



Annual
Report
2017

Mission

To strengthen livelihoods and enhance food and nutrition security by improving fisheries and aquaculture





Dr. Yvonne Pinto

The year 2017 saw some major events at WorldFish, with the transition of key positions, the official launch of the CGIAR Research Program on Fish Agri-Food Systems (FISH) and the implementation of the WorldFish strategy, which is already delivering significant research and development impact.

In July, Dr. Yvonne Pinto took over from Dr. Elizabeth Woods as Chair of the Board of Trustees. The same month, Dr. Gareth Johnstone was announced as Director General, designated to take over on 1 January 2018 from Dr. Blake Ratner. We thank Dr. Ratner for his outstanding contributions to the strategic development of WorldFish as he takes on a new challenge as Director of the Collaborating for Resilience initiative.

The WorldFish Strategy 2017–2022 reaffirmed our mission to strengthen livelihoods and enhance food and nutrition security by improving fisheries and aquaculture. It also laid out our ambitious impact targets, which are closely aligned with the UN Sustainable Development Goals. Activities developed around the three interlinked challenges of sustainable aquaculture, resilient small-scale fisheries, and value chains and nutrition will complement the ambitious agenda of FISH, which WorldFish is leading in cooperation with a number of partners. FISH is an important mechanism to deliver and drive the strategy and is enhanced by the activities developed by the three research challenges. The ultimate goal of FISH is to foster impact-driven research innovations that achieve sustainable increases in gender and socially inclusive production and equitable distribution of nutritious fish to those who need it most.

Dr. Yvonne Pinto
Chair, Board of Trustees (incoming)

Dr. Elizabeth Woods
Chair, Board of Trustees (outgoing)

This annual report highlights some of our key achievements over the past year as we progress towards our impact targets. In Asia and Africa, our genetic improvement program took a major step forward with the use of genomic selection tools to introduce characteristics such as disease resistance and feed efficiency into our improved tilapia strains. These are vital for ensuring the productivity and sustainability of fish farms, particularly in Africa, where aquaculture investment is critical to meet current and future food demands.

In Bangladesh, production of hilsa, the national fish, has increased dramatically, in large part due to our work with the Department of Fisheries and local communities to conserve and restore depleted stocks. As production heads towards half a million metric tons per year, the government is looking to lift the ban on hilsa exports, which has been in place since 2012.

In Cambodia, the number of community fish refuges, which provide a dry season sanctuary for brood fish, was increased from 40 to 134, directly benefiting well over half a million people through better access to fish in the wet season.

FISH work in Myanmar, complementing bilaterally funded WorldFish research, has boosted household consumption of small fish by 13 percent on average, with a particular effect on the nutrition and development of under-fives. As FISH activities continue to develop, the inputs from the program will enhance impacts that contribute to achieving the WorldFish strategy, creating long-lasting change for the millions of people who depend on fish in the developing world.

Dr. Gareth Johnstone
Director General Designate (incoming)

Dr. Blake Ratner
Director General (outgoing)



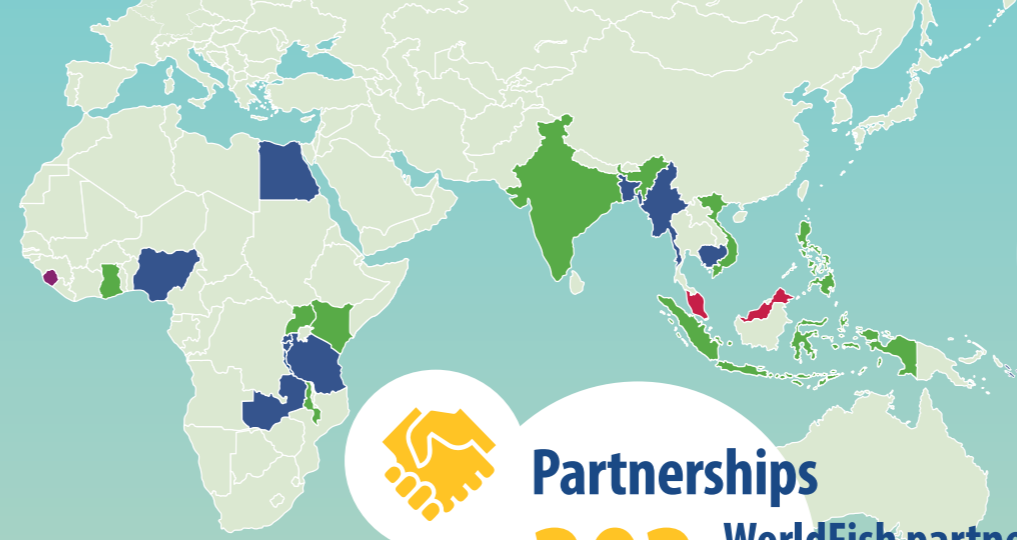
Dr. Gareth Johnstone

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WorldFish at a glance



Where we work
19 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 in the developing world who depend on fish.

Partnerships
202 WorldFish partners with substantial program engagement
 Partnerships are essential to bringing technologies and innovations to scale and achieving development impact.

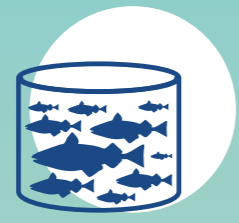
Publications
141 total publications in 2017
61 working papers, reports and briefs

Organization
339 total staff
59% of staff directly working in research

Impacts by 2022



2.4M
 fewer women, men and children suffering from deficiencies in essential micronutrients



5M
 producer households adopt improved breeds, feeds, fish health and best management practices



3.5M
 people assisted to exit poverty through gender-inclusive livelihood improvements



4.7M
 more women of reproductive age consuming an adequate number of food groups



4.8M
 metric tons of fish farmed annually with improved climate resilience and reduced environmental impact



3.3M
 hectares of ecosystems restored through productive and equitable management



Sustainable aquaculture

WorldFish’s sustainable aquaculture research focuses on enhancing production efficiency and sustainability via the use of selectively bred, high-health fish reared in gender-inclusive production systems with low environmental footprints.

Improved breeds show increased potential for aquaculture

WorldFish work to strengthen the technological foundations of aquaculture made major advances in 2017, with the release of new generations of improved fish lines and the use of genomic selection tools to introduce disease-resistance and feed-efficiency traits.

