



Annual Report 2016



Mission

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



The year 2016 began with the launch of the UN Sustainable Development Goals (SDGs), which the UN Secretary-General called a “shared vision of humanity ... a to-do list for people and planet, and a blueprint for success.” Over the course of the year, WorldFish undertook a series of consultations that aimed to sharpen its research priorities, its goals, and its pathways to achieving impact, which position it to make a meaningful contribution to the SDGs. The result is a new WorldFish Strategy, launched in December.

The strategy is distinguished by a clearer value proposition for investing in fisheries and aquaculture for development, combined with quantified, time-bound impact targets developed through bottom-up analysis at country and regional levels. It presents an integrated set of research programs and cross-cutting themes, including an increased emphasis on leveraging the dynamism of private enterprise and a new cross-cutting theme on entrepreneurship.

This annual report includes highlights of progress on key research innovations that lay the groundwork for success in implementing the new strategy. We highlight the critical role of diverse public, private and civil society partnerships, and how these enable not only widespread adoption of new practices but also changes in policies and institutions necessary to deliver impacts at scale.

A key win for the organization in 2016 was the development and approval of the new CGIAR Research Program on Fish Agrifood Systems (FISH).

Closely aligned with our strategy, this is the only CGIAR Research Program to focus specifically on the science of aquaculture and small-scale fisheries, and the benefits this can deliver for gender-equitable livelihoods, food and nutrition security and environmental sustainability. The International Water Management Institute (IWMI), Wageningen University, University of Greenwich and James Cook University are managing partners, with WorldFish as the lead center.

Globally, there is growing recognition of the value of fish in achieving food and nutrition security, as well as increased focus on marine conservation and investment opportunities in the “blue economy.” This is a very positive climate in which WorldFish can pursue its unique agenda. WorldFish has achieved a steady growth in project-specific funding (bilateral and CGIAR “window 3”), from USD 17.1 million in 2012 to USD 22.9 million in 2016, an increase of 34%. Looking forward, WorldFish aims to continue that growth on the strength of its partnerships in its focal and scaling countries, while emphasizing opportunities for cross-country learning and exchange.

As the world’s leading research organization dedicated to strengthening livelihoods and enhancing food and nutrition security in developing economies through fisheries and aquaculture, WorldFish is poised to significantly expand its impact in the years ahead. In these pages, we provide a glimpse of the difference this research can make in the lives of millions of poor producers, traders, processors and consumers across Africa, Asia and the Pacific.

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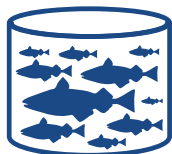
Ms. Belinda Yang, Chair of the Audit Committee, Estuary Innovation Labs Inc., Canada

Mr. Anthony Long, Chair of the Governance Committee, Belgium

Dr. Stephen Hall, WorldFish (term ended on 14 February, 2016)

WorldFish at a glance

Impacts by 2022



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



2.4M

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



4.8M

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



4.7M

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



3.3M

hectares of ecosystems restored through productive and equitable management

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



234

**WorldFish partners
with substantial
program
engagement**

Partnerships are essential to bringing technologies and innovations to scale and achieving development impact.

Organization



335

Total staff



60

**Percentage of staff
directly working in
research**

Publications

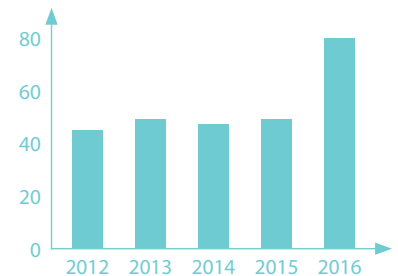


137

**Total publications
in 2016**

57

**Working papers,
reports and briefs**



Peer-reviewed

Sustainable aquaculture

Aquaculture is the world's fastest-growing food production sector. WorldFish research focuses on sustainable increases in aquaculture production ensuring that poor farmers, their families and communities receive direct nutritional and economic benefits.



Projects: Promoting the Sustainable Growth of Aquaculture in Myanmar (MYFC); Improving Employment and Income through Development of Egypt's Aquaculture Sector (IEIDEAS); and Aquaculture for Income and Nutrition (AIN); Bangladesh

Investors: CGIAR Research Program on Livestock and Fish (L&F); European Union (EU); Government of Malaysia; International Fund for Agricultural Development (IFAD); Swiss Agency for Development Cooperation (SDC); and United States Agency for International Development (USAID)

Faster-growing fish breeds increase production, profitability and sustainability

WorldFish researchers are developing improved, fast-growing strains of tilapia and carp for dissemination to developing countries, which is helping fish farmers increase their production, boost profits and reduce environmental impacts.

Aquaculture currently supplies around half of the fish consumed globally and is projected to grow from 66.6 million metric tons in 2012 to 93.2 by 2030. Achieving this significant production increase will require improved fish breeds that thrive in a range of aquaculture systems, convert feeds efficiently and have minimal impacts on the environment—all of which form an ongoing focus for WorldFish research.

In 2016, WorldFish researchers developed the 15th generation of Genetically Improved Farmed Tilapia (GIFT) as part of its long-term GIFT breeding program funded by various donors. GIFT is a fast-growing tilapia strain that can adapt to a wide range of farming systems. On average, each new generation of GIFT has 5–10 percent faster growth than the previous generation.

