported physical habitat reconstruction, and delivered capacity building in a range of areas including biological monitoring processes, among other activities.

To date, the committees have independently raised a combined total of USD 21,026 through traditional ceremonies and local governance planning processes. They have used these funds for the maintenance of the community fish refuges and the protection of conservation zones.

Further research will be conducted over the next year, with results and best management practices shared with communities, agricultural research and development programs, government agencies, nongovernmental organizations, and the scientific community.



Distributing Genetically Improved Farmed Tilapia in Bangladesh

Since its development through a selective breeding program by WorldFish and partners nearly a decade ago, the Genetically Improved Farmed Tilapia (GIFT) strain has been disseminated to 16 countries worldwide. This tilapia strain can adapt to a wide range of farming systems and has brought numerous benefits to fish farmers and consumers.

In Bangladesh, where farmed fish is an important source of income, food and nutrition security, the USAID-funded Aquaculture for Income and Nutrition (AIN) project is disseminating GIFT to selected breeders and hatcheries, which in turn provide quality tilapia seed for small- and medium-scale farmers.

In 2013, four tilapia breeding nucleuses (TBNs) were established by AIN in Jessore, Laxmipur and Mymensingh districts using brood stock of the 11th generation of GIFT brought to Bangladesh from Malaysia. During 2015, the project established three new TBNs, which have provided 2.1 million GIFT fry of the same generation to 59 hatcheries for future multiplication and dissemination. Both mass selection and rotational breeding techniques are being applied in all TBNs under the technical guidance and supervision of WorldFish to avoid inbreeding and ensure the continued development of this high-performing strain.

The project has also provided training to hatchery workers on good management techniques to improve productivity. Through providing capacity building, technical support and GIFT brood stock, the project is ensuring a supply of quality tilapia seed for farmers and supporting the rapid expansion of tilapia farming throughout Bangladesh.



Nutrition

Fish provides nutrients and micronutrients that are an essential part of a healthy diet. WorldFish research focuses on enhancing fish consumption by the resource-poor, especially women and children.



Small fish, big nutritional value

Micronutrient-rich small fish species are providing resource-poor and vulnerable households in Bangladesh with a source of food and nutrition security

While Bangladesh has made significant progress in reducing undernutrition in recent years, a large proportion of the population still does not consume enough vitamin A, iron and zinc to meet nutritional requirements.

In rural areas, more than 30% of the population is stunted, 29% is underweight and 21% is wasted. Young children and pregnant and lactating women are particularly at risk.

The first 1000 days of life, from conception to around 2 years of age, is a critical window during which children must receive adequate nutrition. Without sufficient nutrients, they risk stunting or inhibited brain development and cognition. These are irreversible and make it difficult for them to learn at school and perform at work later in life.

To help improve nutrition security in rural Bangladesh, two United States Agency for International Development (USAID)-funded projects, the Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD) and the Aquaculture for Income and Nutrition (AIN) project, are providing training and inputs to help families cultivate micronutrient-rich small fish and vegetables.

Indigenous small fish species such as *mola* (*Amblypharyngodon mola*) have been found to be particularly rich in micronutrients and highly nutritious, as they can be eaten whole, including the heads, organs and bones. Similarly, the roots and leaves of orange sweet potato are rich in vitamin A and can be easily grown around the banks of ponds.

Women were key targets for the projects, as they generally play the primary role in homestead vegetable gardening, are more vulnerable to undernutrition than men, and are typically responsible for cooking for the family.

“Despite having the land and pond earlier, I could not utilize it for fish farming and I purchased fish instead. I was unaware of the possibilities,” says Shushila Mondal from Milemara village, Khulna District.

Shushila is one of 3921 women farmers to date to receive training from CSISA-BD on vegetable farming and polyculture of *mola* with larger fish species like carp—covering all aspects, from pond preparation to feeding and frequent harvesting techniques, along with nutrition and gender awareness.

Following a 2-day training session, Shushila received *mola* fry, orange sweet potato vines and vegetable seeds from the project and went on to produce 29 kilograms (kg) of sweet potato roots, 22 kg of sweet potato leaves, 80 kg of vegetables and 2.5 kg of *mola* from January to July 2015.

“In the past I had to purchase all my food. I could not always eat *mola*, but now I can have it whenever I desire ... I consume a lot of my vegetables, more than required,” adds the mother of two.