WorldFish and its partners have been breeding genetically improved farmed tilapia (GIFT) since the late 1980s. The latest GIFT generation shows that selective breeding for increased growth is still delivering gains of about 10 percent per generation.

The Abbassa strain developed in Egypt is also showing strong performance, and fish farmers are reaping the benefits. “Last year my production using the common strain was around 9.5 metric tons per hectare,” says Mohamed Gamal, an Egyptian fish farmer who received the improved Abbassa strain in 2016. “This year, the production of the Abbassa strain reached 12 metric tons per hectare.”

Furthermore, a WorldFish survey conducted in 2017 of 83 farms in four major tilapia-producing districts showed that the Abbassa strain had higher growth and required 13.2 percent less feed than another commercial strain to achieve the same production. As a result, the Abbassa strain generated significantly higher profits (47.8 percent) per feddan (0.42 ha) compared to the other strain.

These improved strains of tilapia are spreading rapidly. More than 70 percent of tilapia production in the Philippines comes from GIFT or GIFT-derived stock, as does around 50 percent in Thailand and 20 percent in Vietnam.

Work on carp species is at an earlier stage but is hoping for similar impacts. In 2017, the project established two breeding programs



“ Last year my production using the common strain was around 9.5 metric tons per hectare. This year the production of the Abbassa strain reached 12 metric tons per hectare.

- Mohamed Gamal, fish farmer, Egypt ”

in Bangladesh for catla and silver carp—the first in the world—and harvested the first improved generation of rohu, which, like tilapia, showed a growth gain of around 10 percent.

Yet faster growth alone will not deliver sustainable fish farms. As a result, the project is turning its attention to other characters and factors that influence farmers’ fish enterprises such as disease resistance and feed efficiency. Based on a roadmap created with global experts at a WorldFish-hosted fish breeding workshop on 23–24 May 2017 in Edinburgh, UK, the research is using genomic selection tools to introduce these characteristics into its improved tilapia strains.

Genomic selection has enabled a step change in the rate of genetic improvement of terrestrial livestock and has the potential to do the same in fish. Moreover, incorporating new traits in the GIFT breeding program will help fish farmers prepare for future challenges, such as climate change. This will particularly benefit farmers in Africa and Asia, where tilapia is critical for food security but where there is often limited access to improved fish breeds suited to local conditions.

Selective breeding of tilapia and carp populations and new tools to support this is a key part of FISH and supports WorldFish efforts to increase the productivity of small-scale aquaculture to meet growing global demand for fish.

Projects: Aquaculture for Income and Nutrition (AIN); Sustainable Transformation of Egypt’s Aquaculture Market System (STREAMS)
Investors: Government of Malaysia; Swiss Agency for Development and Cooperation; United States Agency for International Development (USAID)
Partners: CARE International Egypt; private hatcheries

Outcomes

- 5%-10%** increased growth per generation for selectively bred tilapia and carp
- 70%** of tilapia production in the Philippines comes from GIFT or GIFT-derived stock, as does around 50% in Thailand and 20% in Vietnam
- 47.8%** higher profits from the Abbassa strain, compared to another commercial strain, as a result of higher growth and a lower feed conversion ratio

Target SDGs



Impacts on



Small-scale aquaculture improves the lives of farmers in Myanmar

By supporting small-scale fish farmers in Myanmar, WorldFish is enabling the fast-growing aquaculture sector to create jobs and boost the health and incomes of the poor.

Myanmar's fast-growing aquaculture sector has huge potential to improve the lives of rural households, which make up 70 percent of the population and depend largely on low-yielding agriculture for their livelihoods.

Research by the Livelihood and Food Security Trust Fund (LIFT) shows that job creation potential in aquaculture is about twice as strong per acre as for paddy farming. It can also generate higher incomes than almost any other form of agriculture. As incomes rise in Myanmar, consumption of fish—a nutritious source of micronutrients and protein—will rise, particularly consumption of farmed fish.

However, so far many of the country's approximately 200,000 small-scale fish farmers have missed out on these benefits. This is often due to limited technical knowledge of aquaculture and poor access to quality fish seed and feed, which results in low yields. In addition, government regulations prevent the conversion of paddy land to aquaculture, and insecure land tenure dissuades households from renting privately owned land to build more fishponds.

Developing small-scale aquaculture and realizing the sector's potential is the focus of the WorldFish-led, LIFT-funded project Promoting the Sustainable Growth of Aquaculture in Myanmar (MYFC) (2015–2018). Implemented through FISH in collaboration with four government and NGO partners, the project focuses on the Ayeyarwady Delta and the Central Dry Zone, where the majority of Myanmar's subsistence fish farms are located.

To boost farmer's technical knowledge, the project provides training in good aquaculture practices, with topics also covering nursery management, nutrition, gender, dike cropping and business skills.

For 36-year-old farmer Hnin Nu Moe, who was previously unable to earn money from farming fish in her family's 975-m² pond, the training had a huge impact. After stocking her pond with rohu and grass carp seed provided by the project, Hnin applied the techniques she had learned. This included regular feeding, exchanging water, applying fertilizer and testing the water quality.

Six months after stocking, she harvested 219 kg of fish. After saving some for household consumption, she sold the rest and made 550,000 kyat (USD 400) on an investment of 50,000 kyat (USD 36). This income enabled her to buy a cow—a purchase she once could not afford.



“If we carefully follow all the techniques and knowledge we gained from the project, we will be successful fish farmers even if we face lots of challenges.”

- Hnin Nu Moe, fish farmer, Myanmar

“If we carefully follow all the techniques and knowledge we gained from the project, we will be successful fish farmers even if we face lots of challenges,” she says.

Since 2016, more than 1200 farmers out of the target 3000 farmers have received training and inputs such as seed, feed and fertilizer. Trained farmers report that they are now successfully managing their own fishponds. This has led to a 30 percent higher consumption of fish and a 40 percent increase in household income among beneficiary households.

Good fish seed is needed to achieve a good fish harvest. Yet small-scale farmers often use poor-quality fish seed from the wild or buy seed from government or private hatcheries, which often offer low productivity because of poor management of the genetic resource.