Since its development through a selective breeding program by WorldFish and partners that began in 1988, GIFT has been disseminated in 17 countries.

In March 2016, WorldFish sent 1200 fry to the Rajiv Gandhi Center for Aquaculture in India to supplement that center's existing GIFT breeding nucleus. And, in August, 3200 fry were supplied to the Department of Fisheries in Myanmar—the first time that GIFT has been made available in Myanmar, a country where more than 200,000 people engage in small-scale aquaculture. Dissemination programs being developed in India and Myanmar will focus on maintaining genetic integrity and improving the availability of quality farmed fish in these countries.

Using the methodology developed in the GIFT breeding program, WorldFish started a breeding program for a faster-growing strain of Nile tilapia in Egypt, known as the Abbassa improved strain, currently in its 14th generation. In 2016, WorldFish moved the breeding cycle to winter (November to March) to make Abbassa strain fry available in summer (July to October), when

hatcheries and farmers start their own breeding cycles.

Dissemination of the Abbassa strain first started in 2012 and has benefited many farmers in Egypt, the third-largest tilapia-producing country in the world.

Results from the SDC-funded Improving Employment and Income through Development of Egypt's Aquaculture Sector project found that use of the Abbassa strain by 500 fish farms increased yields by 5 percent (t/ha), boosted farm profits by USD 13,571 and reduced environmental impacts by between 12 and 36 percent from 2011 to 2015.

It is anticipated that use of the Abbassa strain will spread to almost all Egyptian fish farms within five years, as it is the only genetically improved Nile tilapia available. As a result of stocking the fast-growing strain, this is expected to help fish farmers increase their production and profitability, which in turn will create new jobs along the aquaculture value chain.

WorldFish is also developing improved breeds of rohu, catla and silver carps, which are important species in developing countries such as Bangladesh, Myanmar and India.

In 2013, with support from the USAID-funded Aquaculture for Income and Nutrition (AIN) project and the CGIAR Research Program on Livestock and Fish, a new breeding program for rohu carp was started. In July 2016, WorldFish produced the first generation of improved rohu. Research experiments have been conducted to test the performance of the improved strain of carp under different nursery and production systems. Each generation is expected to have 5–10 percent improvement in growth.

In 2017, the carp breeding program will include catla and silver carp species, which are normally produced in polyculture systems.

“ I used to produce four tons of tilapia. But now, after using the Abbassa strain, the total production of my ponds is about five tons.

- Hamada Refaat Attia, fish farmer, Egypt ”

Similarly, WorldFish will continue developing its fast-growing GIFT tilapia strain to include new characteristics such as disease resistance. This vital research, and the distribution of these improved strains to developing countries, will enable aquaculture to grow sustainably and allow poor men and women fish farmers to boost their farm productivity and create wealth.

Outcomes

20%	estimated adoption rate of the Abbassa strain by Egyptian fish farmers
13.5K	increase in average profits per hectare for Egyptian fish farmers using the Abbassa strain (USD)



View [photos](#) of GIFT seed being packaged and transferred from Malaysia to Myanmar.

Target SDGs



Research shows quality shrimp seed are key to consistent production

In Bangladesh, the export of black tiger shrimp is the third-largest source of export earnings. About 90 percent of the 275,000 hectares (ha) used for shrimp culture are farmed by low yielding smallholders. A major threat to production and livelihoods is disease, and WorldFish is supporting government efforts to address the problem.

To reduce disease risk and increase production in small-scale farms, the USAID-funded Aquaculture for Income and Nutrition (AIN) project provided technical training to 10,700 shrimp farmers in 2016.

As part of the training, farmers learned about the importance of using quality seed to reduce the risk of disease. The project worked with 24 hatcheries to identify batches of virus-free seed and in 2016, 177 million virus-free seed were sold. This led to an average production increase of 53 percent for 6582 farmers, amounting to an additional total production of 838 metric tons valued at USD 8 million.

Research by WorldFish found that small-scale farms that stocked the quality seed showed a shrimp survival rate of 27 percent compared to 15 percent in farms with non-tested seed. The research also showed a lower disease rate of 29 percent compared to 48 percent with non-tested seed, and an 81 percent higher profit per ha compared with non-tested seed.

AIN has also provided support to the Department of Fisheries (DoF) and the private sector to introduce a second type of shrimp seed, known as specific pathogen-free (SPF) seed, which are produced from domesticated broodstock, have been selected for faster growth and are tested regularly for all known serious pathogens.

Once a critical mass of farmers is using quality seed, the disease cross-contamination between farms, which is a major risk, will be reduced. Further, farmers will likely be willing to invest more in feed and other inputs, and overall production will increase.

Target SDGs





Photo credit: Kate Beintr/WorldFish

Scaling proven technologies in Timor-Leste to boost aquaculture production

The marine fisheries surrounding the half-island of Timor-Leste account for over 90% of the country's total fish production. But capture fisheries alone will not be sufficient to meet the growing fish demand in the country.

