

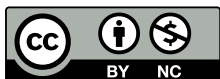
2020 ANNUAL REPORT

Building Forward Better with
Aquatic Foods

Citation

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WorldFish: An overview

Who we are

WorldFish is an international, nonprofit research and innovation institution that creates, advances and translates scientific research on aquatic food systems into scalable solutions with transformational impact on human well-being and the environment.

Since 1975, WorldFish has firmly established itself as a global leader in research and innovation in sustainable aquaculture and fisheries. Our work has enhanced the lives of millions of low- and middle-income people who depend on aquatic food systems for food, nutrition, livelihoods and overall well-being.

We have a global presence across 20 countries in Asia, Africa and the Pacific with 460 staff of 30 nationalities deployed where the greatest sustainable development challenges can be addressed through holistic aquatic food systems solutions.

We are part of One CGIAR, the world's largest agricultural innovation network, whose mission is to "end hunger by 2030 through science to transform food, land and water systems under threat of climate change". Within One CGIAR and the wider global agricultural research agenda, we have a unique research mandate that focuses on the role and contributions of aquatic food systems to the 2030 SDGs.

Our work is supported by a diverse network of funders and investors aligned to shared goals for positive social, economic and environmental impact. Our teams of science experts and professionals are deployed and conduct work where the greatest sustainable development challenges can be addressed through holistic aquatic food systems solutions.



Our vision

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

Our mission

To end hunger and advance sustainable development by 2030 through science and innovation to transform food, land and water systems with aquatic foods for healthier people and the planet.

Who benefits from our research?

Our research activities focus on regions where there is poverty, food and nutrition insecurity, and where many women, men and young people are involved in fisheries and/or aquaculture as producers, consumers of aquatic foods, workers and business owners in related value chains. These groups often remain marginalized, underserved or overlooked despite the important contributions they make to local and national economies and food security.



Small-scale fishers, farmers, producers, processors, traders and consumers



Media and the general public



Local community and development actors



Private sector



Scientific community in low- and middle-income countries



Young scientists, innovators and entrepreneurs



Public sector



Investors, philanthropic actors and development agencies



One CGIAR

Big facts on aquatic foods



800 million

people around the world depend on small-scale fisheries and aquaculture for their livelihood.



204 million tons

of aquatic food will be produced by 2030.



3.3 billion

people get 20% of their animal protein from eating aquatic foods.



17%

of all animal protein consumed globally comes from aquatic foods.



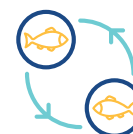
\$ 24 trillion

is the value of the ocean economy, including fisheries, shipping lanes and tourism.



50%

of the total global catch comes from small-scale fisheries.



\$ 164 billion

was the global export value of fish alone in 2018, making aquatic foods among the world's top traded commodities.



\$ 22.5 billion

is the annual loss of discarded fish alone.



35%

of the global harvest from fisheries and aquaculture is lost or wasted.



\$ 70 million

is the estimated market size of plant- and cell-based aquatic foods by 2030.



1 in every 2

workers in the primary and secondary sectors of fisheries and aquaculture are women.



66%

of fishstocks are currently within biologically sustainable levels, compared to 90% in 1990.



40%

decline is estimated in tropical fish catch globally by 2050, unless actions to curb CO2 emissions are taken.

Production of aquatic foods has a much lower carbon footprint and far fewer biodiversity impacts compared to production of crops and livestock.



2 billion

people are suffering the triple burden of malnutrition who can benefit from the life-changing option of consuming nutrient-rich aquatic foods.



The weight of ocean plastics will exceed the weight of all fish by 2050, unless coordinated multistakeholder actions to curb plastic pollution are taken.



Omega 3

Aquatic foods naturally contain healthy omega fats that are difficult to obtain from land-based food sources, such as crops and livestock.

The intake of omega-3 fatty acids from fish and aquatic foods is associated with lower risk of cardiovascular disease and obesity.

When consumed as part of a balanced diet, fish can increase the absorption of essential minerals, such as iron and zinc, from other foods.

Foreword

In 2020, the COVID-19 pandemic disrupted lives, economies and food systems everywhere. It exposed the limitations of our existing systems to withstand shocks and gave rise to the urgent need for increased scientific collaboration and innovation to deal with the short-term impacts of the pandemic and put in motion transformative actions for the long term.

In response to the pandemic, WorldFish and its many partners across the public and private sectors worked to generate scientific evidence, insights and innovations in support of national efforts to maintain safe supply chains of fish and aquatic foods in low- and middle-income countries across Africa, Asia and the Pacific. The goal was to manage critical aquatic genetic resources, keep food production and market supplies functional under enormously challenging conditions, and orient social protection schemes toward the most vulnerable populations, who continue to experience increased levels of hunger, malnutrition and poverty as a result of the food and socioeconomic crises triggered by the coronavirus pandemic.

In 2020, our 45th anniversary allowed us to take stock of our past achievements and chart a bold institutional course of action in response to the global call to action to transform food systems toward healthy and sustainable diets. We sharpened the agility and responsiveness of our operations, devised an innovative business model to support our adaptation to new ways of working, secured new sources of funding for research and innovation in aquatic food systems, and reimagined scientific collaboration through an innovation ecosystem of public and private sector partners.

We launched the hugely successful *2030 WorldFish Research and Innovation Strategy: Aquatic Foods for Healthy People and Planet*. The strategy broadens our mandate for research and innovation in aquatic food systems and outlines our new vision for an inclusive world of healthy, well-nourished people and a sustainable blue planet, now and in the future. This vision can be realized through our unique proposition on aquatic foods in meeting the 2030 Sustainable Development Goals (SDGs).

We believe fish and other aquatic foods must occupy a central place in the global agricultural research agenda, which traditionally focuses on land-based crops and livestock. Our strategy is critical to transforming food, land and water systems through increased scientific collaboration and innovation in One CGIAR. It articulates our bold aspiration to become the go-to global thought leader on aquatic food systems in One CGIAR and beyond.

That is why in 2020, we worked hard to put aquatic foods front and center in food systems transformation efforts across the world. Our scientific evidence continues to shape an ever-increasing global conversation about the untapped potential of aquatic foods to nourish people and the planet while highlighting rising demand for research and innovation in aquatic food systems.

Over 600,000 people tuned in to the 2020 Virtual Ocean Dialogues led by the World Economic Forum. Our scientists and partners discussed the latest evidence on aquatic foods as a way to boost food and nutrition security in the wake of the COVID-19 pandemic and guide innovation and action for inclusive ocean governance and a sustainable blue economy. The highly influential *Blue Papers* shaped crucial recommendations and the action agenda of the High Level Panel for a Sustainable Sustainable Ocean Economy for aquatic food systems solutions that offer triple benefits, for people, nature and the economy.

In Malawi and Zambia, our research demonstrated how consumption of nutrient-rich fish-based products could boost nutrition and health outcomes for lactating mothers, breastfeeding infants, and women and girls of childbearing age. In Bangladesh, our work with government and local actors led to critical policy developments and value chain innovations that enabled vital stocks of hilsa to bounce back after years of overfishing and pollution.

A 2020 breakthrough study outlined the potential of global marine fisheries to tackle various nutrient deficiencies suffered by millions of low- and middle-income communities in coastal areas. A new *set of guidelines* provided practical guidance on integrating irrigation systems with fisheries to boost resilient and productive food systems across Asia and Africa.

Our unique commitment to aquatic food systems and our continued persistence to discover, develop and promote science-based innovations, technologies and practices that transform food, land and water food systems in a climate crisis helped inform the dialogues, processes and outcomes of the UN Food Systems Summit in 2021. In her role as Vice-Chair of Action Track 4 'Advancing equitable livelihoods,' Dr. Shakuntala Thilsted, 2021 World Food Prize Laureate and Global Lead of Nutrition and Public Health at WorldFish, advocated the importance of aquatic foods for healthy and sustainable diets to nourish people and the planet, and the need to engage young people, women and indigenous communities in critical decisions for food systems transformation.

These achievements—and more—were made possible by the generosity of our funders and the enduring support of our partners and our highly dedicated staff. They delivered outstanding science and innovations in an incredibly challenging year that stretched our capacities but also our imagination and dedication to game-changing solutions with aquatic foods. We are proud to share this report and invite all of you to learn more and get excited about the solid foundations we laid out in 2020 toward our fantastic journey to transform food, land and water systems with aquatic foods.



Big splashes

2020



275
active partnerships



47
new partnerships
in 2020



Over 33,500
people reached via
online events



More than 160
active projects



259
capacity development
initiatives



54
research innovations



247
publications
during 2020



81
peer-reviewed
journal articles



72
publications are
open access



5 publications
with an Altmetric
score above 100



2020
highlights

Strategic transformation for a decade of action with aquatic foods

In November, WorldFish launched a 10-year strategy for an exciting research and innovation agenda in aquatic food systems in the new One CGIAR. Our new mission is to support the SDGs by ending hunger through research and innovation in transforming food, land and water systems with aquatic foods for healthier people and the planet.

Around 3 billion people worldwide lack access to diverse, nutritious and safe diets. Meanwhile, the COVID-19 pandemic and climate crisis have highlighted the urgent need for transformation of global food systems. In response, WorldFish has widened its mandate to include larger aspects of aquatic food systems and their role in sustaining human well-being and the health of our planet.

New, ambitious agenda for research and innovation

We believe aquatic foods must play a central role in global agricultural research, which has traditionally focused on land-based crops and livestock. With this strategy, we are expanding our thinking, multidisciplinary research and partnerships with fellow One CGIAR entities and with partners worldwide to support a game-changing agenda that recognizes the growing importance of aquatic foods in global agricultural research, the transformation of global food systems and the achievement of the SDGs.

The WorldFish strategy focuses on achievement of SDG 2: Zero Hunger and SDG 14: Life Below Water, while enabling progress toward multiple other SDGs. The transformative agenda focuses on three crucial areas of impact:

- climate resilience and environmental biodiversity
- social and economic inclusion
- nutrition and public health.



WorldFish is the only center in CGIAR with 45 years of experience in fisheries and aquaculture research in low- and middle-income countries. Its unique proposition champions the important but largely overlooked role of aquatic foods in meeting the critical challenges associated with the SDGs, as well as those outlined in the 2030 Research and Innovation Strategy of One CGIAR.

Yusuf Abubakar, Board Chair



Strategy formulation

Thousands of staff, partners, policymakers, funders and aquatic food sector stakeholders participated in workshops and online consultations to discuss and shape the new 2030 strategy. This process was enabled with support from Dalberg and ReD Associates as part of a USD 1 million grant from the Bill & Melinda Gates Foundation to support WorldFish's organizational transformation. We did this because we believe the impact of our scientific work is greatest when we bring together diverse perspectives, resources and partnerships. A transformative agenda for food systems research required us to reinvent ourselves, particularly since WorldFish is part of One CGIAR, the world's largest global agricultural innovation network. This process allowed us to devise a new business and operations model that reimagines the way in which we will accomplish our goal of building successful collaborations to enable critical links between aquatic and land-based food production systems within One CGIAR and beyond.



Building forward better with aquatic foods

The COVID-19 pandemic has disrupted global food supplies and has pushed millions of people into poverty. Transportation, labor and trade issues are straining fish and aquatic food supply chains. Falling production will lower access and consumption of vital foods. Food prices will increase, along with job instability for vendors, suppliers and transportation workers. Women and girls will be disproportionately affected by health and economic crises.