To improve seed access, WorldFish began promoting improved management practices at fish hatcheries run by the Department of Fisheries in 2017. The aim is to produce quality rohu carp seed, which accounts for 70 percent of all farmed fish production in Myanmar, as well as seed for silver barb.

The breeding initiative also includes tilapia and climbing perch, which are currently produced in small amounts but for which there is strong local demand and the potential to earn higher returns. For tilapia, the project will focus on GIFT, an improved strain of Nile tilapia developed by WorldFish that grows more than 30 percent faster and has a higher survival rate than other strains (see page 8).

In parallel, the project has established 30 fish nurseries in 30 villages, providing rural farmers with local access to affordable quality seed. Since 2016, the project has distributed over 450,000 seed to more than 1000 farmers in 152 villages. By 2018, it aims to have distributed around 1 million seed to more than 2500 farmers.

Aquaculture has grown rapidly over the past 10 years, mostly because of large enterprises, and now accounts for 22 percent of total fish production. With no sign of this growth slowing, efforts by MYFC to engage smallholders in aquaculture will be critical for increasing incomes and contributing to food and nutrition security for the poor in Myanmar.

Project: Promoting the Sustainable Growth of Aquaculture in Myanmar (MYFC)
Investors: Livelihood and Food Security Trust Fund (LIFT)
Partners: Network Activities Group; Myanmar Department of Fisheries; PACT Myanmar – NGO; Groupe de Recherches e d'Echanges Technologiques (GRET)

Outcomes

1200 farmers trained in good aquaculture practices

450K quality seed distributed to more than 1000 farmers in 152 villages

30% higher consumption of fish and a 40% increase in household income among beneficiary households

Target SDGs



Impacts on



Resilient small-scale fisheries

WorldFish research aims to improve the resilience and productivity of small-scale fisheries, a critical source of food for people in developing countries.

Bumper hilsa harvest boosts the income and fish consumption of poor households

WorldFish works with Bangladesh's fishing communities to protect fish stocks and improve livelihood resilience through research-led fisheries co-management initiatives.

Hilsa is the national fish of Bangladesh and the country's most important single-species fishery. It comprises 12 percent of total fish production and contributes more than 1 percent to the gross domestic product. Approximately half a million artisanal fishers are directly involved in hilsa fishing, mostly in the Meghna River estuarine system in southern Bangladesh, and 2 million more are indirectly involved in the hilsa fish value chain.

Following the rapid decline of hilsa yields in the early 2000s because of habitat degradation, overfishing and use of illegal fishing gear, the government introduced various conservation measures. These included the designation of five sanctuaries in hilsa nursery grounds and spawning areas, and a seasonal ban on catching juvenile and brood hilsa.

Yet many fishers—who have few alternative sources of income—often continue to fish illegally. Helping fishing households to comply with the ban and cope during the no-fishing period is one focus of the USAID-funded Enhanced Coastal Fisheries in Bangladesh (ECOFISH^{BD}) project (2014–2019). Implemented by WorldFish and the Bangladesh Department of Fisheries with other partners, the project aims to support research-led decision-making in fisheries co-management and improve the livelihoods of communities reliant on hilsa.

For instance, the project promotes the formation of hilsa conservation groups (HCGs) consisting of 30–40 fishing households. These meet weekly to discuss best fishing practices and encourage community members to protect their fishery. More than 448 conservation groups in 125 villages have been established since 2014, with women making up 30 percent of members. The project has also recruited and trained 200 community fish guards to patrol the sanctuary areas.



“ One mother fish lays 2.2 to 2.3 million eggs. If the mother fish survive we can save millions of hilsa for the next generation.

– Putul Rani, member of a hilsa conservation group, Hossainpur, Patuakhali ”

Putul Rani is a member of an HCG in her area. Before she became involved with the project, her husband used to fish for juvenile hilsa during the ban. Since receiving training from the project, she has become a passionate advocate for hilsa conservation. “We tell people not to catch the juvenile and mother fish because one mother fish lays 2.2 to 2.3 million eggs. If the mother fish survive, we can save millions of hilsa for the next generation,” she says.

Together, the project's efforts have contributed to greater awareness of and compliance with the ban, resulting in stock recovery and higher yields. Data collected by WorldFish from three hilsa sanctuaries over two harvest seasons (July 2015–June 2016 and July 2016–June 2017) shows that the total hilsa catch increased by 28 percent, from 387,211 metric tons to 496,417 metric tons. The catch is expected to exceed 500,000 metric tons in the next season, prompting the Bangladesh government to lift the ban on hilsa exports, which has been in place since 2012.

The WorldFish data goes on to show that the greater availability of hilsa has had multiple benefits for actors throughout the value chain. Despite a drop in price per kilo as a result of increased supply, fishers' total sales increased by 70 percent, boosting average monthly incomes by more than 67 percent. A portion of this money was used to repay loans that are typically taken out to cover livelihood expenses during the no-fishing period. Following the bumper harvest in 2016–2017, fishers were able to repay around 71 percent of their loans—66 percent more than the year before—because of higher earnings.

The relatively cheaper price also saw household consumption of hilsa almost double. Particularly notable was consumption by women, who in rural households often sacrifice their own dietary needs for other family members. In the study area, women's hilsa consumption rose by more than 60 percent. Fish is an important source of protein and other crucial nutrients for millions of people in Bangladesh, and its regular consumption may improve the nutritional status of households where dietary diversity is low.

As hilsa is a resource shared with neighboring Myanmar, transboundary learning and cooperation are crucial. Since April 2017, WorldFish has been working with the International Institute for Environment and Development and other partners, as part of the UK government-funded Darwin-Hilsa^{MM} project, to develop a scientifically researched, cost-effective and incentive-based fisheries management mechanism that will ensure the long-term sustainability of the hilsa fishing sector.

Watch a video about how fishing communities are conserving hilsa stocks in Bangladesh: tiny.cc/hilsa

Project: Enhanced Coastal Fisheries in Bangladesh (ECOFISH^{BD})
Investors: United States Agency for International Development (USAID)
Partners: Bangladesh Fisheries Research Institute (BFRI); Wildlife Conservation Society (WCS); International Union for Conservation of Nature (IUCN); Community Development Centre (CODEC); Center for Natural Resource Studies (CNRS); Coastal Association for Social Transformation Trust (COAST); Bangladesh Department of Fisheries

Outcomes

448

conservation groups established since 2014, with women making up 30% of members

28%

increase in hilsa catch as a result of project intervention

200%

approximate rise in household consumption of hilsa and 60% increase by women

Target SDGs



Impacts on



Value chains and nutrition

WorldFish analysis of fish value chains aims to reduce losses and improve the availability, accessibility and affordability of nutritious fish for poor consumers.