Recognizing the need to increase the productivity of inland aquaculture, the Timor-Leste Government developed the National Aquaculture Development Strategy (2012–2030) with the support of WorldFish and partners. The strategy aims to increase annual per capita fish consumption from 6 kg to 15 kg by 2020, thereby also helping to combat widespread poverty and malnutrition.

To support implementation of the strategy, WorldFish assisted the government to introduce and promote the use of Genetically Improved Farmed Tilapia (GIFT) seed, combined with on-farm production of tilapia feed using local resources and better management practice (BMP) training for rural, poor fish farming households. WorldFish research shows that these technologies, when validated in the local context and used together, can significantly increase aquaculture production and profits.

As part of the New Zealand Aid-funded Partnership for Aquaculture Development in Timor-Leste project, WorldFish refurbished a government hatchery in Gleno, Emera, which started operations in January 2016. By the end of year, the hatchery had distributed nearly 400,000 GIFT fingerlings to 655 farmers from 11 of the 13 municipalities—a huge increase on the 10,000–20,000 fingerlings the hatchery produced each year previously. In addition, the hatchery maintains four breeding cohorts to minimize inbreeding of brood stock.

As part of the WorldFish-led Combatting Malnutrition and Poverty through Aquaculture in Timor-Leste (COMPAC-TL) project, funded by the Norwegian Ministry of Foreign Affairs, project partners Mercy Corps and Hivos delivered BMP training to fish farmers on topics such as pond construction, preparation and fertilization, feeding, maintaining pond record books and marketing. Between January 2014 and November 2016, the project trained over 1500 farming households across six rural municipalities to grow tilapia in household ponds.

Target SDGs



Resilient small-scale fisheries

Most capture fisheries are already at or beyond production limits. WorldFish research focuses on how to improve the resilience and productivity of small-scale fisheries



Project: Enhanced Coastal Fisheries in Bangladesh (ECOFISH^{BD})
Investor: 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); and Department of Fisheries, Bangladesh

Research-led efforts to protect hilsa fisheries in Bangladesh boost production and strengthen livelihoods

WorldFish works with fishing families in Bangladesh to conserve hilsa, the country's national fish, and conducts research to inform government decision-makers on the best fishery conservation measures.

In Bangladesh, it is illegal to catch, carry or sell juvenile hilsa (*jatka*) from November 1 to June 30 or catch mother hilsa during the breeding season, usually September and October. This ban was introduced by the government in 2011 to protect fragile stocks of hilsa, the country's national fish.

But many fishers—who earn less than BDT 10,000 (USD 127) a month, have little savings and no alternate source of income—often keep fishing illegally.

Helping fishing families 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 provides training and support to poor and rural fishing households and research-backed advice to government decision-makers.

The project encourages fishing communities to form hilsa conservation groups consisting of 30-40 households, with the aim to inform, empower and encourage participation of community members in protecting their fishery. As shown by WorldFish and partner case studies, this is critical to achieving successful adaptive co-management, which can promote a well-managed fishery and subsequently improve the living standards of fishers and their families.

The project provides group members with different varieties of seeds to grow vegetables for household consumption, including spinach, cucumber, gourd, radish and pumpkin. After family consumption, any surplus can be sold at the local market for a profit.

Members are also trained in alternative income generating activities such as fish farming, toy making, providing para veterinary services and raising ducks and goats.

“Because we're not fishing, they teach us how

to do farming. They give us goats and we do alternative income generating activities, but we don't catch fish,” says fisher Amir Hossain Firoz from Hossainpur, Patuakhali.

Over 279 conservation groups in 81 villages have been established since 2015, with women making up 30% of members. By 2019, the project aims to establish 500 groups, directly involving around 20,000 households in the community management of hilsa.

To improve access to credit, a problem for many poor families during the ban, the project is involving women from fishing villages in community savings groups.

Group members contribute BDT 25 each week (USD 0.31), which is deposited by the secretary into a local bank account. These funds are then loaned to members at the interest rate of 6.7%, a much lower rate than other moneylenders.

“With these savings we can slowly pay the loans we have taken from our boat owners,” explains Khadija Begum from Rahamatpur.

The project's efforts have contributed to greater compliance with the government-imposed bans, evidenced by a bumper hilsa harvest in 2016.

“Over the last two years, the number of hilsa has increased in the Andharmanik river,” explains Dr. Md Abdul Hasnat, District Fisheries Officer, Patuakhali. “Total production in 2016 has overtaken the combined production of the previous two years.”

To enhance the government's understanding of the best hilsa management measures, the project is conducting research into the species' distribution patterns, migration routes and breeding sites in Bangladesh.

Similar research on hilsa is being undertaken by WorldFish in Myanmar, as part of the ACIAR-funded MYFish project, helping to inform

“ Before, we spent all our days in the river but we couldn't find a fish. Now, we catch four to five fish each day and can earn 2000 to 3000 taka [USD 25–37].

- Putul Rani, general secretary of a hilsa conservation group in Hossainpur, Patuakhali

WorldFish's understanding of the total hilsa resource in the Bay of Bengal.

Lessons from the ECOFISH^{BD} project, drawn from three years of experiences and ongoing field visits by project staff to conservation and savings groups, help refine the project's interventions. In particular, this learning has improved project strategies to build alternative livelihoods and increase the incentives to comply with fishery conservation measures.