Governments, funders and decision-makers need scientific data to understand the severity and complexity of these issues. Working with aquatic food system actors and governments in Asia, Africa and the Pacific, WorldFish monitors disruptions in aquatic food systems that impact food availability, affordability, incomes and livelihoods. We focus on low- and middle-income communities that depend on fish and aquatic food value chains. This data assists government and private sector actors to minimize the impact of the pandemic and to build more resilient food systems through informed recovery efforts.

WorldFish COVID-19 research response in 2020



Published reports on the impacts of and responses to COVID-19 on aquatic food systems in Africa, Asia and the Pacific.



Launched an ongoing survey with actors in fish supply chains in Bangladesh, Egypt, Myanmar, Nigeria, Timor-Leste, and India in the states of Odisha, Assam and Andhra Pradesh.



Genetics research teams in Malaysia, Egypt and Bangladesh ensured action in management of critical aquatic genetic resources.



Quality research must inform effective responses if we are to build forward better in response to shocks. These responses rely on accurate and timely data on the multifaceted effects of the pandemic or other shocks and on the diverse women and men affected.

Cynthia McDougall, Gender Research Leader





Provided evidence-based insight to government advisories and policies to ensure value chains continued safe operations in Bangladesh in collaboration with One CGIAR centers, FAO and the World Food Programme.



Worked with the Odisha state government to develop advisories for fishers and aquaculture farmers, hatcheries and markets.



In Timor-Leste, high-resolution digital technologies track and record pattern changes in small-scale fishing activities.



Examined changes and adaptations to village food systems in the Solomon Islands.



Published guidelines for safeguarding gender integration in research during the COVID-19 pandemic.



Published guidelines for research quality in distance research during COVID-19 and future food system shocks.

Launch of COVID-19 online portal

WorldFish launched an online portal of resources analyzing the impacts of and responses to the COVID-19 pandemic in aquatic food systems related to food and nutrition security poverty and development. WorldFish and partners are identifying vulnerabilities within aquatic food systems and opportunities for governments, international bodies, industries, small-scale actors and civil society to respond, adapt and build resilience. This online resource hub is updated regularly with links to blogs, publications, policy briefs, events and other resources featuring WorldFish analysis on COVID-19, including specific regional and country impacts.

Advancing global food systems transformation and COVID-19 recovery

COVID-19 has exacerbated efforts to improve food and nutrition security around the world, demonstrating that our food systems are not prepared to withstand shocks. Aquatic foods are a critical part of this solution. The Virtual Dialogue: Building Forward Better with Aquatic Foods hosted by WorldFish and partners explored science-based approaches to ensure that aquatic foods become an integral part of the response and recovery to COVID-19 and aid in the transformation of global food systems. Our panelists discussed case studies and explored how aquatic foods can be

better incorporated into the global agricultural research agenda, which will make our food systems more resilient for future shocks and support country efforts to meet the SDGs by 2030.

Building on this discussion, WorldFish hosted a Committee on World Food Security (CFS) High Level partner event on the role of sustainable, resilient and inclusive aquatic food systems in driving COVID-19 recovery and global food systems transformation. Panelists from the Pacific, South Asia and Africa emphasized integration of aquatic foods throughout the entire food system and highlighted the urgent need for integrated policies and investments.

Panelists also talked about how departments of fisheries must take a holistic and long-term strategic approach while integrating with other sectors to raise awareness and use the full potential of aquatic foods for national development. They emphasized the importance of engaging youths across aquatic food systems to help stakeholders accelerate the recovery from shocks and to ensure resilience in the face of future shocks.

COVID-19 response in Bangladesh: One CGIAR approach

With CGIAR partners and the Food and Agriculture Organization (FAO), WorldFish published analyses of COVID-19's impact on Bangladesh's food systems. Our research guided the government on key action areas for response and recovery. Emerging concerns include notable reductions in availability of perishable foods, reductions in harvests, transportation disruptions, and disruptions in supply of essential animal feeds and veterinary services. WorldFish research published in late 2020 focused on indicators to monitor food system disruptions caused by COVID-19, the impact of COVID-19 on aquatic food supply chains, and guidance for improving live fish transportation.

“The economic crisis triggered by COVID-19 has set to increase the number of undernourished people by at least 14 million to over 80 million, and another 70 million will be driven into extreme poverty. We must reimagine new ways of doing things, and working together as this pandemic has unfolded has forced us to confront the urgent need to transform our food system to do better for people and for our planet.”

Gareth Johnstone, Director General



Combating global hunger through climate-resilient food systems

WorldFish's climate change program is now integrated across all research programs and interventions. In 2020, WorldFish also welcomed Essam Yassin Mohammed as the newly appointed WorldFish Climate Change Program Leader. The organization brought together influential researchers and representatives from the development, government and private sectors to mobilize a global movement for sustainable and nutritious food production and consumption.

Together with CGIAR and other partners, we produced two key pieces of research on climate-sensitive aquaculture in 2020: (1) quantifying greenhouse gas emissions from global aquaculture and (2) climate change, tropical fisheries and prospects for sustainable development. WorldFish is also working to reduce food waste to support sustainability in the aquatic food chain.

We have reduced food waste through improved post-harvest storage, handling and processing. The use of insulated containers in Egypt and solar-powered freezers in Solomon Islands has been effective to reduce waste and promote improved livelihoods.

Virtual dialogue: A systems approach for climate-resilient and inclusive aquatic foods

WorldFish hosted an international virtual dialogue on the impacts of climate change on aquatic food systems. The dialogue also explored ways that a systems approach can enhance the effectiveness of interventions to build social and ecological resilience. The dialogue called for united action among all stakeholders in aquatic food systems. Panelists discussed holistic climate-resilient solutions in aquatic food production, marketing and consumption that involves technical, institutional and market actions that reach all. A systems approach to build resilience of all actors in aquatic food systems is essential to tackle the double-threat of climate change and COVID-19.



Climate change is a key driver behind the rise in global hunger. It is one of the leading causes of severe food crises, negatively affecting all dimensions of food security, including food availability, access and utilization.

Essam Yassin Mohammed, Climate Change Research Leader



Changing the way we think about food

WorldFish research and innovation on aquatic foods is shaping the narrative around food systems transformation. Our priority is to ensure greater integration of fish and aquatic foods into the global agricultural research agenda. Aquatic foods are rich in numerous vitamins, minerals, omega-3 fatty acids and other nutrients essential to cognitive development and human health. They could also offer a critical solution for the two billion people worldwide who suffer from malnutrition, with women and children poised to benefit the most. Moreover, compared with other animal-source foods, many aquatic foods offer multiple nutritional benefits at a lower environmental cost than many land-based animal production systems.

Highlighting the nutritional value of aquatic foods

In 2020, WorldFish research published in the scientific journal *Public Health Nutrition* reviewed global data on the nutrient composition of poorly assessed inland and marine species of fish. We provided a resource for fisheries and nutrition researchers, experts and practitioners to understand these species and include them in fishery management and food-based programs and policies.

Building an evidence-based narrative around aquatic foods systems

WorldFish partnered with Stanford University, EAT and the Stockholm Research Institute for the global Blue Food Assessment to identify, review and fill important gaps in our understanding of the role of aquatic foods in global food systems now and in the future in the lead up to the 2021 UN Food Systems Summit. Critical findings of the study advocate the need for redistribution of fish and other aquatic foods rich in macro and micronutrients, and provide evidence to inform a sustainable increase in production.

Participating in global food transformation discussions

WorldFish's involvement in the Blue Food Assessment was showcased during an episode of the online EAT@Home newscast for global food transformation. WorldFish discussed how fishers, farmers and food producers can receive their fair share of the food that they produce, but of which they are often deprived. Shakuntala Thilsted, WorldFish's Research Program Leader for Value Chains and Nutrition, discussed the importance of aquatic foods in feeding and nourishing the world within environmental limits.

Guiding sustainable and inclusive growth of aquaculture

Many of the world's vulnerable people are dependent on fish and other aquatic foods harvested from ponds, lakes, rivers as well as oceans to support healthy diets and livelihoods. Aquaculture is currently one of the fastest-growing forms of food production on Earth. Most farmed aquatic foods originate from diverse land-based freshwater production systems that are not as resource constrained as often claimed. Recently, growth in aquatic food production has occurred mainly through intensification rather than horizontal expansion, enabling higher levels of farm productivity using the same or less land and water.

WorldFish research published in *Nature Communications* evaluates claims that growing offshore ocean aquaculture, typically high trophic species such as salmon, alone can sustainably increase fish production and boost livelihoods. The research points toward a balanced approach to aquaculture investment between diverse marine and freshwater systems, which also include land-based aquaculture, as essential to achieving the SDGs.

Offshore aquaculture has little likelihood of delivering affordable aquatic foods to those who need it most. The study calls on policymakers and investors to increase the current and future role of inland freshwater aquaculture and fisheries in low- and middle-income countries.

One Health approach to fish farming

As the aquaculture industry grows, so does the amount of antibiotics used to keep farmed fish disease-free. Overuse of antibiotics has led to resistance among microbes. This antimicrobial resistance (AMR) presents a threat to human and sustainable development. As part of the CGIAR One Health Hub, WorldFish is leading aquaculture research and innovation to keep AMR at bay.

Tilapia is the second-most farmed fish in the world, but tilapia stocks in 16 countries on three continents have been ravaged by the tilapia lake virus (TiLV) since its detection in 2014. Up to 90 percent of fish die once infected. A new study from University of Edinburgh's Roslin Institute and WorldFish shows that selective

“This is a truly exciting finding at the frontier of fish genetics. WorldFish will build on this research, with our partners in the research, donor and investment community, to accelerate the further development of resilient TiLV resistant tilapia strains and their wide accessibility to small-scale fish farmers.”

Michael Phillips, Director, Aquaculture and Fisheries Sciences

breeding of new Genetically Improved Farmed Tilapia (GIFT) species may lead to resistance to TiLV. The breakthrough could help protect tilapia stocks worldwide.

WorldFish scientists co-authored an article in *The Lancet Infectious Diseases* scientific journal to advocate for the creation of the international One Health platform for online learning. The platform could provide evidence related to AMR in a database and generate new insights into interventions related to AMR.

WorldFish launched a pilot study to investigate ways of raising awareness on antimicrobials in rural aquaculture practices in Bangladesh through digital communications. Few awareness campaigns to date have highlighted the aquatic foods production sector. WorldFish's digital campaign used a four-minute animation to communicate antimicrobial awareness and the benefits of GIFT adoption. Ninety-seven percent of fishers who participated in follow-up online messaging campaigns mentioned their interest to learn about improved antimicrobial treatments online.

Timor-Leste president calls for expansion of aquaculture

President of Timor-Leste Francisco Guterres Lú Olo visited the Gleno Hatchery established under WorldFish's Partnership for Aquaculture Development in Timor-Leste (PADTL) project to learn about production and nationwide distribution of WorldFish's high-quality GIFT fingerlings. The GIFT strain is a part of a pioneering selective breeding program developed to be fast growing and adaptable to a wide range of environments.

GIFT was first supplied to Timor-Leste in April 2015, when broodstock was sent from WorldFish Headquarters in Penang, Malaysia, to the Gleno Hatchery in Ermera. Since 2016, the Gleno Hatchery has distributed GIFT fingerlings to communities, hatcheries, civil society organizations and government organizations. The project is now in its second phase, aiming to increase aquacultural production and reduce undernourishment by increasing consumption of fish across Timor-Leste. Farmers benefit from using monosex GIFT fingerlings as they can be harvested 4 or 5 months after stocking the pond if the recommended management practices are followed.