Facilitating fish trade in Southern Africa

The first harmonized fish standards in Southern Africa, approved in 2017, could significantly enhance cross-border fish trade, improving food security and income for the millions of people who are directly employed in fisheries and aquaculture in the region.

Efforts to boost cross-border trade have become increasingly prominent elements of African regional integration and economic development agendas. However, trade is constrained by inadequate market and trade infrastructure and poor policy implementation. These lead to high transport costs, complex and unaligned trade rules and deficient market information, all of which prevent Africa from optimizing the social and economic benefits available.

This is exemplified by the fish trade. WorldFish data gathered at various border posts in the four trade corridors of Southern, Eastern, Central and West Africa showed a massive movement of fish between countries. The results also showed how customs and bureaucratic formalities at the border posts hampered this movement. For instance, at the Katimamulilo border post between Zambia and Namibia, an inspector from the Zambia Bureau of Standards reported that cross-border trucks carrying fish products sometimes spend six to seven days waiting for their goods to be cleared.

In response, the European Union-funded, WorldFish-led FishTrade for a Better Future project (2014–2018) was established to provide an evidence-based understanding of the challenges facing cross-border traders and to make recommendations that inform crucial policy decisions.

In the Southern Africa Development Community (SADC), a regional economic bloc of 15 countries, it was noted that the lack of harmonized regional fish standards and conformity assessments pose a particular challenge to fish traders.

As a first step toward introducing harmonized fish standards, in September 2016, WorldFish and SADCSTAN, a body mandated by the SADC Council of Ministers to coordinate regional standardization activities and services, convened experts from the SADC Fisheries and Sanitary and Phytosanitary (SPS) Technical Committee, and the Common Market for Eastern and Southern Africa (COMESA) Secretariat,



“Manufacturers can import or export their fish and fisheries-related products without non-tariff barriers because there is equivalence in the treatment of both local products and imports within the region.”

– Manuel Mutale, Director, Zambia Bureau of Standards

along with various national livestock, fisheries and revenue authorities, to undertake a familiarization tour of the Chirundu one-stop border post (OSBP) between Zambia and Zimbabwe.

OSBPs give neighboring countries authority to enact their rule on the other country’s side of the border, meaning only one stop for people and goods crossing the border. OSBPs were introduced in 2009 to accelerate and simplify cross-border trade but until recently were not focused on fish. Since 2016, FishTrade has supported a pilot for an OSBP for fish at Busia, between Kenya and Uganda, helping traders to avoid the bureaucracy, double inspections and taxation that have undermined fair and speedy trade across the border.

Following the visit to Chirundu, WorldFish convened a meeting of SADCSTAN’s Technical Committee on Fish and Fishery Products Standards. The meeting explored how harmonized standards would be implemented in SADC countries without compromising quality and safety by involving all stakeholders in the fish subsector.

The outcomes of the meeting culminated in the presentation and approval of 11 harmonized standards at the 20th SADCSTAN Annual General Meeting on 15 March 2017. The standards cover 11 products and areas, including fresh, frozen, farmed, salted and smoked fish, fish snack products, fish sausages, canned sardines and Good Aquaculture Practices (GAP) for bream fish (tilapia).

It is now the responsibility of member states to align national fish standards with the SADC harmonized standards as well as improve the dissemination of information on the standards and strengthen the capacity of SADCSTAN to coordinate their implementation.

Zambia is currently leading the way, with the Zambia Bureau of Standards launching the country’s harmonized fish standards and implementation plan in November 2017.

“The harmonization of the standards means that manufacturers within the SADC region can import or export their fish and fisheries-related products without non-tariff barriers because there is equivalence in the treatment of both local products and imports within the region,” says Manuel Mutale, Director of the Zambia Bureau of Standards. “I would like therefore to urge the Zambian manufacturers involved in fish and other fishery products to export their products in the region and be a flag bearer of these harmonized standards.”

Once the implementation process is complete, the expected benefits from better access to intra-regional markets on competitiveness and food security, and a more rational exploitation of natural resources, could be immense.

Project: FishTrade for a Better Future
Investors: European Union (EU)
Partners: NEPAD Planning and Coordinating Agency (NPCA); African Union Inter-African Bureau for Animal Resources (AU-IBAR)

Outcomes

11

harmonized fish standards influenced by WorldFish data and recommendations approved

3

of the 11 SADC countries have already adopted the standards in their national policies

Target SDGs



Impacts on



The big benefits of small fish

WorldFish is teaching poor, rural households in Myanmar to grow micronutrient-rich small fish alongside carp species in homestead ponds—an approach that research from Bangladesh and Cambodia shows can boost at-home consumption of fish and impact nutrition outcomes.

Households in Myanmar spend nearly as much money on fish (14 percent of food expenditure) as on rice (19 percent), and average fish consumption is estimated to be just above the global average, at 21 kg/person/year and increasing. Over 50 percent of animal protein consumed in Myanmar comes from fish.

Yet these figures hide a range of consumption patterns. Women and children tend to eat less fish than men because of social norms that affect the distribution of food within a household. And despite fish being a cheap animal-source food, it is still unaffordable to many, resulting in diets that rely heavily on rice and are low in diversity.

These factors contribute to the country's undernutrition rates, which are the highest in Southeast Asia. To improve the nutrition and livelihoods of poor, rural households, the Managing Aquatic Agricultural Systems to Improve Nutrition and Livelihoods in Rural Myanmar (MYNutrition) project (2015–2019) aims to increase household production and consumption of micronutrient-rich small fish, particularly among women and young children, as well as boost household income through the sale of fish. Funded by the International Fund for Agricultural Development (IFAD) and led by WorldFish, in collaboration with the Department of Fisheries and local NGOs, MYNutrition is part of FISH.

The project focuses on the Ayeyarwady Delta, where malnutrition rates are among the highest in the country and there are 200,000 subsistence fish farms, many of which are underutilized or derelict. The project provides training to women and men in targeted households on how to grow carp species alongside micronutrient-rich small fish species such as mola (*nga bel phyu*) in homestead ponds, a system known as carp-mola polyculture.