The project is further leveraging its research by sharing findings with other partners and governments, including the Philippines, ensuring a significant and lasting effect.

Outcomes

279	hilsa conservation groups formed in 81 villages since 2015
82	savings groups formed since 2015
20K	households involved in conserving hilsa by 2019



Watch a [video](#) about how fishers and their families are joining together to protect hilsa in Bangladesh.

Target SDGs



Value chains and nutrition

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



Project: FishTrade for a Better Future
Investor: European Commission (EC)
Partners: African Union Inter-Africa Bureau for Animal Resources (AU-IBAR); and New Partnership for Africa's Development (NEPAD) Planning and Coordinating Agency (NPCA)

Opening avenues for cross-border fish trade in Africa

Reformed pan-Africa policies and one-stop border posts enable fish traders and processors to conduct easier and more equitable cross-border trade.

Intra-regional fish trade in Africa is constrained by inadequate market and trade infrastructure, and deficient policy and institutional frameworks. These have led to high transport costs, complex trade rules and inadequate market information, all of which have prevented Africans, especially women, from optimizing the social and economic benefits available from fish trade.

Take the case of the Penucum-Senegal Women Fish Mongers Association (PSWFMA). Each month, the women process about 10 metric tons of fish from which they can supply the local market. But to penetrate the lucrative markets in neighboring countries, the women face many hurdles. WorldFish studies have shown that only 6% of the fish make it across Senegalese national borders.

As part of the European Commission-funded FishTrade for a Better Future project, WorldFish research is deepening understanding of the challenges that traders face in cross-border trade, identifying potential opportunities and making recommendations that inform national and regional food trade policies. FishTrade focuses on four fish trade corridors in sub-Saharan Africa, covering 21 countries.

In 2016, the project supported the PSWFMA to move processed fish in a trade caravan from Dakar, Senegal to Bamako, in Mali—a distance of some 1300 km that takes about 26 hours by road. Along the road are numerous checkpoints, ranging from a few minutes delay for a routine inspection to an hour for a thorough stop and search.

“We have to plead and explain to the authorities that we are carrying fish, a perishable commodity,” said Aisatou, one of the traders on the trip.

In 2014, the second Conference of African Ministers of Fisheries and Aquaculture endorsed the African Union Policy Framework and Reform Strategy for Fisheries and Aquaculture

in Africa, which prioritizes fish trade and aims to promote responsible and equitable fish trade and marketing. During the same year, the African Union Heads of State made the Malabo Declaration to triple intra-regional agricultural trade by 2025.

Spurred by these commitments, the FishTrade project, led by WorldFish in partnership with the African Union Inter-Africa Bureau for Animal Resources (AU-IBAR) and the NEPAD Planning and Coordinating Agency (NPCA), is supporting African Union member states to enhance the role of fish products to the Malabo Commitment.

Among means of supporting these African commitments, FishTrade is working to strengthen the trade capacities of private sector associations, in particular women fish processors and traders and small and medium-scale entrepreneurs, to enable them to make better use of expanding intra-regional fish trade opportunities.

Supporting the concept of One Stop Border Posts (OSBPs), which have been developed to simplify the process of exiting one country and entering another for fish traders, will remove a major obstacle. The OSBPs were developed to facilitate cross-border trade but have thus far not focused on the trade in fish. In 2016, FishTrade supported a pilot at Busia, straddling Kenya and Uganda. Charles Achieng of the Cross-Border Traders' Association at Busia said that with FishTrade's support members of his 400-strong association would now be able to avoid the bureaucracy, the double inspection and taxation and lengthy procedures that, for a long time, have been undermining fair and speedy trade across the border.

In addressing some of the challenges at the Busia border post, which include lack of information and appreciation of the need for harmonized standards at the border,

“ I wish there was a way for the authorities to agree to grant easy passage along the way to fish traders so that we minimize these stops and move our product faster across the border.

- Aisatou, fish trader, Senegal ”

the FishTrade project has also undertaken a public campaign, through community radio, to raise awareness about import and export requirements, especially for the traders.

Through these activities, the FishTrade project aims to generate information that facilitates policy reforms, influence implementation of appropriate policies and support institutional strengthening to improve food and nutritional security and reduce poverty in sub-Saharan Africa.

Outcomes

2.9K	women fish processors and traders across Africa with increased capacities for cross-border trade
6	Policies influenced by WorldFish data [Uganda, South Africa, Malawi, Zambia, Guinea, and the Fisheries Committee for West-Central Gulf of Guinea (the Regional Fisheries Body)].



Learn [more](#) about how the FishTrade for a Better Future project strengthens Africa's great potential for increased trade in fish.

Target SDGs



Fish provides minerals and vitamins that are needed for good health. WorldFish research focuses on increasing the availability of fish and their consumption by poor consumers, particularly women and children.