Similarly, AIN has provided vegetable seeds, *mola* fry and orange sweet potato vines to farmers in the neighboring Bagerhat District, along with training on *mola* polyculture and vegetable cultivation for household consumption.

A key focus of AIN’s work is providing education on nutrition and teaching women in particular how to prepare and cook the *mola* whole to maximize the nutritional value. A key element of the workshops focuses on the importance of consuming a nutritious diet during pregnancy and lactation and introducing complementary foods to infants after 6 months of age.

“We learned how to farm fish in the pond, grow vegetables ... After catching the *mola* with our gill net, we consume most of it and sell the rest. Whatever I’ve learned, I share with those who don’t know, including how to prepare and feed it to the children,” explains Shuily Shingho, who participated in the AIN training in Mailmara village, Bagerhat.

Since 2014, the projects have collectively provided training on small fish, vegetable and orange sweet potato farming to 68,584 participants.

Outcomes

68.6K Women and men trained by CSISA-BD and AIN on *mola*-based fish polyculture, vegetable gardening, orange sweet potato production and nutrition

26K Farmers who received *mola* seed from AIN and CSISA-BD from October 2010 to December 2014



Watch a video about micronutrient-rich small fish in Bangladesh.

Facts

Projects: Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD) and Aquaculture for Income and Nutrition (AIN)
Donor: United States Agency for International Development (USAID)
Partners: International Rice Research Institute (IRRI), International Maize and Wheat Improvement Center (CIMMYT) and BRAC
Research program: CGIAR Research Program on Aquatic Agricultural Systems (AAS)



Diversifying diets for improved health in Zambia's Barotse floodplain

AAS participatory action research yields new knowledge about nutrition for local communities

Zambia's Barotse floodplain is a landscape of extremes, cycling between annual floods and periodic droughts.

For the 250,000 people living in the region, 80% of whom survive on less than USD 1.25 per day, accessing nutritious foods throughout the year can be challenging.

With little income, most cultivate crops, keep livestock, catch fish or harvest wild foods from the surrounding plain.

Understanding how the changing landscape influences the varieties and availability of foods is key for the CGIAR Research Program on Aquatic Agricultural Systems (AAS), which is working in partnership with communities here to sustainably increase food and nutrition security.

"During floods, plants like sweet potatoes are transplanted to the upper land and maize is also grown there. However, this year's maize and sweet potatoes dried up because of drought," explains mother of three Namakando Mubiana from Mapungu village.

"In this village only one person grows green vegetables. Some also tried it but were discouraged because our gardens were flooded before our vegetables were ready," she says.

Faced with these challenges, including limited knowledge about nutrition and low farm productivity, undernutrition is widespread in the area, with more than half of all children under the age of five experiencing stunting. This is due to the fact that children are mostly fed staple foods like *nshima*, a stiff porridge made from maize flour and water, and which generally contain only small amounts of micronutrients.

In 10 communities, including Namakando's, researchers and community members have developed tools to help improve diets year-round.

The program takes a participatory action research approach that treats communities as partners, whose challenges and visions for the future guide the program's interventions. Communities help conduct research and jointly lead the program work in their village, increasing their ownership over the process and capacity to continue to improve their lives in the future.

Local knowledge was used to create seasonal calendars that show which foods are available and abundant during each month. Based on this information, infographics were developed that highlight the key nutrients in each food type. This helps families to plan and balance their diet throughout the year and guides farmers on the best crops for each season.

Through the sessions, participants also learned about nutrition and the importance of dietary diversity, which helps increase the consumption of a variety of nutrients and improves overall health and wellbeing.

"We didn't know that one food can be mixed with other foodstuffs and be eaten at the same time. We thought each food was to be cooked separately and eaten on a particular day," says Namakando, who explains that traditional dishes in Barotse are very simple, and in the past children were often given only boiled sweet potato for breakfast.

"But we now know that in the same sweet potatoes we can add cooking oil, onion and milk. We've also mixed pumpkin with their leaves and ground nuts or pumpkin seed," she adds.

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- Namakando Mubiana, Zambia

To share their knowledge and new nutritionally balanced recipes, men and women have held cooking demonstrations using seasonal ingredients in public spaces.

"[The demonstration] was really welcomed. A lot of the people came along to learn with us. The majority of the village took part in the learning and were excited about it ... They now use the new cooking methods in their homes," recalls Namakando.