Mola is a small indigenous species that grows well with other fish and reproduces frequently. It can be partially harvested often, providing a constant supply of fish for household consumption. This makes it the ideal species to farm alongside carp, which accounts for around 70 percent of all farmed fish in Myanmar.

WorldFish first implemented carp-mola polyculture in 2011. Research shows that the technology is an effective, low-cost, nutrition-sensitive approach that increases pond productivity and the nutritional quality of the total production. It also promotes small fish consumption in the household.



“When the dry season is approaching, you will not worry about food because you already have access to food from your own home.”

- Daw Aye Win, fish farmer, Myanmar

“Small fish are easy to farm because no special techniques or feed are needed,” explains mother-of-three Daw Aye Win from Mal Nyo village, who began practicing carp-mola polyculture in her homestead pond in early 2017 after attending project training. “When the dry season is approaching, you will not worry about food because you already have access to food from your own home.”

Daw Aye Win's household is one of 133 that have been trained and supported to farm mola since 2016. By the end of the project in 2019, the project aims to have reached 300 households.

When eaten whole, mola is an excellent source of micronutrients, such as vitamin A, iron, zinc, calcium and vitamin B12, as well as fatty acids and animal protein, all of which are needed for good health and development, particularly in the first 1000 days of life.

Traditionally, the head and organs of mola—the most nutritious parts—are removed before cooking. As part of the training on essential nutrition and hygiene actions, family members learn about the nutritional benefits of mola and the best ways to prepare the whole fish, such as fried mola balls and mola ball soup with vegetables.

The project hopes word-of-mouth sharing about nutritious ways to cook mola will help to boost consumption of small fish among 700 households engaged in small-scale aquaculture.

To reach this target, the project is drawing on lessons learned by WorldFish and partners in Cambodia, where nutrition training was given to fishing-dependent households between 2012 and 2016. This helped to boost household consumption of small fish by 13 percent on average, and increased consumption of small fish by children under 5 by 23 percent among households in the project target areas.

Addressing malnutrition is a complex challenge. Efforts by WorldFish and partners are helping to tackle some of the immediate and underlying causes, which is enabling poor households to lead healthier and more productive lives.

Project Managing Aquatic Agricultural Systems to Improve Nutrition and Livelihoods in Rural Myanmar (MYNutrition)
Investors: International Fund for Agricultural Development (IFAD)
Partners: Network Activities Group; Groupe de Recherches et d'Échanges Technologiques (GRET); PACT Myanmar – NGO; Department of Fisheries, Myanmar

Outcomes

133 households trained in carp-mola polyculture since 2016

300 households trained on carp-mola polyculture by 2019

700 households engaged in small-scale aquaculture consuming more small fish by 2019

Target SDGs



Impacts on



Scaling up best practices to secure food for rural Cambodians

WorldFish research shows that sustainable management and good governance by community members can increase the productivity and diversity of rice field fisheries.

Rice field fisheries (RFFs)—the fishing that occurs in and around seasonally flooded rice fields—are a vital source of food and income for almost all rural households in Cambodia. But these fisheries, which provide 20–25 percent of the inland fish catch and are home to many species of fish and other aquatic animals, are under threat from overexploitation, habitat loss and environmental degradation.

Through the USAID-funded Feed the Future Cambodia Rice Field Fisheries II (2016–2021) project, WorldFish and its partners are working to sustainably increase the productivity of RFFs. The project focuses on Pursat, Battambang, Siem Reap and Kampong Thom provinces around the Tonle Sap Lake, where dependence on RFFs is greatest.

Building on phase I, the project is replicating and scaling up best practices, including efficient water use and promoting the nutritional benefits of consuming fish. By the end of phase II, the project aims to bring 5221 ha of water bodies under improved natural resource management and to boost annual average fish production in RFFs by 50 kg/ha, equivalent to a total additional output of more than 10,000 metric tons. It is also anticipated that 97,220 people, of which 58,681 are women and children under 5, will consume more fish.

Central to achieving these goals is the good governance of community fish refuges (CFRs). CFRs are natural or human-made ponds that hold water throughout the year and provide a dry season sanctuary for brood fish. In the wet season, when water levels rise, the fish migrate out of the CFRs to the rice fields and floodplains to spawn and feed. Fishing is prohibited year-round in the CFRs, but rice fields become open access when inundated.

CFRs are governed by committees, which are made up of local volunteers who are elected by the community. WorldFish research shows that strong CFR committees coordinate better with local authorities and agencies, reduce resource-use conflict, embrace innovation and are more likely to raise funds for CFR maintenance and enlargement, resulting in higher yields in rice fields while maintaining fish biodiversity.

During phase I, the project supported 40 CFRs, benefitting 86,372 people. By the end of 2017, the number of CFRs had been significantly increased to 134, which is expected to benefit 569,546 people. Each CFR has established a committee. Through WorldFish partners, committee members receive training in areas such as CFR



Photo credit: Phnom Penh Post/WorldFish

“ Since the fish refuge was established, I’ve been able to catch fish for my family all year in the canals between the rice fields.”

– Sok Kiri, Anso Kdam village, Pursat ”

management, fisheries law, stakeholder engagement, problem analysis and action planning. Ongoing coaching and follow-up visits by project staff ensure that action plans are implemented.

Of the 134 action plans submitted in 2017, 73 contained plans for CFR enlargement. When completed, this work will add 236,018 m³ to the 475 ha already managed by communities.

The costs are covered by contributions from the households who benefit from the CFRs, funds raised by CFR committees and Commune Council investment, depending on the local situation. The aim is to make the CFRs self-sustaining by the end of the project. Fundraising activities often include placing collection boxes in public places and pagodas, but some CFR committees have identified site-specific opportunities. In 2017, using knowledge gained from study visits organized by the project, the committee of Damnak Kranh CFR in Pursat province introduced an eco-tourism scheme.

Over the three-day Pchum Ben holiday, one of the most important festivals in the Cambodian religious calendar, tourists were invited to visit the CFR, which is a demarcated zone in a larger reservoir, generating USD 1900 in parking and entrance fees. In total, the committee raised almost as much in 2017 as it did during phase I. Across the CFRs, committees raised USD 18,613 in 2017.