Projects: Enhancing Rice Field Fisheries in Cambodia; Feed the Future Cambodia - Rice Field Fisheries Phase II; and Suchana: Ending the Cycle of Undernutrition in Bangladesh

Investors: United States Agency for International Development (USAID); European Union (EU); and United Kingdom Department for International Development (DFID)

Nutrient-rich small fish: A solution to improve household nutrition and human health

WorldFish research finds that consumption of small fish, which are rich in calcium, iron, zinc, vitamin B12 and vitamin A, can help combat malnutrition in developing countries such as Cambodia and Bangladesh.

In Cambodia, nutrient-rich small fish such as the Mekong flying barb, yellow tail rasbora and slender rasbora are abundant in the flooded rice fields, rivers and streams that cover the Cambodian countryside. Despite this, few people eat them.

Most households, 80 percent of whom engage in fishing, believe that wild-caught small fish are only useful for feeding to chickens, ducks and pigs. “The elderly people in my village would tell us that feeding small fish to children makes them thin and susceptible to illness,” explains Chum Dany from Aren village, Pursat province.

In fact, WorldFish research finds that small fish, particularly when eaten whole, have many nutritional benefits because they are rich in calcium, iron, zinc, vitamin B12 and vitamin A. These micronutrients are needed for cognitive and physical development, especially during the first 1000 days of life.

To encourage greater consumption of wild-caught small fish in Cambodia, where 40 percent of children under five are malnourished, the USAID-funded Enhancing Rice Field Fisheries project (2012–2016) ran an awareness campaign promoting the importance and nutritional benefits of small fish. Activities included regular half-day training sessions, cooking demonstrations and household coaching. The project worked in four provinces surrounding Tonle Sap lake, where many households depend on fishing in rice fields for food and income.

The campaign, informed by WorldFish research, led to increased at-home consumption of small fish by 13 percent on average from 2012 to 2016, and boosted consumption of small fish by children under 5 by 23 percent among households in the project target areas.

As part of the training sessions, participants learned how to process small fish into a fish powder, which can be stored for use during the

lean season, the months when households are less able to catch fish.

Locally sourced solutions featuring nutritious small fish are likewise a part of WorldFish’s nutrition research in Bangladesh, where women and children consume inadequately diverse diets, and rates of undernutrition are high.

In Bangladesh, WorldFish has pioneered the development and use of a fish chutney made from dried small fish, oil, onion and spices for pregnant and lactating women, and a flour of dried small fish, orange sweet potato, rice and oil to be boiled with water and served as a porridge for infants and young children. This is part of the EU- and DFID-funded Suchana project, which aims to reduce undernutrition and stunting in children in Bangladesh. These nutritious foods are easy to produce and use inexpensive ingredients, providing powerful benefits over fortified food products and supplements.

Back in Cambodia, another approach used by the Rice Field Fisheries project to increase fish consumption was to boost production by improving the management of community fish refuges (CFRs)—man-made ponds that provide a dry season sanctuary for broodfish. Research shows that a CFR, with improved management, can significantly improve the fish productivity of the rice field environment in a relatively short time period (as soon as one year after the start of the intervention).

Through the project, over 400 improvements were made at 40 project sites. This directly benefited an estimated 86,000 people, with households at the project sites experiencing a 9 percent increase in fish catch.

“Now, during the rainy season, my family and I can catch more from the flooded rice field—about 50 kg of fish a week,” says rice farmer Phan Phoy, who previously caught 5 kg of fish per

“ I didn’t know small fish were so nutritious. I now know that I should cook the fish whole, so my children get the most nutrition from the fish they’re eating.

– Van Vy, mother, from Aren village, Pursat ”

week during the rainy season. With the larger catch, Phoy and his family are eating more fish.

Nutrition activities will be expanded in phase II of the Rice Field Fisheries project to include training on growing vegetables around the CFRs.

These activities are key steps toward increasing the consumption of nutritious fish and vegetables by rural families in Cambodia, ensuring that their children get the best start in life.

Outcomes

23%	increase in small fish consumption by children under 5 years old
16.5K	individuals reached through awareness-raising campaign
94%	of surveyed households adopted behaviors learned through training and from information materials



Watch a [video](#) about nutrient-rich small fish in Cambodia.

Target SDGs



Gender

Rural women have a major role in fisheries and aquaculture. WorldFish gender research focuses on bridging gaps in the access and use of agricultural resources to promote economic development.



Projects: Sustainable Transformation of Egypt's Aquaculture Market System (STREAMS); and Improving Employment and Incomes through the Development of Egypt's Aquaculture Sector (IEIDEAS)

Investor: Swiss Agency for Development; and Cooperation (SDC)

Partner: CARE International Egypt

Testing the best interventions to tackle the problems of poor women fish retailers in Egypt

Pilot-scale research in Egypt shows that skills training, subsidized equipment and access to low-cost credit can enable poor women fish retailers to overcome their daily problems and increase sales.

In Egypt, the fish retail sector provides around 14,000 full-time jobs, of which informal women retailers play a dominant role in supplying low-value fish products to low-income consumers. But for these women, who informally sell their fish from metal trays in the market or on unshaded street corners, it's a hard way to make a living.

Most have limited means to transport or store their fish to keep them in good condition, resulting in lower quality fish and reduced income. Many retailers have limited negotiating power over vendors and lack access to low-cost credit to expand their businesses. Additionally, women retailers lack a secure, formal place to sell fish and often face harassment from police, who regularly confiscate their produce because they don't have an "official seller" license.

