

Harnessing Aquatic Food Systems for Sustainable Development

Healthy People. Healthy Planet. Shared Prosperity.



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**A Message
from the
WorldFish
Director
General and
Board Chair**

A warm welcome to the 2022 WorldFish Annual Report!

The year 2022 was a pivotal one for WorldFish—a year of transformation and renewed vigor. In the face of mounting challenges, including climate crises, economic uncertainties, and the continued exploitation of natural resources to meet the increasing demand for aquatic foods, WorldFish doubled up on its mission to create an inclusive world where safe, nutritious, and sustainable aquatic foods are accessible to all.

In this report, we share seven stories of change, evidencing shared prosperity can be attained for millions through sustainable fisheries and aquaculture.

Collaboration lies at the heart of our work. Working with as many as 425 diverse partnerships, we co-developed country-responsive solutions pivotal to driving sustainable and scalable impact. Together with multi-sectoral stakeholders, we have implemented projects that empower communities, ensuring the equitable distribution of benefits and the protection of vulnerable ecosystems.

We are delighted to share that in 2022, our projects in countries helped integrate aquatic foods as part of everyday diets of close to 600,000 beneficiaries, about half of them being women and children. Some 460,000 households adopted improved fish breeds and/or fisheries management practices, increasing their resilience to climate change.

Further, we worked with countries to develop and disseminate digital innovations that enhance the productivity, profitability, and sustainability of aquatic food systems. These innovations are transforming how information is collected and utilized to inform policy and improve human well-being and environmental sustainability.

We invite you to dive into this gradual but steady transformation of food, land, and water systems with aquatic foods at their core through stories of fishers, farmers, and coastal communities curated in this report.

We owe deep gratitude to our donors, partners, and the staff of WorldFish without whom none of these achievements would have been possible.

As we chart our course ahead, WorldFish is confident in the power of collaboration and scientific innovation. To this end, we venture into underpinning our efforts with South-South collaboration with countries leading the way to unlock their potential for sustainable, equitable aquatic food systems that benefit all – the people and the planet.

We look forward to continued partnerships and new partners to join us in this new exciting direction to accelerate aquatic foods research and implementation, critical to food and nutrition security and the 2030 Sustainable Development Goals.



A handwritten signature in black ink, appearing to read 'Baba Yusuf Abubakar'.

Baba Yusuf Abubakar
Chair of the Board of Trustees



A handwritten signature in black ink, appearing to read 'Essam Yassin Mohammed'.

Essam Yassin Mohammed
Director General WorldFish
CGIAR Senior Director of Aquatic Food Systems

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Our Value Proposition

Why Invest in Aquatic Foods

Aquatic food systems have a large and distinct sphere of impact

Provides food, nutrition, and livelihoods



3.3 billion

People receiving their micronutrients from aquatic foods globally



600 million

People dependent on fisheries and aquaculture for their livelihoods



90 percent

The percentage of small-scale fishers living in low- and middle-income countries



1 in every 2

Workers being a woman in fisheries and aquaculture sector

Is an engine for economic growth



USD 424 billion

The value of aquatic food production in 2020



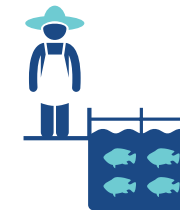
44 percent

The portion of global catch in economic value coming from small-scale fisheries



200 percent

The increase in production trade value since international standards for fisheries set in 1995



22 percent

An estimated increase in aquaculture production by 2030 from 2020 levels

Lowers carbon footprint

For producing healthful nutrient-dense foods compared to land-produced crops and livestock

- **36 percent lower** environmental impact from WorldFish's selectively-bred Abbassa Nile Tilapia
- **Lower environmental stressors** from small fish and bivalve aquaculture than chicken, the most efficient major terrestrial animal-source food



WorldFish at a Glance

Who We Are

WorldFish is a leading international research organization working to improve food security, nutrition, and livelihoods through aquatic food systems that are sustainable, equitable, and inclusive. It collaborates with international, regional, and national partners to enable the delivery of transformative innovations, tools, and practices to advance aquatic food systems through its cutting-edge research, evidence for policymaking, and knowledge co-creation.

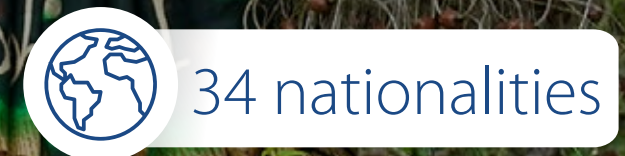
With a global presence in 27 countries across Asia, Africa, and the Pacific, and growing, WorldFish has established itself as a global leader in research and innovation in the realm of sustainable aquaculture and fisheries.

Our Vision

An inclusive world of healthy, well-nourished people and a sustainable blue planet, now and in the future.

Our Expertise

A diverse staff of multi-disciplinary scientists and talented professionals



7 Stories of Change

A tour of impacts and scaling opportunities in aquatic food systems— an outcome of WorldFish’s partnerships with countries and local institutions and communities



1. The GIFT that Keeps on Giving – from Timor-Leste to Nigeria

When Timor-Leste launched its National Aquaculture Development Strategy a decade ago, the average annual fish consumption was just 6 kg per person compared to the global average of around 18 kg.

Today, the country is on track to improve diets, nutrition, and health by doubling consumption to 15 kg by 2030, thanks to the efforts of the Partnership for Aquaculture Development in Timor-Leste, now in its second phase (PADTL2 – 2020-23).

A major driver of the initiative's success has been the introduction of Genetically Improved Farmed Tilapia (GIFT), developed by WorldFish, the production of monosex seed, and high-quality feed, which increased the productivity three-fold and reduced culture period by half from 11+ to 6 months.

In 2022, PADTL2 supported two new public-private partnership (PPP) model GIFT hatcheries, building on the success of the first two introduced under the project. The new facilities in Hera and Manufahi will add millions more fish seeds to the country's supply.

Roberto Bau Maria is one of 133 fish farmers in the Balibo cluster, Leohitu, who receives technical guidance from the PADTL2 project. Roberto started farming GIFT in 2017 and since 2019, he also started nursing of monosex fry to fingerling stage, resulting in the sale of 31,840 fingerlings, earning USD 1449. In 2022, Roberto expanded his enterprise and became a local service provider.

"The PADTL2 project has given me great results. My family eats fish twice per week, which we weren't doing before. I've earned USD 6500 from selling fish, fingerlings, and feed. This is a good outcome compared to other livelihood activities such as growing crops and raising livestock," he said.