Households around Damnak Kranh have already noticed a difference. “In 2015 and 2016, committee members came to the house every three months to collect the CFR contribution. In 2017, because they had another source of income, they only came once,” says mother-of-six Sok Kiri. “Since the refuge was established, I’ve also been able to catch fish for my family all year in the canals between the rice fields.”

Scaling up best-practice methods like these will ensure that fish, which accounts for 76 percent of animal-source protein intake for households, is available and accessible to all poor and rural families in Cambodia.

Project: Feed the Future Cambodia – Rice Field Fisheries II
Investors: United States Agency for International Development (USAID)
Partners: Akphivat Neary Khmer Organization; Village Support Group; Trailblazer Cambodia Organization; Cambodian Organization for Women Support (COWS); Fisheries Administration Cambodia

Outcomes

134

community fish refuges already supported, of the target 140 by 2021

54%

of action plans submitted contain plans for CFR enlargement, which will add 236,018 m³ to the 475 ha currently managed by communities

18.6K

raised by committees for CFR management and enlargement work (USD)

Target SDGs



Impacts on



Gender

Women play a major role in fisheries and aquaculture, but gender-based barriers often limit their opportunities. WorldFish research focuses on gender-focused interventions and innovations that address these barriers and offer more gender-equitable pathways out of poverty.

Gender-transformative skits bring dramatic gains for women fish processors

Drama skits that challenge gender norms have enabled women processors in Zambia's Barotse Floodplain to adopt and benefit from improved technologies that reduce fish losses.

In the Barotse Floodplain, where rates of poverty and hunger are high, fishing is an important source of food and income. Yet around a third of the region's total fish catch is lost every year. WorldFish research shows that these fish losses affect female and male fishers, processors and traders in different ways, with women processors experiencing higher postharvest losses and getting fewer returns on their financial investments than men.

Socially, men in Zambia are expected to do the fishing because it is believed that women lack the physical skills needed to fish. Women, therefore, account for around 60 percent of the people involved in fish processing, the stage in the value chain when the most fish is lost.

Most of this loss (70 percent) comes from degradation in the quality of the fish, causing traders to offload fish products at lower prices. This results in lost revenue for the woman-dominated processing sector, which already has the lowest gross margins (2.6–5.5 percent) compared to fishing (21.5 percent) and trading (12.2–13.8 percent).

To improve postharvesting management and marketing, WorldFish helped to design and test four improved fish processing technologies: salting, icing, smoking kilns and solar tent dryers. The project was carried out in collaboration with the Department of Fisheries (DoF), University of Zambia and private sector partner NoNo Enterprises as part of a three-year research project (2014–2017) funded by the International Development Research Centre (IDRC) and the Australian Centre for International Agriculture Research (ACIAR) through the Cultivate Africa's Future (CultiAF) fund.

Over two fishing seasons (2015 and 2016), 256 male and female fishers, processors and traders from six fishing camps tested the technologies.



“With the solar tent, the drying process is much faster, it doesn't take a lot of time to set up and I can do other work while the fish is drying.”

- Kanyanga Chimbenda, fish processor, Tangatanga camp, Zambia

Recognizing that existing social and gender norms could limit women from fully using and benefitting from the technologies, the project also partnered with the Zambia Centre for Communication Programmes to design and test gender-transformative drama skits in three of the fishing camps.

Over three months, the 30-minute skits were performed by a local drama group to all fishing camp members who wished to participate. The skits encouraged men and women to reflect critically on the norms and power relations that impact value chain actors, especially women processors.

These technical and social solutions have had positive impacts. Salting and the solar tent dryers, in particular, significantly reduced losses and the time it took for women to process fish. They also increased the quality and economic value of the fish products.

“With the solar tent, the drying process is much faster, it doesn't take a lot of time to set up and I can do other work while the fish is drying,” says 38-year-old Kanyanga Chimbenda from Tangatanga camp.

Overall, attitudes about gender equality improved from the project's baseline survey to the end-of-project survey. Participants in the drama skits showed a two-fold increase in their attitude scores—measured using the Women's Empowerment in Fisheries Index survey—compared to those from camps where the drama skits were not performed (18.5 to 23.8 compared to 19.0 to 21.2).

The largest jump in attitude scores (17.6 to 23.9) was seen in men who participated in the drama skits. In particular, a significant shift was observed in these men's attitudes and behaviors around ownership of fishing and processing assets: 44 percent said they jointly owned the fishing gear at baseline, which increased to 76 percent at the end of the project.

Women who participated in the skits also experienced a number of positive behavior changes. Their involvement in fishing activities increased from 5 percent to 75 percent, and a greater percentage of women reported making inputs into decisions about income generated from processing fish (from 45 percent to 94 percent).

The project's results show that using technical and social interventions together is the key to enabling poor women dependent on the Barotse Floodplain fishery to benefit more equally from new technologies and improving livelihoods for women and men in developing countries.

Listen to a podcast about overcoming gender-related barriers in small-scale fisheries: tiny.cc/genderbarriers

Project: Cultivate Africa's Future (CultiAF) fund
Investors: International Development Research Centre (IDRC); Australian Centre for International Agriculture Research (ACIAR)
Partners: Department of Fisheries (Ministry of Fisheries and Livestock; Government of the Republic of Zambia); University of Zambia; NoNo Enterprises

Outcomes

256 fishers, processors and traders trained by the project

36% improvement in gender-equal attitudes for men who attended drama skits (from baseline to the end of the project)

75% of women who attended drama skits participated in fishing activities by the end of the project, up from 5% at baseline

Target SDGs



Impacts on



Delivering impact through partnerships

Partnerships are essential to our research and for delivering impact by bringing technologies and innovations to scale. WorldFish works with an extensive network of partners to create change for the millions who depend on fish in the developing world.

Target SDGs



Call to Action for aquaculture development in Africa

Key regional players have joined with WorldFish and FISH to endorse a vision for inclusive and sustainable aquaculture on the African continent. The three-page Call to Action includes proposals for regional collaboration on research and development with the establishment of centers of excellence, investments in capacity building and the dissemination of best management practices for profitable, productive, environmentally sustainable and nutrition-sensitive aquaculture.