To help women fish retailers—who are among the poorest of the poor in Egypt—address these challenges, WorldFish and its partner CARE International in 2013 established and supported six women retailer committees in five governorates: Fayoum, El Mineya (two groups), Sharkia, Behera and Kafr El-Sheikh.

This pilot-scale intervention was part of the SDC-funded Improving Employment and Incomes through the Development of Egypt's Aquaculture Sector (IEIDEAS) project (2011–2015).

The committees, formed as part of existing community development associations, consist of 10 to 15 elected women fish retailers. The committees provide training, subsidized equipment and low-cost loans to registered women retailers, and represent the daily struggles of registered and unregistered women retailers to government officials.

As a result of this intervention, working conditions improved for 900 women fish retailers who operate within the community

and across the districts. On average, project-supported retailers made higher profits (average USD 10/day) than non-project retailers (average USD 1/day).

Different approaches were tested among the six committees—including market infrastructure, improved transport, distribution centers and empowerment training—helping to inform the project's understanding of the most suitable interventions for different target communities.

Now, the work is being continued with the two most successful retailer committees through the SDC-funded Sustainable Transformation of Egypt's Aquaculture Market System (STREAMS) project (2015–2018). This work is directly benefiting 1125 women retailers and indirectly benefiting 6412 family members (based on an average household size of 5.7 people).

"We've learned that we should work together," explains fish retailer Hayat Abu El Yazid Abdel Farah, referring to training she attended on teamwork. "Before, each woman paid 50 to 60 EGP (USD 2.70–3.20) to rent a motor tricycle to take their fish to market. Now we do it all together, so every person only pays 10 EGP (USD 0.55)."

To improve access to working capital, a key challenge facing women retailers, the IEIDEAS project created 21 village savings and loan associations (VSLAs) in Kafr El Sheikh and El Mineya governorates in 2014. Building on the success of the groups in specific districts, the STREAMS project is now establishing up to 70 VSLAs in Kafr El Sheikh and Fayoum.

The VSLAs consist of up to 25 female and male members, half of whom must be fish retailers. They hold weekly meetings, where members contribute up to 50 EGP (USD 2.73) in savings, the total of which is used to issue loans to group members.

“ (The VSLA) will enable me to buy fish with my own money so that I won't be under control of wholesalers or even use it in case of emergency illness.

- **Zobaida Ramadan Kamel, fish retailer, Shaksouk village, Fayoum** ”

This approach draws on WorldFish gender research in the Barotse Floodplain in Zambia, which shows that savings groups, particularly when combined with gender transformative approaches, can enhance women's control over funds and encourage greater investment in income-generating activities.

By building the human, social, physical and financial capital of poor women fish retailers in Egypt, their livelihoods and working conditions have greatly improved and their important contribution to the fish retail sector is being increasingly recognized.

Outcomes

900	women retailers benefiting from improved working conditions
1.1K	women retailers benefiting directly from project activities
6.4K	family members benefiting indirectly
330	members of VSLAs registered in 2016



Watch a [video](#) about how interactive theater training has helped Egyptian women fish retailers lobby for their rights.

Target SDGs



Entrepreneurship

Private businesses are critical to making fish available for consumers. WorldFish research focuses on increasing safe employment and entrepreneurship for women, men and youth in fish processing and trade.



Photo credit: Mike Luamare/Ducklabbit

Project: Sustainable Shrimp Farming in Aceh, Indonesia
Investor: IDH - The Sustainable Trade Initiative
Partners: Ecohub; Gordon and Betty Moore Foundation; and Rabobank Foundation

A model for the eco-transformation of the shrimp industry

WorldFish and partners have built on a WorldFish-designed model for financing smallholder aquaculture enterprises to support farmers to establish sustainable businesses in Aceh, Indonesia.

Along with many lives in the 2004 tsunami, countless livelihoods were also lost across all sectors. Hit particularly hard was the aquaculture industry, which supported 50,000 jobs in Aceh, Indonesia, alone.

Post-tsunami development efforts focused on grants to successfully rebuild aquaculture in the region. However once the handouts stopped, many farmers were left ill-equipped to continue to improve their businesses. Importantly, they lacked access to credit for vital supplies like feed and seed.

WorldFish, as part of the IDH-funded Sustainable Shrimp Farming in Aceh, Indonesia project, worked with the Aceh Aquaculture Cooperative (AAC) to establish sustainable business models for farming black tiger shrimp, a premium product in foreign markets.

Black tiger shrimp is widely farmed in Aceh and requires near zero feed and chemical input, which means that it is produced “extensively” compared to other types of shrimp produced using “intensive” production methods and high amounts of feed and fertilizer.

As well as its green credentials, and thanks to its size and physical appearance, the black tiger shrimp is highly prized in international markets and attracts a good price. For farmers, the challenges are to gain a fairer share of that premium price, find access to good credit for feed and seed and prove their environmental credentials.

In 2014, with the help of WorldFish, IDH and others, an aquaculture improvement plan commenced to support the AAC. The plan involved training programs to help farmers apply best management practices based on WorldFish research, learn about land and water management, implement new sustainable practices and traceability mechanisms, and develop financial and business management skills.