“ The government is committed to promote and support PPP model hatcheries introduced by WorldFish, and to maintain and expand these to other areas of the country. ”

Taur Matan Ruak
Honorable Prime Minister, Timor-Leste

GIFT and PADTL2 are not only helping to achieve Timor-Leste's national goals but also providing a model approach for other Small Island Developing States.

Funded by: Ministry of Foreign Affairs and Trade, New Zealand since 2014, with complementary funding from the United States Agency for International Development since 2021

Partners: Ministry of Agriculture and Fisheries, Timor-Leste

GIFT to boost Nigerian aquaculture

Almost half of Nigeria's protein consumption comes from aquatic foods, but it relies on imports for 45 percent of its supply, costing USD 1 billion a year. In 2022, WorldFish successfully transferred 60,000 GIFT fry to a local company, Premium Aquaculture Ltd. under an [agreement](#) to develop the breeding population and kickstart a new domestic industry in the country, spreading blue prosperity.



Roberto Bau Maria, a fish farmer in Leohitu, grew his business and brings home more fish to eat.

2. Trained “Aquapreneurs” Benefit Women and Communities in Zambia and Malawi

Despite aquaculture’s important role in Malawi and Zambia, where around 20 percent of land is covered in water, smallholder fish farmers face many challenges, including a lack of access to training and quality inputs. For example, they often use poor quality or old fish seed, resulting in low production.

To help overcome these barriers, WorldFish launched the Inclusive Business and Entrepreneurial Models (IBEM) initiative to strengthen the value chain by supporting all actors – fish farmers, and their service and input providers.

The project, which ended in 2022, trained and mentored 73 local agro-dealers and suppliers of inputs for fish farming or “aquapreneurs” on better management practices for aquaculture. The project also supported them in setting up hatcheries to produce seed and upskilled them to become feed suppliers that could in turn provide training and inputs to smallholder farmers in their communities, creating a profitable value chain for farmers and entrepreneurs alike.

Mfuné Mwendalubi, living in Zambia’s Mporokoso District, became a first-time fish feed seller as one of the 25 feed aquapreneurs trained and mentored by the project. In the first season, she earned ZMW 17,790 (USD 1040) in revenue by selling feed co-financed by the IBEM project. She has since reinvested the money into growing her feed business. As the only fish feed retailer in the area, farmers now buy from Mfuné’s shop instead of travelling more than 150 km away to the next district.

With aquapreneurs in business, more than 73 percent of farmers reported having access to quality fingerlings, up from 14 percent before the project started.

Meanwhile, IBEM trained 3672 farmers—37 percent women—on new approaches for using quality seed and feed, and

“ I am pleased with the IBEMs project led by WorldFish. There are clear results of increased availability and accessibility of quality seed and feed, which I believe will improve household nutrition. We will see to it that the lessons learnt here are upscaled in other provinces. ”

Dr. Anna Songolo
Permanent Secretary, Ministry of Fisheries and Livestock, Zambia

better management practices for aquaculture. By adopting new technologies, farm household income increased 129 percent, while the local fish supply also improved.

As a result of the project, more than 25,000 people, more than half of them women, now have access to healthy and nutritious aquatic foods.

Small businesses like Mfuné’s are enabling local fish farming communities to increase their profitability with quality inputs, while being catalytic for attracting more investment. The trained aquapreneurs in Zambia leveraged an additional USD 223,910 for scaling their business—demonstrating a successful approach to gender-inclusive business models that can sustainably increase incomes and improve food and nutrition security in countries like Malawi and Zambia.

Funded by: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

Partners: Departments of Fisheries in Zambia and Malawi



Mfuné Mwendalubi, a first-time fish feed seller, now has a busy shop in Mporokoso district.



The revenues from *Artemia* and aquaculture have boosted Nurul Absar's income as a farmer.

3. Climate-Adapted Livelihoods and Nutrition with *Artemia* in Bangladesh

Bangladesh is one of the most climate challenged nations in the world, with Cox's Bazar along its coast particularly vulnerable. The region produces 95 percent of the salt in Bangladesh but provides only minimal incomes to some 1.5 million people working in the industry. Fish farming in the region also struggles with poor productivity. This leaves many unable to attain fruitful livelihoods and access to healthy food. To address these interlinked challenges, WorldFish introduced *Artemia* or brine shrimp pond culture through the *Artemia*4Bangladesh project.

Artemia is one of the most widely used crustaceans in the world, often as live feed for farmed fish. Importantly, it can thrive in highly saline water and contains essential nutrients, providing more than 50 percent protein, essential amino acids, and fatty acids needed for child development, so it also has potential as food for people.

The project helped set up around 150 farms introducing *Artemia* and aquaculture technologies, and training 1,500 farmers on *Artemia* pond culture, homestead aquaculture and vegetable gardening, and shrimp, tilapia, carp and mola aquaculture. These interventions enabled farmers to supplement their incomes from salt production by selling *Artemia* to local shrimp hatcheries, nurseries, grow-out

farms, and fish, shrimp, and crab producers, increasing their incomes by as much as 400 percent.

Further, to introduce *Artemia* into local diets, the WorldFish team developed recipes to foster acceptance. For instance, *Artemia* kebabs are becoming popular in the area as an alternative to meat kebabs. As a healthy option to support nutrition for women and children, an *Artemia* omelet was developed. These and other recipes were demonstrated with tastings to more than 200 salt farming families.

Nurul Absar, a farmer in the region, emphasized the importance of *Artemia* for his family: **"I had a very limited scope of earning apart from salt production. Now, the earnings received from *Artemia*, and aquaculture have increased the income of my family."**

Artemia provides not only an alternative source of income and nutrition for the community but a way to adapt to the impacts of climate change. As water salinity increases, the coastal community is affected by low agriculture and aquaculture productivity. *Artemia*, being resilient to high salinity and temperatures, can ensure stable incomes for farmers in the face of climate change.

With further research and collaboration, the project can be scaled out from Cox's Bazar to help farmers across the country adapt to climate change.

Funded by: European Union

Partners: Department of Fisheries, Bangladesh; Bangladesh Small and Cottage Industries Corporation; Can Tho University; Ghent University; Shushilan; Mukti Cox's Bazar; Coast Foundation

Seaweed farming provides for lost incomes along the Naf River

Due to a fishing ban along the Naf River, fishers are shifting to seaweed farming as a sustainable and profitable alternative with support from WorldFish. More than 100 young people have adopted the practice to enhance their livelihoods since the program's start. Along with seaweed aquaculture technologies, scoping out and developing market potential would be a key enabler for further gains.