A landscape cookbook containing recipes for each season is now being developed with the communities. To improve access to nutritious foods, communities have also begun working with the program to trial the cultivation of certain nutrient-dense crops in their villages.

These developments are key steps towards increasing the ability of families in the Barotse floodplain to better use their surrounding natural resources to improve their food and nutrition security.

Fisheries management

Most capture fisheries are already at or beyond productive limits. WorldFish research focuses on how to achieve resilient and ecologically sustainable small-scale fisheries.



Community-based fisheries management in Solomon Islands

Coastal communities are adapting their approach to fisheries management to secure fish stocks for the future

The remote island of Manaoba is home to a number of small communities, which like most in Solomon Islands rely on fish for food, nutrition and income. However, in recent years fishers here have noticed declining fish stocks and the disappearance of certain species from their near-shore reefs.

“At the moment we are experiencing a shortage of fish, so we need more supply in order to earn income to meet our family and other needs,” says Joe Sylvester, who has fished the waters around Manaoba in Malaita Province since he was a teenager.

This sentiment is echoed throughout much of Solomon Islands, where factors including population growth, increased demand for fisheries resources and the use of destructive fishing methods are placing valuable stocks under pressure.

The WorldFish-led CGIAR Research Program on Aquatic Agricultural Systems (AAS) began working with Joe’s village of Fumato’o in 2013. During a visioning exercise, the community highlighted declining fish populations as a key challenge facing their village and identified the need to better manage their marine resources to improve supplies.

AAS supports a community-based resource management approach, which is the principal strategy supported by national government policies for small-scale and coastal fisheries. This approach recognizes that communities are the owners and custodians of their resources and empowers them as stewards.

Traditionally, fisheries in Solomon Islands were commonly managed by establishing a *tambu*, or area that was closed to fishing for a set

timeframe to allow stocks to replenish ahead of ceremonies or celebrations. Today, this system alone may not be sufficient to protect stocks. Research by AAS has found that the success of *tambus* depends on many factors, including the local ecology, the ratio between how often they are opened and closed, and how intensely they are fished when opened to the community.

Considering such variables, *tambus* may be most effective when used in combination with other fisheries regulations. AAS is providing scientific knowledge and guidance on combining customary practices with modern resource management strategies.

One of the first steps the community took was to form a governing body to lead this process. “We decided to form a fisheries management committee, and we chose the committee members from the five tribes in the village,” says Joe, who was elected as chair.

The committee controls and enforces which fishing methods and gears can be used within community-managed waters. In 2014, the committee established a *tambu* that can only be fished for 1 week after 2 months of closure—balancing the immediate need for fish with long-term sustainability goals.

With guidance from AAS, the committee will record these regulations in a written management plan, which Joe will distribute to neighboring communities who share fishing grounds around Manaoba for their feedback.

“Women, youth, everyone is involved in decision-making. It is important for everyone to have their voices and views heard,” says Joe. AAS research has found that strong local

“We have seen changes, not only with marine management, but with people’s behavior and attitudes in the community. The work we do together has resulted in cooperation and my people working together in this community.”

- Joe Sylvester, Solomon Islands

leadership and sustained community-wide awareness and involvement are key elements for effective, long-term community-based resource management.

Joe believes that the program’s approach of bringing the community together to identify and work towards common goals has led to social as well as environmental improvements. “We have seen changes, not only with marine management, but with people’s behavior and attitudes in the community. The work we do together has resulted in cooperation and my people working together in this community,” reflects Joe.

After operating their *tambu* for 1 year, fishers in Fumato’o have reported an increase in fish populations and biodiversity within the area. Through discussion with fishers and observation of changes in their catch, AAS will work with the community to understand and measure these changes.



Watch a video about community-based fisheries management in Solomon Islands.

Facts

Project: Scaling-out community-based marine resource governance in Solomon Islands, Kiribati and Vanuatu
Donors: Australian Centre for International Agricultural Research (ACIAR) and Asian Development Bank (ADB)
Partner: Ministry of Fisheries and Marine Resources (MFMR)
Research program: CGIAR Research Program on Aquatic Agricultural Systems (AAS)

Value chains

WorldFish research focuses on exploring opportunities along the value chain—including reducing waste and loss—to enhance access to fish for resource-poor consumers.