New food frontiers: Alternative seafood

WorldFish and partners published a study exploring how plant- and cell-based alternatives can complement sustainable fisheries and aquaculture initiatives to responsibly meet growing demand. The preliminary projections estimate alternative seafood will account for 8 percent of the global aquatic food supply by 2030.

We co-hosted virtual discussions with researchers and industry actors to address how we can contribute to the potential for alternative seafood to be integrated into sustainable aquaculture and create new opportunities in seaweed and algae farming. We are also examining how new food technologies impact aquatic food systems and how they can be harnessed to complement current food systems for livelihoods and food security in low- and middle-income countries.

Sustainable blue economies

Virtual Ocean Dialogues 2020

The World Economic Forum, along with Friends of Ocean Action, hosted a series of Virtual Ocean Dialogues to connect communities for ocean resilience, innovation and action. Over 600,000 people worldwide attended to discuss innovation and action for healthy, resilient and thriving oceans.

Shakuntala Thilsted, WorldFish Research Program Leader for Value Chains and Nutrition, joined David Nabarro, World Food Prize Laureate 2018, on a panel to discuss contributions of aquatic food systems to food security and nutrition. The session also showcased solutions that overcome the challenges of meeting nutritional needs from aquatic sources in sustainable, ethical and equitable ways. The session called for increased commitment to aquatic food systems to boost food and nutrition security in the wake of the COVID-19 pandemic.



We believe alternative seafood can complement traditional aquatic food systems and contribute to improving livelihoods, food and nutrition security for all, and at the same time alleviate pressures on the aquatic environment. That is why we are discussing priority areas for future research as a group, having our diverse perspectives drive this research agenda forward.

Nisha Marwaha, Junior Researcher



In June, WorldFish, CGIAR, the Bill & Melinda Gates Foundation, and the Stanford University Center for Ocean Solution hosted the “Deep dive into transforming the agricultural research and development agendas through aquatic foods” panel. Panelists discussed research, partnerships, innovation priorities and a vision to ensure fish and aquatic foods are integral to the development agenda.

Blue Papers for the High Level Panel for a Sustainable Ocean Economy

The High Level Panel for a Sustainable Ocean Economy is a unique initiative by 15 world leaders to build momentum for a sustainable ocean economy. WorldFish experts joined a global team developing science to support the panel, contributing to Blue Papers that explore governance, equality and nutrition for healthy oceans. Our researchers contributed to Blue Papers exploring governance, equality and nutrition for a healthy ocean that can help solve global challenges. Sixteen Blue Papers were published by June 2020 and informed recommendations from the High Level Panel at the UN Ocean Conference later that same month.

A Blue Paper entitled The Future of Food from the Sea examines the current status and future potential of food production from the ocean. Researchers summarize evidence and provide an overview of challenges and opportunities for sustainable use of ocean resources. In the Toward Ocean Equity paper, our researchers emphasize that we still have a long way to go in securing a sustainable ocean economy.

In another paper exploring sustainable ocean governance, researchers point to more cooperative ways to manage ocean space, systems of traceability and accountability in fisheries value chains, decarbonizing shipping, and legal innovations such as establishing defensible rights for non-human nature and a human right to a clean environment. The Human Relationship with Our Ocean Planet paper identifies means to ensure that the plurality of “ocean values” is represented in processes of planning and implementing a sustainable ocean economy.

Global collective action for small-scale fisheries

Illuminating Hidden Harvests (IHH) is a global study coordinated by FAO, WorldFish and Duke University to highlight the role of small-scale fisheries in achieving sustainable development goals. When released in 2021, the study will provide one of the most comprehensive

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The potential of diverse aquatic foods spans beyond oceans, with inland water bodies an extremely important part of global production. Focusing on the potential of aquaculture in agricultural systems like rice and fish provides affordable ways to diversify and enrich people’s diets.

Shakuntala Thilsted, Research Program Leader, Value Chains and Nutrition

”

understandings of small-scale fisheries. Our research contributions to IHH informed FAO's State of World Fisheries and Aquaculture 2020 report. The study has compiled findings from more than 300 experts from over 50 countries. Along with our partners, we presented an overview of the IHH research approach to more than 600 participants worldwide at the 34th Committee on Fisheries (COFI 34) Virtual Dialogues 2020.

"The food, nutrition, income and environmental stewardship values of small-scale fisheries are foundations of many of the Sustainable Development Goals. We need to work in ways that protect those foundations—including through transformational change to the climate, food systems and economies. These transformations will only be equitable if fishers and fishworkers, and their aspirations, are genuinely valued," said Philippa Cohen, Research Program Leader for Resilient Small-Scale Fisheries, WorldFish.

WorldFish joined forces with Too Big To Ignore, a global network of research and knowledge mobilization partnership, to co-organize a virtual series of events, known as Small is Bountiful, to showcase the critical contribution of small-scale fisheries to ocean sustainability and innovation. Globally, small-scale fisheries represent the "leave no one behind" SDG principle. The speakers argued that sustainable and equitable development will be at risk if small-scale fisheries are eroded. Small-scale fisheries are instrumental to achievement of other SDGs, and their realities, concerns and voices must be heard and addressed.

Unlocking barriers for small-scale fisheries

With FAO, WorldFish published a handbook for fisheries stakeholders on improved information and communication technologies for small-scale fisheries (ICT4SSF), including social media and messaging apps, and cloud-based data digital weather reports. Six case studies from around the world identify key themes, successes and lessons from ICT4SSF initiatives. The handbook presents evidence for how information and communication technologies for small-scale fisheries can support implementation of FAO's Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines).

When information and communication technologies (ICTs) are locally led or developed, or co-designed with end users and marginalized groups, or have strengthened already existing networks and technologies, the potential for positive impact is much higher. To date, there are few examples of developing mechanisms for fishers and fish workers to hold, access or own their data. There are also few legal mechanisms to recognize their ownership or protect them against misuse or manipulation.



This Illuminating Hidden Harvest study has the purpose to further develop our understanding of small-scale fisheries so that policy and action can be informed by solid evidence.

Shakuntala Thilsted, Research Program Leader, Value Chains and Nutrition



Policies to strengthen aquatic food systems for the poor

Multidisciplinary and cross-sector collaborations are at the heart of scientific discovery. Our partnerships span all levels of governance, from global level decision-making to national, subnational and household levels.

Landmark agreement between WorldFish and the Government of Odisha in India

In November, WorldFish signed a memorandum of understanding with the Government of Odisha, India to support women through small-scale aquaculture activities. This paved the way for fish powder and solar-dried small fish to be included in food rations for women and children in 50 sites within Mayurbhanj District. Children aged 3 to 6 in childcare centers are now served food containing fish powder during lunch. Adolescents and pregnant and lactating women who receive take-home food rations as part of the government's Supplementary Nutrition Program will receive solar-dried small fish, adding essential nutrients to the daily diets of women and children.

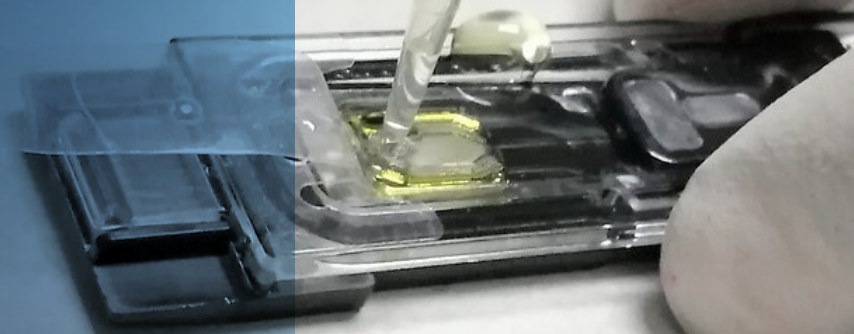
New policies for pond polyculture

WorldFish was also instrumental in informing policies that allow women in Odisha to engage in pond polyculture in village water tanks across the state. These traditionally restricted areas were opened up for the community, and women were encouraged to stock and harvest fish. These initiatives have benefited over 65,000 households, enabling women to participate in household decision-making. Women now have greater say in income and food distribution, and greater control over household expenses in general.

Engaging the private sector for sustained innovation

In December, WorldFish joined USAID and the Indo-American Chamber of Commerce for an investor forum to engage private sector impact investors for sustained innovation. The event highlighted strategic projects with potential to transform the nutrition and livelihoods of vulnerable communities in Odisha. The event connected investors' goals to WorldFish project activities that promote inclusion of fish in diets of women and children, women and youth entrepreneurship in fish supply chains, and new fish polyculture technologies in local communities in Odisha.

Scientists shaping agendas



Top-cited researcher

Professor Eddie Allison, Research Chair for Equity and Justice in the Blue Economy, WorldFish, was recognized as the world's most-cited researcher in the cross-disciplinary category in Clarivate's 2020 Highly Cited Researchers (HCR) list. Allison appeared among fewer than 6,200 researchers from over 60 countries who have made significant contributions to their field through the publication of highly cited papers in the past decade. The recipients are determined according to publications ranked in the top 1 percent of citations in each field in the Web of Science index, with those who publish several such papers making the HCR list.



This is a recognition of my contributions—working within research teams made up of my students, colleagues, partners—to a growing school of thought advocating the critical role diverse aquatic foods and food systems approaches have in the sustainable development agenda.

*Eddie Allison, Research Chair for Equity and Justice in the Blue Economy,
Nippon Foundation Ocean Nexus Program at WorldFish*



UN Food Systems Summit

WorldFish's Research Program Leader, Value Chains and Nutrition **Shakuntala Thilsted** has been appointed as the Vice-Chair of Action Track 4: Advancing equitable livelihoods for the UN Food Systems Summit. In this role, Thilsted is responsible for guiding the global summit's direction related to building sustainable, inclusive and nutritious food systems and value chains that support both people and planet. Thilsted's appointment both ensures aquatic food systems and the communities they serve will be represented at the summit. It also ensures WorldFish and the CGIAR research commitments are acknowledged in planning for the summit. The summit will also offer a catalytic moment for global public mobilization and commitments to invest in ways to make food systems inclusive, climate-adapted and resilient, and support sustainable peace.



Our goal, therefore, is to take a holistic approach to food system transformation. Solutions must move beyond land-based crops and livestock to food below water. The potential of diverse and nutritious aquatic foods is ripe for the picking, offering a path to produce sufficient food supply without increasing carbon emissions while reducing ecosystem stress and habitat loss.

Shakuntala Thilsted, Research Program Leader, Value Chains and Nutrition



CGIAR Big Data Inspire Challenge

WorldFish Research Fellow **Laura Khor** was selected as a top-10 finalist for CGIAR's 2020 Inspire Challenge. The Challenge supports data-driven partnerships that push the limits of possibility in food security. It challenges partners, universities and others to use CGIAR data to create innovative pilot projects that will scale.

Khor's big data project focuses on the rapid field detection of hazards in aquatic foods in Malaysia and Bangladesh. Current detection methods of food hazard risks in aquatic food chains are costly, lengthy and mostly unavailable where they are needed most. In response, Laura's project proposes a portable, user-friendly, point-and-shoot, near infrared device for rapid field screening of key aquatic food contaminants. Prediction models will be developed from infrared calibration datasets via machine learning tools. Devices will then be deployed to remote areas to monitor aquaculture and small-scale fisheries value chains.



We need more approachable methods to encourage stakeholders to get in on the act of ensuring their own safe nutrition and integrity of their produce. People-friendly technology and tools will help us to be more inclusive in the decision-making process.