4. Fostering Climate-Smart Aquaculture Innovations and Enterprises in Egypt

Africa is facing daunting challenges from climate change – from extreme heat to drought, water scarcity and more. With the arid and water-poor regions comprising more than half of the continent, innovative solutions can help better use limited and untapped aquatic resources – as is already being done in Egypt, the largest producer of aquatic foods in Africa.

To spur research and development in fish value chains, WorldFish initiated an innovation hub at its Abbassa research and training facility in Egypt in 2019 with the aim to mobilize cross-sectoral partnerships for developing cutting-edge innovations toward inclusive, climate-smart aquaculture for shared prosperity.

In 2022, as a collaborative space for all “blue economy” actors, the hub held 25 training workshops imparting skills on aquatic foods technologies and entrepreneurship to more than 1100 participants from the private sector and national institutions from 14 African countries, such as Eritrea, Ghana, and Kenya. The hub also facilitated knowledge sharing with global experts from more than 28 countries worldwide. It conducted facility visits for hands-on training on innovative solutions, such as WorldFish’s in-pond raceway system for advancing climate smart aquaculture technologies to maximize water use efficiency and reduce greenhouse gas emissions, and the Abbassa strain of genetically improved tilapia for sustainable aquaculture.

The training programs transferred best aquaculture production and business practices to diverse stakeholders at a local level. The increased knowledge and skills have led farm and hatchery owners and feed company operators, including women retailers, to increase their incomes by 27 percent. The hub also facilitated collaboration between research centers, the Egyptian government, and local universities to develop a new national pathway for aquaculture to complement the country’s [National Climate Plan 2050](#).

“ **Our partnership has resulted in a substantial return on investment for farmers, while contributing toward the development and strengthening of aquaculture systems and institutions. These results underscore the significance of partnerships and sharing of knowledge within the aquaculture industry.** ”

Mousa Wakileh

Lead for Soy Excellence Centre of the U.S. Soybean Export Council in Middle East and North Africa, partnering on training programs on fish feed

Hassan Ali Abdelrahman, a farmer and business owner, participating in several training programs at the hub reflected: **“WorldFish has equipped me to apply the best management practices in fish farming. Moreover, the [genetically improved tilapia] and effective feeding strategies facilitated a substantial increase in both productivity and income for farmers and hatchery owners.”**

Expanding on the initiative’s activities could be transformative in helping countries in Africa adapt their food systems to climate change while creating local employment and incomes through aquaculture.

Funded by: U.S. Soybean Export Council, Norwegian Agency for Development Cooperation, International Fund for Agricultural Development, and Europe Aid

Partners: Lakes & Fisheries Resources Protection and Development Agency, and Central Laboratory for Aquaculture (CLAR), Egypt



Hassan Ali Abdelrahman, a fish farmer and trainee, applied his learnings to increase his income and resilience.

5. Scientific Innovation Opens Door for Mass Mola Breeding to Nourish India

Small indigenous species of fish such as mola are rich in the micronutrients often missing from diets in low-income countries such as India, where 36 percent of children are stunted, and 57 percent of women are anemic. But farming these species at scale to improve nutrition has been technologically challenging—mola are too delicate and small to handle.

At WorldFish, scientists achieved a significant milestone in June 2022 by successfully inducing the breeding of mola for the first time in India at its partner hatchery, Biswal Aquatech in Odisha, standardizing breeding protocol for mola. The breakthrough involved designing breeding tanks fed with a steady shower of oxygen-rich water from an aeration tower to improve breeding and larval survival.

The innovation opened the door for mass mola production with minimal risk of animal disease spread, improving availability and access to nutrient-rich food in rural communities in Odisha.

Between June and September 2022, the project's fish breeding team produced more than 7 million mola hatchlings, which were either sold or distributed free of charge to farmers, who used them primarily for household consumption and sale. Aiming to benefit women in particular, the project collaborated with the Odisha Government's Mission Shakti initiative, distributing approximately 15,000 fry to women's self-help groups for stocking in publicly owned tanks.

"Previously, mola was absent in our gram panchayat tank. After the introduction of mola in our pond by WorldFish and the Department of Fisheries, we are able to harvest and consume mola frequently," said Gurubari Khilar, a mother of two young children and a member of Maa Manasa Women Self-Help Group that received the mola fry from the hatchery.

// This success has motivated other Mission Shakti self-help groups in the area to take up fish farming in gram panchayat tanks on a large-scale basis. The technical collaboration with WorldFish was very instrumental in the successful implementation of this scheme. //

Sujata R Karthikeyan

Commissioner-cum-Secretary, Department of Mission Shakti, Government of Odisha

The achievement was celebrated with a mola seed release program in collaboration with the Odisha Directorate of Fisheries, which spread awareness on the availability of mola seed from the partner hatchery and shared guidance on mola seed production and farming.

The mola model has since been replicated and scaled in Assam.

Funded by: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

Partners: Fisheries & Animal Resources Development Department and Department of Mission Shakti, Government of Odisha, India; Biswal Aquatech

Feeding the future with fish

WorldFish, with support from USAID, has worked with the Government of Odisha to include fish-based meals in Odisha's [Supplementary Nutrition Programme](#). The pilot implemented at 50 childcare centers reached 1200 children and, together with technical support and training to increase fish production, improved the nutrition of more than 100,000 men, women, and children.



Gurubari Khilar and her two small children are now able to consume nutrient-dense mola on a regular basis.

6. Science-Driven Policy Change to Restore Healthy Fish Stocks in Myanmar

In Myanmar, the Hilsa shad is a critical fish for local livelihoods, nutrition, and ecosystems. One farmer in the country underlined the importance of aquatic foods for their community: “Fish is very important to my family because it is not only our source of livelihood but also a source of vital nutrients that help us accomplish our daily tasks.”

However, Hilsa stocks in the region were discovered to be near economic collapse from overfishing and habitat degradation.

To reverse this loss of biodiversity, WorldFish and its partners kicked off a series of research programs to better understand Hilsa in the region, the drivers of its decline, and potential solutions. Researchers found the small-scale Hilsa fishery sector could be worth between USD 790 million and USD 1 billion per year, with more than 1.5 million fishers and market chain actors dependent on the fish for their livelihoods. They also discovered that more sustainable Hilsa management could help protect the Irrawaddy dolphin, a near-extinct species in the region.