Salting fish to improve livelihoods in Zambia's Barotse floodplain

Fishers, processors and traders are working in partnership with researchers to improve the ways they preserve fish to increase its shelf life, reduce losses and create new opportunities for trade

Life in Zambia's Barotse floodplain is defined by water. Annual floods inundate the area and bring a diversity of aquatic life to the plain, with fish in particular providing a critical source of income and food for the region's 250,000 inhabitants, more than 4 out of 5 of whom live in poverty.

As the water recedes, many fishers and their families migrate to temporary fishing camps along the Zambezi River for up to 6 months of the year.

Webby Kahyata, who has been catching and selling fish for nearly 20 years, explains that without electricity for refrigeration, fishers must preserve their catch to stop it from spoiling. Preserving the fish is also necessary for the journey to the market: "We preserve it for future use, for example during floods and the fishing ban. With the preserved fish we are able to carry and consume it wherever we go, since fish is scarce where we are from," he says.

"Sometimes we would get fish which costs ZMW 150 (USD 15), but when we reach the market we would sell it for ZMW 80 (USD 8) because it has started going bad by then. We end up finding no profit," says Webby, whose income supports his wife and four children.

Retailers store fish so they can buy when the price is low and sell when the price is high, increasing their profits.

The most common methods of preservation used in the region are smoking and sun drying; however, these techniques come with challenges.

Smoked and dried fish are brittle and often break during packaging and transportation, creating losses for the seller. The smoking and drying processes also make the flesh susceptible to rotting and insect infestation, reducing its longevity.

To reduce these postharvest losses, the CGIAR Research Program on Aquatic Agricultural Systems (AAS), through the Cultivate Africa's Future (CultiAF) project, is working with communities to trial and refine fish processing technologies.

The project uses a participatory action research approach, which treats communities as partners who drive the focus of the research and conduct experiments themselves. With guidance from the research team, 12 community groups have identified the challenges they face with processing fish. Community members in Webby's village of Mukakani selected salting as one of the methods to trial in response to these challenges.

"The benefits of salted fish are many. It is not easily attacked by weevils or rot, the shelf life is longer, and it maintains its original flavor ... also it does not break easily," explains Nicholas Ndabulula, a fish trader who is working with the project to provide advice and demonstrations on salting fish for interested community members.

"Salting is the cheapest and least laborious. With smoking you need to buy firewood ... but for salted fish you just need a basin, salt and knives, which are things people use when they are preparing fish anyway," says Nicholas.

Sometimes we would get fish which costs ZMW 150 (USD 15), but when we reach the market we would sell it for ZMW 80 (USD 8) because it has started going bad by then. We end up finding no profit.

- Webby Kahyata, Zambia

"The response [to the demonstrations] has been overwhelming in all the fishing camps," he adds, with salting being the most popular technology presented by the CultiAF project. Sun drying, improved smoking and icing were also favored.

Salting is a new technique for many in Barotse. Fish that is salted in Barotse is purchased by foreign traders for export to neighboring countries, including the Democratic Republic of Congo and Angola. There is not yet a formal salting market in Zambia due to lack of consumer knowledge on how to properly desalt fish prior to cooking. The CultiAF project, in partnership with traders like Nicholas and community members, aims to create awareness about the benefits and preparation of salted fish, thereby stimulating a local demand for the product.

With per capita fish consumption in sub-Saharan Africa projected to decline to only 5.6 kilograms by 2030, well below the global average of 18.2 kilograms, reducing postharvest losses through fish processing can increase incomes and provide families with a source of food and nutrition throughout the year.

Facts

Project: Improving Livelihood Security and Gender Relations in Rural Zambia and Malawi through Post-Harvest Fish Value Chain Innovations and Social Change Interventions

Donors: The Australian International Food Security Centre, Australian Centre for International Agricultural Research (ACIAR) and International Development Research Centre, Ottawa, Canada (IDRC)

Partners: Department of Fisheries (Zambia Ministry of Fisheries and Livestock), University of Zambia, University of Malawi and Nono Enterprise

Research program: CGIAR Research Program on Aquatic Agricultural Systems (AAS)

Gender equity

Rural women have a major role in fisheries and aquaculture. WorldFish gender equity research focuses on how resource-poor men and women access and use resources and who benefits from different development alternatives.