Laura Khor, Research Fellow



From research to impact



Shaping agri-food systems with fish and aquatic foods

Fisheries and aquaculture contribute to the livelihoods of 800 million people and provide 3.2 billion people with 20 percent of their animal protein. Fish, a major source of nutrition for cognitive development and physical growth, is often the cheapest and most accessible source of food from animals in low-income and food-deficient countries. Fish production must double by 2030 to meet future demand, particularly in developing countries.

Formed in 2017, the CGIAR Research Program on Fish Agri-Food Systems (FISH) works with national governments and partners to enhance sustainability, productivity, and access to fish and other aquatic foods by those most in need. The program attempts to answer the following overarching question: **How can we optimize the contributions of aquaculture and small-scale fisheries to reduce poverty and improve food and nutrition security, while enhancing environmental sustainability?**

The CGIAR Research Program on Fish Agri-Food Systems made significant progress in transforming aquatic food systems in 2020



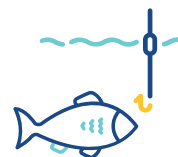
More than **403,300** vulnerable women, children and men increased their fish consumption, and **339,291** people were assisted to exit poverty due to aquaculture and small-scale fisheries interventions.



200 policy, technical briefs and knowledge products resulted in better adoption and management practices of aquaculture, protection of marine biodiversity and scaling of gender-transformative approaches benefiting the livelihoods and nutrition of millions.



Despite the constraints of COVID-19, **259** capacity development initiatives and events were taken up during 2020 where **206,501** people received short-term training through FISH, of which **196,161** (94 percent) were women.

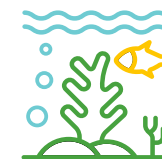


More than **139,460** households have adopted improved aquaculture and fisheries practices, derived from FISH research and disseminated via multiple channels.



81 research publications increasingly helped shape the policy environment for uptake of **54** innovations and influenced the development of nearly **38** policy improvements and investment decisions at various levels.

Fish and aquatic foods for better nutrition, health and food security



Too often, the people closest to the resources of fish and aquatic foods are the least likely to be able to benefit from them. Gaps in the quality and availability of nutritional data make it difficult to determine what people consume around the world, particularly in low- and middle-income countries. We want to turn this around by advancing and increasing scientific knowledge and public awareness and understanding of the nutrition, safety and health benefits of aquatic foods.

Access to aquatic foods for improved health through diverse diets

Nutrition-sensitive approaches put human health and nutrition as a principal objective in the management of aquatic food systems such as fisheries and aquaculture. These approaches produce innovations at multiple entry points to the food system, from production, post-harvest and marketing to consumption and waste. Pioneered by WorldFish and partners in the One CGIAR and beyond, these approaches encourage women's engagement in aquatic food production, improving equal access to resources and opportunities, and boosting nutrition.

Nutrient-rich foods improve diets in Malawi and Zambia

Poor nutrition during the first 1000 days of a child's life, from early pregnancy to the child's second birthday, can result in permanent developmental problems. In Malawi and Zambia, WorldFish and partners launched efforts to improve the nutritional intake of lactating mothers, breastfeeding infants, and women and girls of childbearing ages.

Our research found that fish was usually consumed only by adults. In response, WorldFish launched an initiative to promote dried fish powder that easily fortifies local recipes. Through participatory design, taste-tests, acceptability trials, market diagnostics and analysis of opportunities to scale-up, we identified fish-based products and recipes acceptable for the development of age-appropriate nutrient-rich products. Research shows that nutrient-rich fish, dark green leafy vegetables, and bean powders are highly acceptable in the target areas of Malawi and Zambia. Our researchers worked with women to identify ways small fish species can be dried and turned into a powder using simple processing methods involving a mortar, pestle and sieve. Fish powder is especially useful for inclusion in the diets of young children, beginning with complementary feeding at 6 months of age.

Farmed fish nourishing rural households in Timor-Leste

In Timor-Leste, a WorldFish-led project aims to get more fish onto the plates of households to make diets more nutritious and diverse. The half-island nation of Timor-Leste is surrounded by water, but most people in inland areas lack access to fish. The country has some of the world's highest rates of malnutrition. The PADTL2 project increases access and consumption of fish by marginalized households. The project raises awareness of health benefits of fish consumption, different cooking methods, and development of fish dishes and fish-based products that are suited to local palates. The project is also working with the national government to include aquatic foods in school and complementary feeding programs.

The Chefs' Manifesto hub

In October, WorldFish partnered with the SDG2 Advocacy Hub for the Chefs' Manifesto Resilience Sessions video series. These sessions ran for 6 weeks and explored the often-overlooked, resilient ingredients of cuisines around the world. Shakuntala Thilsted, WorldFish's Global Lead for Nutrition and Public Health raised awareness of the vital contribution dried fish powder can have to cognitive development, especially those in low- and middle-income countries.

The true cost of loss and waste

Worldwide, 35 percent of the fish farmed or caught rots, leading to fewer fish for consumption, higher prices for consumers and lost incomes for fishers. In developing economies, fish is spoiled or damaged when dried on racks in open air or transported on bumpy roads. Low-cost innovations like solar freezers can reduce waste for remote or vulnerable fishing communities. We support increased productivity from fisheries and aquaculture with technologies and sustainable practices that reduce waste in fish value chains.

Research into the loss and waste in fish value chains

We reviewed 22 studies to assess fish waste and loss in low- and middle-income countries. The report, published in September 2020, highlights the tendency of most research to focus on physical loss rather than the loss of quality. Estimated losses in the same place differ from one study to another, as there is no consensus on how to assess or define loss, seasonal changes in the same aquatic ecosystem, and how the data is interpreted in the final report.

Other gaps in research involve findings on how loss affects men and women in the value chain, and the impact of existing programs working to reduce fish loss and waste for consumers. The report reveals the need for this data to inform and improve policy and development initiatives.



Quality fish seed and feed are now available at low cost, farmers know about good aquaculture practices, there's growing interest by key partners in promoting aquaculture, and support is being provided by well-trained extension officers.

H.E. Joaquim José Gusmão dos Reis Martins, Minister of Aquaculture and Fisheries





Climate action

Climate change and the unsustainable use of marine and freshwater ecosystems are affecting the livelihoods of millions of people worldwide. Our work focuses on reversing this trend and accelerating the transition to ecosystem restoration. We generate evidence to reduce food loss and waste, build climate resilience and ensure sustainable aquatic food production systems. We also address challenges facing small-scale fishers, fish farmers, processors and traders who cannot use market opportunities due to a low asset base, exposure to risks, geographical isolation and social exclusion.

Climate-smart aquatic food systems innovations boost adaptation and mitigation

Many climate-smart innovations emerging in Bangladesh

For more than a decade, fish production in southern Bangladesh has been severely impacted by cyclones and other extreme weather events. In the northwest, farmers experience challenges with shorter growing seasons, early drying and drought events and flooding in other areas. In 2020, WorldFish led research and innovations in areas such as fish genetics, climate information services and integration of salt and aquaculture farming.

- WorldFish research shows that salt-tolerant crops can be introduced into saline wetlands to increase biodiversity, mitigate erosion and flooding, and act as low-carbon sinks.
- WorldFish brine shrimp and production systems can increase aquaculture productivity by integrating salt and aquaculture systems, enabling farmers to earn additional income through the year.
- Rohu, the most popular carp species in the country, is also the most important aquaculture species and a significant source of food and income for poor farmers. The WorldFish Rohu Genetic Improvement Program substantially increases aquaculture productivity in Bangladesh by developing and disseminating faster growing rohu to farmers.
- A new climate services project provides weekly climate variability information along with advisory services so fish farmers can modify decisions accordingly to reduce climate variability-induced risks.
- Working with the government and other partners, WorldFish has led training on seaweed farming, green mussel cultivation and post-harvest processing as new livelihood and food options for fisherwomen and their families.
- A new training report highlights the tremendous potential of climate services, information and tools that provide timely information for more informed decisions.



Developing countries like Bangladesh are hardest hit by climate change.

Lord Goldsmith, UK's International Environment Minister



Climate-smart farming of tilapia in Egypt

Aquaculture is an important source of animal protein and micronutrients for Egyptian consumers. Open pond culture farming produces 85 percent of farmed fish, and tilapia is the main farmed species. Globally, Egypt is the third producer of tilapia after China and Indonesia. Despite success achieved in aquaculture, there is a risk of declining production due to limitation of water resources. Climate change and population increase contribute to reduced water availability and quality needed for fish farming. A climate-smart aquaculture system is an urgent need for food security and protection of the environment.

In the face of rising fish production costs such as feed and land rental, Egyptian farmers are looking for ways to ensure higher productivity and profitability. The in-pond raceway system (IPRS), introduced by the WorldFish-led Sustainable Transformation of Egypt's Aquaculture Market System project, increases productivity of aquaculture in existing pond units by culturing fish in aerated raceways and removing solid wastes. The circular system captures nutrients for use as a crop fertilizer and requires minimal use of drugs and chemicals to ensure food safety. The IPRS has potential to improve water use efficiency and support sustainable production of tilapia in Egypt.



Working for reduced poverty and improved livelihoods

The global fisheries and aquaculture sector is a major source of employment. In 2018, an estimated 59.5 million people were engaged in the primary sector of fisheries and aquaculture. The COVID-19 crisis has already had a disproportionate impact on the poorest and most vulnerable through job loss, loss of remittances, inability to afford healthy and nutritious foods, and disruptions in services such as education and health care. **Our work supports the One CGIAR 2030 aim to provide living incomes to 1.5 billion people working in food systems, and lift 500 million people above the USD 1.90 a day poverty line.**

Innovative and inclusive business models create market opportunities

Support for small-scale fish farmers and processors in Myanmar

In Myanmar, our work with small-scale fish farmers, processors and entrepreneurs helps identify business models and market opportunities in times of shock. Since 2017, the Myanmar Sustainable Aquaculture Programme (MYSAP) has worked in the Central Dry Zone and upper regions of Myanmar with smallholder fish processors and vendors to improve fish value



chains. Partnered with BoP Innovation Center, WorldFish assists development of post-harvest fish value chain innovations with female micro-entrepreneurs working on fish processing and vending.

More than 1000 households have received training in areas such as sustainable small-scale aquaculture, integrated vegetable and fruit production on pond embankments and in homestead gardens and improved human nutrition. A survey of fish value chain actors in Myanmar collected information on mobile phone accessibility, digital abilities and the overall COVID-19 understanding of fish value chain actors targeted by MYSAP Inland. In response to the COVID-19 pandemic, MYSAP Inland has continued to support households to harvest their ponds, market their fish, and support ongoing operations of food value chains for essential food items, including rice, eggs, fish, vegetables and fruit.

Food systems approach greatly improves Bangladesh hilsa fisheries

Stocks of the prized estuarine hilsa fish in Bangladesh have recovered dramatically following fishing restrictions introduced by the government. Roughly 20 years ago, annual hilsa catches fell to a low of 199,000 t, a fraction of amounts seen in previous

decades, resulting in economic struggle for half a million fishing families nationwide. Like many species, including tuna, Indian salmon and tiger shrimp, hilsa numbers have been affected by overfishing, rising demand from population growth and pollution.

Following a recent fishing ban over 22 days in October during the breeding season and 60 days in March and April to protect young hilsa, stocks are expected to recover to 550,000 t. WorldFish, as part of a 5-year initiative, provided the evidence that informed policies to help hilsa stocks recover.