A set of policy briefs, informed by the evidence, were presented to the government in Myanmar. One proposed policy to help protect Hilsa stocks included no-take zones, as ineffective enforcement often leads to overexploitation of coastal resources. Industrial bottom trawling, a type of fishing that drags large nets across the seafloor, also damages aquatic environments. Increased monitoring and surveillance can help check and restrain this practice.

As a result, a series of science-driven policies to protect Hilsa stocks were passed in critical regions of the country. Governments and local agencies implemented a closed season aligned with the peak spawning period identified by the research and designated 12 fish sanctuaries along key fish migration routes to protect the juveniles.

These newly enacted policies to protect the aquatic habitats of Hilsa will not only help revive ecosystems but will also ensure sustainable livelihoods and nutrition for the millions of fishers, related workers, and their families in Myanmar.

Funded by: The Darwin Initiative of the United Kingdom

Partners: Myanmar Department of Fisheries, Zoology Department of Yangon University, the Networks Activity Group, International Institute for Environment and Development

Making nutrition accessible for the vulnerable

To improve and support nutrition in Myanmar in the face of conflict and instability, WorldFish worked with supply chain actors to produce and market **dried fish powder**, a long shelf-life food using locally sourced nutrient-dense small fish. The project helped improve the nutrition of more than 2,000 people, especially pregnant and lactating mothers and young children, while also creating a new source of income.



WorldFish co-developed science-driven policies that are securing sustainable livelihoods and nourishment for millions in Myanmar.

Toward Resilient, Inclusive, and Productive Asian Mega-Deltas

WorldFish, through the **CGIAR Research Initiative on Asian Mega Deltas**, has been working in Bangladesh, Cambodia, and Vietnam to advance collective knowledge for informing policies and interventions needed to build nutrition-sensitive agri-food systems in the ecologically fragile region.

The team reviewed and analyzed existing datasets with governments to determine the influence of changes in production practices and consumption patterns on micronutrient intakes based on gender, age, and socioeconomic status, compiling the findings into two research publications.

Further, the methodologies developed for assessing nutrition-sensitive agrifood systems policies were applied in a review of nutrition policies in Bangladesh, Cambodia, Myanmar, and Vietnam. A national stakeholder consultation workshop was held in Cambodia to successfully validate nutrition-sensitive policies and interventions, with plans to facilitate similar consultation workshops in other focus countries.



INITIATIVE ON
Asian Mega-Deltas

7. Institutionalizing Community Based Resource Management in Solomon Islands

Thriving local food systems are the cornerstone of food security, culture, and heritage of Indigenous communities, and in small island states across the Pacific, these systems are heavily dependent on aquatic foods. In Solomon Islands, fish accounts for 57 percent of animal-source protein consumption, providing vital nutrients as well as livelihoods for the islands' fishers.

Equipping and empowering fishers, processors, and all actors in the value chain to carefully manage the islands' natural resources is, therefore, critical to ensure the sustainability and climate resilience of fisheries.

Since 2011, WorldFish has been collaborating with the Ministry of Fisheries and Marine Resources (MFMR) and the government of Malaita—the province with the largest population and the third highest rate of poverty—to inculcate Community Based Resource Management (CBRM) through research, training, and outreach. Having honed this model over the years, WorldFish helped MFMR to launch a nationwide CBRM scaling strategy in 2022, extending technical support to communities throughout the archipelago.

WorldFish has provided customized technical support on CBRM to 76 communities in Malaita since 2021. This included developing 16 information sets on key issues such as mangrove restoration and coral replanting, which contribute to healthy ecosystems and support resilient aquatic food systems. These were disseminated to communities, schools, and health clinics with dedicated sessions for women, empowering women, and young people to have a greater role in CBRM decision-making.

To build institutional capacity, trainings were held for community facilitators, which led to the co-development of 12 management plans. These plans, systematized by WorldFish, set out agreed rules for the management of coastal fisheries to support the sustainability of both the local economy and environment.

The new CBRM scaling strategy provides guidelines for all NGOs and non-profits in the region and directly supports the goals of [Solomon Islands National Fisheries Policy 2019–2029](#).

The initiative by MFMR to scale out CBRM nationally vouches for the enhanced institutional and human resource capacity of Solomon Islands over the years.

The success of the model demonstrates integration of interventions with the national strategy and inclusive partnerships as key to institutionalizing good governance and empowering Indigenous communities for the sustainable use of marine resources to secure their food, nutrition, and livelihoods.

Funded by: Australia Centre for International Agricultural Research

Partners: Ministry of Fisheries and Marine Resources and Malaita Provincial Government, Solomon Islands



WorldFish is working with the government to scale CBRM to communities throughout the Solomon Islands.

Big Splashes in 2022

Contributions and Achievements in Countries and Globally

Global public goods for sustainable aquatic food systems produced



46

innovations in aquatic food systems



400 publications

published

Capacity of value chain actors strengthened



196,936

actors upskilled including small-scale fishers, farmers, extension, suppliers, students, and community workers



34 percent

trainees who were women who applied their skills and knowledge to improve their household and community's food and nutrition security, and incomes

Improved nutrition and food security



590,234

people receiving adequate nutrition with aquatic foods integrated in their diets



~50 percent

beneficiaries consuming adequate aquatic foods in their daily diets who are women and children

Improved livelihoods and resilience



313,584

small-scale farmers and fisher households that improved their incomes through sustainably increased production of aquatic foods



462,245

households that have adopted improved fish breeds and/or fisheries management practices, increasing their resilience to climate change

Greenhouse gas emissions reduced in food systems



356,157 metric tons

of fish, seaweed, and other aquatic foods produced in project countries with improved technologies and practices, enabling lower greenhouse gas emissions and greater water and nutrient use efficiency

Environmental health and biodiversity improved



>326,797 hectares

restored ecosystems through the wider adoption of more productive and equitable management of natural resources

Engaging Stakeholders and Shaping the Discourse

104,524



people who follow WorldFish on **social media**

20,583
followers on
Twitter



22,280
followers on
Facebook



61,661
followers on
LinkedIn



375,134

Unique visitors to the WorldFish website in **2022**

>1.5k news

mentions across media outlets, such as **The Guardian, The Telegraph, Thomson Reuters Foundation News**, and more

>90 events

with some **15,000** online and in-person attendees, including **conferences, global and regional side events, keynote speaking engagements**, and **Fish4Thoughts**

WorldFish @ COP27, Sharm El-Sheikh


WorldFish brought scientific evidence and proven innovations to **COP27** to demonstrate the game-changing potential of climate-resilient aquatic food systems in meeting the challenges facing the world's most vulnerable populations. Together with partners and policymakers, WorldFish shared its insights and country experiences from Asia, Africa, and the Pacific at more than 20 side events hosted at the Food Systems, Oceans, Civil Society, and Resilience pavilions to engage and call to action diverse stakeholder groups toward unlocking a shared "**blue prosperity**."