Savings and lending promotes gender equity in Barotse floodplain, Zambia

Gender-transformative savings and lending groups increase incomes and promote shared household decision-making

In Barotse floodplain, rates of poverty and hunger are high. People depend on a range of activities for income, including fishing, farming and running small businesses. With no access to formal banking, borrowing money to purchase inputs or invest in technologies to carry out these activities is difficult, especially for women.

To address this issue, savings and internal lending communities (SILCs) were established to increase smallholder farmers' access to microfinance. An SILC group is made up of community members, both men and women, who pool savings into a fund from which they can borrow. Loans are paid back with interest, growing the fund. There is an annual share-out for distribution of all or part of the total funds (including interest earnings) to the individual members, on the basis of a formula that links payouts to the amount saved by each individual.

Philip Kaunda, an SILC supervisor for Caritas Mongu, notes, "The idea of SILCs came about after Western Province (Barotse floodplain) had been hit by successive droughts in 1997, 2001 and 2002. We learned that people did not engage in agriculture because they did not have capital to buy inputs. SILCs were introduced so they could invest in agriculture."

Through the CGIAR Research Program on Aquatic Agricultural Systems (AAS), an innovative strategy that embeds gender-transformative approaches (GTA) within SILCs was implemented with the aim of increasing incomes and promoting shared household decision-making on savings and investing. In the floodplain, men customarily make large financial decisions and are regarded as the main wage earners. SILC groups are comprised mostly of women and are formed

and supported by trained community facilitators.

"Initially men were jealous of women's participation in SILC groups," observes Philip. "Men prevented their wives from attending these meetings because they thought women were being empowered more than them and that the women would be able to access money and run businesses."

In response, community facilitators lead additional discussion sessions on gender-related topics—including men's involvement in caregiving, substance abuse, and working as a team—during weekly SILC meetings where each member saves and can take out loans. This is known as SILC+GTA. Discussion topics were selected based on a comprehensive social and gender analysis undertaken by AAS in 2013.

Mary Mupenda from Lealui community joined an SILC group in 2013. "We have discussions called SILC+GTA, where we learn that men and women should work together and not divide roles by gender. This has really helped my husband and me. We work together, make money together, and these days wake up together at 04:00 to make fritters for my business," she observes.

While Mary's husband was initially reluctant about her joining the group, after her first share-out of ZMK 730 (USD 112), he realized the potential of the SILC and joined as well. Mary has taken out loans to buy ingredients to make fritters and to buy vegetable seeds. Through these investments, she and her husband have made enough money to send their children to school and feed the family.

"My husband is very happy about the SILC and his love for me has grown such that we

We now decide together how to use money. Some time back it wasn't like this, but this unity came after I joined the SILC.

- Mary Mupenda, Zambia

are now as close as trousers and a belt," Mary notes. "We now decide together when it comes to the use of money. Some time back it wasn't like this, but this unity came after I joined the SILC."

As of 2015, there were 18 SILC+GTA pilot groups. Initial research suggests that share-out benefits for couples were higher than for individual members.

Through action research in the pilot phase of SILC+GTA, AAS is addressing gender equality, a primary research area, by promoting shared decision-making and access to finance.

The next phase of the project will focus on channeling investments to fish and rice value chain inputs and technologies, which will help women bridge existing productivity gaps.

Outcomes

- 63** SILC groups managed by community facilitators from October 2014 to March 2015
- 18** SILC+GTA groups being piloted in AAS communities
- 73%** SILC group members who are women



Watch a video about how savings and lending promotes gender equity in Barotse floodplain, Zambia.

Delivering impact through partnership

Partnerships are essential to bringing technologies and innovations to scale and achieving development impact. WorldFish partners with hundreds of international, national, regional and local institutions and organizations.



Partnership between local government units supports small-scale fisheries in the Philippines

Small-scale fisheries play a critical role in food security, income generation and poverty alleviation in the Philippines, where 1.3 million people depend on near-shore fisheries for their livelihoods. However, increasing demand for these resources, coupled with habitat destruction and inadequate enforcement of conservation policies, has placed marine resources under threat.

In response to these challenges, the Implementing an Ecosystem Approach to Fisheries in Small-Scale Tropical Marine Fisheries project used an ecosystem approach to improve small-scale fisheries management and enhance the contribution of small-scale fisheries to poverty reduction.