At the same time, it was vital that rural families find alternative sources of food and income. When fewer fish are caught, the women who typically dry, cure and sell them lose income. Women were encouraged to form community savings groups to access loans that can help them to diversify their livelihoods. Repayments were suspended during fishing bans to reduce economic impact on families. Women can now generate income from alternative activities like tailoring, commercial gardening and rearing goats, cattle and poultry during the seasons when the ban is in place.

Working directly with farmers and fishers allowed us to understand their needs and help them to better manage natural resources. Scientific management has enabled fisher families to eat better and earn more.

Low-cost innovation to fight fish disease secures livelihoods for fish farmers

Lab-in-a-Backpack for control of disease outbreaks

A team of researchers from Malaysia, Australia, New Zealand, Thailand and the UK is harnessing the power of genome sequencing to help aquaculture farmers manage fish diseases. The Lab-in-a-Backpack is an affordable and portable innovation to diagnose and treat fish disease and AMR, with great potential for rural and remote areas of Asia and Africa. It enables small-scale aquatic food producers to manage fish disease in real time with minimal cost.

The research team, representing WorldFish, University of Queensland and Wilderlab is sharing their Lab-in-a-Backpack system with other researchers in Asia and Africa to make rapid genomic sequencing of aquaculture pathogens gradually available. Ultimately, this innovation will enable fish farmers and aquaculture enterprises to track and deal with fish disease in real time, minimizing potential loss of food and incomes. The members of the global multidisciplinary research team behind this groundbreaking low-cost technology were also the 2019 winners of the annual CGIAR Inspire Challenge.



We believe this technology will have an incredible impact on the aquaculture industry globally in terms of providing safe, affordable and nutritious fish, especially in developing countries.

Jerome Delamare-Deboutteville, Aquaculture Scientist





Gender, youth and social inclusion

Closing the gender gap in rights to resources

Study of economic and social constraints of fish retailers in Egypt

In March, WorldFish and partners published a research study of economic and social constraints faced by women and men fish retailers in three Egyptian states. The study indicates that women fish retailers face greater economic barriers and generate smaller financial returns. The additional burden of unpaid household work limits opportunities to grow their enterprise. There is a need for further research of the impact of gender-based constraints on livelihoods of fish retailers. New research and programs that improve opportunities for women fish retailers can support the development of Egypt's vital aquaculture sector.

Gender-transformative approach promotes role of women in aquatic food systems

Barriers, opportunities and risks in the aquaculture and agriculture sectors in northwest Bangladesh

In Bangladesh, WorldFish research has highlighted gender norms and stereotypes that hinder women's engagement in aquaculture and agriculture, focusing on northwest Bangladesh. The study recommends the integration of gender-transformation components into development programming to tackle negative stereotypes. Men must be encouraged to engage in unpaid homestead work, and this practice should be normalized at community levels. Women engaging in aquaculture should be encouraged and normalized, and women entrepreneurs should be supported by accelerator programs and entrepreneur networks and groups.



Cultural norms and belief systems around women's abilities limit their full participation in aquaculture. Reputations related to societal ideals on masculinity and femininity further determine what men and women can and cannot do.

Faridul Haque, Gender Specialist with WorldFish's Aquaculture: Increasing Income, Diversifying Diets and Empowering Women in Bangladesh and Nigeria project



Women's producer groups should be strengthened, and programs should engage with non-governmental organizations to create targeted aquaculture groups for women.

We launched a children's television program on a popular local channel, Duroto TV, called Mecho Tota Gecho Bhoot. The program promotes fish-based nutrition, gender equality and women's involvement in aquaculture, and has reached almost 600,000 viewers with these important messages. The television program is part of our efforts to achieve inclusive aquatic food farming growth through a market systems approach, which addresses the root causes of why markets often fail to meet the needs of poor people.

Gender-transformative approaches key to combat gender biases in aquatic food systems

Value chain actors face technological and social challenges that limit them from engaging in and benefiting from capture fisheries in low-income settings. Development programs often focus on technological challenges, and they often do not address gender-based and social constraints. WorldFish published a study to address gender-based social challenges in fisheries development. The study took place in fishing camps

in the Barotse Floodplain, Zambia, to compare two approaches addressing gender constraints within a broader post-harvest fish loss reduction intervention. The two approaches included a gender-accommodative approach, where interventions centered only on women, and a transformative approach, where the entire community engaged.

The study analyzed different levels of women's involvement in the fisheries sector as well as existing structural barriers hindering their life choices. Gender-accommodative approaches in development interventions were less likely to drive structural changes than gender-transformative approaches. Transformative approaches led to better women's empowerment outcomes. Development programs working in fisheries can apply findings from the study to engage with gender constraints, especially in helping men and women overcome social and technical barriers.

Since 2012, WorldFish and partners have spearheaded the conceptualization, testing and scaling of gender-transformative approaches within CGIAR and in aquaculture, fisheries, agriculture and broader development sectors. This has included a focus on gender-equitable control over assets and resources, including microcredit and processing technologies.

Youth inclusion



Boosting jobs and economics for youths in aquatic food systems

Study of youths in fisheries, aquaculture and value chains

WorldFish and CGIAR launched a study of youths in aquatic food systems just as the COVID-19 pandemic surfaced. As the pandemic has affected the entire value chain, the research has widened to focus on the impact on youths in fisheries and aquaculture as part of WorldFish's COVID-19 research response.

The study notes that small-scale fisheries are not a popular choice of livelihood for youths. Youths are constrained in accessing land, finances and other resources, and having a voice in decision-making in regard to fisheries. Other challenges include possessing limited knowledge and experience, and interacting with natural

ecosystems and fishing grounds. Small-scale fisheries are often associated with low social status and sometimes exploitative and discriminatory working conditions.

The study examines ways to build youth-oriented approaches and practices to increase their engagement in aquatic food systems. According to the study, gender-transformative communications have been valuable in building gender-equal attitudes in youth-based small-scale fisheries. WorldFish efforts to increase youth participation for young men in fishing had increased participation levels only very slightly by the end of the study period. However, young women were significantly more engaged in fisheries than when the study had commenced. Both young men and women were significantly more engaged in fisheries processing as a result of WorldFish interventions. The study concludes that youths are more likely to engage in the fisheries sector if they believe they will have greater decision-making power and incomes.

As attention moves toward quick and efficient recovery strategies post the COVID-19 crisis, now is the time to be thinking and acting in ways that do provide new and significant opportunities for youths to be part of the future fish agri-food system. This study is an important foundation of the research work toward equitable and engaging fisheries and aquaculture sectors, but much more can and needs to be done to uncover the potential of youths in fish and aquatic food systems.

Michael Phillips, Director, Aquaculture and Fisheries Sciences



Social inclusion



Equitable fisheries management

Insight for improved governance and management

A vast majority of fishers worldwide are employed or engaged in small-scale fisheries. Despite this importance to livelihoods, research on small-scale fisheries has only come to prominence in the past decade. In 2020, WorldFish published research on small-scale and artisanal fisheries, covering novel research on small-scale fisheries assessment and monitoring, socioeconomics, governance, trade, and management measures.

A new angle on coastal fisheries development in the Pacific

WorldFish and its policy partners published a policy brief with recommendations for coastal fisheries development in the Pacific.

The brief stresses the importance of a healthy ocean for the well-being of people in the Pacific. It calls for government action to ensure marine resources continue to sustain food security and rural livelihoods. Community-based approaches that build on local needs, rights and strengths have potential to make coastal fisheries policies more inclusive, sustainable and cost-effective.

The brief identifies principles for national fisheries agencies to better support rural communities. It proposes guidelines for more community-based management of fisheries, use of existing resources, well-defined interventions, and promotion of relevant technologies. The brief also stresses the need to develop localized programming, strengthen existing groups, build partnerships and improve public services.

“ Only a concerted effort to improve the management of coastal fisheries and provide alternative livelihoods and protein sources can prevent a decline in fish supplies and further degradation of the coastal environment. Traditional ‘top-down’ management is not working and there is a need to empower coastal communities to manage and use their fisheries resources sustainably.

Michael Phillips, Director, Aquaculture and Fisheries Sciences





Environmental sustainability

New guidelines to integrate irrigation systems and fisheries in Asia and Africa

Researchers from WorldFish, the International Water Management Institute (IWMI), FAO and others have published practical guidance on the integration of irrigation systems with fisheries to boost resilience and productivity of food systems in Asia and Africa. The guidelines support water planners, managers and civil engineers in the design, construction, operation and maintenance of irrigation systems.

Inland fisheries are a main source of livelihoods and food in low- and middle-income countries. However, farm irrigation infrastructure often has negative impacts on aquatic foods and their habitats. Growing evidence shows that the integration of fisheries in irrigation systems can benefit both fishers and farmers.

Controlling water through irrigation infrastructure is extremely important for crop production globally. However, growing pressures from other water users and increasing environmental awareness call for a move toward more sustainable, climate-smart irrigation. Integration with fisheries provides an opportunity to obtain multiple benefits for multiple stakeholders.

“What can be restored or recovered is at the core of this integration. Enhancing fisheries within irrigation can bring nutrition and biodiversity benefits and the associated livelihoods and food security that comes with it,” said guidelines co-author Simon Funge-Smith, Senior Fishery Officer, FAO, during an online launching event of the guidelines on World Fisheries Day.



Successful commoditization of aquatic foods

WorldFish research published in the scientific journal *Nature Sustainability* in 2020 has introduced the concept of sustainable seafood commoditization. The research integrates three pillars—sustainable intensification, supply chains and policy and regulation—which will play crucial roles in developing the aquatic food sector in low- and middle-income countries. Sustainable intensification aims to increase overall output and production efficiency, which requires the transformation of supply chains and supporting policy to create favorable conditions. Sustainable commoditization marries these three elements together.

Holistic nature-positive approach to balance trade-offs for sustainable agri-food and aquatic food systems

Rice field fisheries

Research published by WorldFish, IWMI, and the International Rice Research Institute demonstrates that rice field ecosystems

can sustain aquatic biodiversity and fisheries. Across Southeast Asia, most lowland rice is grown in standing water. Consequently, rice and fish can, under the right circumstances, be integrated in the same field. In rainfed rice landscapes that lack irrigation infrastructure and allow natural flooding events, wild fish often use the shallow, temporary, rice field wetlands as feeding and spawning grounds. Rice field fisheries allow the capture of these wild fish from rice fields and associated habitats and are currently most widespread in Cambodia. When fish are integrated deliberately through stocking in flooded rice fields, this is often referred to as “co-culture” of fish and rice. Some of the best-known and longest-standing co-culture systems are in China, but this practice occurs in many countries, including Bangladesh, Indonesia and Vietnam. This research demonstrates the potential for rice-fish systems to be further integrated into food systems. Rice-fish systems represent an ancient practice that, managed correctly, can serve future generations.



Sustainable commoditization offers a framework for reconciling the need to produce more aquatic foods with the need to reduce the impacts of production. It shows that sustainable intensification cannot occur in a vacuum. We need to pay closer attention to the role of supply chains in facilitating food security and sustainability, and better understand how policies and regulations can foster inclusive and efficient supply chains.

*Ben Belton, Senior Scientist, Value Chain and Nutrition, WorldFish,
and Associate Professor, Michigan State University*





Capacity development

WorldFish provides expertise and training opportunities that support small-scale fisheries. Our own scientific research and knowledge is training current and future participants in the aquaculture sector. These opportunities can help researchers, institutions, fishers and farmers to discover and develop their own expertise and confidence. Strengthening capacity development programs can reduce poverty, food insecurity and environmental degradation fostering improved sustainable livelihoods and a better future.