Scientific Excellence

 **46** research innovations

 **400** publications
(73 percent open access) Research topics include genetics, gender equality, life below water, resilient agrifood systems, coral reef governance, and reduced inequalities

 **66** peer-reviewed journal articles
(86 percent open access)

 **6** publications with Altmetric Attention Score above 100¹

¹ An Altmetric score >100 signifies research output has received substantial attention and engagement online, including posted discussions, mentions, and media coverage.

Providing refuges for fish for food security

To improve food security for low-income households and promote sustainable fishing practices in Cambodia's Tonle Sap region, 'community fish refuges' were marked within aquatic ecosystems as safe havens for fish to breed and grow. With training of communities, fish habitats rebounded, and production increased by 71 percent.

WorldFish scientists receive distinguished honor



Most highly cited researcher for three years in a row

Dr. Eddie Allison, WorldFish Acting Director of Aquatic Food Systems, was again named among the world's top 0.1 percent of researchers by Clarivate in their annual list of [Highly Cited Researchers](#), having received this recognition in 2020 and 2021.

Red Sea seastar named after WorldFish scientist

Acanthaster benziei, a crown-of-thorns seastar native to the Red Sea, was named after **Dr. John Benzie**, WorldFish's Acting Director of Aquatic Food Biosciences, in recognition of his groundbreaking genetic studies on crown-of-thorns seastars in the 1990s and early 2000s.



A new aquaculture research center inaugurated in Penang

WorldFish inaugurated a new aquaculture research center at its headquarters in Penang. The new state-of-the-art facility doubles the center's capacity in developing new strains of Genetically Improved Farmed Tilapia (GIFT), more resilient to climate change.

“This provides much-needed additional capacity to support the development of new resilient GIFT strains and to rear fish for dissemination to target markets.”

Dr. John Benzie
Acting Director of Aquatic Food Biosciences

Digital Innovations: Enabling Data-Driven Policies and Practices

Feeding and nourishing 9.8 billion people by 2050 is a major global challenge, made even more daunting by the effects of climate change on our food systems. Digital innovations can fuel a revolution by empowering all actors in food systems—from policy-makers to farmers and sellers—with valuable data and insights for policy-making, faster and more dynamic transactions along value chains, and a greater adaptive capacity among fishers and fish farmers to market and climate shocks.

Digital innovations can be truly transformative if they address systemic barriers to equal access faced by low-income and marginalized groups and are especially mindful of small-scale actors in the value chain.

However, aquatic food systems are particularly challenged with pervasive data gaps that limit countries from reaping its many benefits at scale.

WorldFish, in partnership with governments, businesses, and research institutions, has been developing and testing such digital tools and innovations for aquatic food systems, which are at various stages of implementation, transforming our understanding of how we can accelerate their positive and inclusive impact.



PeskAAS –a near-real-time digital data system

A monitoring system that processes and analyzes fisheries catch and effort data to provide high-resolution, near-real-time production data from small-scale fisheries. The **PeskAAS** data pipeline is open source and connects to free or cheap software, making it scalable and adaptable to other countries and food systems. The Timor-Leste government has adopted **PeskAAS** as the national fisheries information system, enabling effective monitoring of small-scale fisheries production to inform government policies.

Countries implemented in: Timor-Leste and Malaysia



EpiHealth Survey Tool

A digital survey tool for tracking on-farm aquaculture systems performance and risk factors, including productivity, profitability, input use and farm management practices, fish epidemiology and environmental changes, using a smartphone. It has helped identify risk factors and target context-specific interventions to improve performance and reduce the incidence of infectious diseases. In Bangladesh, the growth performance of Genetically Improved Farmed Tilapia (GIFT) was shown to be 27 to 36 percent faster than non-GIFT strains and more profitable.

Countries implemented in: Bangladesh, Egypt, Malaysia and Nigeria

FishBase

A comprehensive online database with detailed information on over 32,000 fish species worldwide. Developed in the 1990s, it is one of the most cited sources in the history of scientific research with 700,000 unique monthly users. Coupled with the recently integrated **Fish Nutrient Analysis Tool**, fisheries managers and researchers are better equipped with data and valuable insights to make evidence-based decisions for improved human health and sustainable fisheries management practices.

Countries used in: Worldwide



FishScores

A Bayesian environmental benchmarking framework for aquatic foods that enables farmers and scientists to easily evaluate their production systems and identify environmental hotspots in their value chains. It enables stakeholders to make more informed decisions by considering the environmental implications of their choices.

Countries used in: Worldwide



Interactive Digital Training

A web-based online learning curriculum for remote extension workers to learn relevant digital resources and tools on aquatic animal health, including fish syndromic surveillance and fish farm biosecurity, without the need to install any software.

Countries reached: A total of 317 trainees from 24 countries, including Bangladesh, Egypt, Ghana, Kenya, Madagascar, Malawi, Mozambique, Nigeria and Zambia



Lab-in-a-Backpack

Improves disease management practices by providing accurate and rapid diagnosis of aquaculture pathogens at the farm without laboratory support. It empowers local communities to conduct on-the-spot assessments and monitoring while bridging the gap between scientific knowledge and local decision-making processes. The accurate and rapid diagnosis of aquaculture pathogens reduces farmer dependency on antibiotics that has global health implications.

Countries implemented in: Australia, Bangladesh, Malaysia, Nigeria and Thailand



Climate Information Services

A web-based platform that integrates data from local meteorological departments and water temperature from reference ponds to help aquatic food producers predict and manage local climate risks. A decision framework is generated from these data inputs to guide fish farmers in responding to the forecasted climatic situation. It empowers stakeholders with accurate data and improves decision-making, increasing the profitability and resilience to the impacts of climate change.

Countries implemented in: Bangladesh, India and Zambia

Tackling systemic challenges in aquatic food systems



WorldFish leads and contributes to the CGIAR Research Initiative on Aquatic Foods (AqFS), aiming to tackle systemic challenges to the sustainability and resilience of aquatic food systems, including data gaps that lead to the exclusion of the sector from wider food and nutrition policies and programs, and limited research investment.