The project worked with the eight local government units in the Philippines comprising the Iligan Bay Alliance of Misamis Occidental (IBAMO) in Northern Mindanao. The local government units share 60 kilometers of coastline in Iligan Bay, which has suffered declining fish catches in recent years.

The project reactivated and expanded the alliance, which provided a governance framework for inter-local governmental collaboration and a mechanism to strengthen fisheries and coastal resources management. The project provided capacity building and technical support to increase the effectiveness of the alliance and its ability to develop coastal and fisheries management policies while educating members on an ecosystem approach to fisheries.

As a result, the IBAMO has implemented standardized fishing regulations in Iligan Bay to prevent illegal fishing and has enhanced coastal law enforcement. The IBAMO has also expanded its networks to include community civic action groups, nongovernmental organizations and academe and has secured additional support from government agencies, including the Bureau of Fisheries and Aquatic Resources and the Department of Environment and Natural Resources.



Helen Keller International and WorldFish: Partnering for a nutrition-secure future

Like all development challenges, reducing the incidence of undernutrition in resource-poor and vulnerable populations can only be achieved through partnerships. WorldFish and Helen Keller International (HKI) are working together to tackle these challenges and improve nutrition security and awareness in Bangladesh and Cambodia.

Founded in 1915, HKI takes an evidence-based approach to combating the causes and consequences of blindness and malnutrition. A key focus of this work is promoting improved nutrition practices for families, including maternal and child nutrition education, family-led agricultural programs, and fortification of staple foods.

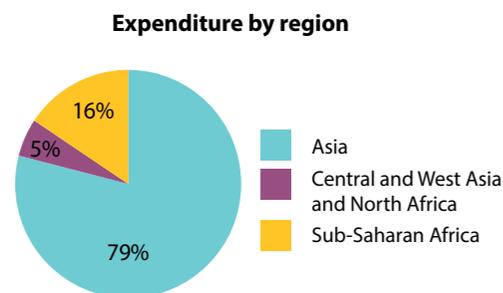
In Bangladesh, HKI is supporting the nutrition interventions under the United States Agency for International Development (USAID)-funded Aquaculture for Income and Nutrition (AIN) project through their development of the *Nurturing Connections* manual, which integrates nutrition and gender activities to empower women and help improve maternal and child health. The organization also provided training on how to use the manuals to 400 community facilitators through "training of trainers" workshops. The community facilitators have in turn delivered workshops on nutrition awareness, and in particular on the benefits of micronutrient-rich small fish and orange-fleshed sweet potato, to 129,000 households in southern Bangladesh.

By conducting surveys in Bangladesh, HKI is also providing WorldFish with valuable nutritional information about fish consumption among the urban resource-poor, which will inform the interventions under the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)-funded project "Aquaculture and the poor: Improving fish production, consumption and nutrition linkages."

The organizations are also working together on the International Development Research Centre (IRDC)-funded "Innovation in aquaculture for improved food security and nutrition" project in Cambodia, for which HKI provided expertise in homestead food production.

STATEMENT OF FINANCIAL POSITION (USD '000)

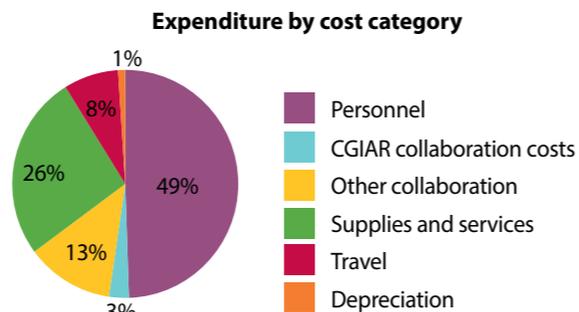
	As of 31 Dec 2014	As of 31 Dec 2013
ASSETS		
CURRENT ASSETS		
Cash and cash equivalents	23,542	15,307
Accounts receivable	-	-
Donors	3,057	3,612
Employees	305	112
Other CGIAR Centers	2,024	6,134
Others	817	927
Prepayments	458	588
Total current assets	30,203	26,680
NON-CURRENT ASSETS		
Property and equipment, net	204	158
TOTAL ASSETS	30,407	26,838
LIABILITIES AND NET ASSETS		
CURRENT LIABILITIES		
Accounts payable		
Donors	10,209	7,724
Other CGIAR Centers	70	339
Others	2,830	1,907
Funds in trust	266	422
Accruals and provisions	5,214	5,424
TOTAL LIABILITIES	18,589	15,816
UNRESTRICTED NET ASSETS		
Designated	1,092	1,092
Undesignated	10,726	9,930
TOTAL NET ASSETS	11,818	11,022
TOTAL LIABILITIES AND NET ASSETS	30,407	26,838