Mobile app connects fish farmers with aquaculture information despite COVID-19

Fish account for 60 percent of animal-source food consumed in Myanmar, but aquaculture production and marketing activities have been disrupted since March due to government-imposed travel restrictions. Shwe Ngar, a new mobile application developed by WorldFish and partners, launched in October to provide timely and affordable aquaculture information to small-scale fish farmers who have restricted access to extension services. It provides fish farming families with information on how to stock and feed fish, fish health, and aquaculture technologies, as well as nutrition, water, sanitation and hygiene practices.

The app is a part of WorldFish's Fish for Livelihoods project that helps connect fish farmers to suppliers, traders and others to strengthen fisheries value chains. Shwe Ngar is available in English and Burmese. Farmers can access modules in Burmese and easily formulate fish feed recipes with local ingredients with a few clicks.

Tilapia-based e-learning platform to improve aquaculture TEVET training in Zambia

A new tilapia-based aquaculture online training platform is enhancing delivery of aquaculture technical vocational and entrepreneurship training (TEVET) in Zambia. Tilapia has traditionally been the main cultured fish species in Zambia. WorldFish, Norwegian not-for-profit company Blue Planet and the Natural Resources Development College (NRDC) Zambia have created a training platform for students and smallholder farmers to understand concepts such as tilapia biology, production, nutrition and health. The aim is to help students in their employment searches and to help smallholder farmers apply new skills to the Zambian aquaculture industry. The course includes animations, video, assessments and completion certifications. It will also be used as an additional resource to classroom training at the NRDC.

Our contribution to the Sustainable Development Goals

WorldFish is dedicated as a part of the global effort to eradicate poverty, hunger and malnutrition and reverse environmental degradation, as well as many complex global challenges reflected in the 2030 SDGs. There are 10 SDGs that are particularly pivotal to our work and mission.

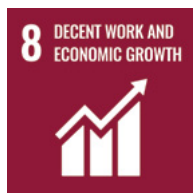




Globally, approximately 800 million people depend on fisheries and aquaculture for their livelihoods. WorldFish works to create opportunities in sustainable and productive aquatic food systems—fisheries and aquaculture and their supply chains—to help lift people out of poverty who rely on fish for their income, livelihoods and well-being.



Fish, particularly small fish, are rich in micronutrients like vitamin A, iron, calcium, zinc and essential fatty acids. WorldFish strives to make quality fish available and affordable to the poor in developing countries, particularly women and children in the first 1000 days. Our research informs strategies for combating under- and malnutrition and for preventing public health issues, such as stunting and other non-communicable diseases related to poor diets and nutritional deficiencies.



WorldFish research shows that adopting new technologies alone is not enough to improve productivity. Using natural resources efficiently, pursuing innovation and having access to knowledge, networks or credit to invest in business and other entrepreneurial activities, especially for poor women and youths, are also vital and central to our contribution to this SDG, particularly in Small Island Developing States.



Fish and other aquatic foods offer untapped potential to meet increasing demand for safe, nutritious food by a growing population. By sustainably improving the productivity of fisheries and aquaculture in an environmentally and socially responsible way, WorldFish seeks to improve the supply, accessibility and use of aquatic foods within diverse and nutrient-rich diets.



Rural women play a vital role in fisheries and aquaculture as fishers, farmers, processors and traders. However, they often have unequal access to the resources and services they need to be successful. WorldFish works to address gender inequalities and their underlying factors in order to improve women's livelihoods through aquatic food systems, and who in turn amplify the benefits of these livelihoods for their children, families and communities.



WorldFish works closely with national actors to enhance local capacities for scientific research and technological innovation in fisheries and aquaculture. We also support the integration of small-scale fish producers and enterprises into national, regional and global value chains and markets.



In the face of a growing world population and the impacts of climate change, there is an increasing imperative to do more and better with less. WorldFish works to achieve sustainable management and efficient use of natural resources and to reduce waste and loss along aquatic food value chains.



Overfishing, ineffective management practices, industrial development, agricultural pollution and the impacts of climate change have reduced fish stocks. WorldFish conducts cutting-edge genetics research on improved and resilient fish species and promotes a sustainable approach to aquatic food systems to ensure that enough nutritious aquatic foods are available for future generations.



Ensuring that all users benefit equitably from marine and aquatic resources requires new thinking, new information and greater collaboration between less traditional partners. Among the 15 members of CGIAR, WorldFish is uniquely positioned to contribute to this SDG. We focus on generating evidence-based solutions that inform policies and practices relating to sustainable ocean governance and the development of an inclusive and people-centered blue economy, with special attention for the value and contribution of small-scale fisheries.



The results of many land-based activities, such as pollution, plastics, deforestation and livestock waste, are affecting, altering or destroying oceans, lakes and other inland aquatic ecosystems and habitats. Preserving life below water (SDG 14) also requires the adoption of environmentally sustainable practices on land. WorldFish research is informing interventions to reduce waste and loss in fish handling and processing, to conserve and restore degraded ecosystems in inland and coastal environments and to develop gender-responsive practices and technologies for innovative small-scale aquaculture systems with low environmental impact.

Living our values

We recognize that our scientific work and impact in the world is enhanced when we bring together a diversity of backgrounds, skills, disciplines, talents and partnerships that inform the way we work and shape our organizational culture and workplace, as well as our aspiration to be a global thought leader.

Our LEAD values

Learn

We are relentlessly curious and seek to learn from challenges and from others. We embrace discovery, adaptation and growth. We rely on data and evidence to deepen our understanding, make the best decisions and drive bold innovation.

Accountability

We take ownership of our work and promptly correct mistakes to the greatest extent possible. We honor our commitments to partners and to each other. We measure ourselves against the highest standards of integrity and fiscal responsibility, and we are open and transparent in communicating our results.

Excellence

Science of the highest quality and professional standards is the foundation for all we do. We actively partner with others who share our passion for excellence and impact.

Diversity

We recognize it takes people with different ideas, talents, disciplines and backgrounds to make our work stand out. We encourage differing perspectives, healthy debate and an inclusive environment for all, and at every level, to create solutions to complex problems.

Communicating science, knowledge and evidence

Research alone is not enough to turn data, insights and innovations into concrete action and tangible impacts on the ground. As an international research and innovation organization, we believe it is our duty to effectively engage with society and share the results of our research work beyond the scientific community.

To us, communication is a critical 21st-century skill. It is a strategic organizational function that allows us to provide a tangible return on society's trust and continued investment in science and in us as a vibrant community of scientists who care about the meaningful impact of our work in the real world. It also plays an important role in how staff, partners and stakeholders interpret the cultural landscape of our organization in terms of who we are, what we stand for, what we value and why our mission matters.

Aside from helping the public appreciate the wonder, pleasure and critical importance of science in our lives, communicating scientific discoveries and research evidence effectively is critical to important decisions from household to global levels that affect our quality of life and the future of our planet.

Over the next 10 years, we will use evidence-based communications to make aquatic foods part of the conversation to address critical sustainable development challenges. At the same time, we will note the rightful place and contribution of aquatic food systems to the global call to action for a food systems transformation to healthier and sustainable diets.



Commitments

Our philosophy and practices of communications, in varied forms and mediums, will be guided by three key commitments:

- **Advocacy and strategic outreach:** We will resource and use evidence-based communications for advocacy and strategic outreach to stimulate increased public awareness of and policy discourse on aquatic foods, as well as public and funders' interest in the mission and research work of WorldFish, One CGIAR and our partners.
- **Internal communications:** We will strengthen communications internally to ensure shared understanding of the organizational vision, mission, values and research work to (a) stimulate an open and high-performance culture of learning, knowledge sharing and innovation, (b) facilitate increased collaboration across disciplines, functions and geographical locations, and (c) celebrate individual, team and organizational achievements.
- **Digital transformation:** We will use innovative information and communication technologies and data-rich technology platforms to share, translate and communicate research data, knowledge and insights with the largest numbers and broadest kinds of internal and external stakeholders in fast, compelling, engaging and cost-effective ways. We will also enhance learning, new ways of working and digital-savvy leadership at individual, team and organizational levels.

Impact



40,718 followers on LinkedIn;
145% growth in 2020



19,158 followers on Facebook;
1,639 new followers on Facebook in 2020



17,286 followers on Twitter;
2,118 new followers on Twitter 2020



Media coverage: Mentioned
2,189,579,086 times in 2020

Selected publications

Meeting fisheries, ecosystem function, and biodiversity goals in a human-dominated world

Publisher: American Association for the Advancement of Science

Theme: Resilient small-scale fisheries

MEL Pub Type: Journal Article

URL: <https://hdl.handle.net/20.500.12348/4243>



Journal Impact Factor: 41.845

Altmetric Score: 496

Altmetric URL:

<https://www.altmetric.com/details/79929297>

Authors: Cinner JE, Zamborain-Mason J, Gurney GG, Graham NAJ, MacNeil MA, Hoey AS, Mora C, Villéger S, Maire E, McClanahan TR, Maina JM, Kittinger JN, Hicks CC, D'Agata S, Huchery C, Barnes ML, Feary DA, Williams ID, Kulbicki M, Vigliola L, Wantiez L, Edgar GJ, Stuart-Smith RD, Sandin SA, Green AL, Beger M, Friedlander AM, Wilson SK, Brokovich E, Brooks AJ, Cruz-Motta JJ, Booth DJ, Chabanet P, Tupper M, Ferse SCA, Sumaila UR, Hardt MJ, Mouillot D.

Summary: Climate change, overfishing and pollution affects millions of people who depend on the beauty and bounty of coral reefs. Professor Joshua Cinner led a team of 38 other scientists from around the world to study 1800 coral reefs from 41 countries to see where local management tools could make the biggest impact to achieve multiple social and ecological goals.

Social determinants of adaptive and transformative responses to climate change

Publisher: Nature Research

Theme: Climate change

MEL Pub Type: Journal Article

URL: <https://hdl.handle.net/20.500.12348/4344>



Journal Impact Factor: 20.893

Altmetric Score: 223

Altmetric URL:

<https://www.altmetric.com/details/88000524>

Authors: Barnes ML, Wang P, Cinner JE, Graham NAJ, Guerrero AM, Jasny L, Lau J, Sutcliffe SR, Zamborain-Mason J.

Summary: The authors examine how social determinants are related to adaptive and transformative actions for people to cope effectively with the impacts of climate change. The study draws evidence consistent with an influence process in which exposure to others in social networks encourages both adaptive and transformative actions among Papua New Guinean islanders experiencing climate change impacts.

Climate change, tropical fisheries and prospects for sustainable development

Publisher: Springer Nature

Theme: Climate change, resilient small-scale fisheries

MEL Pub Type: Journal Article

URL: <https://hdl.handle.net/20.500.12348/4247>



Journal Impact Factor: -

Altmetric Score: 248

Altmetric URL:

<https://www.altmetric.com/details/87132267>

Authors: Lam VWY, Allison EH, Bell JD, Blythe J, Cheung WWL, Frölicher TL, Gasalla MA, Sumaila UR.

Summary: Tropical marine habitats and fishstocks are vulnerable to the physical and biogeochemical oceanic changes associated with rising greenhouse gases. In this review, the authors synthesize the effects of climate change on tropical marine fisheries, highlighting the socioeconomic impacts to both tropical and extratropical nations, and discuss potential adaptation measures.