Policy guidance is a key theme, with evidence-based research expected to support policy makers to undertake policy and governance reforms effectively. The vision notes a need to make policies understandable and accessible to those farming communities to which they will apply and to take into account the conservation of aquatic biodiversity.

The Call to Action is a result of deliberations that took place at the African aquaculture policy day held during the World Aquaculture conference from 26–30 June 2017 in Cape Town, South Africa.

Besides WorldFish, the supporting organizations are: the African Union Inter-African Bureau for Animal Resources (AU-IBAR), the East African Community Lake Victoria Fisheries Organization (EAC-LVFO), the Food and Agriculture Organization of the United Nations (FAO), the Intergovernmental Authority on Development (IGAD), the New Partnership for Africa's Development (NEPAD), the Southern African Development Community (SADC) and the World Aquaculture Society.



Photo credit: Sara Fouad/WorldFish



Photo credit: Habibu/Haque/WorldFish

Support for new research on fish for nourishment

Participants at the Global Workshop on Nutrition-sensitive Fish Agri-food Systems, held from 5–8 December 2017 in Siem Reap, Cambodia, agreed that while evidence is mounting that fish is a solid investment choice, in particular for reducing global undernutrition, more needs to be done to build the case.

The event was convened by WorldFish with support from IFAD, the European Union and the Royal Government of Cambodia. It brought together 150 participants, including representatives from UN organizations, NGOs and research institutes, to discuss a need to shift from approaches focused on fish production to fish agri-food systems that are more geared to nutrition-sensitive outcomes.

The workshop ended with strong statements of support from the Bill & Melinda Gates Foundation, IFAD, Japan International Cooperation Agency (JICA), USAID and the World Bank, among others, in particular recognizing the need for further investments in fish as a critical means to address health and nutrition.

Examining the role of research in resilient small-scale fisheries

Small-scale fisheries (SSF) play a critical and often irreplaceable role in nutrition and livelihood security, particularly in developing countries. Yet these benefits are underreported, undervalued and under threat from a range of social, ecological and political drivers.

The Resilient Small-scale Fisheries Symposium, organized by WorldFish at its headquarters in Penang, Malaysia from 5–7 September 2017, brought together WorldFish and partners in FISH to reflect critically on the role of research in contributing to resilient SSF. These include reducing poverty, fostering greater environmental sustainability, facilitating gender and social equity, and increasing food and nutrition security.

Within sessions, researchers illustrated through their presentations the diversity of SSF, the range of geographies and the distinctive systems in which they are working as well as the different ways that research is used to understand and catalyze development outcomes.



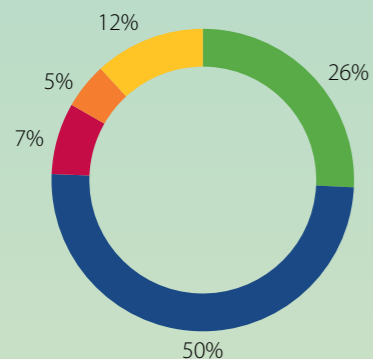
Photo credit: WorldFish

STATEMENT OF FINANCIAL POSITION (USD '000)

As of 31 Dec 2017 As of 31 Dec 2016

ASSETS	As of 31 Dec 2017	As of 31 Dec 2016
Cash and cash equivalents	14,614	17,609
Accounts receivable	4,026	3,968
Other current assets	253	378
Capital assets	605	705
TOTAL ASSETS	19,498	22,660
LIABILITIES		
Accounts payable	8,374	10,738
Accruals and provisions	869	1,594
Other current liabilities	45	62
Non-current liabilities	473	504
TOTAL LIABILITIES	9,761	12,898
NET ASSETS	9,737	9,762
TOTAL LIABILITIES AND NET ASSETS	19,498	22,660

WorldFish expenditure by region, 2017



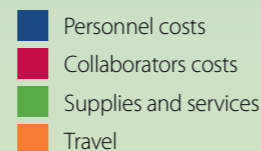
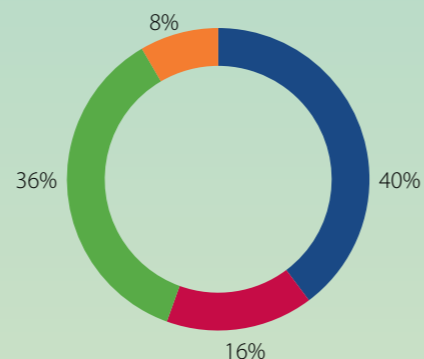
Full audited financial statements are available at worldfishcenter.org/who-we-are/financials

STATEMENT OF OPERATING ACTIVITIES (USD '000)

For the years ended December 31

	2017	2016
REVENUE		
Grants	24,718	27,368
Other income	1,014	1,063
TOTAL REVENUE	25,732	28,431
EXPENSES		
Research	17,093	19,643
Administration, support and other	8,664	10,232
TOTAL EXPENSES	25,757	29,875
NET DEFICIT	(25)	(1,444)