WorldFish expenditure by region, 2014

STATEMENT OF ACTIVITY (USD '000)

	For the years ended December 31	
	2014	2013
REVENUE AND GAINS		
Grant revenue	-	708
Window 1 & 2	18,518	15,702
Window 3	8,636	7,021
Bilateral	13,514	12,070
Other revenue and gains	448	388
TOTAL REVENUE AND GAINS	41,116	35,889
EXPENSES		
Research expenses	28,792	25,678
CGIAR collaborators	1,147	757
Non-CGIAR collaborators	5,064	3,843
General and administration	5,317	4,675
TOTAL EXPENSES	40,320	34,953
EXCESS OF REVENUE OVER EXPENSES	796	936
EXPENSES BY NATURAL CLASSIFICATION		
Personnel costs	19,947	18,760
CGIAR collaboration	1,147	757
Other collaboration	5,062	3,843
Supplies and services	10,590	8,522
Travel	3,164	2,904
Depreciation	411	167
Sub-total expenses and losses	40,320	34,953
Indirect cost recovery	-	-
TOTAL OPERATING EXPENSES	40,320	34,953



WorldFish expenditure by cost category, 2014

WorldFish investors 2014

- ANZDEC Limited
- Asian Development Bank
- Asian Institute of Technology
- Association for Strengthening Agricultural Research in Eastern and Central Africa
- Australian Agency for International Development
- Australian Center for International Agricultural Research Center
- Bangladesh Local Government Engineering Department
- Bay of Bengal Large Marine Ecosystem
- CARE International
- Catholic Relief Services – United States Catholic Conference of Bishops
- Centre National de la Recherche Scientifique–France
- CGIAR
- CGIAR–Science Council (Standing Panel on Impact Assessment)
- Challenge Program–Water and Food
- Conservation International
- Critical Ecosystem Partnership Fund
- Danish Development Assistance
- Department of Sustainability, Environment, Water, Population and Communities
- Deutsche Gesellschaft für Technische Zusammenarbeit
- European Commission
- Feed the Future Partnering for Innovation
- Food and Agriculture Organization of the United Nations
- French Research Institute for Exploration of the Sea
- German Federal Ministry for Economic Cooperation and Development
- Gordon and Betty Moore Foundation
- Government of Mexico
- IDH Sustainable Trade Initiative
- International Center for Tropical Agriculture
- International Development Research Centre
- International Food Policy Research Institute
- International Fund for Agricultural Development
- International Labour Office
- International Livestock Research Institute
- International Pole & Line Foundation
- International Rice Research Institute
- International Water Management Institute
- Irish Aid
- Japanese Ministry of Foreign Affairs
- KATALYST
- Land O'Lakes, Inc. International Development
- Margaret A. Cargill Philanthropies
- Ministry of Environment, Climate Change, Disaster Management & Meteorology
- Ministry of Fisheries and Marine Resources
- Nathan Associates Inc.
- National Institute of Water & Atmospheric Research Ltd.
- Natural Environment Research Council
- Netherlands Ministry of Economic Affairs
- Netherlands Royal Ministry of Foreign Affairs
- Norwegian Ministry of Foreign Affairs
- OPEC Fund for International Development
- Pacific Rim Innovation and Management Exponents, Inc.
- Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
- Philippines Bureau of Agricultural Research
- Philippines Department of Science and Technology
- Rajiv Gandhi Center for Aquaculture
- Republic of South Africa
- Resources Legacy Fund
- Save the Children (USA)
- Stimulating Household Improvements Resulting In Economic Empowerment
- Swedish International Development Agency
- Swiss Agency for Development and Cooperation
- The Agricultural Research Center of the Ministry of Agriculture, Government of Egypt
- The Nature Conservancy
- The Rockefeller Foundation–Bellagio Study and Conference Center
- U.S. Soybean Export Council
- United Kingdom Department for International Development
- United States Agency for International Development
- University of Malawi
- University of Sussex
- University of Wageningen
- Winrock International
- World Bank
- World Resources Institute
- World Wide Fund for Nature

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