Evidence for action: A One Health learning platform on interventions to tackle antimicrobial resistance

Publisher: Elsevier

Theme: Sustainable aquaculture

MEL Pub Type: Journal Article

URL: <https://hdl.handle.net/20.500.12348/4339>



Journal Impact Factor: 24.446

Altmetric Score: 55

Altmetric URL:

<https://www.altmetric.com/details/88822016>

Authors: Wernli D, Jørgensen PS, Parmley JE, Troell M, Majowicz S, Harbarth S, Leger A, Lambraki I, Graells T, Henriksson PJ, Carson C, Cousins M, Skoog Stahlgren G, Chadag V, Simpson AJ, Wieland B, Pederson K, Schneider A, Chandy SJ, Wijayathilaka TP, Delamare-Deboutteville J, Vila J, Stalsby Lundborg C, Pittet D.

Summary: Within the efforts to strengthen the global governance of antimicrobial resistance, we advocate for the creation of an international One Health platform for online learning. The platform will synthesize the evidence for actions on antimicrobial resistance into a fully accessible database and ultimately contribute to the goal of building societal resilience to this central challenge of the 21st century.

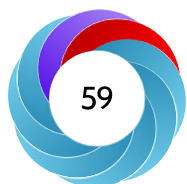
Emerging COVID-19 impacts, responses, and lessons for building resilience in the seafood system

Publisher: SocArxiv

Theme: COVID-19

MEL Pub Type: Journal Article

URL: <https://hdl.handle.net/20.500.12348/4258>



Journal Impact Factor: -

Altmetric Score: 59

Altmetric URL:

<https://www.altmetric.com/details/84915048>

Authors: Love D, Allison EH, Asche F, Belton B, Cottrell RS, Froehlich HE, Gephart JA, Hicks CC, Little DC, Nussbaumer EM, da Silva PP, Poulain F, Rubio A, Stoll JS, Tlusty MF, Thorne-Lyman AL, Troell M, Zhang WB.

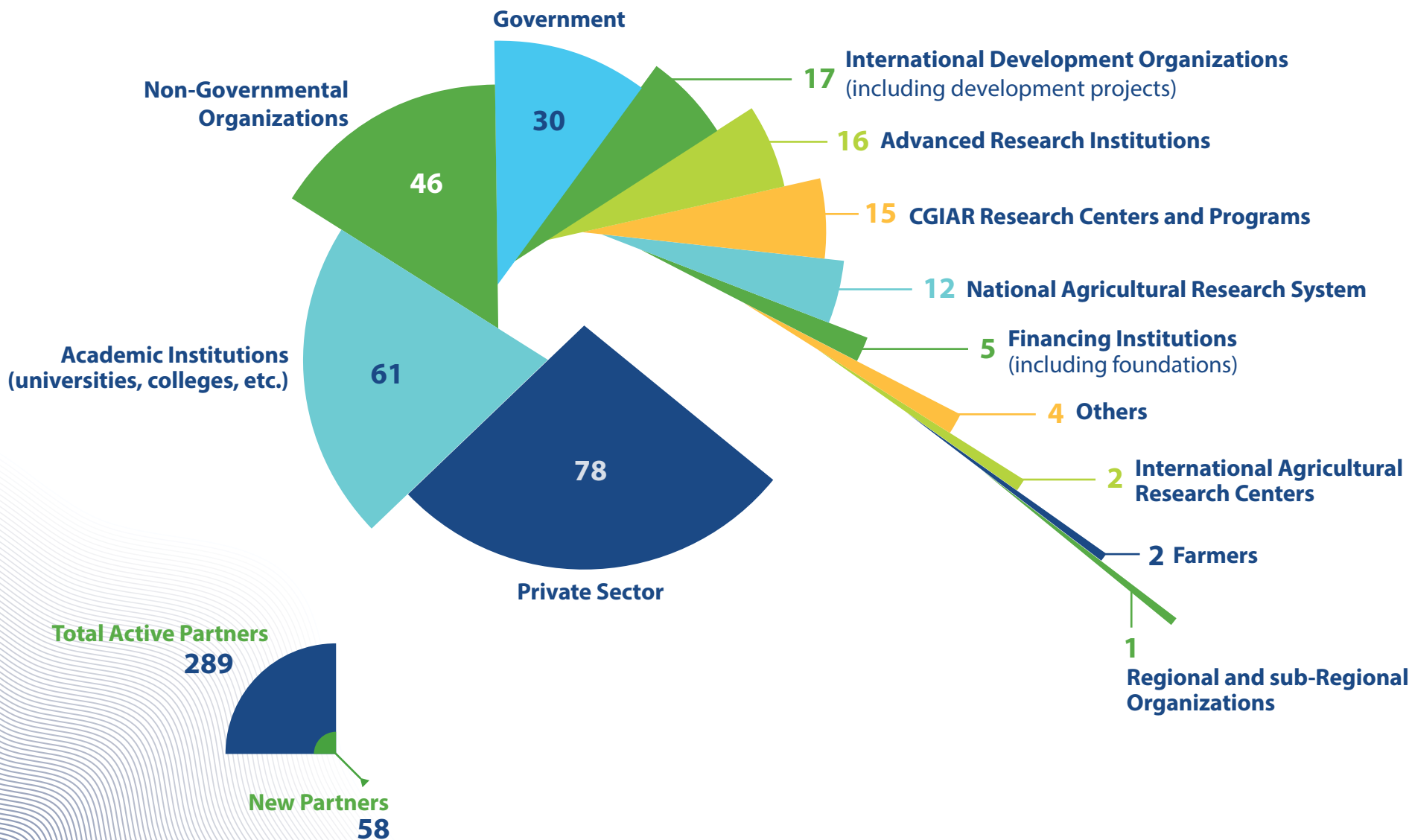
Summary: The COVID-19 pandemic and subsequent lockdowns are creating health and economic crises that threaten food and nutrition security. The seafood sector provides important sources of employment and nutrition, especially in low-income countries, and is highly globalized, allowing shocks to propagate internationally. We use a resilience “action cycle” framework to study the first five months of COVID-19-related disruptions, impacts and responses to the seafood sector.



Partners and donors



Partners

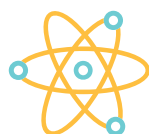


Donors



Academic institutions

Chiang Mai University School of Public Policy
Lilongwe University of Agriculture and Natural Resources
Mississippi State University
Stockholm Resilience Centre
University of Exeter
University of Malawi, Chancellor College
University of Stirling
University of Wollongong
Wageningen University & Research



Advanced research institutions

International Institute for Environment and Development
Rajiv Gandhi Centre for Aquaculture



Financing institutions

African Development Bank
Bill & Melinda Gates Foundation
European Commission
International Fund for Agricultural Development
Livelihoods and Food Security Fund
Margaret A. Cargill Philanthropies
Minderoo Foundation
National Philanthropic Trust
Schmidt Family Foundation



International development organizations

Food and Agriculture Organization
Norwegian Agency for Development Cooperation
Pacific Community
United States Agency for International Development
Winrock International



Governments

Australian Center for International Agricultural Research
Bangladesh Local Government Engineering Department
Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
**Fisheries & Animal Resources Development Department,
Government of Odisha**
Egypt Ministry for Agriculture and Land Reclamation
India Ministry of Agriculture & Farmers' Welfare
Japan Ministry of Foreign Affairs
Malawi Ministry of Agriculture, and Food Security
New Zealand Ministry of Foreign Affairs and Trade
Norway Ministry of Foreign Affairs
South Africa Department of Agriculture, Forestry and Fisheries



Private sector

AquaBioTech Group
De Heus Animal Nutrition
Pelagic Data Systems
Skretting Egypt



International organizations

CGIAR System Organization
Bioversity International
International Center for Tropical Agriculture
International Food Policy Research Institute
International Institute of Tropical Agriculture
International Livestock Research Institute
International Potato Center
International Water Management Institute
World Vision International
World Vegetable Center



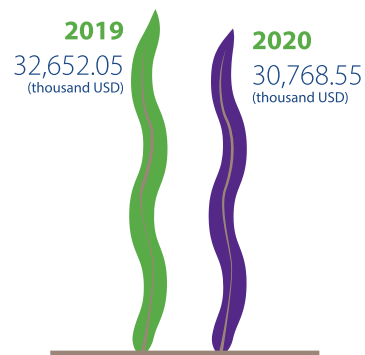
Non-governmental organizations

**Assam Rural Infrastructure and Agricultural
Services Society**
**Coral Triangle Initiative on Coral Reefs, Fisheries, and
Food Security**
CARE International
Istituto Oikos Onlus
Oak Foundation
Save the Children
Synergos

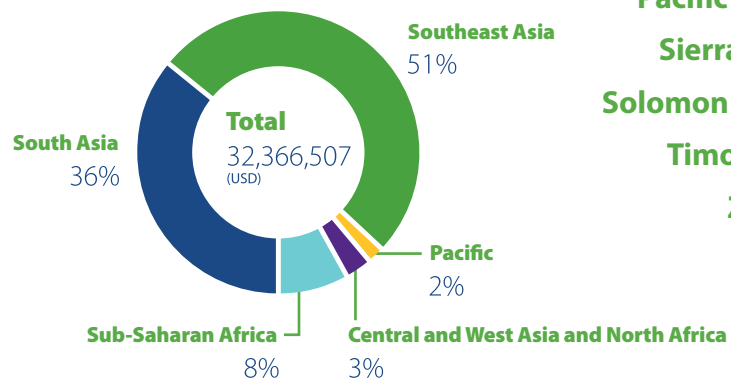
Financial overview

We are committed to managing our finances efficiently and transparently. This section provides an overview of our financial position for the year ended December 31, 2020. Full audited financial statements are available on our website.

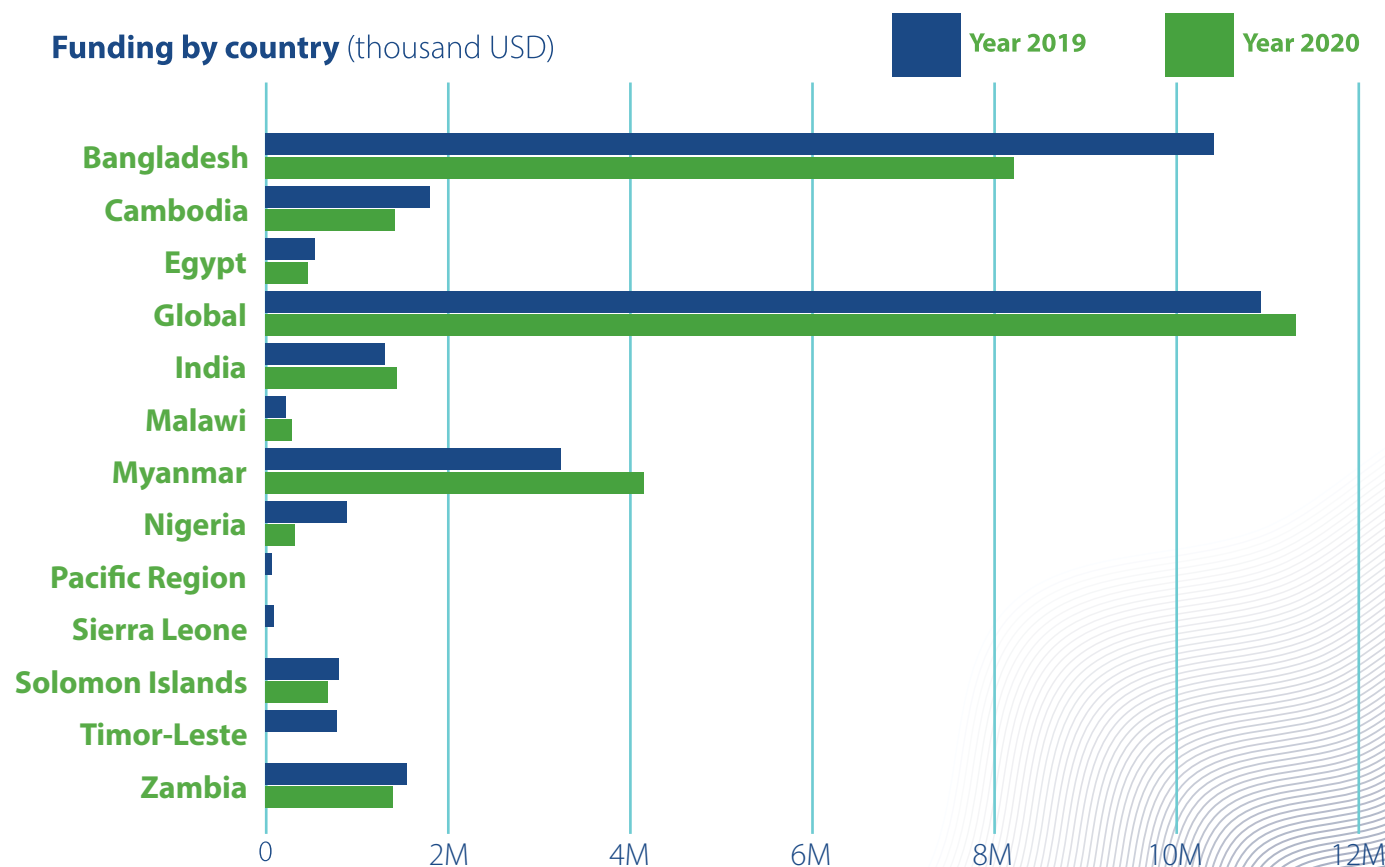
Total funding globally



Expenditure by region



Funding by country (thousand USD)