In 2022, AqFS contributed to the growing body of scientific research and innovations relating to aquatic food systems through activities with 130 partners in 9 countries and research collaborations in 26 countries. These achievements included:

- Developing the **next generation of GIFT** strains in Malaysia and India
- Supporting **Nigeria and India's goals** to sustainably expand their aquaculture through GIFT
- Publishing research evidencing Rohu Generation 3 fish strain growing 30% faster than existing Rohu breeds, informing aquaculture growth in Bangladesh
- Developing geospatial tools to identify aquaculture suitability in small reservoirs in Ghana
- Informing **10 instances of policy/regulatory framework change** across Ghana, India, Nigeria, and Solomon Islands
- Convening stakeholders at the **2022 FishBase and SeaLife Base Symposium** to promote the use of digital platforms and data on aquatic food systems

 **38** peer-reviewed articles

8 new innovations developed and already in use in **four countries** 

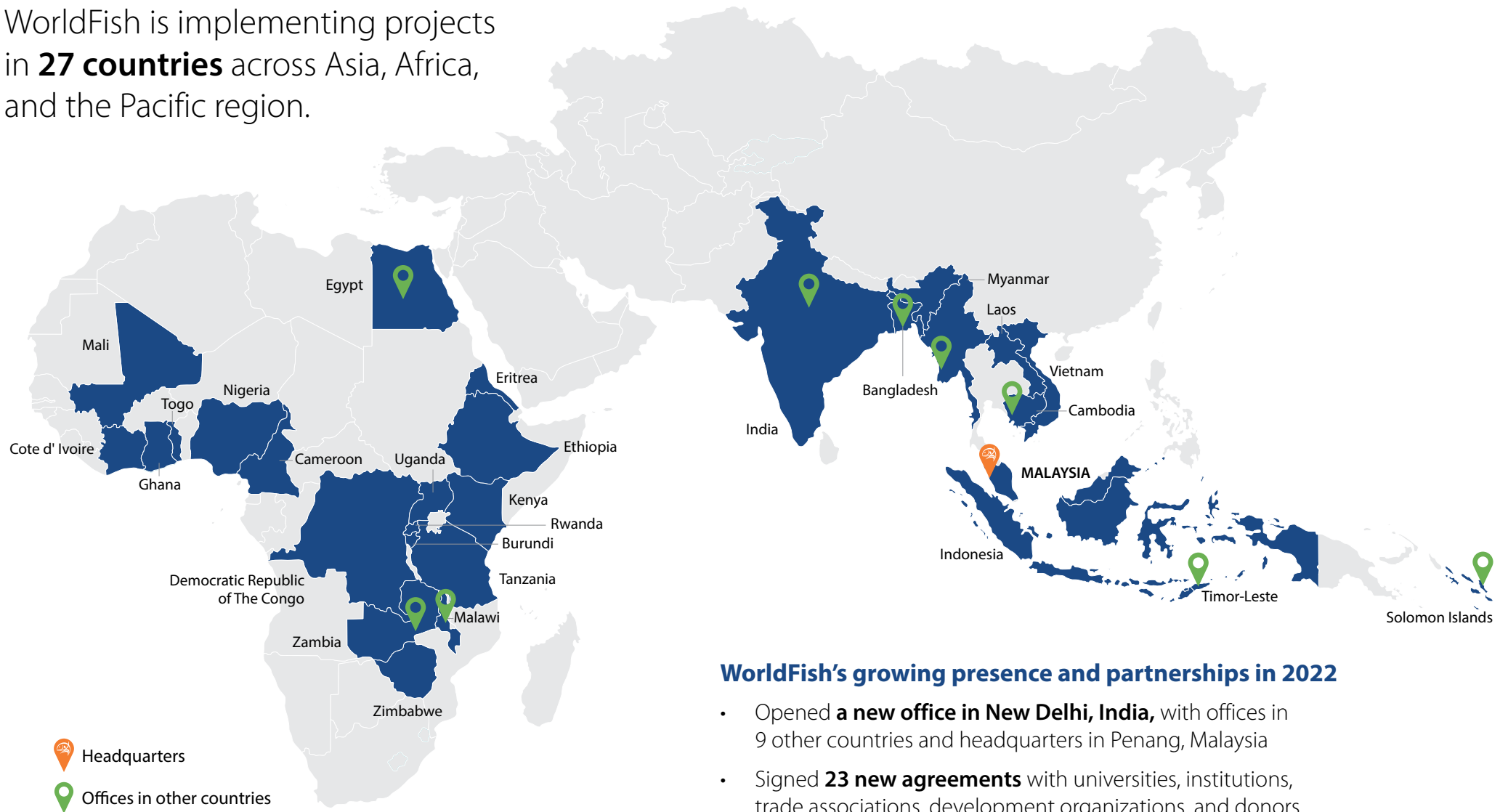
30 policy briefs,  technical briefs, and guidelines

23 new innovations  under development

WorldFish is a partner on 14 CGIAR Research Initiatives that aim to deliver impact by transforming food, land, and water systems in a climate crisis.

Our Global Footprint

WorldFish is implementing projects in **27 countries** across Asia, Africa, and the Pacific region.