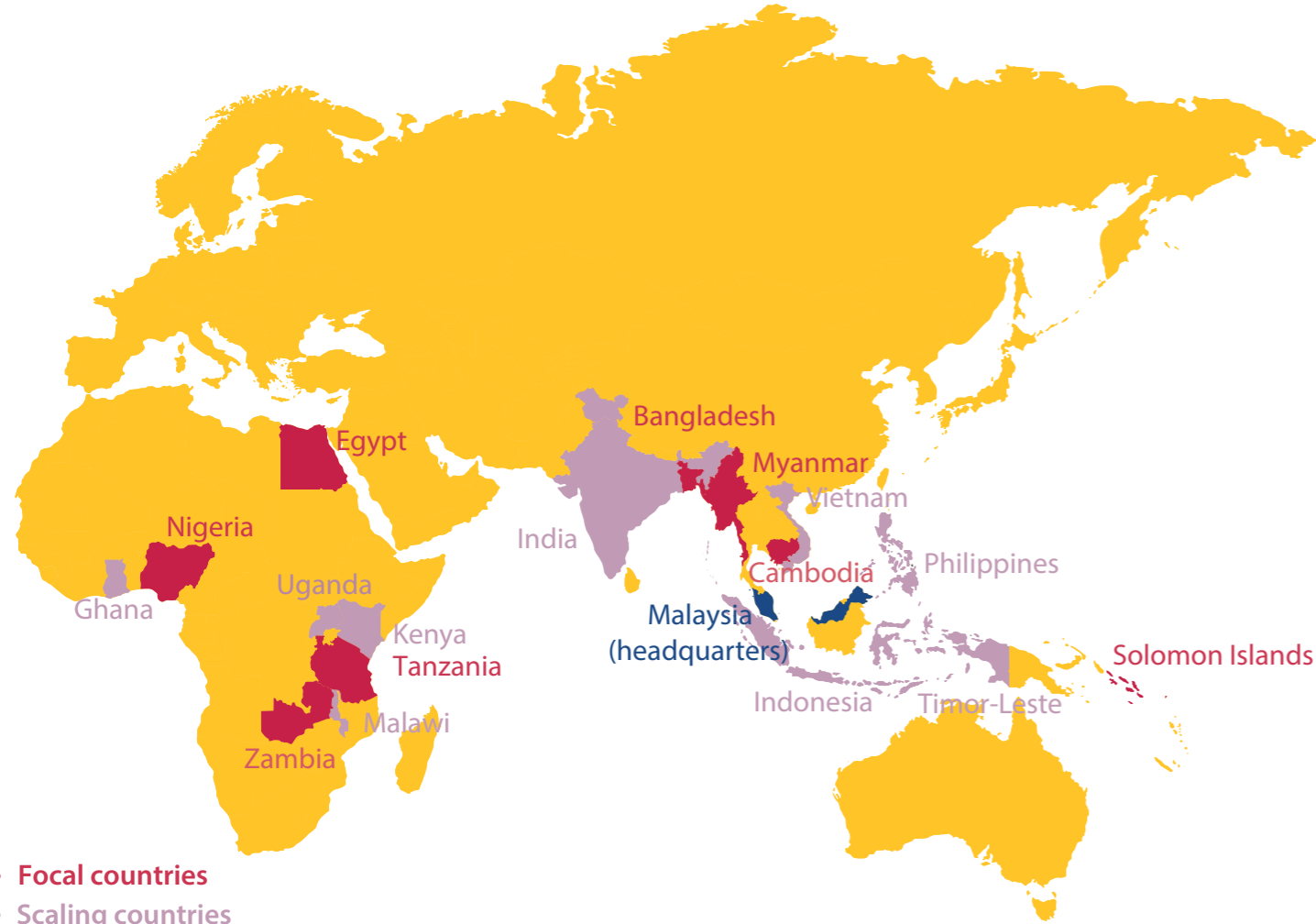
WorldFish expenditure by cost category, 2017



WorldFish investors 2017

- Asian Development Bank
- Assam Rural Infrastructure and Agricultural Services Society
- Australian Centre for International Agricultural Research
- Bangladesh Local Government Engineering Department
- Bureau of Agricultural Research
- Caritas Bangladesh
- Catholic Relief Services
- CGIAR Fund
- CIRAD-Agricultural Research for Development
- Conservation International
- Critical Ecosystem Partnership Fund
- Department for International Development, United Kingdom
- Department of Agriculture, Forestry and Fisheries, South Africa
- Department of Foreign Affairs and Trade, Australia
- Deutsche Gesellschaft für Technische Zusammenarbeit
- Egyptian Government
- Euroconsult Mott MacDonald
- European Commission
- Farm Africa
- Fisheries and Animal Resources Development Department of the Government of Odisha, India
- Fisheries Research Institute, Malaysia
- Fondation Ensemble
- Food and Agriculture Organization of the United Nations
- Foundation for Rural Enterprises and Ecology Development of Mindanao Inc.
- Gordon and Betty Moore Foundation
- HELVETAS Swiss Intercooperation, Bangladesh
- International Center for Tropical Agriculture
- International Centre for Environmental Management
- International Development Research Centre
- International Food Policy Research Institute
- International Fund for Agricultural Development
- International Institute for the Environment and Development
- International Institute for Tropical Agriculture
- International Livestock Research Institute
- International Rice Research Institute
- International Water Management Institute
- Irish Aid
- Livelihoods and Food Security Trust Fund
- Margaret A. Cargill Philanthropies
- Mercy Corps, Scotland
- Ministry of Agriculture and Land Reclamation, Egypt
- Ministry of Economic Affairs, the Netherlands
- Ministry of Foreign Affairs, Japan
- Ministry of Foreign Affairs, Norway
- Mohamed bin Zayed Species Conservation Fund
- National Institute of Water and Atmospheric Research
- OPEC Fund for International Development
- Pacific Community
- Pacific Rim Innovation and Management Exponents, Inc.
- Pactworld
- Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
- Philippine Government
- Plan International UK
- Rajiv Gandhi Centre for Aquaculture
- Rockefeller Foundation
- Save the Children
- SEAMEO Regional Center for Graduate Study and Research in Agriculture
- Skretting Egypt
- Solomon Islands Association of Community Learning Centres
- Solomon Islands Community Conservation Partnership
- Stimulating Household Improvements Resulting in Economic Empowerment
- Sustainable Trade Initiative
- Swedish International Development Cooperation Agency
- Swedish University of Agricultural Sciences
- Swiss Agency for Development and Cooperation
- United States Agency for International Development
- University of Malawi
- University of Queensland
- University of Rhode Island
- University of Stirling
- University of Sussex
- University of Wollongong
- Wageningen University
- Winrock International
- World Bank
- World Vegetable Center
- World Wildlife Fund for Nature, Solomon Islands

Where we work



The geographic focus of WorldFish is based on (1) the current status and projected future potential for aquaculture and small-scale fisheries in developing countries, (2) the probability that the program and its partners can effectively respond to demands for research and deliver impacts at scale, and (3) striking a balance between the needs of regions where fish production and supply chains are more developed and must adapt, versus regions where they are less developed and offer promise.

In focal countries, we aim to deliver significant impacts through sustained research engagement. In scaling countries, we will pursue further development outcomes through capacity building, policy dialogue and advisory services that leverage the technology and learning resulting from our focal country research.



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Photo credit: Front cover, Md. Masudur Rahaman, WorldFish.
The photo, which shows a woman in Bangladesh holding up nutritious small fish caught with a gill net, won gold in the honorable mention category at the 78th International Photographic Salon in Japan.