STATEMENT OF FINANCIAL POSITION

(USD '000)

As of Dec. 31, 2020 As of Dec. 31, 2019

ASSETS

Cash and cash equivalents	18,048	17,224
Accounts receivable	3,098	3,808
Other current assets	330	256
Non-current assets	684	818
TOTAL ASSETS	22,160	22,106

LIABILITIES

Accounts payable	12,605	11,600
Accounts and provisions	1,375	1,507
Other current liabilities	199	219
Non-current liabilities	477	566
TOTAL LIABILITIES	14,656	13,892

NET ASSETS	7,504	8,214
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TOTAL LIABILITIES AND NET ASSETS	22,160	22,106
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STATEMENT OF OPERATING ACTIVITIES

(USD '000)

For the years ended December 31

REVENUE

Grants	30,769	32,652
Other income	555	416
TOTAL REVENUE	31,324	33,068

EXPENSES

Research	20,722	21,224
Administration, support and other	11,312	12,458
TOTAL EXPENSES	32,034	33,682

NET DEFICIT	(710)	(614)
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Leadership and governance

Our leadership team is a diverse, global group of leaders who bring decades of experience in scientific research, international and organizational development and communications.

Board of trustees

The Board of Trustees approves WorldFish's long-term organizational strategy, annual plan of work and budget and research agenda, monitors progress toward the achievement of the center's mission, sets and approves programs and policies and financial regulations, exercises oversight of investment and risk management and ensures compliance with relevant legal and regulatory requirements. It also has scientific oversight and fiduciary responsibility for the implementation of FISH.

Executive team

The Executive Team comprises the Director General, the Director of the CGIAR Research Program on Fish Agri-Food Systems and Aquaculture and Fisheries Sciences, the Director of International Partnerships and Program Delivery, the Director of Communications and Marketing, the Director of Finance and IT and the Director of Human Resources and Administration. The Director General is delegated by the Board of Trustees to implement the organizational strategy, programs, policies and plans. The Executive Team works together to realize the strategy, research agenda and organizational vision for WorldFish and take decisions on issues that affect the organization across various functions at all levels.

Science leadership team

The global research leaders are responsible for the overall coordination and management of our research agenda. The team reviews the annual work plans developed at country and regional levels to ensure consistency with our strategic goals and allocate appropriate budgets.

Country directors

The country directors are accountable for the leadership and management of our country programs. Working collaboratively with our global research and functional leaders, country directors deliver an integrated research-for-development program that addresses national priorities and organizational goals, strengthens institutional and partner capabilities across the aquaculture and fisheries sectors, including building capacities, policy influence and evidence-based research capabilities.

Board of trustees

Baba Yusuf Abubakar

Nigeria, Board Chair

Alice Ruhweza

Uganda

Abdou Tenkouano

Senegal, Chair, Governance Committee

Marco Ferroni

Switzerland

Cristina Rumbaitis del Rio

United States, Chair, Audit & Risk Committee

Alyssa Jade MacDonald-Baertl

Australia

Ayman Anwar Ammar

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Hilary Wild

United Kingdom

Gareth Johnstone

Malaysia, Ex-officio Board Member

Shenggen Fan

China

Neal Gutterson

United States

Patrick Caron

France

Executive team

Gareth Johnstone

Director General

Michael Phillips

Director, Aquaculture and Fisheries Sciences

Montgomery Simus

Executive Director, Business Development and Partnerships
(joined September 14, 2020)

Tana Lala-Pritchard

Director of Communications and Marketing

Marion Barriskell

Director of Finance and IT

Zarinah Davies

Director of Human Resources and Administration

Science leadership team

John Benzie

Research Program Leader, Sustainable Aquaculture

Philippa Cohen

Research Program Leader, Resilient Small-Scale Fisheries

Shakuntala Thilsted

Research Program Leader, Value Chains and Nutrition

Essam Yassin Mohammed

Climate Change Research Leader (joined June 15, 2020)

Eddie Allison

Research Chair for Equity and Justice in the Blue Economy, Nippon Foundation Ocean Nexus Program at WorldFish (joined May 4, 2020)

Cynthia McDougall

Gender Research Leader

Cristiano Rossignoli

Monitoring, Evaluation and Learning (MEL) and Impact Assessment Research Leader

Country directors

Ahmed Mohamed Nasr-Allah

Officer-in-Charge, Egypt

Christopher Price

Country Director, Bangladesh

Delvene Boso

Country Director, Solomon Islands

Pablo Degl'Innocenti

Country Director, Cambodia (term ended December 31, 2020)

Sunil Siriwardena

Officer-in-Charge, Nigeria

Victor Siamudaala

Country Director, Zambia and Southern Africa

Regional directors

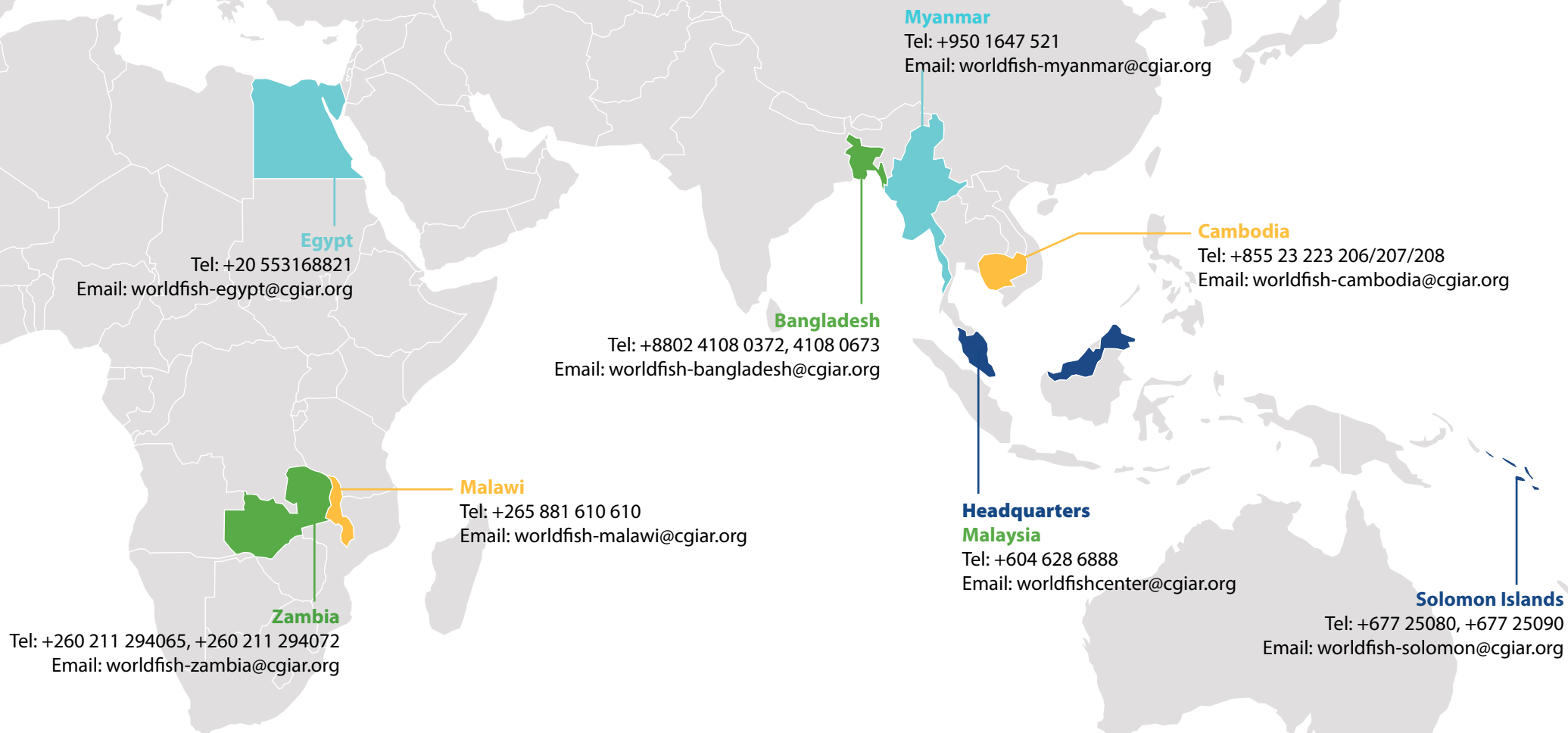
Michael Akester

Regional Director Southeast Asia and Pacific

Abbreviations

AMR	antimicrobial resistance	IWMI	International Water Management Institute
CFS	Committee on World Food Security	IPRS	in-pond raceway system
COVID-19	Coronavirus Disease 2019	MEL	Monitoring, Evaluation and Learning
FAO	Food and Agriculture Organization	MYSAP	Myanmar Sustainable Aquaculture Program
FISH	CGIAR Research Program on Fish Agri-Food Systems	NRDC	Natural Resources Development College
GIFT	Genetically Improved Farmed Tilapia	PADTL2	Partnership for Aquaculture Development in Timor-Leste Phase 2
HCR	Highly Cited Researchers	SDGs	Sustainable Development Goals
ICT4SSF	information and communication technologies for small-scale fisheries	TEVET	technical education, vocational and entrepreneurship training
ICTs	information and communication technologies	TiLV	tilapia lake virus
IHH	Illuminating Hidden Harvests	USAID	United States Agency for International Development

Where we work



About WorldFish

WorldFish is an international, not-for-profit research organization that works to reduce hunger and poverty by improving aquatic food systems, including fisheries and aquaculture. It collaborates with numerous international, regional and national partners to deliver transformational impacts to millions of people who depend on fish for food, nutrition and income in the developing world. Headquartered in Penang, Malaysia and with regional offices across Africa, Asia and the Pacific. WorldFish is a member of the CGIAR, the world's largest research partnership for a food secure future dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources.

For more information, please visit www.worldfishcenter.org