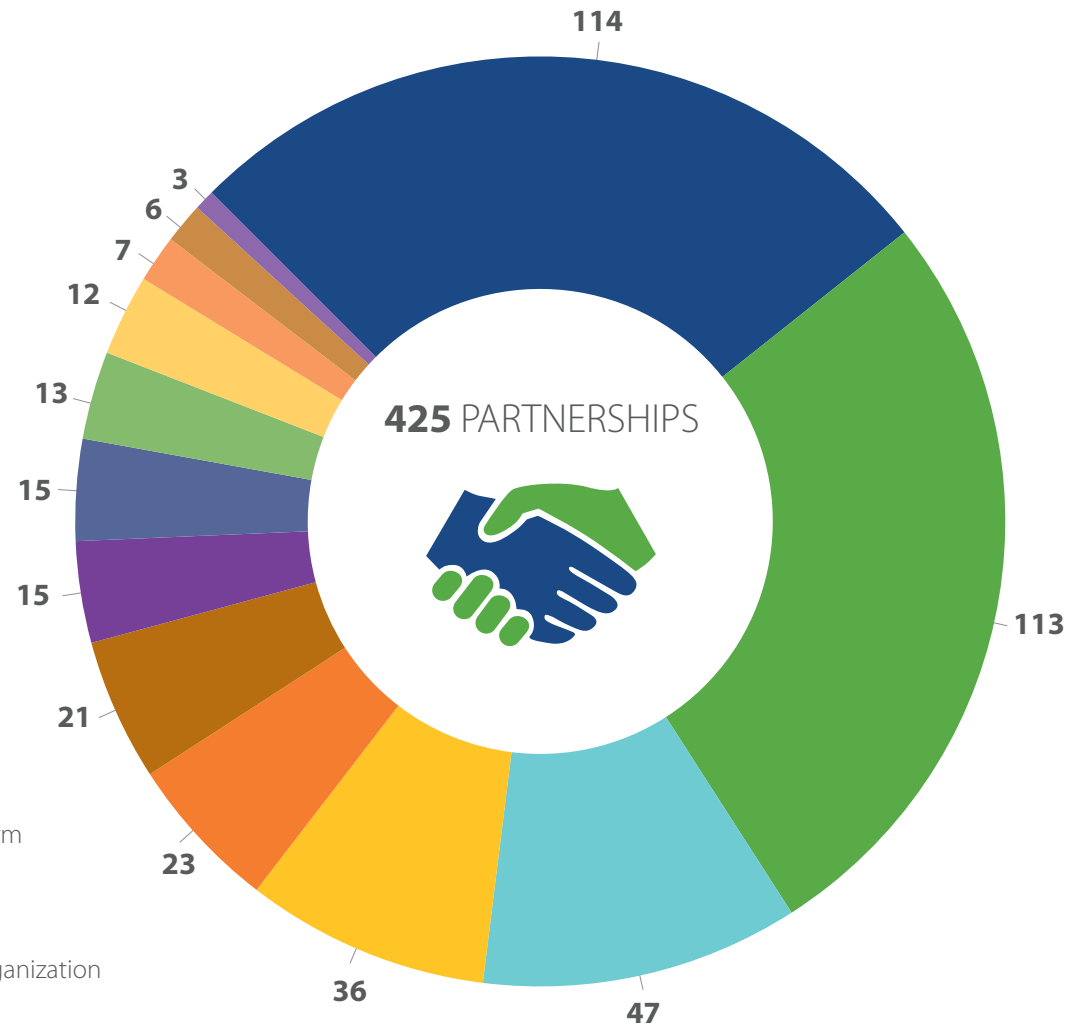
WorldFish's growing presence and partnerships in 2022

- Opened a **new office in New Delhi, India**, with offices in 9 other countries and headquarters in Penang, Malaysia
- Signed **23 new agreements** with universities, institutions, trade associations, development organizations, and donors

Partnerships: Enabling Sustainable, Scalable Impact

WorldFish nurtures and builds on a diverse mix of partnerships, leveraging multi-sectoral stakeholder engagement and knowledge exchange to co-develop locally relevant solutions—**key to enabling sustainable, scalable impact.**

- Private Sector
- Academic Institution (university, college, etc.)
- Non-Governmental Organization
- Government
- Advanced Research Institution
- National Agricultural Research System
- Financing Institution (including Foundation)
- International Development Organization (including Development Project)
- Other
- CGIAR Center/Program/Platform
- Farmer
- Regional and Sub-regional Organization
- International Agricultural Research Center



Total number of active partnerships: **425**

Local partners comprising private sector, academic institutions, and NGOs: **~65 percent**

Finances

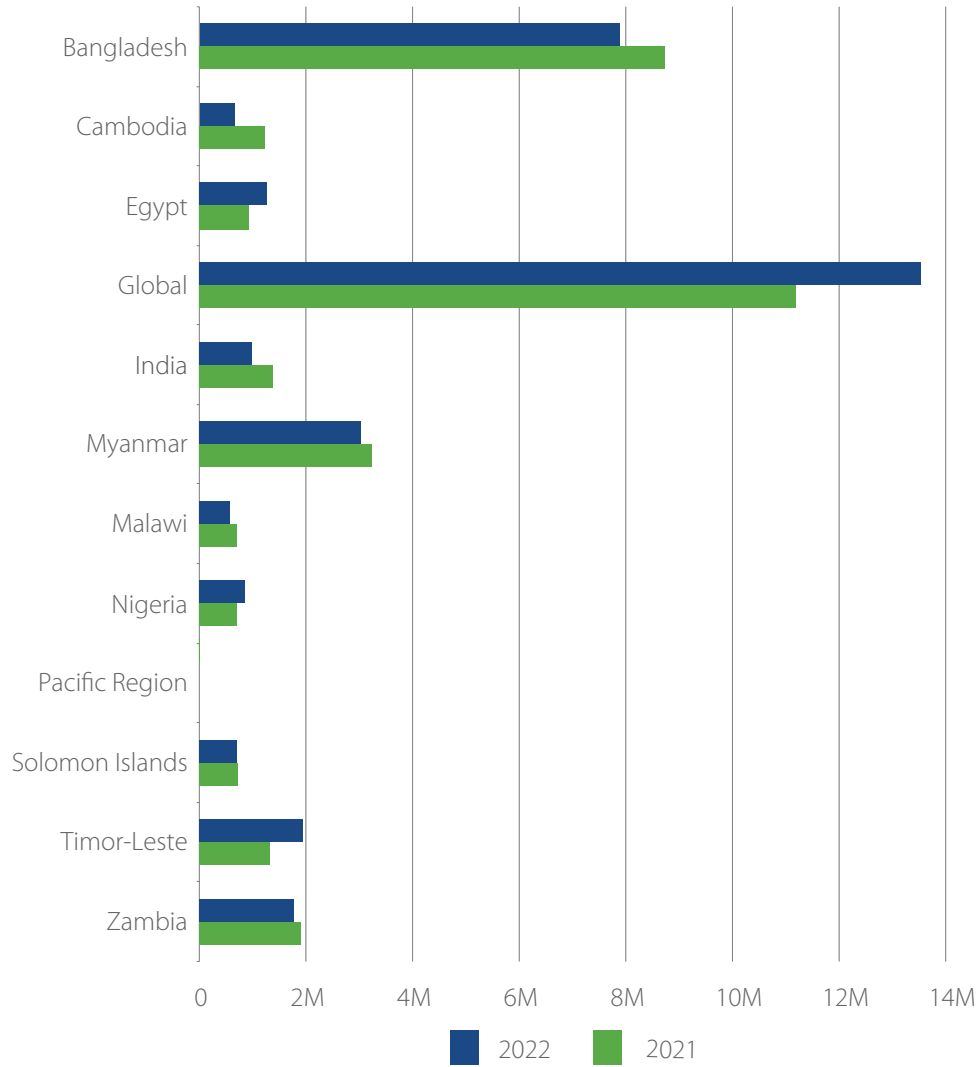
Statement of Financial Position (USD '000)