The program was also structured to lay the groundwork through benchmark gap analyses to meet certification standards. These programs potentially open the door to higher value global markets, which increasingly require a traceable and certifiable product to meet changing consumer preferences.

Smallholders in aquaculture in developing markets often do not have the collateral nor the credit history to access commercial loans from banks and other institutions. Added to this, aquaculture is traditionally seen as a risk by financiers, partly because they have little experience in the sector, and data to make the financial case is lacking.

But with the transformation of the AAC brought about by the implementation of best management practices and more robust administration, the Rabobank Foundation has been willing to offer two loans of USD 25,000 and USD 140,000 so that the AAC can provide microcredit to its members at competitive interest rates.

The AAC uses the cash injection to offer seed and feed to farmers on credit. This has been a transformational change for farmers. With the adoption of new techniques, less feed and better seed resulting in higher yields, AAC farmers can now compete at a level that was previously inaccessible to them.

To facilitate a fairer price for farmers, WorldFish has been working with value chain specialist Ecohub, along with middlemen and processors. The collaboration is bearing fruit with farmers starting to receive better prices for some of their harvests.

The AAC’s successful transition to a commercially sustainable business underlines the fact that these small-scale businesses can become bankable commercial enterprises that are profit and growth focused, once they are

shown to be well managed, and grounded in local regulatory and institutional rules, with strong procedures and solid management systems in place.

The experience of working with the AAC and Aceh black tiger shrimp farmers to grow a cooperative and sustainable business model has been a successful case study that WorldFish and IDH are keen to share with others and replicate with other groups of farmers in the region as well as globally.

Outcomes

45%	increase in average shrimp weight across three crop cycles
6%	increase in survival rates across five crop cycles
1100%	increase in membership of AAC, up from fewer than 50 to 600 (2013–2016)



Watch a [video](#) about how black tiger shrimp farmers are building sustainable businesses in Aceh, Indonesia.

Target SDGs



Delivering impact through partnership

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

Target SDGs



WorldFish partners with Odisha State to scale-up aquaculture and reduce malnutrition

Proven WorldFish technologies that have successfully boosted aquaculture production in Bangladesh, now the world's fifth-largest producer of farmed fish, are being scaled to neighboring India. This is part of a five-year partnership between WorldFish and the Department of Fisheries in the eastern Indian state of Odisha, which aims to sustainably boost aquaculture in the state.

Since 1989, WorldFish has worked with partners in Bangladesh to increase the productivity of inland aquaculture by promoting improved fish breeds, quality seed and best management practices. Research shows that these interventions, when used together, can positively impact a farmer's production and profits.

Through the Odisha partnership, launched in June 2016, WorldFish provides support through improvements in seed, technology and farming systems. A long-term goal is to foster a sustainable aquaculture sector that is seen as low risk and will attract increased private investment.

The partnership also focuses on improving the value chain for aquaculture products, with a view to having an impact on human nutrition in Odisha, where over 25% of children under 5 in rural parts of the state suffer from acute malnutrition.

Through this direct investment by the Odisha state government, WorldFish innovations can be adapted and scaled to achieve significant development outcomes.





Photo credit: Heba El Begawi/Duckrabbot

Private sector R&D partnership in Egypt focuses on feed efficiency

Feeds typically represent 70 percent of aquaculture's operational costs and have significant environmental impact, so solutions that reduce this burden are a priority for many farmers. To tackle this challenge in Egypt, where the price of imported feeds has tripled in recent years, WorldFish, with almost 20 years of aquaculture research experience in Egypt, has partnered with the global feed manufacturer Skretting.

The collaboration focuses on testing local raw materials, including agricultural by-products, as the main ingredients in fish and shrimp feeds. The research aims to find the most suitable feed solutions that maximize fish growth, survival and digestion rates with minimal or no negative environmental impact.

The experiments take place in the Fish Nutrition Research Unit, constructed specifically for this research and opened in June 2016, at the WorldFish-run Africa Aquaculture Research and Training Center in Abbassa, Egypt.

Another aim of the partnership is finding ways to intensify aquaculture production combined with the most efficient use of water. Experiments are done using an advanced recirculation system, which enables researchers to work throughout the year.

These efforts are vital to supporting aquaculture development in Egypt and across Africa, where governments hope that aquaculture will provide 40 percent of the continent's total fish consumption by 2025.

Partnership with Malaysian Department of Fisheries enables breeding program expansion

Genetically Improved Farmed Tilapia (GIFT), a fast-growing tilapia strain that WorldFish has developed for nearly 30 years, has been disseminated in 17 countries, benefiting millions of people. WorldFish, which continues to provide high-quality GIFT seed to the Asian and Pacific regions, is now expanding the GIFT breeding program—made possible by an ongoing partnership with the Malaysian Department of Fisheries (DoF).

For the past 17 years, the GIFT breeding program has been based at the DoF research station in Jitra, Malaysia. In 2016, DoF granted WorldFish an additional 16 research ponds, bringing its total ponds to 34. The department has also been upgrading the center with new facilities, including two stand-alone incubation rooms, improved bio-security and better water quality management.