	As of Dec. 31, 2022	As of Dec. 31, 2021
Assets		
Cash and cash equivalents	12,254	15,211
Accounts receivable	5726	4379
Other current assets	251	243
Non-current assets	739	827
Total assets	18,970	20,660
Liabilities		
Accounts payable	8965	10,920
Accruals and provisions	1821	1534
Other current liabilities	196	198
Non-current liabilities	794	858
Total liabilities	11,776	13,510
Net assets	7194	7150
Total liabilities and net assets	18,970	20,660

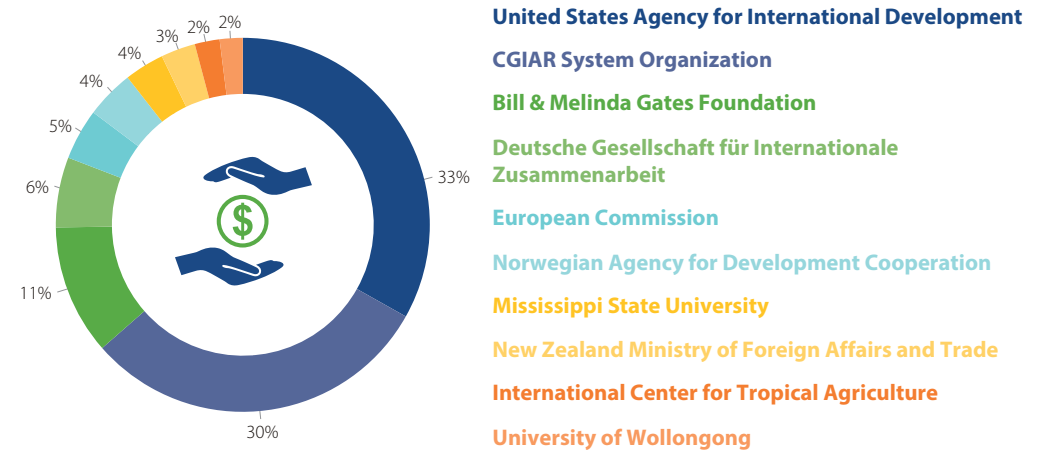
Statement of Operating Activities (USD '000)

	For the years ended December 31	
	2022	2021
Revenue		
Grants	33,137	32,002
Other income	1016	789
Total revenue	34,153	32,791
Expenses		
Research	28,375	27,724
Administration, support and other	5734	5421
Total expenses	34,109	33,145
Net deficit	44	(354)

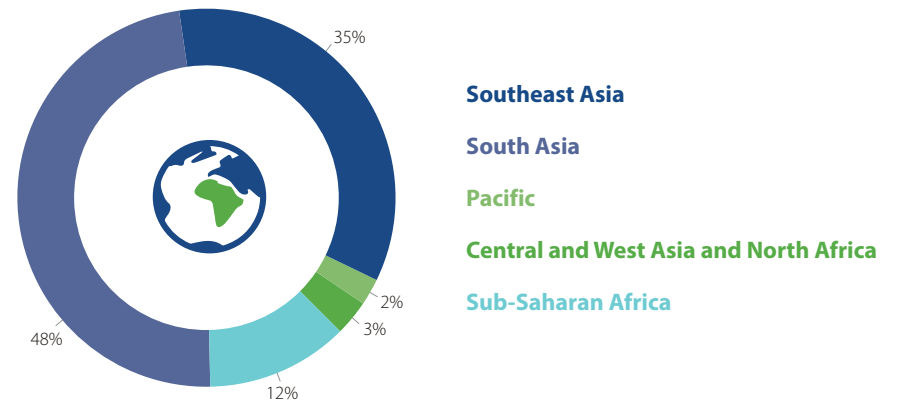
Funding by Country (thousands USD)



WorldFish Top 10 funders



Expenditure by Region 2022



Our Donors

We are deeply grateful to our donors for their support and partnership with WorldFish in together advancing sustainable development in countries by investing in sustainable aquatic food systems.

Academic or Research Institute

- Lilongwe University of Agriculture and Natural Resources
- Mississippi State University
- Rajiv Gandhi Center for Aquaculture
- Synergos Institute
- University of Exeter
- University of Wollongong

Foundation

- Bill & Melinda Gates Foundation
- Margaret A. Cargill Philanthropies
- Minderoo Foundation
- Oak Foundation
- Swiss Philanthropy Foundation

International and Regional Organization

- African Development Bank
- CGIAR System Organization
- Food and Agriculture Organization
- International Center for Tropical Agriculture
- International Institute of Tropical Agriculture
- International Potato Center
- International Fund for Agricultural Development
- ISTITUTO OIKOS Onlus
- Livelihoods and Food Security Trust
- Pacific Community
- Save the Children
- US Soybean Export Council
- World Bank

Government Institution

- Assam Rural Infrastructure & Agricultural Services Society
- Australian Centre for International Agricultural Research
- Centre for Environment, Fisheries and Aquaculture Science
- Democratic Republic of-Ministry of Agriculture and Fisheries, Timor-Leste
- Department of Agriculture, Forestry and Fisheries, South Africa
- Deutsche Gesellschaft für Internationale Zusammenarbeit
- European Commission
- Fisheries and Animal Resources Development Department, Odisha, India
- Japan International Cooperation Agency
- Local Government Engineering Department, Bangladesh
- Ministry of Agriculture and Farmers Welfare, India
- Ministry of Foreign Affairs and Trade, New Zealand
- Ministry of Foreign Affairs, Norway
- Norwegian Agency for Development Cooperation
- The Ministry of Agriculture and Food Security, Malawi
- United States Agency for International Development
- West Africa Trade and Investment Hub, United States

Private sector

- De Heus Limited Liability Company
- Skretting Egypt

Others

- Institute of Food Technologists

About WorldFish

WorldFish is a leading international research organization working to transform aquatic food systems to reduce hunger, malnutrition, and poverty. Collaborating with global, regional, and national partners, WorldFish delivers scientific innovations, evidence to inform policy, and knowledge to enable equitable and sustainable impact for millions who depend on fish for their livelihoods. As a member of CGIAR, WorldFish contributes to building a food- and nutrition-secure future and restoring natural resources. Headquartered in Penang, Malaysia, with country offices across Africa, Asia, and the Pacific, WorldFish strives to create resilient and inclusive food systems for shared prosperity.

For more information, please visit www.worldfishcenter.org.