These improvements will enable WorldFish to expand its GIFT research, currently focused on growth rates only, by developing new genetic characteristics such as disease resistance, feed efficiencies and resilience. Incorporating new traits like these will help fish farmers prepare for future challenges such as climate change and increasing evidence of disease risks.

As a result, Malaysia has the potential to be a production hub of quality tilapia seeds for the country and the region, with the Jitra Station developed as an internationally recognized center of excellence for GIFT.



Photo credit: Jaja Juswanto/WorldFish

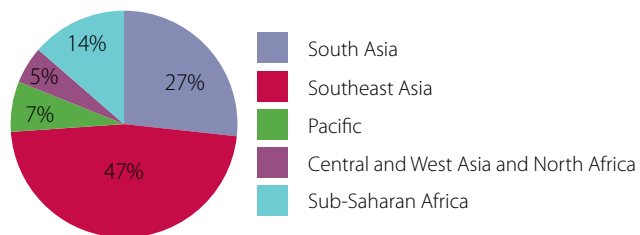
STATEMENT OF FINANCIAL POSITION (USD '000)

	As of 31 Dec 2016	As of 31 Dec 2015
ASSETS		
Cash and cash equivalents	17,609	20,861
Others current assets	4,048	4,251
Capital assets	182	231
TOTAL ASSETS	21,839	25,343
LIABILITIES		
Accounts payable	10,452	12,049
Accruals and provisions	1,594	2,021
TOTAL LIABILITIES	12,046	14,070
NET ASSETS	9,793	11,273
TOTAL LIABILITIES AND NET ASSETS	21,839	25,343

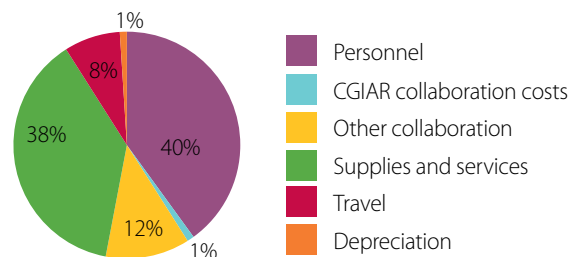
STATEMENT OF OPERATING ACTIVITIES (USD '000)

	For the years ended December 31	
	2016	2015
REVENUE		
Grants	27,368	32,670
Other income	983	1,519
TOTAL REVENUE	28,351	34,189
EXPENSES		
Research expenses	24,822	29,212
Administration, support and other expenses	5,009	5,522
TOTAL EXPENSES	29,831	34,734
EXCESS (DEFICIENCY) OF REVENUE OVER EXPENSES	(1,480)	(545)

WorldFish expenditure by region, 2016



WorldFish expenditure by cost category, 2016



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

WorldFish investors 2016

- Asian Development Bank
- Assam Rural Infrastructure and Agricultural Services Society, Government of Assam, India
- Australian Centre for International Agricultural Research
- Bill & Melinda Gates Foundation
- Bureau of Agricultural Research, Philippines
- Caritas Bangladesh
- Catholic Relief Services
- CGIAR Fund
- Critical Ecosystem Partnership Fund
- Department for International Development, United Kingdom
- Department of Agriculture, Forestry and Fisheries, South Africa
- Department of Fisheries, Malaysia
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- Embassy of the Kingdom of the Netherlands in Dhaka
- European Commission
- Farm Africa
- Fisheries and Animal Resources Development Department of the Government of Odisha, India
- Food and Agriculture Organization of the United Nations
- Foundation Ensemble
- Foundation for Rural Enterprises & Ecology Development of Mindanao, Inc.
- Gordon and Betty Moore Foundation
- Helvetas Swiss Intercooperation Bangladesh
- IDH - The Sustainable Trade Initiative
- International Development Research Centre
- International Fund for Agricultural Development
- International Water Management Institute
- Irish Aid
- Livelihoods and Food Security Trust Fund: LIFT
- Local Government Engineering Department, Bangladesh
- Margaret A. Cargill Philanthropies
- Mercy Corps Scotland
- Ministry of Economic Affairs, Netherlands
- Ministry of Foreign Affairs, Japan
- Ministry of Foreign Affairs, Norway
- National Institute of Water and Atmospheric Research Ltd.
- Nofima The Norwegian Institute of Food, Fisheries and Aquaculture Research
- OPEC Fund for International Development
- Pacific Rim Innovation and Management Exponents, Inc.
- Pactworld
- Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
- Rajiv Gandhi Center for Aquaculture
- Save the Children (USA)
- SEAMEO Regional Center for Graduate Study and Research in Agriculture
- Skretting Egypt
- Southern Province of New Caledonia, Direction du Developpement Rural
- Stimulating Household Improvements Resulting in Economic Empowerment
- Swedish International Development Cooperation Agency
- Swedish University of Agricultural Sciences
- Swiss Agency for Development and Cooperation
- The Mohamed bin Zayed Species Conservation Fund
- The Rockefeller Foundation
- The World Vegetable Center
- United States Agency for International Development
- University of Malawi, Chancellor College
- University of Queensland
- University of Stirling
- University of Sussex
- World Wildlife Fund for Nature - Greater Mekong Programme, Lao Country Office

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